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# ABSTRACT BOOK

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## held at Goa during 05 - 06 May 2022

**Organized by**

**Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli**
**&**
**Maharashtra Society of Agricultural Economics**

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Olson, K. D. (2014). Farm Management: Principles and Strategies. *Iowa State Press, Ames*. ISBN: 0-8138-0418-3, pp. 416.

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Pawan Kumar Sharma, Sanjay Swami and Arvind Ishar (2013). Agricultural Marketing System in the Intermediate hills of Jammu & Kashmir. Edited book "Agribusiness potentials in India: Experiences from Hill states." EBH Publishers, Guwahati, India, pp. 557-570.

**Conferences/Symposium Abstracts:**

Pawan Kumar Sharma, K.S. Risam, Sudhakar Dwivedi and Suraj Parkash. (2015). Farmers Perception about Climate and Resource Use Dynamics in Poonch District of J&K, Proceedings of the 4th J&K Agricultural Science Congress organized at SKUAST-Jammu w.e.f. 28-30 October 2015, pp. 133.

**Thesis:**

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# Themewise Abstract list

**Theme-I:** Natural Farming: Prospects, Productivity and Economics of Production, Marketing with value chain analysis and export of Horticulture, Forestry etc

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## Theme-II: Challenges and Prospects of Hitech Agriculture ,drones, IT climate change etc

## Theme-III: Tourism, Success stories of Agri-entrepreneurship, Group dynamics Role of Public policies etc

* * * * *

# THEME - I

# Natural Farming: Prospects, Productivity and Economics of Production, Marketing with value chain analysis and export of Horticulture, Forestry etc

# Factors affecting formation of Farmer Producer Organisations in Jammu & Kashmir

**Pawan Kumar Sharma*, S.K. Gupta, Anil Bhat, Rakesh Sharma, VivakArya and Harsh Sharma SudhalkarDwivedi and R.K. Arora**
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Group dynamics has a great role in agriculture, especially where farmers are mainly marginal and small. The Farmer Producer Organisation is an effective mechanism for promoting such group dynamics in hilly areas. The UT of Jammu and Kashmir (J&K) has a very limited number of functional FPOs and the problems in their growth remain the lack of awareness among farmers about their process of formation and way of functioning, lack of social participation/ cohesiveness, lack of communication and absence of startup capital. Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-Jammu) has been entrusted with the responsibility of Cluster Based Business Organization (CBBO) for formation and promotion of FPOs in Jammu region. The present study analyses the factors affecting the participation of farmers as members and shareholders in these FPOs.

The products under each FPO are selected following One District One Product (ODOP) approach. Multiple mobilization drives were organized for encouraging farmers to become an active member of these FPOs. During these mobilization drives, the data regarding the socio-economic and farm practices were also collected. This study is based on 900 farmers mobilized during the process of formation of FPOs, including 100 from each block/FPO. The insufficient marketable surplus remains the biggest challenge for formation of FPOs in J&K. Therefore, one should focus and recommend multi-object entity for farmers of J&K. FPO can involve in production and marketing of multiple products for their survival through generation of sufficient employment and economic benefits.

**Keywords:** Farmer Producer Organizations, CBBO, Jammu & Kashmir

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# Economics of Manufacturing Indigenous Dairy Product at Producer Level in Yavatmal District

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Dahi,Paneer and Pedhaaresome of the most important traditional products widely consumed in India. Economic analysis of this product is necessary to optimize the cost of each component used to manufacture the indigenous dairy product. It helps the product to keep its presence in the competitive market. As a result the consumer will benefit of this optimum price. Therefore, cost of the product was calculated at the milk producer's level. The production cost of Dahi, Paneer and Pedhais Rs.52.69, Rs.283.27and Rs. 264.59 per Kg. respectively.

**Keywords:** Dahi, Paneer, Pedha, Cost

# Economic considerations in adopting Integrated Farming System under North-Western Himalayas

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The present study was an attempt to understand the dynamics of existing integrated farming systems in North-Western Himalayas of Jammu & Kashmir. It can be concluded that efficiency and economics of existing farms can be enhanced through adoption of integrated farming system. The enterprises such as mushroom, fisheries etc. have a great potential to enhance farm income. But lack of training and skill restricted farmers to adopt these as additional enterprise on their farms. The agroforestry component was also lacking which can act as useful resource in a farming system. Farmers were agreed with the assertion that IFS offers better economic returns and environmental sustainability. But due to the constraints, they could not able to follow the approach. The results of the present study suggested that continuous efforts are required to develop confidence among farmers. This can be done through provision of skill trainings which can motivate them to adopt new enterprises in existing farming systems. The study also recommended government support in adoption of new enterprises by farmers. The farmers who were engaged in off-farm activities were also reluctant to adopt new enterprises. The reason was lack of time for farming activities and high cost of hired labour. Keeping in view the low chemical use in cold arid zone, the scheme of zero-budget natural farming techniques (ZBNF) offers good scope for transforming this zone into natural farming cluster.

**Keywords:** Integrated Farming System, constraints, north-western Himalayas

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# Economic analysis of Value added products of coir in Sindhudurg District of Maharashtra

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The present study entitled, “Economic analysis of Value-added products of Coir in Sindhudurg district (Maharashtra)” was undertaken with twelve Coir and value added products of coir processing Units. Thus, analysis was carried out with respect to the data collected from the twelve Units. The findings of the study are summarized below.

The twelve coir units were established within the range of year 1998 to year 2019. Most of the Units were found to be from Sawantawdi, Kudal and Vengurla followed by Malvan and Dodamarg.

At overall level, the average cost of production was found to be Rs. 1902093 with the average cost of raw material of Rs. 814141 and it was the highest cost in total cost followed by the wages paid to daily labours of Rs. 316750 The average gross returns and net returns were found to be Rs. 5558017.00 and Rs. 3655923.6 respectively with B:C ratio of 2.92.

On average at the overall level Rs.2161567.00 and Rs. 1569668.2 were found to be the gross value added and the net value added and per cent gross and net value added were 356.3% and 217.65% in case of coir fibre. Similarly, in Coir yarn the percent net and gross value added to the cost of raw material was calculated to be

323.66% and 434.97% to the cost of raw material respectively with the gross value addition of Rs. 1211138.00 and net value addition of Rs. 840714.34.

For Coir Matt and Geo-textiles, the net value added and the gross value added to cost of raw material was Rs. 10997.00 (26.29%) and Rs. 35809.00 (109.67%) and Rs. 21059 (8.12%) and Rs. 68400.00 (26.38%) respectively. At overall level, the selling of the value-added products of coir through direct sale was found to be highest. The average quantity of coir fibre sold through direct sale was 156237.5 kg with the returns of Rs. 3421850.00. Around 24566.6 kg of coir yarn was sold per annum with average selling rate of Rs. 80/kg and the average returns of Rs.16923333.00. Similarly, the number of coir mats sold through direct sale were 690 with average returns of Rs. 81500.000 and the geo-textiles sale was through wholesaler with average quantity sold 12000 sq.mt having average selling of Rs. 90/sq.mt. and average returns of Rs. 1080000.

**Keywords:** Value added products, Cost and returns

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# Comparative economics of intensive and extensive goat rearing in north Konkan region

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The several large and progressive farmers, businessman and industrialists have adopted commercial goat farming. The entry of large farmers, who have better access to technical knowledge, resources and market, into this activity would help in realizing the potential of goat enterprise. Following were the objectives 1) To study the socio-economic profile of goat keepers. 2) To examine the goat management practices followed in intensive and extensive goat rearing. 3) To assess the profitability in intensive and extensive goat rearing. 4) To study disposal pattern in goat farming. 5) To analyse the constraints faced by the goat keepers in goat rearing.. For the present study, three stage sampling procedure was followed with selection of district as a primary stage, selection of tehsil as secondary stage and selection of goat keepers as final stage. The total sample was 80 goat keepers out of 40 goat keeper each for intensive and extensive method.

The overall average age of the sample goat keeper was 38.37 in intensive goat rearing whereas in extensive goat rearing 43.47 years this indicated that they were middle aged.In both the methods maximum numbers of goat keepers were found rearing goats for the purpose of meat production in intensive method 95 per cent and in extensive method was 90 per cent.

The average land holding of sample goat keeper in intensive method was found to be 1.00 ha, whereas in extensive method it was 0.51 ha. The cropping intensity was 103.9 per cent and 105.15 in intensive and extensive goat rearing respectively. In intensive goat rearing 55.00 per cent of the goat keepers had goat farming as main occupation and 45.00 per cent as a subsidiary occupation and in extensive goat rearing 37.50 per cent had goat keeping as main occupation and 62.50 per cent had as subsidiary occupation.

The average size of flock was 87.35 goats in intensive goat rearing. On an average per flock, the proportion of adult goats was 70.55 per cent and a kid was 29.45 per cent. The average flock size was 19.65 goats in extensively goat rearing. On an average per flock, the proportion of adult goats was 70.55 per cent and kids were 30.68 per cent.

In intensive method 95 per cent goat keepers were found to keep their goats in separate shed and in extensive method 62.5 per cent. In intensive method 100 per cent respondents reported that they used improved buck for breeding. It is seen that in the extensive method 20 per cent respondents reported that they used improved buck for breeding.

In Intensive method the cent per cent of the selected goat keepers were found to follow stall feeding. In extensive method cent per cent of selected goat keepers were found to follow grazing method. The average period of grazing was 5 hours of grazing.

The kidding rate was 1.33 in both the method of goat keeping. In intensive method the average milk production per female per day was 0.93 liters and in extensive it is 0.76 liters. On an average, per flock annual milk production observed was 2247.47 liter in intensive method and in extensive 391.65 liter. In intensive method 21.25 liter milk was consumed at home and 64.50 were sold and in extensive 40.13 liter milk was used for home consumption, 99.25 liter sold.

In intensive method per flock fixed capital investment was worked out to Rs. 1469707.5. In extensive method, per flock fixed capital investment was worked out to Rs. 77249.5.In intensive method out of total income of Rs. 1431424, major income (85%) was received from sale of animals followed by income from imputed value of kids and marketable bucks (10.38%).The another important sources or income were goat manure production (4.65%) and goat milk (0.12%). In extensive method out of total income of Rs. 62712, major income (69 %) was received from sale of animals followed by income from imputed value of kids and marketable bucks (10.44%).The another important sources or income were goat manure production (14.12%) and goat milk (4%).

Total cost incurred on goat enterprise Rs.567245 in intensive method and Rs. 21823.45 in extensive method. The net returns worked out from intensive method and extensive method were Rs. 1119916 and 38124 respectively. On an average, total income earned by the goat keeper from different sources was 1822610.81 (92.57 %) in intensive method and 131963.55 (69.26 %) in extensive method by goat keeping followed by service 2.70 per cent in intensive method and in extensive method followed by farming 13.09 per cent.

In intensive method the important constraints as reported by the goat keepers in intensive and extensive method were lack of veterinary aid, inadequate own fund. Major suggestions given by the goat keepers in intensive and extensive method were, provision of adequate veterinary facilities, followed by provision of information regarding Government scheme.

Considering the cost and returns from goat keeping, it can be concluded that intensive goat rearing is more profitable than extensive got keeping in the study area.

Keywords: Goat rearing, Cost and returns

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# Technological change in Cashew Production in South Konkan region (M.S.) – An Economic Analysis

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The present study entitled, "Technological change in Cashew Production in South Konkan region (M.S.) – An Economic Analysis" was undertaken with following specific objectives viz., i) To study the extent of adoption of modern cashew production technologies ii) To study the economics of cashew cultivation across different levels of technology adoption iii) To estimate the technical efficiency in cashew production across level of adoption and to assess the impact of technology on productivity iv) To identify the factors responsible for yield gap and to estimate their contribution in yield gap v) To identify the constraints experienced by cashew cultivators in the adoption of modern technologies. The Ratnagiri and Sindhudurg district, where there is maximum area under cashew crop, so these districts selected purposively. It was found that, majority of farmers planted Vengurla - 4 and Vengurla - 7 varieties of cashew in this region. So, this study was conducted on the basis of per cent growers of these varieties. Thus, final sample was consisting of 2 districts, 8 tahsils, 32 villages and 320 cashew growers. A separate sample of two cashew growers were selected at the age of 1st to 5th year from each village. The primary data required for the study were collected during year 2018-19 from selected

growers by adopting personal interview method with the help of specially designed schedule. Selected cashew growers were classified as per Technology Adoption Index (TAI). In the present study, different statistical techniques such as percentages, ratios, different cost concepts and higher analytical techniques, such as Cobb Douglus production function analysis and Timmer measure of technical efficiency were used.

In case of Vengurla - 4 variety orchard, the adoption index of different technologies for low, medium and high adopters' group was 13.80 per cent, 15.70 per cent and 17.38 per cent, respectively. It was 16.18 per cent at overall level. Among the different technologies at overall level, the adoption index was higher in high yielding variety adoption and size of planting material used (100%) followed by spacing adoption (50.31%), canopy management through training and pruning (50%),dose of FYM application (34.12%), dose of phosphorus (26.52%), dose of nitrogen (24.99%), pest management in cashew (24.20%), apple harvesting technique and its further utilization (18.75%), dose of potassium (13.56%), disease management in cashew (11.38%).

Whereas in Vengurla - 7 variety orchard, the adoption index of different technologies for low, medium and high adopters' group was 9.97 per cent, 14.43 per cent and 17.35 per cent, respectively. At overall level, it was 14.48 per cent. Among the different technologies at overall level, the adoption index was higher in high yielding variety adoption and size of planting material used (100%) followed by spacing adoption (63.64%), canopy management through training and pruning (52.60%), apple harvesting technique and its further utilization (31.82%), dose of FYM application (30.51%), dose of nitrogen (29.82%), pest management in cashew (29.48%), dose of phosphorus (21.55%), dose of potassium (21.47%), disease management in cashew (11.66%). The level of adoption of different technologies was found highest in high adopters' group in both of varieties. Per hectare total cost incurred for establishment of cashew orchard was ` 123856.57. Out of which, cost incurred during first year of establishment was maximum ` 47749.94 (38.55%). Expenditure on labour was ` 34698.92, out of which, ` 26112.07 were spend on male labour and ` 8586.85 were spend on female labour. Per hectare cost incurred on fertilizers and manures was ` 10043.10. Per hectare cost of plant protection ` 145.63. Per tree total cost of establishment was ` 616.63. At overall level, the per hectare total labour required for annual maintenance in Vengurla - 4 variety orchard was 306.69 days, out of which 117.95 (38.46%) were male labour days and 188.73 (61.54%) were female labour days. Among the different operations maximum labour was utilized for mature nut collection (51.20%) followed by supervision (15.84%), weeding (10.07%), repairs of fencing (9.09%), application of manures and fertilizers (7.00%), drying of nuts (2.66%), grading of nuts (1.65%), plant protection (1.17%) and packaging and transport of nut (2% each). Among the all groups, per hectare maximum labour was utilized in high adopter group (311.11 labour days) followed by medium adopter group (304.79 labour days) and low adopter group (298.60 labour days). In Vengurla - 7 variety orchard, the per hectare total labour required for annual maintenance was 400.57 days, out of which 156.00 (38.95 %) were male labour days and 244.56 (61.05 %) were female labour days. Among the different operations maximum labour was utilized for mature nut collection (53.52 %) followed by supervision (18.26 %), weeding (8.73%), repairs of fencing (3.82%), application of manures and fertilizers (11.27 %), drying of nuts (1.25%), grading of nuts (1.25%), plant protection (0.92%) and packaging and transport of nut (0.50% each). Among the all groups, per hectare maximum labour was utilized in low adopter group (627.23 labour days) followed by high adopter group (397.97 labour days) and medium adopter group (367.81 labour days). The results showed that female labour was maximum utilized in all the operation of all groups. Requirement of labour was more for high adopter group as they use different technologies. In Vengurla - 4 variety orchard, at the overall level per hectare total cost of cultivation (Cost-C) of cashew orchards worked out to be ` 149335.29. Cost-A and Cost-B were calculated to ` 40853.14 and ` 85943.71, respectively. As regards the item-wise cost of cultivation at the overall level, the share of labour cost (` 80022.12) was maximum followed by rental value of land (` 44299.99), plant protection measures (` 447.90), manures and fertilizers (` 4695.15). It is further revealed from the table that, the per hectare total cost of cultivation (Cost-C) in case of orchards in low adopters group was ` 141442.55, in medium adopters group was ` 145451.30 and it was ` 156852.85 in case of orchards in high adopters group. The benefit ratio at overall level was 1.78. In case of Vengurla - 7 variety, the overall level per hectare total cost of cultivation (Cost-C) of cashew orchards was worked out to be ` 172860.87. Cost-A and Cost-B were calculated to ` 42125.15 and ` 83291.45, respectively. As regards the item-wise cost of cultivation at the overall level.

**Keywords:Technology Adoption Index,Cost of Cultivation**

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# Marketing of Arecanut in Konkan region (M.S.)

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Arecanut is an important cash crop having a place of pride in social, cultural and economic life of Indian people. The present study entitled, 'Marketing of Arecanut in Konkan Region (M.S.)' was undertaken in Raigad and Ratnagiri district. The data pertained to agricultural year 2019-20. The sample growers were divided into three groups viz. small, medium and large according to size of orchard. The study focused on identifying marketing channels, marketing cost, market margin, price spread and constraints faced by arecanut growers.
In marketing of arecanut nine channels were observed in the study area. Among all, the nine channels channel - V was used by maximum 36 (29.67%) growers with a quantity sold49695 kg.Total marketing cost among all channels was maximum for channel - IV ₹ 7150, followed by channel - VI ₹ 6600, channel - V ₹ 6550 and minimum for channel- I ₹ 500 as produce in this channel sold directly to consumer.

The marketing efficiency estimated by using modified Acharya's formula, was the highest 1:7.6 for channel – I, followed by 1:3.47 in channel - IX, this resulted in maximum producer's share in consumer was 86.84 and 75.66 per cent respectively.

It was observed that, at the overall level 88.10 per cent growers faced problem of fluctuation in market prices. The 78.57 per cent farmer who sold produce through channel - I to VI faced problem of marketing facilities to sale their produce. The market intermediaries reported that this trade is totally depends on demand and supply of produce (85.71%)as the major constraint which influence the market prices.

**Keywords: Marketing Cost, Price Spread, Marketing Channel**

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# Economic analysis of Production and Disposal of Pineapple in DodamargTahasil of Sindhudurg District(M.S.)

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Pineapple is delicious tropical fruit with a fine flavour and high nutritive value. It is an important horticultural fruit crop with immense export potential. The present study entitled "Economic analysis of production and disposal of pineapple in Dodamarg tehsil of Shindhudurg district (M.S.)" was undertaken with specific objectives viz, 1) To assess the existing pattern of resource use in pineapple. 2) To estimate costs, returns and profitability of pineapple cultivation. 3) To study farm business analysis for pineapple cultivation. 4) To study the disposal pattern of pineapple. 5) To identify the constraints in pineapple production and disposal. After plantation of suckers of pineapple it is possible to continue as ratoon crop during second and third year, hence the results of the study are presented separately for three years.

This study was conducted based on the information collected from a limited number of 20 pineapple tenant growers of the tehsil. The variety cultivated by all the growers was 'Queen'. It is noticed from the study that, the average size of leased in land was 6.91 ha and the area under pineapple crop was 94.21 per cent of the total gross cropped area. The remaining area of 5.77 per cent was under banana, cashew nut and rubber. This resulted in a cropping intensity of 100.00 per cent.

The per hectare physical input utilization pattern indicated that there was higher utilization of inputs such as hired human labour, fertilizers, plant protection chemicals and lesser utilization of manures and suckers.

The per hectare cost of cultivation was worked out to Rs. 588220 for the three years out of which the total labour cost accounted to 42.51 per cent and remaining 57.49 per cent was constituted by material cost. The net returns wasRs. 993511 with an overall benefit cost ratio of 2.68.

The per hectare total production of pineapple for three years was 742.34 q with a marketable surplus of 730.41q. The produce was disposed off through various agencies i.e., wholesaler, commission agent and retailer. The income measures such as farm business income, farm investment income, family labour income and net income for farm business analysis were found to be higher in second year as compared to first and third years.

As regards constraints in production and disposal, non-availability of hired human labour, high cost of planting material and fertilizers, non-availability of water for irrigation, lack of technical know-how, destruction of crop by wild animals, fluctuations in market prices, lacunas in weighment and post-harvest losses at farm level were the major constraints reported by farmers.

**Keywords: Input Utilization pattern,Planting material**

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## Forecasting Area, Productivity and Prices of Mango in Valsad District of Gujarat: Time Series Analysis

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Horticulture is playing an important role in food production and industrial economy.Forecasting of area, production and the idea about price trend are used to provide support in decision making and proper planning for sustainable growth of the developing country. The cultivated area and yield of a mango has more effects on the price of a mangobut in other ways pre orpost-harvest management also effectson it. The problems regarding the price fluctuations arises due to seasonality in arrival and perishable nature. Therefore, forecasting of area, productivity and prices of mango play important role. In the current investigation, simple exponential smoothing (SES) implemented to develop the forecasting models for area and productivity of mango. Under the SES, the error measurements at different values of alpha ($\alpha$) for forecasting of area and productivity were observed that the value 0.8 and 0.9 of alpha ($\alpha$) showed minimum Mean Absolute Percentage Error (MAPE) error i.e. 3.11 per cent, and 12.73 per cent respectively. The study also developed time series ARIMA models for forecasting the prices of the mango (Keshar and Alphanso) for Valsad markets of Gujarat. It was revealed that ARIMA (6, 1, 2) and ARIMA (1, 1, 2) were found good models for forecasting the prices of the Keshar and Alphanso respectively in Valsad district of Gujarat.

**Keywords:** ARIMA, Exponential smoothing, Forecasting, Mango, Time series analysis

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## Market Integration of Selected Cotton Markets in India.

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Cotton is an important commercial fibre crop, which plays a major role in agriculture and industrial sectors of an economy of the country. Cotton serves as a raw material for the textile industrial sector. India stands first in production and export of cotton in the world. In India cotton is cultivated in 130.07 lakh hectare area with the production of 353.84 lakh bales of 170 kgs each and the productivity is 462 kg/ ha during 2020-21. The present study has been conducted to analyse the co-integration among the selected cotton markets in India.

The monthly data on prices of cotton were collected from January 2006 to December 2021. The data were analysed by using advanced econometric tools like co-relation analysis, Augmented Dickey Fuller test, Johnsen's co-integration test and Granger Causality test. Corelation analysis of the piece series of different selected market revealed that prices in the selected cotton markets moved together and are well integrated. The prices series doesn't have a consequences of unit root and were non-stationary at level. The long-run equilibrium relationship among the selected markets indicated the presence of co-integration among the markets. Granger Causal relationship between the markets showed bidirectional price influence in most of the market pairs except 4 market pairs which had a unidirectional price influence (Rajkot – Hinghanghat, Rajkot – Adilabad, Sirsa – Adilabad, and Hinghanghat – Adilabad).

**Keywords:Cotton raw material, Cotton market**

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## Economics and yield of banana crop as influenced by organic and inorganic mulches

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An experiment was conducted at Agriculture Research Station, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Achalpur (M.S.), India to evaluate the effect of various organic and inorganic mulches on Banana crop. Maximum yield, gross return, net profit and B: C ratio $ha^{-1}$ (114.69 t $ha^{-1}$, Rs. 931283, Rs. 600534 and 2.82) were obtained under treatment black polyethylene (50 µ) inorganic mulch followed by dry grass (108.69 t $ha^{-1}$, Rs 882563, Rs. 560584 and 2.74) organic mulch.

**Keywords- Mulching, Straw, Polyethylene, Banana plant parts**

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## Economics and yield of turmeric (*Curcuma longa* L.) as influenced by land configuration, irrigation level and nutrient management.

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A field experiment was carried out to study the effect of land configuration, irrigation level and nutrient management on growth, yield and economics of turmeric (*Curcuma longa* L.) at the Research Farm, Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maharashtra) during *kharif* season of the year 2014-15 and 2015-16. A set of twenty four treatment combinations of land configuration, irrigation level and nutrient management (2 x 3 x 4) were laid out in a Split plot design with three replications. The experimental pooled results revealed that, total fresh yield $ha^{-1}$, gross monetary returns, net monetary returns and benefit cost ratio $ha^{-1}$ were recorded significantly superior in broad bed furrow of land configuration (249.18 q $ha^{-1}$, 444656 Rs $ha^{-1}$, 285952 Rs $ha^{-1}$ and 2.77), irrigation level 40 mm CPE (292.01 q $ha^{-1}$, 542359 Rs $ha^{-1}$, 378141 Rs $ha^{-1}$ and 3.28), application of 100 % RDF + 25 % RDN through vermicompost (275.53 q $ha^{-1}$, 508604 Rs $ha^{-1}$, 339867 Rs $ha^{-1}$ and 2.97) and treatment combination of 40 mm CPE with 100% RDF + 25% RDN through vermicompost (355.71 q $ha^{-1}$, 719101 Rs $ha^{-1}$ and 540862 Rs $ha^{-1}$ ).

**Keywords: GMR,NMR, *Curcuma longa* L., CPE**

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# Levelized Cost of Renewable Energy (LCOE) for Hi-tech Agriculture

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The future hi-tech agriculture in India required electrical power for its different operations. The share of electricity in agricultural operations estimated to be doubled in next decade due to its modular utility, simplicity and environment friendly effect. According to the most recent reports on renewable energy technologies, from IRENA, REN21 and IEA, electricity costs from almost all the renewable projects that were commissioned, have continued to decline. Projects of bioenergy power, hydropower, geothermal and onshore wind, solar PV etc which were commissioned, have widely fallen into the generation costs' range of fossil-generated electricity, and furthermore, some of these projects have actually undercut those of fossil fuels-based ones.

The most common methodology for comparing different energy sources, is to calculate the Levelized Cost Of Energy (LCOE). LCOE measures lifetime costs, including building and operation of a power plant, divided by lifetime energy production/output.The varying fall ranges in LCOE for solar and wind power in particular have been mainly driven by the reduction in total instalment costs, which is affected by three main forces:

- Technology improvements.
- Competitive procurement and the rise of patents and innovators in the sector.
- The consequent emergence of a large base of experienced medium-to-large project developers, who are actively seeking new markets globally.

All the renewable power generation technologies are expected to fall within the fossil fuel cost range, with the majority having the potential to undercut it. This will significantly lower the LCOE of all technologies, eventually leading to a market potential increase and development for renewables.

**Keywords:** Levelized Cost of Energy, IRENA, REN21 and IEA

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# Economics of marketing of mango during COVID-19 pandemic in South Konkan region of Maharashtra state.

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The present study was undertaken to study the economic impact of extra methods adopted for marketing of mango during the COVID-19 pandemic For this purpose, 60 respondents were selected randomly from Dapoli, Chiplun, and Lanja tahsils of Ratnagiri district, and 60 respondents were selected randomly from Kudal, Vengurla and Vaibhavwadi tehsils of Sindhudurg district for study. Thus total 120 farmers were selected from the south Konkan region. Data related to the agriculture years 2019-2020 and 2020-21 were collected by personal interviews with the cashew farmers.

Partial budgeting technique was used to capture the economic impact of the extra methods, distant marketing of mangoes and marketing through social media and phone calls are adopted for marketing of mango during the

pandemic. There are four components in partial budgeting. First, the added costs due to these methods over the sell through wholesalers and commission agents are considered. This includes all increased expenses for transportation and packaging of mangoes. The second component is the reduced returns due to the adoption of these methods. These first two components were listed on the debit side of the partial budget. The third component is reduced costs due to the adoption of these methods which includes the elimination of charges wholesalers and commission agents which were charged when mangoes were sold through wholesalers and commission agents. The fourth component is added to the returns side or the credit side of the partial budget. The final step in the partial budget is the summary indicated by the difference between the credit and the debit.Distant marketing and marketing through social media and phone calls were extra two more methods adopted by the farmers during the pandemic than the previous year. The debit and credit side of the partial budgeting revealed that the total additional cost of distant marketing was observed to be Rs. 1063 per quintal. However, the reduced costs and added returns due to distant marketing of mango were Rs. 7038 per quintal. Similarly, added costs due to marketing through social media and phone calls were estimated to be Rs.719 per quintal, and reduced costs and added returns were Rs.7444 per quintal. Thus, the net change in income due to selling through distant marketing and through social media and phone calls rather than selling through wholesalers and commission agents was estimated to be Rs.5975 and Rs.6725 per quintal respectively.

**Keywords:** Partial budgeting, social media, distant marketing, net income

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# Economics of Production and Marketing of Dragon Fruit in Western Maharashtra

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Dragon fruit is very strange looking fruit. The dragon fruit is also known as a pitahaya or pitaya in Mexico. In Central America and northern South America it popular as pitaya Roja. Dragon fruit plant sowing is excellent in the less expected rainfall areas. The tropical weather conditions are better for the dragon fruit cultivation. Cultivator can use the shading method for protecting the dragon fruit crop from the high sunlight. The dragon fruit plant gets the flowering in May to June month and fruits from Aug to Dec month. After one year of planting Dragon fruit plant start bearing the fruits. After one month of flowering stage, dragon fruits are ready for harvest. The immature dragon fruit has a bright green color skin. In this contest, the present research on "Economic of Production and Marketing of Dragon Fruit in Western Maharashtra" has been undertaken with objectives, to estimate the establishment cost in dragon fruit production, to study the costs and returns in dragon fruit production, to study the marketing of dragon fruit and to study the problems of dragon fruit production. Total 30 dragon fruit growers were selected form Pune and Solapur district. Data was pertaining to year the 2019-2020. Per hectare average costs of establishment of dragon fruit orchard was Rs.8,04,027. The major cost incurred on cement pole and cement plate used as supporting framework to dragon fruit plant, and it shared about 66 cent in the total cost. Per hectare resource use levels of total human labour was 197.53 man days comprising of 110.20 male labour and 87.33 female labour days. The per hectare bullock labour utilization was 0.60 pair days. In the case of machine power viz; tractor, spray pump and electric motor, it was observed to be 12.20 hrs, 17.67 hrs and 435 hrs, respectively. In the total cost of cultivation, the Cost A was Rs.78404.95 (24.71 per cent) and Cost B Rs.293917.45 (92.65 per cent). The per quintal cost of dragon fruit cultivation worked out to Rs.2639.96. B:C ratio in dragon fruit production was 3.13, which indicate that dragon fruit cultivation is highly profitable crop. Per quintal marketing cost incurred was Rs. 292.40. The major items in marketing cost were commission charges (48.15 %) followed by transportation charges (29.17 %), packaging

charges (7.46%) and loading and unloading charges. The problems identified in production and marketing of dragon fruit are dragon fruit crop requires high initial investment cost for establishment of orchard, no any bank has started disbursement of loan for cultivation of dragon fruit crop as scale of finance for this crop is not done, government has not provided any subsidy for dragon fruit as like other fruit crops and technology was not developed for processing of dragon fruit.

**Keywords:** Production and Marketing

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## Input out put prices, their Pariety and Income from Gram

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In this study an attempt has been made to study the input-output prices, their parity and income received from gram in Vidarbha region of Maharashtra State. For the present study data on input use, their prices, cost of cultivation, output, output prices and Gross returns from gram was obtained for last 10 years i.e. from 2010-11 to 2019-20. Every year, numbers of the farmers were obtained as per the availability of farmers in APC cluster. The study revealed that, the output-input price parity indices for gram were decreased during year 2010-11 and increased in the subsequent years, indicated thereby in the year 2010-11 the output price was lower than input price and term of trade was unfavourable for gram growers. However, the term of trade was favourable for the gram growers in the remaining years. The total cost of cultivation for gram has gone up from Rs 23691.14 per hectare in 2010-11 to Rs 47907.08 per hectare in 2019-20 depicting an increase by 2.02 times during a period of study. The gross return for gram has recorded an increase of 38.60 per cent during the period study. This is attributable to the increase in the prices of main product

**Keywords:Input- Output,Price parity Index**

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## Economic feasibility evaluation of Micro-Rainwater Harvesting (Jalkund) technology in Tribal Areas of Konkan Region

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The present study was taken up to analyze the impact of decentralized rainwater harvesting structure “Jalkund” in high rainfall hilly regions of Konkan. The study concluded that these structures can serve the purpose of creating facility of protective irrigation for grafts, which can be useful in increasing their success rate. Area under horticulture crops has shown vast increase due to intervention with decrease in fallow land by almost four times. Water storage capacity utilization index also increased in the range of 77.14 to 89.12 per cent.The intervention not only reduced drudgery and time loss in water transport but cost of operation also. Partial budget analysis indicated that the scenario for adaption of technology only to grow mango and cashew without growing intercrop revealed that the debit value reduced to Rs.80,926/- per ha, where the profit of technology also reduced to Rs. 49,408/- per ha. In this case, only the advantages of Jalkund technology are highlighted. Since additional returns due to intervention of Jalkund are greater than additional costs, the technology is economically viable with and without intercrop of jasmine. More profit from this intervention can be extracted with jasmine intercrop.

**Key words:** Micro-rainwater harvesting, economic assessment, efficient utilization

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# Economic analysis of trends in arrivals and prices of Bajra in APMC, Nandurbar

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Pearl millet (Pennisetum typhoids L.) belongs to the family graminae. It is popularly known as bajra. The origin of bajra has been traced to tropical Africa, cultivation subsequently spread to East and Southern Africa and Southern Asia. It is the most widely grown type of millet, under the millet group. Pearl millet has a number of advantages that have made it the traditional staple cereal crop in subsistence or low resource agriculture in hot semiarid regions like the West Africa Sahel and Rajestan in North Western India. It is well adapted to the production system characterized by drought, low soil fertility and high temperature. It performs well in soils with high salinity or low pH. It has various names such as pearl millet. Cattail or spiked millet in English. It is known as 'Kambu' in Tamilnadu, 'Dukhen' in Arabic and 'Mahangu' in Africa.

The price fluctuations in agricultural commodities are a common phenomenon due to their seasonal nature of production, wide ecological imbalances compared to other crops and seasonal demand for agricultural commodities. As per price theory, prices are a function of demand and supply. But demand and supply are independently related to prices. The analysis of arrivals and prices over time is important for formulating a sound agricultural price policy.

The study of arrival and prices helps the farmer to find out the best time for marketing of agricultural commodities to secure higher price for their produce. Thus it helps them to take decision regarding when to sale so as to obtain maximum price. The acreage under bajra in Khandesh area particularly Dhule, Nadurbar and Dhondicha is substantial.

The arrivals of bajra in Nandurbar market are remarkable. However, the fluctuations in arrivals and prices of bajra were noticed in APMC, Nandurbar. But it is to essential to have stability in the prices and arrivals of bajra. The present study namely trends in Arrivals and Prices of bajra in APMC, Nandubar was undertaken with specific objectives to study the changes in arrivals and prices of bajra in APMC Nandurbar, to study the trends in arrival and prices of bajra in APMC Nandurbar and to examine seasonal indices of arrivals and prices of bajra in APMC Nandurbar .The present study was based secondary data on the prices and arrivals of bajra collected from APMC, Nandurbar. The data relate to period of 10 years *i.e.* from 2010-11 to 2019-20. The data pertaining to prices and arrivals of bajra were collected from Agriculture Produce Market Committee Nandurbar

The time series data pertaining to monthly arrivals and prices of bajra covering the period of ten years (April 2011 to March 2020) was collected from APMC, Nandurbar. The compound growth rates of arrivals and prices of bajra crop were worked out. Seasonal variations were computed by twelve months moving average method.

The arrivals of Bajra showed severe changes in APMC, Nanurbar market. In 2010-11 arrivals were 17120 qtls in 2014-15 it increased by 7.14 per cent but decreased by -59.36 per cent in 2019-20 over the base year. The price of bajra was increased by 38 per cent in 2014-15 and in 2019-20 it was increased by 76 percent. Month wise percentage change also shown more or less similar picture with annual change in arrivals and prices of bajra in APMC, market Nandurbar. A very negligible arrivals of bajra was noticed in the month of April in 2014-15. and it was maximum in the month of May and June. In the year 2019-20 the arrivals of bajra was decreased by -2.98 per cent in month November and -90.08 in the month of August over the base year.

On whole, it is concluded that in the year 2019-120 decreasing trend was found in case of arrivals of bajra and increasing trend was found in case prices of bajra except in the month of August.

The annual compound growth rates of arrivals of bajra (-9.32) were found negative and prices were positive (2.31). Arrivals negatively significant at 1 per cent level of significance and prices non significant indicating thereby the arrivals of bajra was decreased by -9.32 per cent prices were increased by 2.31 per cent per annum during period under study. The markets showed inverse relationship between arrivals and prices of bajra

The peak arrival was found to be during the months of May (307.54) followed by April (142.05) and it was the lowest and in jully. The highest price was recorded during the month of April (112.21) followed by May (107.04) while it was lowest during the month of August (87.60)

**Keywords:APMC,Arrivals and Prices**

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# Trends in Arrivals and Prices of Chilli in APMC, Nandurbar

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Chilli (*Capsicum annum* L.) is most widely used and universal spice of India belongs to the "*Solanaceae*" family. The nutritive value of chilli is excellent, Chillies are rich in vitamins. India has immense potential to grow and export different types of chillies required to various markets around world. The most important chilli growing states in India are Andhra Pradesh (49%), Karnataka (15%) Maharashtra (6%) and Tamilnadu (3%) which constitute nearly 75 per cent of the total area under chilli. The present study namely trends in Arrivals and Prices of chilli in APMC, Nandubar was undertaken to fulfill the specific objectives to study the changes in arrivals and prices of chilli in APMC Nandurbar ,to study the trends in arrival and prices of chilli in APMC Nandurbar and to examine seasonal indices of arrivals and prices of chilli in APMC Nandurbar

The present study was based secondary data on the prices and arrivals of Chilli collected from APMC, Nandurbar. The data relate to period of 10 years *i.e.* from 2009-10 to 2018-19. The data pertaining to prices and arrivals of Chilli were collected from Agriculture Produce Market Committee Nandurbar

The time series data pertaining to monthly arrivals and prices of chilli covering the period of ten years (April 2009 to March 2019) was collected from APMC, Nandurbar. The compound growth rates of arrivals and prices of chilli crop were worked out. The variations are worked out for data which recorded monthly.

The arrivals of green chilli showed severe changes in APMC, Nanurbar market. In 2009-10 arrivals were 128294 qtls but in 2014-15 it decreased by 31 per cent and again increased by 21 per cent in 2018-19 over the base year. However in case of price of green chilli variation is near about same in 2018-19 but in 2014-15 it was increased by 56 percent.

Arrivals and prices of dry Chilli in 2009-10 were 8894 qtls and Rs.4698. The arrivals of dry chillis lightly increased in 2014-15 (4.56 percent) but tremendous decrease showed in 2018-19 (91.54 per cent) by arrivals of chilli. It is interesting to note that prices were increasing continuously over the period of time i.e 34.25 percent in 2014-15 and 152.15 per cent in 2018-19. This less arrivals may be due to drought condition during the 2017-18

Month wise percentage change also shown more or less similar picture with annual change in arrivals and prices of green as well as dry chilli in APMC, market Nandurbar. A very negligible arrivals of both the chillies was noticed in the month of July and August because of off season of chilli crop

On whole, it is concluded that the increasing trend was found in case of arrivals and prices of green and dry chilli except arrivals of green chilli in 2014-15 and prices of dry chilli in 2018-19. The annual compound growth rates of arrivals of green chilli (1.95) were found positive and prices were negative (18.72). Arrivals non-significant and prices significant at 10 per cent level indicating thereby the arrivals of green chill were increased by 1.95 per cent prices were decreased by 18.72 per cent per annum during period under study. The markets showed inverse relationship between arrivals and prices of green chilli. Higher arrivals of green chilli in the market may be due to higher demand to green chilli in Nandurbar.

In case of dry chilli, the annual compound growth rate of arrivals were found negative (18.24) but prices were found positive (3.91). Indicating thereby the arrivals of dry chilli decreased by 18.24 per cent per annum and prices were increased by 3.91 per cent per annum during period under study. The markets showed the decreased arrivals and increased prices in the period under study which may be due to the increased demand from nearby state market

The peak arrival of green chilli was found to be during the months of January (300.98) followed by December (246.04) and it was the lowest and negligible from May to September. The highest price was recorded during the month of March (135.03) followed by February (133.85) while it was lowest during the month of July (13.91)

In case of dry chilli the highest arrival was found to be during the month of January (279.36) while it was lowest in September (4.36). The highest price was recorded during the month of February (204.01) while the lowest price was observed during the month of September (51.84)

**Keywords: Market Arrivals and Prices**

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# Economics of coconut based multispecies cropping systems under coastal littoral sandy soil

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Optimal nutrition to coconut still plays a vital role in enhancing the productivity of coconut. Considering this aspect, the experiment was conducted in littoral sandy soil at Regional Coconut Research Station, Bhatye, Ratnagiri (M.S.) to study the performance of multispecies cropping system in the coconut garden during 2016. The experiment was laid out in split-plot design contains three cropping systems as main plot CS1: Coconut + Garcinia *indica* + Vegetable Crops (Rainy season), CS2: Coconut + *Garcinia indica* + Pineapple, CS3: Monocrop of coconut; whereas subplot was nutrient management contains N1: Green manuring +biofertilizers +organic recycling +FYM (as per package of practices) N2: Green manuring +biofertilizers +organic recycling +Soil test-based nutrient (chemical fertilizers) application N3**:** Green manuring +biofertilizers +organic recycling +100% RDF in three replications with numbers of palm/per replication was six. The results revealed that there was a significant difference among the treatment of different nutrient management practices. Maximum no. of leaves per palm (30.17), annual production of leaves (12.8/palm/year), No of inflorescences (9.07), no. of female flowers (158.7), and nut yield (144.7/palm/year) were recorded significantly highest in the treatment N2 (Green manuring +biofertilizers +organic recycling +Soil test-based nutrient (chemical fertilizers) application. Whereas in the case of the cropping system, only the number of functional leaves was found significant. The interaction effect of the cropping system and nutrient management was significant only for the number of functional leaves per palm/year. The yield of pineapple was 8690 kg/ha and Snake gourd was 8652 kg/ha was maximum in plots receiving soil test based NPK nutrients (N2). The kokum plants are still in the juvenile phase. The highest net returns (Rs. 236425/ha) was obtained from the treatment combination CS2N2 while the lowest Rs. 18423/- was recorded in CS3 N1. Soil taste based nutrient management indicates the efficiency and deficiency of nutrients in the soil.

**Keywords:**FYM, RDF, Cropping Systems

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# An Economic Analysis of Yield Gap in Groundnut Production in Mahaboobnagar District of Telangana

**A. Jyothirmai,. M.H. Sandeep, G.P. Sunandini, K. Suhasini, D. Srinivasa Chari**

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Groundnut is the KING of oilseeds. Botanically known as ‘Arachis hypogeae’, it belongs to the family Leguminosae. Groundnut constitutes 2.61 per cent of the total cropped area and 28.18 percent of the

total oil seeds cropped area in Telangana. The groundnut cropped area was 1.28 lakh hectares during 2015-16 as against 1.55 lakh hectares in 2014-15showing a decrease of 17.42 percent over previous year in the state.

Mahaboobnagar district was purposively selected for the study as it had major area under groundnut cultivation in Telangana state with 60 percent of the groundnut production in the state (2017-18). Two mandals were selected from the Mahaboobnagar district for the present study based on the highest groundnut cultivated area. Two villages from each mandal were selected based on highest concentration of area under groundnut. At this level stratified random sampling technique was adopted. For the study, a sample of 40 farmers each from marginal, small and large categories were selected. Total 120 groundnut farmers were taken as the sample for the study.

The study indicated that among the various farmers the per hectare total cost of cultivation (Cost C3) ranged from Rs.94109.82 for marginal farmers to Rs.108161.10 for progressive farmers. It also understood that net returns per hectare of groundnut cultivation ranged from Rs.4978.37 for marginal farmers to Rs. 37520.89 for progressive farmers. Comparing the B-C ratio of various farmers, the progressive farmers stood first with a BCR of 1.34 and marginal farmers stood last with a BCR of 1.05.

For the study the Yield Gap-I was designated as yield difference between the potentialyield and demonstrations plot yield, which accounted to be 3293 kg/ha. Yield difference between demonstration plots and progressive farmers i.e. Yield Gap-II which was negative accounted to be -803.40 kg/ha. Yield difference between progressive farmers and average farmers i.e. Yield Gap-III varies from 1092.16 kg/ha for marginal farmers to 850.95 for large farmers. This analysis also revealed that yield gap decreased with the increase in farm size.

The results implied that for the pooled farmers, 1 percent decrease in the seed gap (Sg), phosphorus gap (Pg), potassium gap (Kg) and plant protection chemicals gap (PPCg) keeping the other variables constant would decrease the Yield Gap-III by 0.15, 0.54, 0.29 and 0.34 percent, respectively. 1 percent increase in farm size, education and experience in groundnut farming keeping the other variables constant would decrease the Yield Gap-III by 0.04, 0.04 and 0.001 percent, respectively. It was also found that 1 percent decrease in nitrogen gap and hired human labour gap would increase the Yield Gap-III by 0.20 and 0.01 percent, respectively.

It was found that technical factors like in-time sowing (around 1$^{st}$ September) increases the average yield up to 30.00 kg/ha. Seed rate of 150 kg/ha and proper seed treatment increases the groundnut yield by 308.40 kg/ha and 63.60 kg/ha, respectively. It was understood that 8 irrigations over 6 irrigations and two weeding over one weeding increases the yield by 140.60 kg/ha and 122.00 kg/ha, respectively. Herbicide application and gypsum application increases the yield by 119.00 kg/ha and 156.50 kg/ha, respectively.

The biggest production constraint in the farmers view was “labour unavailability and high cost” followed by “lack of irrigation water”. The major marketing constraint was “non-remunerative price” followed by lack of market information. Under other constraints “wild boar damage” became a major constraint for the groundnut farmers.

It was understood that adopting the technical factors like recommended seed rate, proper seed treatment, sufficient irrigations, proper weed management practices, gypsum application will improve the productivity by a greater extent. Through development of drought resistant, short duration, pest and disease resistant varieties and making the quality seed available to the farmers at proper time in required quantities, conducting regular trainings on new technologies and adoption of recommended package of practices will reduce the yield gap. Input subsidy, machinery subsidy with effective extension mechanism in place, credit along with insurance, noncredit linked insurance, subsidy on drip system for groundnut, machinery for weeding and harvesting will improve production and make groundnut cultivation more productive and profitable.

**Keywords:** Package of Practices, marketing constraint

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# Efficient Marketing of Bio fungicide and Value Chain Analysis

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Bio fungicide is one of the most important input for the farming. Bio Fungicide is nothing but a any substance which is organic and natural supplier for one or more of the elements required for plant Protection. In India Bio fungicides are not use on the large scale bio fungicide has residue effect. The concept of bio fungicide is based on observation the natural processes where a beneficial micro] organisms usually isolated from soil activity of plant pathogens. The study was taken with the Objectives to study the sample farmers behavior towards use of Trishul plus bio fungicide, to identify the competitors of Trishul plus bio fungicide, to study the promotional activities of Pravara Agro Biotech and its Competitors, to study the market share of Trishul plus bio fungicide and its competitors and to study the feedback of the sample farmers. 54 sample farmers (i.e. Pomegranate and Tomato growers) were selected purposively from Ahmednagar district on the basis of their land holding Dealers and retailers were selected purposively due to their limited numbers. Brand name was the most dominant factor while purchasing the product which consists of 95.12 percent followed by quality which was situated on second rank (86.99 percent) and result was the less effective parameter contributes only 66.66 percent. Price of Trycopower was high in all competitors fallowed by Trishul plus and Ketostar where the price of Amrutout was low among all competitors. Posters were mostly used by Patil biotech followed by Ajay Agro. News paper advertisement was mostly used by Pravara followed by Patil biotech. Pravara attend most number of exhibitions while Ideal Agro and Patil biotech doing most no of wall printing. Market share of Pravara Agro Biotech was high i.e. 17.22 percent than the competitors in the study area followed by Patil Biotech which contribute 17.05 percent. Market share of Invent agro was comparatively low among all competitors in selected area. The 20.33 per cent of farmers were saying that unavailability of small size packaging while 15.25 per cent farmers were give their feedback as a High price followed by delay in result and unavailability of product (11.86).

**Keywords:** Bio fungicide ,Pravara Agro Biotech, Value Chain

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# Economics of Vegetable Nurseries in Solapur District of Maharashtra

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In recent years, vegetable nurseries have one of the complementary business to agriculture. The present study on economic of vegetable nurseries in Solapur district was ensure in order to study the socio-economic characteristics of nursery owners, estimate the cost incurred and returns and employment generated through the nursery activity. The financial feasibility also estimated by the way of B:C ratio, internal rate of returns of nursery enterprise along with the problems of nursery owners. The study was based on primary data obtained from 15 nursery owners, selected 5 nurseries from each group. Groups were classified based on the turnover of nursery i.e. group I (1 to 3 lakh), group II (3.1 to 5 lakh)and group III (Above 5.1 lakh). The 15 nurseries were selected by sample random samplingmethod for present study.

The data concerning the costs and returns from nursery activity, employment pattern,problem faced by nursery owners were collected by survey method with the help of pre- tested schedules for the period of 2019-20. From the study, it was observed that about 10 nursery owners were managing nursery as main occupation, while at overall level, the survival percentage in case of chilli, tomato and brinjal seedling was 82.95, 82.02 and 96.23per cent respectively and the total cost required for preparation of chilli, tomato and brinjalseedling was ` 2,78,637.10, ` 4,68,492.81 and ` 3,43,549.93, respectively. However, the overall total returns generated from

sale of chilli, tomato and brinjal seedlings were ` 6,39,414.80, ` 9,58,410.80 and ` 6,97,887.89,respectively. Therefore, at overall level, the chilli, tomato and brinjal seedlings were observed to be economically feasible and it have B:C ratio 2.29, 2.04 and 2.03, respectively and the chilli seedlings more observed to be moreprofitable than tomato and brinjal. As most of the operations in the nursery business were carried out by manually, the nursery business become labour expensive. Therefore, nursery business provide more employment to the labours. At overall level, employment generated through nursery activity was about 78.15 days for males and 40.56 days for females.The price fluctuation, less germination percentage and high labours charges were themajor problems faced by nursery owners. Other important problems *i.e.* lack of credit facility, lack of quality seeds *etc.*, were faced by nursery owners.

The capital investment on vegetable nursery was found to be economically profitablein terms of positive net present worth, benefit cost ratio of nursery more than unity and internal rate of return of group I (29.81 %), group II (31.97 %) and group III (37.27 %). Therefore, from the study it is observed that nursery business provided additional income and opportunities to farmers throughout the yea

**Keywords:** financial feasibility, capital investment

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# An Economic Analysis of Cashew nut Production in Konkan Region of Maharashtra,

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Cashew is one of the most valuable processed nuts on global commodity markets and has the potential to generate employment and revenue for developing countries. India is the second largest exporter of cashew kernels in the world. The study was conducted in Konkan region of Maharashtra and is based on both primary and secondary data collected from120 respondents and data were analyzed by using standard statistical tools (i) compound annual growth rates (CAGR) (ii) budgeting technique (iii) financial feasibility tests. The study revealed that both area and production of cashew has been increasing in the country as well as in Maharashtra over the past years. The establishment cost (initial investment cost and maintenance cost during gestation period) accounted to Rs. 1,30,255 per ha. Cost of cultivation during bearing period was Rs. 61,773 /ha, while the average total yield obtained by the farmer was 2114 kg of raw Cashew nut per ha. Average price realized was Rs. 153.40/ kg of raw nuts. Farmers realized higher gross return of Rs. 3,18,631/ ha and net return of Rs. 2,57,877/ha. It is observed that April month was the highest harvest month. Feasibility analysis revealed that, the NPV @ 12 percent discount rate, BCR, IRR and payback period were Rs. 10,78,155, 3.98, 68.73% and 5.7 and 5.6 years respectively. Study revealed that establishment cost of plantation is highly expensive. Hence farmers should be provided with required credit at reasonable rate of interest. Since there is high labour requirement and higher wage rate, there is a scope to evolve labour saving technologies. Study also revealed that cashew cultivation is highly profitable venture and is also financially feasible to establish new plantations in the konkan region of Maharashtra.

**Keywords:** Compound Annual Growth Rates, budgeting technique, financial feasibility tests

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# Marketing behaviour of sapota growers in Thane district of Maharashtra

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Sapota ( *Manilkara achras* (Mill.) Fosberg) is one of the important tropical fruits belonging to the family sapotaceae. It is known by many names viz., chikku, sapodilla plum, zapota, and nose-berry. In India sapota cultivation was taken up for the first time in Maharastra in 1898 in Gholwad village. The area and production of sapota is increasing steadily in the Maharashtra state in general, and Konkan region in particular. The situation demands concerted efforts in the area of marketing and export of sapota. Production and marketing of sapota is helping in checking migration through creation of employment opportunities in the Konkan region. Recognizing the role of sapota crop in the economy of the Konkan region, it is necessary to ensure that the sapota growers get maximum share in consumers rupee. However, very few studies are there on marketing behaviour of sapota growers and constraints faced by them in marketing of the produce. The study was conducted in Palghar and Dahanu tahasils of Thane districts of Konkan region. The sample was constituted of 120 sapota growers from 12 villages. The respondents were interviewed with the help of specially designed schedule. It could be observed that majority (70.84 per cent) of the sapota growers had 'medium' marketing behaviour, followed by 18.33 per cent and 10.83 per cent of the sapota growers had 'high' and 'low' marketing behaviour, respectively. The sapota growers were planning, preparing action plan, implementing the action plan as well as reviewing the activities of sapota marketing in a good manner, as it indicates from their 'medium' level of marketing behaviour score. It is revealed that maximum number of the sapota growers 'always' collected information about available resources and facilities in area while undertaking new plantation (75.00 per cent), understood the consumer's preference before plantation (61.66 per cent). As regards the use of various sources for collecting market information, it was observed that majority of the sapota growers ``always' used television (50.00 per cent), followed by newspaper (42.50per cent). It revealed that maximum number of sapota growers 'always' used self intitution (85.83 per cent) and family members (72.50 per cent) as resources while taking decisions. As regards the implementation of action plan, it was observed that majority of the sapota growers 'always' cultivated varieties as decided (100.00 per cent) and followed marketing systems as decided (40.00 per cent).It was observed that 53.33 per cent of the respondents never seeked advice from the extension personnel for solving the problem.

Majority of the sapota growers 'always' used wholesale market (65.00 per cent) and majority of them 'always' marketed their produce within the taluka (80.00 per cent). Majority of the sapota growers 'always' cleaned all the sapota produce (100.00 per cent) and undertook grading of sapota fruits (47.50 per cent). Maximum number of the sapota growers 'always' stored the fruits in open place (65.83 per cent). Majority of the sapota growers 'always' packed the sapota fruits in gunny bags (80.83 per cent) followed by CFB box (68.33) sometimes. Mode of transport for sapota fruits 'always' used by sapota growers was 'private vehicle' (45.83 per cent). According to 71.67 per cent of the sapota growers, market demand of the sapota was 'always' regular and majority of the sapota growers 'always' sold their sapota immediately after harvesting (95.00 per cent) through commission agent (84.17 per cent). Almost all the sapota growers 'always' sold their sapota fruits on weight basis (99.17 per cent).

**Keywords:** Marketing and Export,

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# Economic Analysis of Marketing of Jalgaon brinjal in Maharashtra

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The study viz. Economic Analysis of Marketing of Jalgaon brinjal in Maharashtrawas conducted in six villages of Yawal and Bhusawal tehsil of Jalgaon district. The objective of the study was to estimate the

resource use, cost returns and productivity of brinjal. The study was based on the primary data of brinjal growers for the year 2019, spread over the six randomly selected villages of two tehsils. From each selected village, 15 growers, 5 from each size group viz. small, medium and large were randomly selected.

The study revealed that the average per quintal cost of marketing of Jalgaon brinjal in channel I was Rs, 65 at the overall level. Major items of marketing cost were packaging charges and transportation charges. It accounted for 61.54 and 38.46 percent respectively, while in the case of channel II and channel III the cost of marketing was Rs, 108.3 and Rs, 231.75 repetitively which is greater than that of channel . Price spread in marketing of Jalgaon brinjal was minimum in channel due to intermediaries. In channel l , the producer's share in consumer's rupee was highest (98.56 per cent). In channel , it was (67.83 ) per cent and (54.09) per cent in channel . The net price received by the producer was maximum (₹ 4435/quintal) in channel Ⅰ than that of channel Ⅱ (₹ 3391.7/quintal) and channel Ⅲ (₹ 3218.25 /quintal). The producer's share in consumer's rupee was more in channel I as compared to channel II and channel III due to involvement of middlemen, therefore study suggest that farmer should be motivated to form Jalgaon Brinjal Producers Organization to minimize number of middlemen in distant marketing and accrue more share in consumers rupee

**Keywords: Marketing channel, Marketing cost, Price spread**

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# Economic analysis of Shetakari Gat (Farmer Interest Group ) formed under ATMA in Kolhapur District,

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Agricultural technology management agency (ATMA) is a district level body created under the Innovation Technology Dissemination component of National Agricultural Technology project (NATP) pilot testing agricultural extension reforms. In Kolhapur district the ATMA has started in 2006. One of the first task of ATMA is to facilitate the preparation of strategic Research and Extension Plan (SREP) of the district. ATMA is supported by a Governing Board (GB) and a Management Committee (MC). Block level Farm Information and Advisory Centers (FIACs) have been created which are operated by a Block Technology Team (BTT) of technical advisors and a Farmer Advisory Committee (FAC), a group exclusively of farmers. Commodity oriented Farmer Interest Groups (FIGs) are being promoted at block / village level to make the technology generation / dissemination farmer driven and farmer accountable. Farmer Interest Groups (FIG) **is** one important objective of the ATMA approach is to redirect extension activities toward diversification into high-value crops and products and the overall goal of increasing farm income and rural employment. The Shetakari Gat plays vital role in adoption of advanced crop production technology, processing, marketing and increasing their income so the research study 'Status report of Shetakari Gat/ Group farming or Farmers Interest Groups (FIGs) of ATMA in Kolhapur District' was conducted during the year 2020-21 with specific objectives to study the status of Shetakari Gat under ATMA in Maharashtra, to study the status of Shetakari Gat under ATMA in Kolhapur district, to study the performance of selected Shetakari Gats formed under ATMA in Kolhapur district.Kolhapur district is purposively selected for the study as 3261Shetakari Gat has been formed upto 2020. Three tahsils viz., Karveer, Kagal and Panhala were selected for study sample Shetakari Gat sheti and primary information were collected by preparing questionnaire. Simple statistical tools viz., average, percentage were used for analysis.

The study revealed that Shelf Help Groups / Shetari Gat registered under ATMA are 67245 upto year 2020. The maximum number of Shetakari gats were formed in Pune division followed by Latur Division. Districtwise analysis showed that Osmanabad district (15.28 per cent) followed by Solapur district. In Kolhapur district the out of total 3261 Shetakri Gats Maximum number 796 Shetakari Gats were formed in Bhudargad tahsil followed by Kagal tahsil (368). Farm produce purchase and sale, use of new technology, productivity enhancement and sale of farm produce, farm mechanization were the major activities for which Shetakari Gats were formed.Majority of sample Shetakari Gats registered after the year 2016 and they collect Rs. 200/- per month subscription. Shetakari Gat arranged visits to MPKV, Rahuri and other Agricultural Universities in

Maharashtra, KVKs and SAUs from other states. Production of organic jaggary, organic jowar, organic vegetables, seed production of paddy, finger millet, ragi, turmeric and ginger powder. The income of members of members of 'KasariKhore Organic Ginger, Turmeric, Nachani Production and Processing Shetakari Gat' in Panhala tahsil was increased by more than 154 per cent i.e. from Rs. 46.15 to Rs.117.46 from 50 acre land during the after formation of Shetakari Gat period over before formation of Shetakari Gat as the group member are producing organic Turmeric, Ginger, Nachani (finger millet), they are processing Turmeric, Ginger and Chilli and have their own marketing system.

**Keywords:FIG,ATMA, Processing cost**

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## Growth and Instability of Major crops in Akola district

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The present study " Growth and Instability of major crops in Akola district" was undertaken with the view, to study the growth and instability of Area, Production and productivityof five major crops viz., Soybean, Cotton, Tur, Wheat and Gram. These crops were selected because they cover more than 80% area under cultivation. The study was based on secondary data for the period of 10 years ( 2011-12 to 2020-21 ) for the Akola district. The Growth rates in area, production and productivity was studied by estimating the compound growth rates. To measure the degree of instability in the area, production and yield of major crops in Akola district coefficient of variance has been computed. The study revealed that the significant positive growth in area under Soybean, Cotton, Wheat and Gram was observed in Akola district i.e. 3.61 per cent, 0.07 per cent, 3.53 per cent and 0.59 per cent simultaneously. The area of kharifTur exhibited negatively significant trend under study period i.e. -1.73 per cent. In case of Soybean, Cotton, Tur, Wheat and Gram the production was significant during study period , and Gram recorded highest positive significant trend in production i.e. 10.17 per cent. In case of Soybean, Tur, Gram recorded positively significant trend in productivity while in case of Cotton and Wheat the productivity was non-significant during study period.

**Key words :** Growth, instability and major crops

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## Production and Export performance of Cereals from India

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Agriculture is an important sector in India. It is indispensible for the sustenance and growth of the Indian economy. On an average, about 70 per cent of the households and 10 per cent of the urban population is dependent on agriculture as their source of livelihood. Today, India is a major supplier of several agricultural commodities like tea, coffee, rice, species , oil meals, fresh fruits, fresh vegetables, meat and its preparations and marine products to the international market to the international market. India is a large producer of several agricultural products. In terms of quantity of production, India is the top producer in the world in milk, and second larges in wheat and rice. Agricultural production is prone to several risks which affect both producers and consumers. In order to enhance investment and achieve a sustained increase in production, coherent and integrated long term strategies and polices are required to reduce risk aversion and build flexibility among

Indian rural producers. In this research objective is to study the performance of area, production & productivity of major cereals and Export performance of major cereals in India.

The data pertaining to all states have been collected for the period from 2000-01 to 2019-20. For that the time series data on Area, Production and Productivity of Spices and Export of Cereals were gathered from the Web Site of APEDA Board.

Cereals products contribute substantially to the national income through exports of its basmati as well as non-basmati rice varieties. The study has also revealed that Indian Cereals Products exports had a fabulous performance during the study period i.e.2000-01 to 2020-21. The study has also revealed that export of rice from India is highly price sensitive. India was the world's second largest maker of Rice, Wheat and other cereals. The huge demand for cereals in the global market is creating an excellent environment for the export of Indian cereal products. India has not only the largest producer of cereal but also the largest exporter of cereal products in the world.

Keywords: Production of Cereals, Export of Cereals

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## Status of Indian Export& Import of Spices

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India is the world's largest producer, consumer and exporter of spices. Country produces near about 75 of 109 varieties listed by International Organization for Standardization (ISO, 2021) & accounts for half of global trading in spices. Export of spices contribute near about 41 per cent of total export earnings from all horticultural crops in the country. In India, spice exports ranks 4$^{th}$ among all agricultural commodity.

The data pertaining to all states have been collected for the period from 2011-12 to 2020-21. For that the time series data on Area, Production, Productivity, Export and Import of Spices were gathered from the Web Site of Spices Board and the same were subjected to growth rate analysis.

The overall study result concluded that the, during the year 2016-17 and 2020-21, the area under total spices found to be increased with 10.79 per cent. The production figures in respect of total spices in India found to show only 0.91 per cent increase during the year 2020-21 over the year 2016-17.It means in India, area and production of species steadily increased from 2016-17 to 2020-21. The results of Export spices, the largest quantity exported from India was found to be ginger which is403.81 per cent over the year 2016-17 &the largest quantity imported in India was found to be garlic during 2020-21 which is 9382.50per cent over the year 2016-17. Also, Cumin holds first position with positive significant growth of 16.57 per cent & 18.80 per cent in export quantity & value respectively.

Spices continue to be a significant part of country's economy. The total export of spices in India has increased substantially last 10years i.e. 7.25 & 10.12 per cent both in terms of quantity & value respectively due to the growing importance of the crop in both domestic and international. Overall study, spice export from India has registered all time high both in terms of quantity and value, currently India is formidable position in world spice trade with more share of volume with fair value.

**Keywords:** Production of Spices, Export of spices, Compound Growth Rate, Import of Spices

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## A Study on Growth Rates Analysis of Cotton Lint Export in India

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Indian economy has cheap labour source, diverse agro-climatic conditions and good soil resources, abundant sunshine, balanced growth rate in production. In the circumstances of agricultural exports, policy makers and trade analytics suggested cotton lint export promotion as a crucial component of strategies for diversifying agricultural export. The present study based on the objectives to analyses the growth rates in area, production, productivity, export quantity, export value of cotton lint in India from 1998-99 to 2017-18, which includes the data of 20 years. Study showed that there is increase in agriculture exports but percentage share of agriculture export to total exports was decreasing due to increase in share of manufacturing sectors and service sectors etc. also there is increase in quantity of India's cotton lint export during overall period of study and percentage share of worlds cotton lint export to India's cotton lint export was also increasing in overall period of study. The growth rates of area, production and productivity of cotton in India were found to be positive and significant during the period I, period II and overall period of the study.The growth rate for export quantity, export value and of cotton lint export was found positive and significant for period I, period II and overall period.Export earnings in terms of value showed higher instability in overall period with 106.82 per cent of co-efficient of variation of export value and export value of cotton lint export was observed 91.52 per cent in period I and 61.57 per cent in period II.

**Keywords:** Growth rates, coefficient of variation (CV), Coppock's instability index, cotton lint and export.

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## Economic Evaluation of Tendu Patta Collection in Wardha District

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Investigation was undertaken in Wardha district of Vidarbha region. Total 75 tendu patta pluckers were selected and data pertained for the year 2020-21.The average household size of tendu patta pluckers were estimated at 4.31 and majority of them were educated upto high school level. The average annual household income of tendu patta pluckers were estimated to Rs. 83499.98. 0wn farm Agriculture was the main occupation of tendu patta pluckers. The income from own Agriculture farm was found predominant over other sources. The individual tendu patta plucker was spend on an average 5.59 hours per day and they travelled average distance was estimated 2.81 Kms per day for collection of tendu patta. All tendu patta pluckers were sold their collected tendu patta to private agents. The threat from wild animals was the major constraint in tendu patta collection. The absence of employment during April- June was the main reason behind choosing this profession of tendu patta collection.

**Keywords:** tendu patta pluckers, cost and returens

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## Economics of production of Arecanut in Konkan region of Maharashtra

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Arecanut is an important cash crop having a place of pride in social, cultural and economic life of Indian people. The present study entitled, 'Economics of production of Arecanut in Konkan region of Maharashtra was undertaken in Raigad and Ratnagiri district. The data pertained to agricultural year 2019-20. The sample growers were divided into three groups viz. small, medium and large according to size of orchard. Standard cost concept were used to study cost, returns and profitability of arecanut orchard.The per hectare plant

population of arecanutorchard was more (1705 plants) than recommended by university (1370 plants) at overall level. Per ha total cost of establishment was ` 211134.2 for six years gestation period. The per hectare labour utilized for maintenance of arecanut was 804.62 labour days, out of which family labour days were less (27.64%) than hired labour days (72.36%).Per hectare cost of maintenance of arecanut orchard was ` 414323. Out of which cost "A" contributes 55.93 per cent and share of cost "B" 81.00 per cent. The per hectare gross returns from arecanut orchard at over all level were ` 602979 from main produce and `11189 from by-produce. The gross returns increased with increase in size of orchard. The net returns at total cost i.e. cost "C" were ` 155127,` 205703 and ` 234624 in small, medium and large group.The benefit cost ratio was higher in large group 1.59, followed by medium group 1.49 and 1.34 for small group.

The study of disposal pattern indicated that more than 98 per cent produce was actually sold in market, among all the size groups, very less quantity was retained by growers

**Keywords:** Standard cost concept, gross returns

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## Economics of Production of Bg II Cotton in Akola District

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Akola is the major cotton growing district in Vidarbha region. Area under BG II cotton cultivation in Akola district for the year 2020-21 was 136750 ha (Source: District Superintendent Agriculture Office, Akola). The study was based on the primary data that was pertained for the year 2020-21. The primary data of 90 cultivators was collected from nine villages of three tahsils of Akola district. Per hectare total cost of cultivation of BG II cotton (cost '$C_3$') was highest in large size group i.e. Rs. 82045.90 followed by medium size group (Rs. 78556.92), small size group (Rs. 76755.15) and at overall level it was Rs. 79734.96. Input-output ratio of BG II cotton cultivation at cost '$C_3$' was highest in large size group i.e. 1.64 followed by medium size group (1.60), small size group (1.50) and at overall level it was 1.59. The value of coefficient of multiple determination ($R^2$) of estimated production function for small, medium, large size groups and at overall level was 0.93, 0.96, 0.95 and 0.94, respectively. In case of small, medium, large size groups and at overall level inputs such as human labour, bullock labour, seed, manure, fertilizer and plant protection were over utilized.

**Keywords:** Cotton crop, standard cost concept, gross returns

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## Export Competitiveness of Jute in India

**B. Ray, Dr. V. J. Rathod, P. A. Ambadkar, A. S. Akhare and A. Pratihari**
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The jute industry has an important and special place in the Indian economy. Jute ranks next to cotton as the most important natural fibre. Jute industry is one of the important industries which have origin of the rise of modern industries in India.The NPC value of jute showed that its value was 0.811 in period I and 0.828in period II. For overall period, it was 0.819 which indicates jute is moderately competitive in international market. The factors affecting export were analysed by using different demand functions and Cobb-Douglas production function was found to be suitable one which concluded that international price ($X_4$) and world import of Jute ($X_6$) were significant.

**Keywords:** Jute industry, Cobb-Douglas production function

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# Marketing of Bg II Cotton In Akola District

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BG II cotton crop is the important cash crop grown in Akola district. Area under BG II cotton cultivation in Akola district for the year 2020-21 was 136750 ha (Source: District Superintendent Agriculture Office, Akola). The study was based on the primary data that was pertained for the year 2019-20. The primary data of 90 cultivators was collected from nine villages of three tahsils of Akola district.In BG II cotton marketing chain,10 village traders and 10 wholesalers were selected from APMC Akola for collecting the information of marketing.In per quintal marketing of BG II cotton,highest total marketing cost was observed in channel III i.e. Rs. 346.26 followed by channel IV (Rs. 334.80), channel II (Rs. 167.00) and channel I (Rs. 158.33). Producer's share in consumer's rupee was highest i.e. 97.11 per cent in channel I followed by 93.45 per cent in channel II, 88.13 per cent in channel IV and it was 85.89 per cent in channel III. It showed that if share of various intermediaries decreases, the producer's share in consumer's rupee increases.

**Keywords:** Market functioneries, Marketing cost, marketing channels, Price spread

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# Performance of Coffee in India

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The present study entitled "Performance of coffee in India" was undertaken to know growth and instability in area, production, productivity, import and export of coffee,The nature of data used for the study is entirely based on secondary source of data for 20 years i.e. (2000-01 to 2019-20) was equally divided into two periods i.e., period I (2000-2009) and period II (2010- 2019).The compound growth rate of coffee area, production, was found to be positive and highly significant during study, except productivity. The growth rate of coffee for import quantity and value was found to be positive and significant during period II and overall period. The growth rate of coffee for export quantity was found to be positive and significant for the period I and overall period whereas in case of export value, period I, period II and overall period were found to be positive and significant.The study of instability observed in area, production, productivity, it was shown that the coefficient of variation was found more in case of productivity as compared to area and production of coffee. The coefficient of variation was found to be highest in case of productivity of coffee during the period I (15.19). In the case of import quantity and import value, the coefficient of variation was found to be highest in case of overall period. The instability was more pronounced in export quantity as compared to export value during period II. In case of export quantity and export value, coefficient of variation was found to be less in overall period and period I. Coppock's instability index shows that area, production and productivity was found to be more in case of overall period of production as compared to area and productivity in coffee. In case of the import quantity and value, the variation was found more in overall xiii period of import value as compared with import quantity. In case of export quantity and value, it was shown that variation was found to be more in overall period of export value compared to export quantity.

**Keywords:** CGR, Coppock's instability index

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# Performance of Jute in India: Growth and Instability Analysis

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The jute industry has an important and special place in the Indian economy. Jute ranks next to cotton as the most important natural fibre. Jute industry is one of the important industries which have origin of the rise of modern industries in India. The compound growth rate of jute revealed that there is the positive and significant growth of production and productivity of jute for period I and overall period. There is negative and non-significant growth rate of area under jute cultivation for period II and overall period. Also, there is positive and significant growth of export as well as import for overall period. The study of instability revealed that there was stability in area, production, productivity, and consumption of jute throughout the study period whereas there was varying level of instability in export and import (quantity as well as value) of jute throughout the study period.

**Keywords:** CGR, production, productivity, and consumption

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# Trend of Coffee in India

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The present study entitled "Performance of coffee in India" was undertaken to know the Trend analysis of area, production, productivity, domestic prices and international prices of coffee in India for the overall period showed that, cubic models are found best fitted for area, production, productivity, domestic price and International price. The NPC value of coffee showed that in period I, it was 0.96, while for the period II, it was 0.49 and for overall period, it was 0.73 which indicates that Indian coffee was competitive in international market.

**Keywords:** CGR, production, productivity, and consumption

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# Constraints faced by the mogra and kagda growers in marketing of mogra and kagda

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The study was conducted in Palghar district from Konkan region of Maharashtra state. Majority of the growers of mogra and kagda flowers (97.50 per cent) had stated that 'shortage of labour' was a major problem in harvesting of flowers. Whereas 96.16 per cent of them had faced the constraints 'low quality flowers due to pest and disease attack'. In case of packaging 95.33 per cent of respondents had faced the constraints of 'non availability of packaging material' followed by 'markets are far away 92.50 per cent. Majority 90.83 per cent had faced constraints of 'lack of scientific knowledge and training',while 89.16 per cent of them experienced problem of 'fluctuation in market price',85.00 per cent respondents had reported 'non availability of grading facilities' and 'good varieties' as constraints. Seasonal demand', 'high cost of inputs' and 'lack of co-operative marketing institutions were the constraints faced by 82.50 per cent, 73.33 per cent and 70.83 per cent growers respectively. These are the major constraints reported by the respondents.

**Key words**: Constraints, mogra and kagdagrowers.

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# Marketing behavior of the mogra and kagda growers

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The study was conducted in Palghar district from Konkan region of Maharashtra state. It was observed that majority (43.33 per cent) of the mogra and kagda growers had 'medium' marketing behavior followed by 44.17 per cent and 12.50 per cent of the respondents had 'high' and 'low' marketing behavior respectively. The average marketing behavior score of the respondents was 29. All (100.00 per cent) of the respondents expressed that highly perishable nature of flowers was the major reason for selling mogra and kagda flowers at a particular period. Majority (93.33 per cent) expressed that they sold their mogra and kagda flowers to wholesalers through commission agents.

**Key words:** Marketing behaviour

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# Cost and Return Analysis of Beneficiaries and Non-Beneficiary Farm Pond Farmers for Soybean Cultivation in Washim District

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The present study entitled, 'Cost and return analysis of beneficiaries and non-beneficiary farm pond farmers for soybean cultivation in Washim District. The study was undertaken to examine the impact of farm ponds on production of soybean crops. There were 50 beneficiary farmers having farm ponds and 50 non-beneficiary farmers without farm ponds on their field were selected from Malegaon tahasil of Washim district. 10 villages from Malegaon tahasil were selected purposively and, from each village sufficient samples of beneficiary and non-beneficiary farmers were taken randomly for comparison. The selected farmers were classified into three categories *viz*., small, medium, large according to their land holding. The primary data was collected from the farmers by survey method and cost concept *i.e*., cost 'A', cost 'B' and cost 'C' was used for the analysis of data. The beneficiary and non-beneficiary farmers per hectare cost of cultivation of soybean crop for the sample as an overall was Rs. 89555.54 per ha and Rs. 75716.89 per ha.respectively. It is observed from the study that in case of beneficiary farmers at overall level the Output-input ratio at cost 'C' was 1.59, while in case of non-beneficiary farmers it was 1.38. It shows that the beneficiary farmers were more profitable than non-beneficiary farmers.

**Key words:** beneficiaries and non-beneficiary farm pond farmers

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# Assess Marketing of Selected Minor Forest Products.

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The present study was conducted in Gadchiroli district of Maharashtra state. In India, Minor Forest Products are an important livelihood source for several communities, particularly those living in forest fringe village. According to census 2011, the tribal population in India was 104 million people which accounts for 8.6 per cent of the total population of the country. It is estimated that, there is one tribal man for every fourteen

Indians. In India, nearly 31.00 per cent of them are directly dependent on MFPs for their livelihood**.** In the present study entitled assess marketing of selected minor forest products in Gadchiroli district", was undertaken with a view to study the various channels of marketing of MFPs and to analyse the problems faced by the tribal farmers in transacting MFPs. Dhanora tahsil is a tribal dominated tahsil which was selected purposively on the basis of maximum area under forest. Random sampling techniques was fallowed regarding selection of the villages and tribal farmers. In present study represents marketed and marketable surplus of selected MFPs, in case of charoli and gum, marketed surplus is 100.00 per cent means whatever products were collected, the whole quantity was sold to the market. But in case of mohaflower only 7919 kg quantity which was account to 78.26 per cent sold by collector and 2200 kg quantity which account 21.74 per cent kept for family consumption, for making liquor to family consumption Minor Forest Products (MFPs) are seen as crucial in improving the livelihood of tribal poor and to promote sustainability as there is immense potential of these product in value added in national and international market. Tribals farmers obtained employment and additional income trough out the year from the collection of MFPs.

**Keywords :** Assess Marketing, Minor Forest, Products**.**

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# Effect of age of seedlings and different levels of fertilizers and micro nutrients on Economics of Proso millet grown in Konkan region

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Millet is a prominent group of agronomical crops thrive and perform well under rainfed conditions having suitability under adverse conditions is the chief characteristic of thiscrop. India is a largest producer of many kinds of millet, which were often referred to as coarse cereals. However, realizing the nutrient composition of these grains they are now considered as nutria cereals (Nutritious grains). In India small millet is cultivated over an area of 9.03 lakh ha with a total production of 4.45 lakh tones during 2014-15.Proso millet is known for its high nutritional value. The seeds are a rich source of protein (12-13%) and have long storability under ambient conditions and hence, suitable as a famine reserve (Ramesh et al., 1998).A field experiment was conducted to study the "Effect of age of seedlings and different levels of fertilizers and micro nutrients on Economics of Proso millet grown in Konkan region. The experiment was laid out in split split plot design with three main plot, two sub plot and four sub sub plot treatments. Soil having low to moderate soil fertility status.The soil of the experimental plot was sandy clay loam in texture, moderately acidic in pH and very high in organic carbon content. It was low in available nitrogen, low in available phosphorous and moderately high in available potassium.

The data revealed that of proso millet at 30 day old age seedling were obtained the minimum grain (13.27 kg $ha^{-1}$)and straw (27.63kg $ha^{-1}$) yield found under different age of seedling. In fertilizer level levels application of 125 per cent of the RDF were significantly highest grain (12.40 kg $ha^{-1}$) and straw (25.45 kg $ha^{-1}$) yield over the 100 per cent RDF. Regarding different levels of micro-nutrients data reveals that the treatments combination consistingapplication of $ZnSO_4$ and $FeSO_4$wererecorded higher grain (13.37 kg $ha^{-1}$) and straw (27.48 kg $ha^{-1}$) yieldover rest of the treatments. The data revealed that transplanting of prosomillet at 30 day old age seedling wereobtained that the highest cost of cultivation, gross return(49902.51 ₹ $ha^{-1}$), net return and B:C (0.93 ₹ $ha^{-1}$) ratio found under the different age of seedling. In fertilizer levels application of 125 per cent of the RDF were significantly highercost of cultivation, gross return, net (45890.99 ₹ $ha^{-1}$)return and B:C (0.85 ₹ $ha^{-1}$)ratio over the 100 per cent RDF. In cases of different levels of micro-nutrients data reveals that the combined application $ZnSO_4$ and $FeSO_4$wererecorded highestcost of cultivation, gross return(50184.42 ₹ $ha^{-1}$), net return and B:C (0.91₹ $ha^{-1}$)ratio over rest of the treatments.The data on economics of treatment combinations are presented in Table 2. The data revealed that the highest B:C ratio 0.98. was observed when proso millet by

transplanting, at 30 days age old seedling with 125 per cent of RDF along with the micronutrient combination of zinc and ferrous sulphate @ 15 kg ha-1.These results are in line with (Ramesh et al., 1998) and Kakad (2017).

Transplanting prosomillet at 30 days old seedling with 125 per cent of RDF along with Micronutrient combination of ferrous and zinc sulphaterecorded the higher yield and B:C ratio over rest of the treatments.

**Keywords :** Cost and returns

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## An Economics Performance of Navnath Dairy in western maharashtra

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Dairy processing is the fast-growing business but bounded by inefficiently in procurement and processing Estimation of procurement cost, resource utilisation in plant, manufacturing cost and breakeven level of various milk products is unavoidable part of management to take right decisions for product manufacturing, policy and planning purpose to ensure maximum turnout from the plant. Keeping in view the above facts, the present study entitled "An Economics Performance of Navnath Dairy in western maharashtra ", was conducted with flowing specific objective- To estimate the costs and returns structure of Navnath dairy .

Navnath Milk and Milk Products plant has the widest variety of product mix. So, it has been selected for the study. Data for the study was collected from the records of the plant for the financial year 2018-2019. The total investment in capital assets is ₹ 810 lakhs. The major portion of investment was for plant and machinery which was ₹ 448.49 lakh (55.36 per cent). The second major investment is seen in factory building accounting for ₹ 165.40 lakh (20.41 per cent). The remaining 25% of investment was done in vehicles, furniture, non-factory building, micro-lab plant and diesel pump station. Total procurement of milk during the financial year 2018-2019 was 145 lakh liter. The share of fixed cost and variable cost in total cost per liter was found to be 11.23 per cent and 88.77 per cent respectively. The total revenue generated after selling the product was ₹ 1467.66 lakhs and ₹ 1646.73 lakhs respectively. The B:C ratio of Navnath dairy for the financial year 2018-2019 was 1.25, . The internal rate of return is 21.17 per cent The payback period is 5.29 years it is suggested that to improve economic efficiency of a business activity to a higher level, the dairy unit should try to increase the utilization of installed capacity and profitability in business.

**Keywords :** Milk and milk product,BCR

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## An Impact Analysis of Farmpond's on Beneficiary and Non-beneficiary Farmers for Gram Cultivation in Akola District of Maharashtra

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The present study entitled, 'An impact analysis of farm pond's on beneficiary and non-beneficiary farmers for gram cultivation in Akola district'. The study was undertaken to examine the impact of farm ponds on production of gram crop. The majority of population in Maharashtra exists in village and more than about 50 % among them depends on agriculture.And the scarcity of water it's been a major threat to the farming. Hence the rain water management is necessary to increase water efficiency and enhance the farmers productivity.For the present study, 100 farmers were selected in which 50 beneficiary farmers having farm ponds and 50 non-beneficiary farmers without farm ponds on their field were selected from Telharatahsil of Akola district. Out of 94 villages from Telharatahsil, 10 were selected purposively andfrom each village sufficient samples of beneficiary and non-beneficiary farmers were taken randomly for comparison. The

selected farmers were classified into three categories viz., small, medium, large according to their land holding. These villages were purposively selected taking into consideration, availability of at least five farm ponds in each village and their accessibility. List of farm pond beneficiary farmers from these villages was prepared with the help of officials of the state department of agriculture who are stationed at Telharatahsil. Schedule was designed for data collection by keeping in view the objectives of the study. The sample farmers for present study were personally contacted and primary data was collected from them in a specially structured schedule and questionnaire.The primary data was collected from the farmers by survey method. For this analysis,analytical tools and techniques were used such as cost and return analysis, and cost concept analysis i.e., cost 'A', cost 'B' and cost 'C'.The input use such as total hired human labour employed in case of beneficiary and non-beneficiary farmers at overall level was 24.18 per ha. and 25.47 per ha. respectively. Total fertilizer usage in case of beneficiary and non-beneficiary farmers at overall level was 53.75 per ha. and 72.05 per ha. respectively.The per hectare cost of cultivation of gram for beneficiary farmers at overalllevel as a whole was ₹ 32855.29. While in case of non-beneficiary farmers it was ₹ 43099.90. In case of beneficiary farmers at overall level the output-input ratio at cost 'C' was 1:52, while in case of non-beneficiary farmers it was 1:41.

**Keywords : cost and returns, BCR**

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# Efficient Marketing: Tools, Linkages and Value Chain Analysis

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Agriculture marketing entails interrelated duties such as production planning, growing and harvesting, grading, packing, shipping, storage, agro and food processing, distribution, and sale. All services relating to delivering agricultural products from the farm to the customer are included and it is undergoing significant changes due to liberalisation and globalisation of markets. It is complicated in and of itself because to its perishable nature and bulkiness, demanding additional attention and effort to determine the most effective marketing channel and strategy. In this environment, agriculture must become more market-driven, cost-effective, competitive, imaginative, and responsive to high-tech and information technology applications. Farmers have an efficient agricultural marketing system if they can sell their produce for a reasonable price, which improves farmers living standards, as well as agriculture, which is ultimately dependent on efficient agricultural marketing. An efficient agricultural marketing system is crucial for agricultural advancement and development because it encourages production, stabilizes output and pricing, reduces production costs, guarantees that producers get their fair share, and avoids consumer price discrimination. As many countries have demonstrated, agricultural development cannot progress and enhance production and price stability without an effective marketing framework. Farmers are either unaware of or late to learn about market demand for their crop, as well as market prices for their produce.

Various tools and linkages play an important role in bringing effective agriculture marketing system. Information and Communication Technology is one of the tools providing solutions that are required to assist farmers and agribusiness owners in improving their marketing effectiveness by providing information that aids in the sowing of crops that are in higher demand in the market. There is a higher demand for technology that allow farmers to swiftly get market information, assist farmers in directly connecting their produce to the farm and in the setting of their own prices, and assist business people in effective marketing. Digital ICT instruments include radio, television, cellular phones, computers, networks, hardware, software, and satellite-linked systems, as well as their associated services and applications, such as video conferencing, community radio, and distance learning systems. Some technologically successful market-changing projects include e-NAM, e-Choupal, Kisan Rath, AGMARKNET, and others. This results in the elimination of middlemen, the prevention of exploitation, and an increase in farmer earnings. Along with tools, linkages are also essential for the farmers to know where they may sell their produce and where buyers can physically interact with them. So, it depicts the interconnections are also crucial for effective marketing. Farmers to Farmers markets are a direct relationship between farmers and customers, with no need to store product because agriculture produce is perishable.

Farmers markets in India includes Rythu Bazar in Andhra Pradesh and Uzhavar Santhai in Tamil Nadu, play an important part in efficient marketing. Farmers' links with Farmers Producer Organizations (FPOs), direct linkages through a leading farmer, cooperative linkages, farmers to domestic traders, farmers to retailers, farmers to agro processors, farmers to exporters, farmers to the government, and so on, all aid in efficient marketing. Some farmers in Andhra Pradesh who are members of Farmers Producer Organizations sell their produce directly to the food processing industry, with the District Collector acting as a middleman and witness to their returns. This demonstrates the efficacy of farmers' marketing through FPOs. Some sugarcane farmers in Maharashtra's Kolhapur area are selling their crop directly to the jaggery businesses. These jaggery industries extract sugarcane juice and turn it into sugar, jaggery, and other products. They are improving the nutritious content of the sugarcane juice by processing it. Jaggery is high in nutrients, purifies the blood, is high in iron, is high in minerals, aids digestion, and increases metabolic activity, among other things. Bagasse is another byproduct of the jaggery production process which is used to make paper and cow feed, among other things. This demonstrates how effective marketing may improve the value of agricultural products. Efficient marketing increases the profitability of farmers, raises the standard of life, improves the efficiency of agri-based companies, and reduces harvesting losses. It adds to the value chain of agricultural products and improves the agricultural sector's returns.

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# Trends in export of turmeric from India

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India is known as land of spices and it is the world's largest producer, consumer and exporter of spices. There are about 70 spices grown in different parts of the world. In India, however, the major spices are pepper, turmeric, cardamom, and chillies. Turmeric is known as "Indian saffron". India is largest producer, consumer and exporter of turmeric in world. In 2018-19 quantity of export of turmeric was 133600 tonnes and value was 141616 lakhs. The present study was undertaken to study trends and competitiveness in export of turmeric. Study was based on secondary data .The secondary data on production, export quantity and export values were compiled from spice board of India and www.indiastats.com for a period of 17 years (2000-01 to 2017-18). The compound growth rates were worked out to assess the trends in export of spices. The study revealed that the export of turmeric has steadily increased over a period of time and it rose from 0.03% to 14.95% export with respect to total spices export (2001-2017).During 2000-01 the total export of turmeric was reported to be 7147.22 MT accounted 0.03 percent of total spices export, whereas during year 2016-17 it was increased to 90749.64 MT.

The export competitiveness was arranged using nominal protection coefficient (NPC). This is the ratio of domestic price to the border price. This helps in measuring the degree of export competitiveness and the competitiveness of market for turmeric. The study revealed that North America (0.39) was highly competitive market at constant price for turmeric export from India. However, continents like Europe (0.51), South America (0.66), Africa (0.71) and Asia for export of turmeric were observed to be moderately competitive markets. Australia (1.12) was non-competitive market. At current price, it was seen that North America (0.72) and Europe 0.94 were the moderately competitive markets. Whereas South America, Australia, Asia and Africa markets were found to be non-competitive at current price for export of turmeric.

The determinants for export performance of turmeric from India were analyzed for the period 2000-01 to 2016-17. The factors determining the turmeric export from India were studied by using multiple regression of log-log form were quantity exported was regressed against the export price to the domestic price, production, exchange rate, domestic consumption, lag production and world output. Turmeric is one of the important exporting spice and factors included in model were influencing 92.69% of turmeric export from India. Out of total factors included in model, the production of turmeric was positive indicating positive role in export. Domestic consumption has statistically significant factor but negatively influence on export of turmeric.

**Key words:** export, turmeric, competitiveness, trend, determinants

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# Techno-Economic Feasibility of Battery Electric Vehicle Sprayer for Custom Hires Service Business

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The work presents, techno-economic feasibility of battery electric vehicle sprayer for custom hires service business model. The key ethics of the study were to determine the economic parameters for developing a battery electric vehicle spraying custom hire service business. In present investigation Modified Accelerated Cost Recovery System (MACRS) was used in which a depreciation schedule will begin with a declining balance method, then switch to a straight-line schedule to finish the schedule. During the techno economic feasibility of the BEV sprayer the payback period was analyzed to be 4.13 years of the machine operation. The result shows that the average rate of return on investment was found 1.53. As can be seen from results that the BCR, PBP, BEP, was estimated as 1.53, 4.13 yrs., and Rs. 105.21 ha/yr respectively. The IRR and NPV was estimated to be 29.45 %, and Rs. 70821.

**Keywords :** BCR, PBP, BEP, IRR and NPV

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# Economic Analysis of Custard Apple pulp in Akola District

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Custard Apple (Sitaphal) is a tropical fruit grown mainly in the tropical climate. The fruits are well known for their delicious taste and are heart shaped with light green skin, a soft creamy white flesh. The Custard apple Pulp was selected for study as Vidarbha is one of the major Custard apple growing regions in Maharashtra.The problems of post-harvest lose and availability of raw material creating hurdles to startup of Custard apple pulp processing industry in the study area.Present study aims to quantify cost and return of starting Custard apple pulp industry and also identified the problems faced by the processor. The total Establishment cost required Custard apple Pulp Processing Unit was found Rupees15, 876.76 in the study area. The Major constraints faced by processing firm were frequent power cut in the study area and price fluctuation of Custard apple and unavailability of raw material during off season.

**Keywords**- Custard Apple, Processing Unit, Establishment cost, Constraints

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# Economic Analysis of Tendu Patta Plucking in Wardhadistrict

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Investigation was undertaken in Wardha district of Vidarbha region.Total 71 tendu patta pluckers were selected and data pertained for the year 2020-21.The average household size of tendupattapluckers were estimated at 4.31 and majority of them were educated upto high school level.The average annual household income of tendupattapluckers were estimated to Rs. 83499.98.0wn farm Agriculture was the main occupation of tendu pattapluckers.The income from own Agriculture farm was found predominant over other sources.The individual tendupattaplucker was spend on an average 5.59 hours per day and they travelled average distance was estimated 2.81 Kms per day for collection of tendupatta. It was found that 77.47 per cent oftendupattapluckers were sold their collected tendupatta to private agents. The threat from wild animals was

the major constraint in tendupatta collection.The absence of employment during April- June was the main reason behind choosing this profession of tendupattacollection.

**Keywords**-: tendu patta pluckers , Cost and returens

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## Pattern of Market Arrivals and Prices of Pigeonpea in Akola District

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In this study an attempt has been made to study the pattern of market arrivals and prices of Pigeon pea in Akola district. The present study was based on the time series data of monthly prices and arrival of principal commodities were collected from major APMC'S of Akola district for the period of 10 years i.e. from 2011 to 2020. The study was carried out by employing the econometric tools like ADF test, Johansen's Multiple Co-integration test, ARCH-GARCH model and GrangerCausality test were used to study price volatility and co-integration among selected markets.The study reveals thatthere is inverse relationship between prices and arrival of Pigeon pea in selected market of Akola district.The selected markets for principal commodities having long run equilibrium relationship for the prices of principal commodities and there exist co-integration among them.The volatility shocks in the prices of Pigeon pea is quite persistent in the selected markets.

**Keywords:** Seasonal variation, cyclical variation, ADF test, ARCH-GARCH, Co-integration, price volatility.

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## ARIMA Model for Forecasting of Area, Production and Productivity of Rice in Chhattisgarh plain zone of Chhattisgarh State

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Crop acreage estimation and crop yield forecasting are two components, which are crucial for proper planning and policy making in the agriculture sector of the country. This research is a study model of forecasting area, production and productivity of rice in Chhattisgarh plain zone of Chhattisgarh. Data for the period of 2002-03 to 2017-18 were analyzed by time series methods. Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) were calculated for the data. Appropriate BoxJenkins Auto Regressive Integrated Moving Average (ARIMA) model was fitted. Validity of the model was tested using standard statistical techniques. For forecasting area, production and productivity ARIMA (1, 3, 2), (1, 3, 2) and (1, 3, 2) model respectively were used to forecast ten leading years. The results also shows area forecast for the year 2027 to be about 2883009 hectare, production forecast to be about 5087281 tonnes and productivity forecast to be about 1.65 tonnes per ha.

**Keywords:** Forecasting, Area, Production, Productivity, Rice, ARIMA

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# Economic Analysis of Farmer-Producer–Organization (FPO) : A case study of Abhinav Farmers Group, Narayangaon, Pune.

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The Abhinav Farmers Group of grape growers came into existence in 1988 at Narayangaon, Pune. Its main object was to eliminate middlemen in marketing process, encouragement and development of agricultural export. The present studay was undertaken to evaluate the profitability of Abhinav farmers group by using the economic indicators to compare the costs and returns of member and non-member farmer's farm. The data of cost of cultivation of grape and problem faced by member farmers and non member farmers (30 each, thus total 60 farmers) were collected for the year 2019-20. Economic Parameters such as Internal rate of return**s,** Benefit cost ratio**,** Break even analysis and Pay - back period (PBP) were employed alsong with financial analytical tools like liquidity ratios (Current, Quick, Net Working Capital and Debt equity ratios) and profitability Analysis by return on assets, return on equity and net profit margin were estimated.

Average per hectare yield, cost of cultivation, gross returns, B: C ratio obtained from grape cultivation were 204.64 quintal and 211.31 quintal, ` 878924.47 and ` 830294.23, ` 1244448.77 and ` 1082617, 1.42 and 1.30, respectively for member and non member grape grower which indicated that the cultivation of grapes was profitable.

The financial feasibility of investments of Abhinav farmers group, measures of project appraisal was computed. The payback period was 18.4 years. The benefit cost ratio in grape was 1.32 at 30 per cent discount rate which was more than unity. The internal rate of return 32.10 per cent which indicates a higher average earning power of money invested in the project. The break even quantity of export of grape for abhinav farmers group is 65.56 tones.

Price received by abhinav farmers group for grape per kg was ` 111. The per kg cost incurred by abhinav farmers group was ` 26.30 (23.69%).The per kg net profit earned by abhinav farmers group was ` 18.50 (16.66%).The per kg net price received by producer was ` 62.00 (55.85%).

More incidence of pest and disease, high cost of fertilizer and plant protection material and non-availability of labour in peak season, the lack of market information, lack of price policy by govt. and Cheating by Trader, non availability of credit in time and crop insurance not covered for grape were major problems faced in production of grape by Abhinav farmers group members and non members.

**Keywords:** Farmers Group,Cost and returns,BCR

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# A study on the consumption of super food with reference to Millets

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In recent years, the focus of the people has shifted from fast food products to healthy food products. This inclination is major because of the increase in the number of patients with different types of medical conditions. People want to eat healthily, but the problem arises that they don't know which type of food is healthy for them, what is needed of their body, and what nutrition is their food providing to them.
The main objective of the research was to study the awareness level among different stakeholders about Super foods. Super foods are foods that have a very high nutritional density. This means that they provide a substantial

amount of nutrients and very few calories. They contain a high volume of minerals, vitamins, and antioxidants. Antioxidants are natural molecules that occur in certain foods. They help neutralize free radicals in our bodies. Free radicals are natural by-products of energy production that can wreak havoc on the body. Millet is one of the most important superfoods. To study the nutritious levels of different millet products and their benefits on different types of disease & medical conditions.

The study is based on primary and secondary research. Primary research was conducted by interviewing various stakeholders to know their awareness level about the millet products and their consumption patterns. Qualitative and quantitative data were analyzed using various research tools. Results show that Millets have a higher nutritive value as compared to wheat and rice in terms of proteins, fibers, and micronutrients. Millets can be helpful in preventing as well as controlling health issues like diabetes, iron deficiency and digestion-related problems. It has antioxidants and can be helpful in preventing diseases like cancer. Millets can withstand the harsh climate and have better resistance to pests as compared to wheat and rice. Despite so many advantages millets are consumed far less as compared to wheat, rice, and maize. From the research, it is observed that lack of awareness is a major issue among households and patients. The study recommended that there is a strong need to create awareness among consumers about the benefits of consumption of millets through various modes of advertising and Promotion.

**Keywords-** Super food, Millets, Healthy food, Disease

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# Effect of Different Rice Establishment Techniques on Economics and Agronomic Indices of Panvel -1 Rice Variety under Coastal Saline Soil condition of North Konkan Region

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A field experiment was conducted during the *Kharif* season of 2016, 2017 and 2020 at Khar Land Research Station, Panvel, Dist. Raigad (Maharashtra) to study the effect of different establishment techniques of rice on agronomic indices and economics under Coastal Saline Soil Condition of *North* Konkan region. The experiment was laid out in randomized block design with four replications and treatments consist of 5 establishment techniques, i.e. $T_1$-Direct seeding by drum seeder, $T_2$-Transplanting, $T_3$- *Rahu* method (Broadcast), $T_4$-Direct seeding (Broadcast) and $T_5$- *Avatani* (local practice).The salt tolerant *Panvel-1* rice variety was taken. The three years pooled data revealed that, the transplanting method recorded maximum biological yield (58.72 q $ha^{-1}$) and higher production efficiency (23.62 kg/ha/day) than other establishment techniques, while the economic efficiency was observed maximum i.e. 133.67 Rs./ha/day in direct seeding by drum seeder method. The minimum value of economic efficiency (65.98 Rs./ha/day) was observed in *Avatani* (local practice) method. In case economics, direct seeding by drum seeder method recorded maximum net returns (Rs.14182) with highest B:C ratio (1.44), the transplanting method had recorded second highest net return (Rs. 12903). The minimum net returns (Rs. 5898) with lowest B:C ratio (1.14) noted in *Avatani* local method. It was concluded that, to get the maximum net profit from *Panvel-1* salt tolerant rice variety among the different rice establishment techniques the direct dry seeding drum seeder should be followed under coastal saline soils of North Konkan region.

***Key words:*** Agronomic indices, Economics Establishment Techniques,, Coastal saline soil

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# Constraints faced by the farmers of Konkan region in organic farming

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As per the definition of the USDA study team on organic farming "organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc.) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection".Present study was carried out in 5 district of Konkan region of Maharashtra state. List of the organic farmers from all the five district of Konkan region were obtained from central Government scheme "ParamparagatKrishiVikasYojana" running under Agricultural Technology Management Agency to promote organic farming. In all, 300 farmers were selected using proportionate random sampling method. The finding of the study revealed that, Major constraints faced by the farmer in organic farming were lack of knowledge about organic plant protection management (93.67 per cent), unavailability of organic inputs in critical time (Bio-pesticides, Bio-agents and Pheromone Traps) (85.22 per cent), no minimum support price for organic produce (81.00 per cent), lack of testing facilities (soil, water etc) (70.33 per cent), Lack of knowledge about recommended low cost technologies (69.66 Per cent), lack of skill regarding the preparation and usage of organic inputs (68.33 per cent), lack of technical guidance at proper time (64.00 per cent), lack of demand for organic produce in large amount in local market. (61.33 Per cent), inadequate availability of market for organic products (53.00 per cent) and high cost of organic manures and biofertilizers (48.33 per cent).

**Key words**: Constraints, Organic farming

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# Export Oriented Farming

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Agriculture is the primary source for around 58% of India's population as an income. Now since India has become self sufficient in food production, the need of the hour is to re-orient our research and policies towards export oriented farming. As a result, export-oriented agriculture will play a critical role in tripling farmers' income. This will bring much-needed foreign exchange home and will almost probably lift some farmers out of poverty. India being a tropical country provides the favourable climatic conditions for growing spices, medicinal crops, tropical fruits and vegetables. We have to utilize this comparative advantage and grow as a leading exporter. There are some major areas of farming where there is scope in international market. Those are, spices, herbal crops, organic food products, floriculture, value added or processed food.

In herbal crop production India can compete fairly well in the international export. Since it has global monopoly in isabgol/psyllium and is topmost exporter in turmeric and only next to China in ginger. In the world market for Isabgol, India has a monopoly. It is a proven bowel regulator. It's mostly utilized as a viscous, soluble dietary fiber that the small intestine doesn't absorb. It also lowers blood cholesterol and thus is useful in reducing the risk of coronary heart disease. Psyllium husk may also lower your chances of developing type 2 diabetes. Ginger where India is next to only China in export market. In India ginger is used in making curry paste. Ginger appears to have anti-nausea properties. It has a long history of being used to treat seasickness. It can help in overcoming indigestion, has anti-inflammatory effects and can help with osteoarthritis. Ginger is shown to significantly reduce blood sugar levels and improve risk factors for heart disease and can also reduce

the risk of cancer. Turmeric in which India is the leading exporter. It has very high medicinal value in ayurveda, siddhi, unani etc. It has anti inflammatory property and is generally the first thing to be given (mixed in milk) in accidental injuries in India. Turmeric first used as a dye, and later in folk medicine. It's a potent anti-inflammatory agent and it is recommended in arthritis and it is also an antioxidant and may also help to improve and can help to prevent depression symptoms. Other health benefits include prevention of cardiovascular disease and Alziemers. People in advanced country are becoming aware of the health benefits of such medicinal crops, as the leading producer of these crops, we owe a responsibility to popularize the high medicinal value and tap the market advantages available in international market. However, to hold its positions in worldwide export market of these crops, India should make extra investments in agricultural and marketing research. Agricultural research is required to produce high-yielding cultivars and agronomy with higher levels of active chemicals, as well as market research for new export markets. Floriculture products includes Cut flowers, pot plants, cut foliage, seeds, bulbs, tubers, rooted cuttings, and dried flowers or leaves. Roses, carnations, chrysanthemums, gerberas, gladiolus, gypsophila, liastris, nerine, orchids, archilea, anthurium, tulip, and lilies are among the most important floricultural crops in the international cut flower trade. Gerberas, carnations, and other floriculture crops are cultivated in greenhouses. Chrysanthemums, roses, gaillardia, lily marigold, aster, tuberose, and other open-field crops etc. USA, Netherland, UAE, UK, and Germany were major importing countries of Indian floriculture. In such cases the infrastructure facilities must be improved for reducing post harvest losses. For example air cargo space improvement, air freight and sea freight rates must be monitored, more airports must be converted into international airports for exporting such perishables. Facilities must be provided from the government to practice floriculture near the metropolitan cities and earn foreign exchange through exporting quality cut flowers etc. Organic farming: Since is highly demanded in developed countries. By practicing organic farming we can improve our soil health along with exporting the branded organic products to developed countries. India must set the standards and develop brands which highlight the Indian organic products and excel in exporting field. India has good market for Basmati rice, Cashew, Coffee and fruits like mango etc. Cultivation, processing and value addition in these major crops and developing uniform quality and packaging standards for organic and ethnic products will help to gain profit from international market. Finally Government of India needs to identify more such crops, the areas where they are grown and provide necessary research, processing facilities and procurement at pre-fixed price to facilitate their production and export.

**Key words:** export market, organic farming, processing and value addition

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# Production and marketing of Sorghum bread (*Roti*) in Solapur District

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Purpose of this research was to investigate the selective sorghum value added products, as they are produced on large scale and has market value. In light of these considerations, the current study on the marketing of value-added products of sorghum was carried out with the specific objectives as to ascertain the input use and estimate the costs and returns of sorghum *roti*; to access the marketing structure; to estimate the channel wise costs, margins and price spread and to ascertain the constraints in marketing. Primary data on physical input, cost incurred, returns gained and marketing constraints were collected through personal interviews with 15 *roti* vendors purposively selected from Solapur city. For the analysis, data for the years 2020-21 were collected. The cost of production of sorghum bread (roti) was evaluated by using fixed and variable costs involved.

The annual sorghum requirement was 3847.98 kg, rice and salt requirements of 769.59 kg and 76.96 kg, respectively. The labour charges for 100 *roties* ranged between ` 85 and ` 100, thus annual labour charges were calculated to be `90,357.80/- and annual fuel costs were calculated to be ` 51,480.42/-. Grinding costs `21,182.58/- at a rate of `4.60/kg.

The main factor influencing the total cost of production was sorghum, which contributed 35.36 percent (`24.6) to the total cost. Labour charges were the next major factor, accounting for 34.16 percent (`23.76/-), followed by fuel expenditure (19.49 %), grinding charges (6.61 %) and rice (3.18 %). The total cost of production per kg was calculated to be `69.56. The cost of production per *roti* was Rs. 2.64. Annualy, 100692.67 *roties* were produced and approximately, 78.36 and 20.18 per cent were disposed of in Channel-I (*Roti* vendor – Hotel owner – Consumer) and Channel-II (*Roti* vendor – Consumer), respectively.

The total marketing cost in Channel-I was `7.86, which included packaging charges of `2.70 and transport charges of ` 5.16. The cost of marketing in Channel II was `2.70 only. The producer received a gross price of ` 108.60 and a ` 112.53 per kg of flour (i.e. 26.47 number of *roties*) from Channel-I and Channel-II, respectively. The per *roti* price paid by the consumer in Channel-I was `8.50, while ` 4.25 in Channel-II.

Unpredictability in demand was the major problem faced by cent per cent vendors in marketing of *roties*, followed by higher fluctuations in prices of inputs (73.33%) and low margin (46.67%).

**Key words:** marketing cost, marketing Channel,price spread

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# Trends in export of Black pepper from India

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India is traditionally known as spice bowl of world and is also the largest consumer, producer and exporter of spices.It is the world's largest spices producer with 44 per cent share in output and 36 per cent in global spice trade. Over the past years there has been a steady increase in area and production of spices in India. 5 to 10 per cent is utilized by oleoresins, pharmaceuticals and cosmetics companies, 15-20 per cent exported and the remaining 5 per cent goes for seed purposes. Total spices export from India stood at 1.08 billion kgs, valued at US$ 3.11 billion in the year 2017-18. Top exporters of Indian spices in 2017-18 were the US, China, Vietnam, Hong-Kong, UK, UAE, Malaysia and Sri Lanka. Traditionally Black-pepper known as black gold or the king of spices, has been produced in the 3 tropical countries, namely India, Indonesia and Malaysia.India stand in the first position in terms of pepper exports and area of production followed by Indonesia. India on an average export around 22 thousand tonnes of pepper annually. Meanwhile, it imports 17 thousand tonnes of pepper. Growth in Indian pepper export is just 0.2 per cent in the last 10 years. Whereas in value terms it is growing at a rate of 18 per cent.

The main objective of the study is to study trends in export of spices .The export of black pepper during the year 2000-01 was reported to be 171227 MT accounted 0.72 per cent share in total export of spices. However, the export of black pepper increased to 29204.47 MT during 2016-17 and it was accounted 4.81 per cent share in total spices export in the respective year; indicated that during the study period the export of black pepper increased over a period of time from 0.72 per cent to 4.81 per cent in total spices export from India. The study was based on secondary data. the secondary data on production, export quantity and export value were complied from Spice Board of India and www.indiastats.com for a period of 17 years (2000-01 to 2017-18). The data were grouped into continents and continent wise analysis was done using various statistical tools.

In black pepper export competitiveness it was revealed that, the continents like, Europe (0.71), Asia (0.71), Australia (0.75) and North America (0.76) were moderately competitive markets for Black pepper export whereas, the continents like Africa (2.49) and South America (4.71)were found to be non-competitive markets at constant price. However, the competitiveness also estimated at current price and it was observed that all the markets in the world for black pepper were non-competitive to India. It may be due to high production cost.

The determinants for export performance of Black pepper analyzed from India, the variables included in the model influencing 91.49 per cent of the total export of black pepper from India. The production of black pepper was independent variable that was found to be positive and significant effect on export of black pepper. The production influenced the export by 12.60 per cent. However, the other variable like domestic consumption has a significant effect on export of black pepper but it was found to be negative, indicating effect of export of

black pepper (-11.83%). The trends in export value and per unit of export value of spices were positive and significant. the extent of instability of export of spices in terms of quantity, value and per unit value from India were high.

**Key words** : export, black pepper, trends, competitiveness, determinants ,

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## Structural changes analysis of mango export market of India and competitiveness

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This study has examined the trade direction and export competitiveness of mango from India during 1995-96 to 2017-18. The direction of trade of Indian fresh mango and mango pulp export to different destinations was examined by estimating the transitional probability matrix using Markov chain analysis and accordingly future export for same were calculated. Saudi Arabia showed highest positive and significant growth rate for mango import and YAR showed highest positive and significant growth for mango pulp export. Though India is the largest producer of the choicest varieties of mango, the country is not a major player in the export market, either fresh mango or processed mango products. The findings showed that Mexico, Netherlands, Brazil, Peru and India are the top most exporters. USA, Netherlands, Germany, UAE, and UK are the major mango importing countries of the world accounting for more than half of the total world imports of mango. . Study revealed that in case of fresh mango export, UAE and Qatar were the most loyal market. Similarly, in case of mango pulp, UAE and Saudi Arabia were the most stable markets. The increasing share of other countries clearly shows the need to explore and exploit the market potential of other countries It was predicted that quantum of fresh mango export to major countries viz. UAE, Saudi Arabia, Kuwait, UK and Qatar are expected to increase from the year 2017-18. India has enjoyed comparative advantage in mango exports in the world market over Brazil, China, Thailand and Indonesia during study period. Efforts are also needed to improve the efficiency of production and quality in order to stabilize the markets and also to make the product acceptable and price competitive in other importing countries.

**Keywords:** Mango, Mango pulp, Trade, Competitiveness

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## Economics of Banana Production in Kolhapur District of Maharashtra

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The area under Banana in Kolhapur district is increasing day by day due to congenial good soil and climatic condition for banana cultivation and more water availability of banana. The present study with specifics objective are trends in area, production with productivity and costs, returns of banana production in Kolhapur district. The data was collected for the year 2019-20 . The ACGR for area, production and productivity of banana in Kolhapur district for the period 2009-10 to 2019-20 were estimated to 8.82, 7.09 and -2.30 per cent per annum, respectively. At the overall level, the per hectare use of human labour and manure were 350.93 man days and 371.18 qtls. respectively . The per hectare cost of cultivation was 3,82,987. The major items of cost were rental value of land (35.59%), seedlings (20.06) and interest on fixed capital (0.29%). The percentage of

cost A and cost B in the total cost of cultivation were 65.31 and 96.71 percent respectively. The benefit cost ratio 2.55 indicating profitability of crop.

Keywords : Banana, Kolhapur, ACGR

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## Performance of different varieties of Gerbera (*Gerbera jamesonii* Bolus) under protected cultivation in Konkan region of Maharashtra

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The present investigation entitled "Performance of different varieties of Gerbera (*Gerbera jamesonii* Bolus) under protected cultivation in Konkan region of Maharashtra." was conducted at High-Tech nursery during the year 2020-21 at College of Horticulture, Dapoli, Dist. Ratnagiri (MS). The experiment was laid out in Randomized Block Design with ten treatments and three replications. The treatments consisted of ten gerbera varieties viz. Stanza, Ankur, Danna Ellen, Brilliance, Silvester, Balance, Dune, Goliath, Intense and Rosalin. Studies for enhancing the vase life of gerbera cut flowers was carried out by using distilled water at ambient conditions.

The results revealed that, Ankur variety recorded maximum number of leaves (64.53), plant spread (77.80), leaf length (39.32), leaf area index (2.35), days to first flower bud emergence (84.76), flower diameter (99.59), stalk length (64.15), length of ray floret (4.81), number of flowers per plant (22.00), flower yield per ha (7.92 lakh). It also recorded maximum net returns (Rs. 38.89 lakhs per ha) with highest B:C ratio (2.58).

Another variety Goliath recorded maximum plant height (44.03 cm), leaf breadth (11.55 cm), stalk diameter (5.98 mm), number of petals per flower (85.02).Dune recorded maximum disc diameter (2.41 cm).

During the period of investigation Ankur, Goliath and Dune varieties performed better with respect to yield, quality and cost:benefit ratio. Based on limited period of study, it can be concluded that Ankur and Goliath varieties are suitable for protected cultivation in the Konkan region.

**Key words-** plant spread, ray floret, leaf area index, disc diameter

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## Performance of Agricultural Export from India

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Export plays a key role in enhancing economic growth. Almost all countries wish to enlarge their market share in global trade for sustainable economic development. In export endeavours, the focus is always on exporting manufactured products, even though opportunities exist for exporting numerous value added agricultural products. India has immense potential to transform agricultural commodities into exportable goods through value addition. International trade not only results in increased efficiency but also allows countries to participate in a global economy which raise employment levels and increases the income of individuals and nation as a whole. This leads to stimulating economic growth. The present study is undertaken to study

Performance of Agricultural Export from India. The study revealed that the share of agricultural export in total export is increasing from 9.71 to 13.79 per cent from year 2010-11 to 2013-14 after that it decreases slightly 12.63 to 11.39 per cent from year 2014-15 to 2019-20 and then again increases to 14.40 per cent in year 2020-21.

**Key Words :** Export, Import, Balance of Trade

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## Performance of Fruits Export from India

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Export plays a major role in boosting economic growth of a country. Almost all countries aim toexpand their market share in global trade for sustainable economic development. Internationaltrade results in increased efficiency along with it allows countries to interact in a global economic platform which in turn not only raise employment levels but also increase theincome and living standard of individuals and the nation as a whole. This leads to stimulating economic growth. In export sector,focus is mainlygiven on export of manufactured products, even though immense opportunities exist for exporting numerous valueadded agriculture and allied products.India has immense potential to transform fruits products,which is a sub-sector of Horticulture products, into exportable goods through value addition.The present study is undertaken to study Performance of Fruits Export from India. The study revealed that the share of fruits export in agriculture export is increasing from 2.33 to 3.92 per cent from year 2011-12 to 2016-17 after that it decreases slightly to 3.61to3.47 percent from the year 2017-2018 to 2020-2021.

**Key Words:** Export, Import, Balance of Trade

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## Natural farming: Away forward for improving sustainable soil health.

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Soil is a fundamental and essential natural resource for existence of all living organisms. Soil health or quality is defined as the capacity of soil to function as a vital living ecosystem that sustains plants and animals. Intensive crop cultivation using broadly using imbalanced fertilizer, high nutrient mining through monoculture, decline in organic matter status, deficiencies of secondary and micronutrients, etc. have deteriorated the soil health across the region in India resulting into declining crop productivity growth.

AS per the economic survey categorized alternative farming practices likeNatural farming or ZBNF as one of the organic farming models. It also highlights that the main aim of ZBNF is the elimination of agro-chemical and to sustain agricultural production with eco-friendly processes in tune with nature. Through ZBNF, soil fertility & soil organic matter is restored, less water is required, and it promotes climate-friendly agriculture system.

ZBNF aims to improve soil health by improving the soil biological activity by adding microbe inoculants and organic matter. The practices of Natural Farming include the addition of microbial cultures to enhance decomposition and nutrient recycling; use of local seeds; integration of crops, trees and livestock (mainly cows of native breeds); effective spacing of crops, contouring and bunds to conserve water; intensive mulching; extensive intercropping and crop rotations. Moreover, mulching has huge positive effect on SOC content due to enhanced soil and water conservation, lower average and maximum soil temperatures under

mulch than in unmulched soil surface, return of biomass to the soil, increase in soil biodiversity, and strengthening of the nutrient cycling mechanisms.

Pure Naturally/organically grown products have higher antioxidant, lower cadmium concentrations and lower incidence of pesticide residues. High concentrations of a range of antioxidants such as polyphenolics found in organic crop-based foods are linked to a reduced risk of chronic diseases, including neurodegenerative diseases and certain cancers.

**Key Words:** Natural farming or ZBNF, organic farming models, antioxidant

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## Status of Fresh Papaya Export form India

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India is known as basket of fruits and vegetables in the world. Among fruits, India ranks first in production of Banana, Papaya and Mangoes. This immenseproduction base offers India tremendous opportunities for export of fruits specially Banana, Papaya and Mangoes. Hence this study was under taken to know the status of fresh papaya export from India during last two decades. The secondary time series data on export of fresh papaya was collected for the period of 20 years i.e. 2000-01 to 2019-20. The data was collected for HS code of 08072000. The results revealed that, in terms of quantity, UAE, Saudi Arabia, Nepal, Bahrain, Qatar and Kuwait are the major fresh Papaya importing countries form India. In value terms, major fresh Papayaimporting countries are UAE, Saudi Arabia, Netherland, Qatar, Kuwait and Bahrain. UAE is a single most country which has exported around 39.00 per cent of fresh papaya from India.

**Key Words:** time series data,Export and Import

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## Best Model to Predict the Short Run Prices of Soyabean in Latur Apmc Market of Marathwada Region.

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Prices of Agricultural commodities play a crucial role in overall development of the economy. It helps famer-producer to enhance their income. It helps farmer-producer to take rational decision about uses of limited resources to maximize to output of agricultural commodities. Short run price forecasting of important agricultural commodities helps farmer to decision about land allocation in crop mix and decided the level of crop production. Soybean which is one of the most important oilseed crops of world has occupied 43 per cent areas of total oil seed crops in India and contributed 25 per cent oilseed production. It is second most important crop Maharashtra state after Cotton. Hence this study was under taken to develop best model to predict short run prize of soybean in one of the most important APMC i.e. Latur. Monthly secondary time series data of soybean prices was collected for the period from 1999- 2000 to 2020- 2021 from APMC Latur. Time series modelling approach was employed to accomplish the task. Time series models *viz.* Simple, Holt's Linear trend, Brown's liner trend, Damped trend, Simple seasonal, Winter additive, Winters multiplicative, ARIMA and SARIMA was fitted. The best model was judged based on lowest AIC and BIC criteria. The results revealed that, soybean price series in Latur APMC market has shown strong seasonal pattern. SARIMA model was found superior over ARIMA and other time series model. SARIMA model of order $(0,1,3)\ (0,1,1)_{12}$ was found best model for short run soybean price forecasting. The short run price forecast shows the increasing trend in soybean prices.

**Key Words:** APMC market, SARIMA and ARIMA model

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# Seasonally in Arrivals and Prices of Major Oil Seed Crop in Maharashtra.

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India is the fourth largest oilseed producing country in the world next to USA, China and Brazil. The diverse agro-ecological conditions in the country are favourable for growing nine annual oil seed crops which include seven edible and two non-edible oil seeds. The major oilseeds produced in India are Soybean, Groundnuts, Rapeseed, Mustered, Caster seed, Sesamum, Sunflower etc. Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, Tamil Nadu, Haryana and Andhra Pradesh are the major oilseeds producing state in the nation. In Maharashtra Soybean is major Oilseed crop. It arrivals in market usually start in the month of September-October and ends during February-March. Many agricultural commodities revealed the seasonally in arrivals and prices. To test this statement with soybean crop, this particular study was under taken. The monthly time series secondary data was collected from APMC Latur on two important parameter *viz.,* arrivals and prices. The data was collected for the period from 1999-2000 to 2020-2021. The seasonal indices were worked out with the help of ratio to moving average method. The result revealed that, arrival index was more than 100 for the month of October, November, December and January. This period is called as peak period of arrivals. This shows seasonally in arrivals of soybean in Latur market. In regards to prices, index was highest in the months of June, July and January to May. Due to seasonally in arrivals and prices, wider fluctuation was noticed.

**Key Words:** Arrivals and Prices, monthly time series, APMC

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# Direction and Pattern of Groundnut Export from India

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Groundnut is one of the world's most important oilseed crops. This crop is called as King of oilseeds. To Indian farmer, it is most valuable cash and food crop. The export of this crop was mostly in the form of Shells or Kernels and not in the form of edible oil. In India Groundnut is cultivated mostly in Gujarat state followed by Andhra Pradesh, Rajasthan, Karnataka, Maharashtra etc. After the establishment of WTO, the interaction between Indian economy and world economy was increased. This action enhanced direct consumption and export of Groundnut for table purpose from India. So this was undertaken to know the direction and pattern of groundnut export from India. The secondary time series data was collected from 2000-01 to 2019-20 to accomplish the task. The data was collected for HS code 1202.The trade direction of export was analysed using the first order Markov chain approach. The results revealed that, during first period of the study (2000-01 to 2009-10), Indonesia was the most stable market followed by Philippines, Malaysia, Thailand. During second period of study (2010-11 to 2019-20) Malaysia was the most stable country followed by Indonesia, Ukraine, Philippines, Pakistan, Thailand, UK and Russia.

**Key Words:** time series ,export and import

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# Constraint and Suggestion Analysis in Production and Marketing of Maize in Marathwada Region of Maharashtra using Garrett's Ranking Technique

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Maize (*Zea mays* L.) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as 'Queen of Cereals' because it has the highest genetic yield potential among the cereals. Maize is considered a promising option for diversifying agriculture in upland areas of India. It now ranks as the third most important food grain crop in India. Maize is the third largest grain crop in India, after rice and wheat.The area under maize crop in Maharashtra state was 1.16 million hectares (12.21 percent), production of 3.54 million tonnnes (12.33 percent), with productivity of 3062 kg per hectare.The present investigation was undertaken with a view to study the constraints faced by the maize growers in production and marketing of maize in Marathwada Region of Maharashtra. Multiple responses taken to ascertain the constraints faced by the maize growers in production and marketing of maize. Opinion of selected maize growers was taken in order to understand the problems in production and marketing. Thus suggestions of maize growers were recorded and analyzed. Garrett's ranking technique was employed to find out the constraints faced by the maize cultivating farmers in production of maize were explained in terms of ranks and total mean (score). The results inferred that the most important constraint in cultivation of maize were high cost of seed, Infestations of pests and diseases especially fall armyworm, Severe drought condition or long dry spell, credit facility in time, High cost of fertilizers and plant protections, High labour wages, and the most important constraint in marketing of maize were price fluctuation, lack of remunerative price of the crop, Lack of public procurement on MSP. Suggestions opined were, initiatives of govt. procurement on MSP in peak harvesting period, Seed price policy by Govt, Appropriate Credit facility in time Crop insurance in drought and pest incidence, Timely supply of inputs and reasonable input costs.

**Key Words:** production and marketing, MSP, input costs

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# Socio Economics Characteristics of Maize Growers inMarathwada Region of Maharashtra State, India

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Maharashtra is the one of the largest producer of maize in India. As concerned to Maharashtra state in the year 2014-15 area, production and productivity of maize was 1.08 Million ha, 2.2 Million tonnes and 2045 kg/ha. In Marathwada region maize was cultivated on 140800 ha and production and productivity was 321394 tonnes and 1095kh/ha respectively during 2016-17 (*kharif*) An attempt had been made to study selected personal and socio economics characteristics of maize growers in the Marathwada region. It had been proven beneficial to know socio economics status of the growers to identify the challengers faced and establish their knowledge about improvedfarming practices. This in turn would help relevant stake holders to formulate appropriate policies which would give an added boost to the industry.The study was administered by selecting a sample of 180 respondents from 12 villages. Multistage sampling design was used in selection of district, taluka, village and maize growers. Relevant data on various aspects of socio economic status were illuminated using a pretested structured schedule and through personal interview method. Results revealed that 38.33 per cent of

growers were of middle age, and the young and old group farmers were 31.11 per cent and 30.56 per cent respectively. With respect to educational level, higher secondary level was dominating with 28.33 per cent followed by secondary level education with 26.67 per cent. About 46.67 per cent of growers belonged to medium family size. In respect of occupational level of maize growers, most of farmers belonged to agriculture that was 82.22 per cent. The operational land holding of medium group was found to be maximum having 46.67 per cent and 70.00 per cent farmers have one bullock pair. The average number of livestock rearing of maize growers was 1.74 with 112.64 per cent coefficient of variation.

**Key Words:** family size, coefficient of variation

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# Create a Platform as a Facilitator that Connects Farmers of Fresh Vegetables to End User Consumers at Doorstep

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Various segments of the vegetable supply chain, from consumption to production, including delivery, wholesaling, logistics, processing, storage and production, have been undergoing rapid and unprecedented changes in the country in recent times. This research paper examines the changes and increasing interactions in nodes, including upstream (farmer-producers), midstream (processors), and downstream (consumers) from the perspective of the value chain, as well as those of the sectoral innovation system.

The main objective of this studyis to understand current supply chain of vegetables and fruits; challenges imposed in supplying the produce from farm till consumers. This study is useful for investigating, review and analyse existing model used by farmers and to design a prototypefor sustainable model which minimize the logistics cost in the entire model to make it more profitable for the farmers as well as consumers. It also includes studying about AI technology which can be introduced to make the supply chain effective. The purpose is to create a platform as a facilitator that connects farmers of fresh vegetables to end user consumers at doorstep.

In this research paper,the primary research was conducted by interviewing various stakeholders like farmers, retailers and end consumers fromthe state of Maharashtra. In each village, 10 supermarket farmers and 5 traditional market farmers were selected randomly for interview. The sample so selected comprises of 100+ vegetable growers.Secondaryresearch was conducted to collect the needed information from articles, reports, available applications on play store, research papers etc.Qualitative and quantitative data were analysed using various research toolsfor determining, review and analyse the existing channel and design the prototype of the model.

Result shows significance of such an efficient supply chain in this sector is the birth of another business model that would largely provide the farmers with the best prices for the vegetables from the consumers and eradication of middle elements in the supply chain, if backed by suitable players in process.Itis observed that designing a business model would bring things appropriately into the interest of the farmers with regard to the better price of the vegetables as well as of the consumers with regard to their comfort and choices in purchasing.

**Keywords-** Agriculture, Farmers, Consumers, Supply chain, Business model, Vegetables

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# Growth rates in Area, Production and Productivity of Soybean in Marathwada region of Maharashtra state

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**Soybean**, (*Glycine max*), also called soja bean **or** soya bean, annual legume of the peafamily Fabaceae(Legumonosae). The "king of beans" is mostly crushed into soy oil and meal and is found in hundreds of edible and non-edible products, ranging from cooking oil, animal grains, milk and vegan food to biodiesel and industrial applications. Investigation was carried out for the period from 2000-01 to 2019-20 in order to estimate the "Growth rates in area, production and productivity of soybean in Marathwada region of Maharashtra state". The growth in the area, production and productivity of soybean was estimated by using the compound growth function of the linear trend equation. The study analyzed growth rate over initial for area,production and productivity of soybean in Marathwada region of Maharashtra andobserved an increased during the study period i.e. 90.59 percent 94.19 percent and 0.20 per cent for overall period, respectively per annum. The CDVI for area, production and productivity of soybean of Maharashtra was 14.22, 45.87 and 35.70, for overall period respectively.

The increase in production of soybean in Marathwada region of Maharashtra was due to the increase acreages under soybean crop and little due to increase in productivity of soybean. It was revealed that, farmers in Marathwada region are gradually switching over to soybean from cotton, jowar, tur and other traditional crops due to higher yield, easy crop husbandry and remunerative price for soybean due to high demand for oil, animal feed and industrial products. Efforts should be made to improve the productivity of soybean in order to increase soybean production in Maharashtra state.

***Key words:*** Soybean, Production, Compound Growth Rate, Maharashtra, Cuddy and Della instability index (CDVI).

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# Compound growth rate and instability in soybean crop of Marathwada region of Maharashtra

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Soybean has an important and valuable place in world's oilseed cultivation scenario, due to its high productivity, profitability and vital contribution towards maintaining soil fertility.The direction and magnitude of growth and instability in area, production and productivity of Soybean was estimated with the help of functional analysis and Cuddy-Della Valle Index. Secondary time series data were used for estimating for the years from 2000-01 to 2019-20. Growth rate and instability were computed for two sub-periods and overall

period. The compund growth rate of area was highest for beed (19.84) for period I and osmanabad had area,production and productivty highest for Period I,II and overall periood.Latur had highest productivity for overall period. Hingoli district was consistent in the case of area for period I, II and overall period. In case of Production for period I, II and overall period Hingoli (63.82 per cent), Parbhani (51.87 per cent) and Aurangabad (62.85 per cent), respectively showed a minimum coefficient of variation and were consistent. Parbhanidistrict was consistent in the case of productivity for period I, II and overall period. Parbhani district showed a positive compound growth rate (16.14),(10.40) and (9.41) with minimum instability index (35.04), (41.17) and (44.84), respectively. Developed new varieties of soybean which introduced for commercial usage in India, resulted the replacement of the tradition cropping pattern and improvement in the yield resulted the increase in area and production of districts of Marathwada region of Maharashtra.

**Key words:** Soybean, Production, Compound Growth Rate, Maharashtra, Cuddy and Della instability index (CDVI).

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## Impact Assessment of Farm Ponds on Beneficiaries and Non-beneficiary Farmers for Gram cultivation

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The present study entitled, 'Comparative economics of farm pond beneficiary and non-beneficiary farmers of Malegaon tahasil of Washim district. The study was undertaken to examine the impact of farm ponds on production of major crops. For the present study, 50 beneficiary farmers having farm ponds and 50 non-beneficiary farmers without farm ponds on their field were selected from Malegaon tahasil of Washim district. 10 villages from Malegaon tahasil were selected purposively and, from each village sufficient samples of beneficiary and non-beneficiary farmers were taken randomly for comparison. The selected farmers were classified into three categories *viz*., small, medium, large according to their land holding. The primary data was collected from the farmers by survey method and cost concept *i.e*., cost 'A', cost 'B' and cost 'C' was used for the analysis of data. It is observed from the study that in case of beneficiary farmers at overall level the Output-input ratio at cost 'C' was 1:65, while in case of non-beneficiary farmers it was 1:40. It shows that the beneficiary farmers were more profitable than non-beneficiary farmers.

**Key words:** farm pond, standered cost concept BCR

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## Zero Budget: Natural Farming a Boost for Agricultural Development

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India comes under the top countries in cultivating and development. Agriculture is the backbone of the Indian economy. While addressing the UN Conference on Desertification, our Prime Minister has said that India is focusing on Zero Budget Natural Farming (ZBNF). To double farmer's income by 2022, ZBNF also was highlighted in Budget 2019. Hon. Finance Minister Smt. Nirmala Sitharaman emphasized zero budget farming in the 17$^{th}$ Lok Sabha's first speech in July 2019. That was the time, Zero Budget Farming came into the spotlight. The Green Revolution started to ruin livelihoods and lands, few farmers started their research to return

to alternative systems. One of them was a Maharashtrian agriculturist, and Padma Shri Subhash Palekar developed it in the mid-1990s as a green resolution's methods alternative, which was driven by chemical, intensive irrigation, and pesticides. Mr. Subhash Palekar argued that the rising cost of external inputs is the main cause of suicide and indebtedness among farmers. The impact of chemicals on long-term fertility and the environment is devastating. He met with the Japanese philosopher Fukuoka. They both came with techniques of natural farming. They promoted the technique of natural farming widely in Karnataka as zero budget natural farming. Several states, Andhra Pradesh and Himachal Pradesh, have been attracted to this farming technique. However, the complete knowledge regarding ZBNF has yet to reach the majority even now. Zero Budget Natural Farming is a set of methods for chemical free agriculture. The main aim of ZBNF is to bring down the cost of production to zero. Government is promoting Natural Farming through Bhartiya Prakritik Krishi Padhati (BPKP) introduced during 2020-21 as a sub scheme of Paramparagat Krishi Vikas Yojana (PKVY) for the promotion of traditional indigenous practices including Natural Farming. The scheme mainly emphasises on exclusion of all synthetic chemical inputs and promotes on-farm biomass recycling with major stress on biomass mulching, use of cow dung-urine formulations and plant based preparations .Under BPKP, financial assistance of Rs 12200/ha for 3 years is provided for cluster formation, capacity building and continuous handholding by trained personnel, certification and residue analysis. Until now, under BPKP, an area of 4.09 lakh ha. area has been covered and a total fund of Rs. 4980.99 lakh has been released in 8 States across the country. In ZBNF it is believed that there is no need for expensive manufactured chemicals in farming & agriculture. It uses biological pesticides. To crop protection, farmers can use cow dung, urine, human excreta, plants, natural fertilizers, and earthworms. It protects the soil from degradation and decreases the farmer's investment. Zero budget farming is the best method of chemical-free farming drawing from conventional Indian methods.

**Keywords:** Zero budget farming, Natural Farming. Bio-Waste, Agricultural Development, Bhartiya Prakritik Krishi Padhati (BPKP), Paramparagat Krishi Vikas Yojana (PKVY).

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# Economic Evaluation of Front-Line Demonstrations on Chickpea (*Cicer arietenum*)

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Front-line demonstration is an appropriate means for demonstration of improved technology and innovations in agriculture for large scale popularization among the farming community. Therefore, Krishi Vigyan Kendra, Jalgaon Jamod efforts have been made through front line demonstrations to demonstrate improved production technologies for increase productivity of pulses crops in the Buldana district. Thirty front line demonstrations was conducted on chickpea (Jaki-92-18) plots covering an area of 12.0 hectare and latest production and protection technologies were exhibited for each year. Farmers were randomly selected from adopted villages for conducting front-line demonstration in Buldana district, Maharashtra. The improved technologies consisting use of improved variety, seed treatment with rhizobium and PSB culture, sowing method, balanced fertilizer application and improved pest management techniques. The findings in respect of chickpea revealed, during three years, the overall yield trend from 90 demonstration plots in 36 ha varied from 8.10 to 12.94 q/ha with an average of 10.07 q/ha. Average yield of chickpea increased by 22.44 per cent. The yields were considerably low in local practices with old variety, highest technological gap was recorded 11.90 q/ha during 2015-16, mean extension yield gap was recorded 1.84 q/ha during study period. The economic of improved production practices under front line demonstration were estimated on the basis of prevailing market rates, average highest gross return of FLD's plots was Rs 36,515/ha and average benefit cost ratio (2.12) was recorded. Adoption of improved technology including new variety, timely supply of critical inputs with proper guidance by the

scientist, frequent monitoring visits to diagnose the problems and take appropriate corrective measures, field days etc., might be the contributing factors for high yield with good quality in all demonstration plots.

**Key words:** Green gram, FLD, Technology gap, Extension gap, Technology Index and Economic return

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# Trends in export of Cashewnut kernels and Cashewnut shell liquid

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The present study aimed to find growth trends and direction of trade for two cashew nut products a) Cashewnut kernel and b) Cashewnut shell liquid. Growth rates of exports of selected processed products of cashew were computed for a period of 16 years (2003 -04 to 2018-19).Considering 2011-12 as the base year, growth rates at the constant price were worked out to give the real picture of export earningsThe trade directions of Indian processed cashew product exports were analysed using the first order Markov chain approach. During the study period,Cashewnut kernel export growth has shown increasing trend, in case of quantity it was 25.53 per cent per annum and regarding export earnings it was 38.31 per cent per annum. The average quantity of cashewnut kernels export from India in last decade was 1678.50 MT. The top ten countries together shared about 93.72 per cent of total export from India. The average export earnings in last decade were Rs.6680.23 lakh. It was concluded that the cashewnut kernel export has indicated a promising picture regarding growth in quantity as well as export earnings. However, it was also concluded that the average share of USA alone was 81.64 per cent (1370.34 MT) indicating dependency on one country and therefore export of cashew kernel need to diversified. USA was loyal importer of cashewnut kernels from India. USA has retained 94 per cent of its previous share as indicated by diagonal transitional probability value. UAE has retained 40 per cent of its previous share and found to be relatively stable importer for cashewnut kernels from India as indicated by its transitional probability value.USA, UAE, UK, Japan as well as other importers may be focused and overall export policy should planned accordingly as cashewnut processing in India is highly influenced by international market, import policy. The export of CNSL does not show a promising picture as far as growth rates of the majority of countries are concerned. The overall trend of CNSL export was negative. However, export to Spain has shown increasing trend, compound growth rate for quantity and values were positive and significant such as 59.69 per cent and 141.91 per cent, respectively. The CNSL export to Italy was also positive and significant both in terms of quantity and values. The compound growth rates regarding CNSL export to Italy were 95.5 per cent for quantity and 60.88 per cent in terms of values. The major importing countries (Top ten) contributed about 96.32 per cent share of total export indicating their dominance and importance than other countries. It was revealed that most major importing countries do not show a promising picturebecause growth rate of export to many of the major importers were negative. The USA was loyal importer of CNSL from India as indicated by transitional probability value (0.94).

**Keywords:** CNSL, export, trend, transitional probability, Markov chain

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# Export Performance of Mango and its processed products from India

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The study wasundertaken to assess export trends andtrade direction of fresh mango and its processed products.A country-wise average export data in respect of quantity and value of the top ten importing countries as well as total export for the last decade (2009-10 to 2018-19) at constant prices (the base year 2011-12) was used for analysis. Growth rates of exports of selected processed products of mango were computed for a period of 32 years in the case of mango pulp (1987 to 2018-19) and 16 years (2003 -04 to 2018-19) in the case of all other processed products. There is usually fluctuation in the international or external value of any currency over a period of time. Therefore, considering 2011-12 as the base year, growth rates at the constant price were worked out to give the real picture of export earnings. Markov chain analysis was used to find out the direction of trade of selected processed products of mango to various countries and to study the changes in it. The average export earnings for the last 10 years from fresh mangoand its various processed various products together at 2011-12 priceswere Rs. 1469.28 crores and at nominal prices of 2018-19 it was Rs.1889.49 crores. The export value in the case of mango flour and mango slices inbrine was less than one per cent of total mango and its product export.Average export earnings in last decade from the sale of mango pulpwas 49.39 per cent out of total export earnings from fresh mango as wellas its processed products, export of mango pulp is increasing 6.46 percent per annum for quantity and 4.6 per cent in terms of value hence,processing of mango in general and mango pulp, in particular, should befocused as a major source of foreign currency instead of export of freshmango fruits. The average export quantity of mango pulp for last 10years was 1.46 MT and export earnings realized at constant prices wereRs. 72.57 billion. It was also revealed that, the top ten importingcountries together shared about 79.86 per cent of total exportfrom India, which indicated the importance of major importing countries.Saudi Arabia, Yemen Republic, UAE and Netherland were found to berelatively stable importers for mango pulp from India. However, Kuwaitwas most unstable importer for mango pulp.The export quantity of mango slices in brine is decreasing at 17.8per cent per year. Saudi Arabia was loyal importer of mango slices inbrine from India whereas; Netherland, Germany and France were mostunstable importers.The export of Jam, Jellies and Marmalade found to be isincreasing at 20.87 per cent per annum which is a good sign. Thoughthe share of countries other than the top importers, in total import ofmango jam, jelly and marmalade is 26.52 per cent looking in to theirhigh retaining capacity (83%) one hand and major importing countriessuch as Saudi Arabia USA, and Iran are unstable market as indicated byvery low transitional probability values in such situation, other than themajor importers should also be focused for steady growth in export. U.K.was loyal importer of Mango Jam, Jellies and marmalade from India.Top ten importing countries shared of about 73.48 per cent of totalexport from India. The average export earnings in case of mango, jam,jelly and marmalade at constant prices of 2011-12 were Rs. 478.16crores. The total export earnings in mango flour in study periodindicated a positive growth trend to the extent of 13.94 per cent. USA was loyal importer of mango flour from India.

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# Mango processing a profitable venture in south Konkan region of Maharashtra

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An attempt was made to study economics of value addition of mango and its export trend. The primary data was collected from south Konkan region of Maharashtra. Three tahsils from each districts and fifteen mango processing units from each district, thus final sample consisted 60 processing units.Per unit capital investment in mango processing Rs. 53.30 lakh, indicating requirement of large amount of capital. Per

quintal total cost of mango pulp production was Rs.10486 and gross returns were Rs.14172 resulting into net returns to the extent Rs. 3686 and input output ratio about 1:1.30. Mango processing is profitable venture and its profitability increases with scale of production.Inputoutput ratio of mango pulpal one (1:1.30) was found to be improved(1:1.37) when other products such as mango leather (poli), mango mava, mango syrup wereadded together. Mango syrupwas highest profitable product with input output ratio to the tune of1:2.94.The export of Jam, Jellie sand Marmalade found to be is increasing at20.87 percent per annum. Export of mango pulp has increasing trend for both quantity (6.46%) as well as value (4.6%) and contribute about 49.39 per cent to total mango related product export earnings. The decadal average export earnings from mango processing (2018-2019) was 1469.28 crores, which underlined a important role of mango in fetching foreign earnings.

Key words :Value addition mango, South konkan region

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## Profitability of individual enterprises as well as farm business on mechanized farm and non-mechanised farm.

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Investigation was undertaken in Parbhani district of Maharashtra.Total 48 mechanised farms were selected from sixteen villages of two tehsils in Parbhani district of Maharashtra. Data were collected by personal interview method with the help of pretested schedule. Data were related to all crops and livestock's on mechanized farm and non-mechanised farm. The results revealed that on mechanized farm Farm business as a whole cost-C was Rs.259874.10. Gross return was Rs.445097. Net profit of farm business as a whole was Rs.197710.50 on mechanised farm. Regarding all crops, area under crops was 4.81 hectares. Cost-C was Rs.193680.83 and gross return was Rs.336364.32. Thus, net profit from all crops was Rs.155170.49. Then, regarding all livestock, herd size was 1.68 in number. Cost-C was Rs.66193.27, while gross return was 108732.68. Net profit from all livestock was Rs.42540.01. On non-mechanised farm Farm business as a whole, cost-C was Rs.245545.95 and gross return was Rs.326421.71. Then, net profit of farm business as a whole was Rs.112166.63. Regarding all crops, area under crops was 4.49 hectares, cost-C of all crops was Rs.171749.40 and gross return was Rs.260126.67. Net profit from all crops was Rs.89547.03. Regarding all livestock, herd size was 1.343, cost-C of all livestock was Rs.43796.55 and gross return was Rs.66295.04. Difference between mechanised farm and non-mechanised farm of farm business as a whole, cost-C was Rs.44328.15 and gross return was Rs.118675.29. Regarding all crops, difference was 0.32 hectare. Differences of cost-C due to all crops were Rs.21931.43 and gross return was Rs.76237.65. Then, net profit due to all crops was Rs.65623.46. Regarding all livestock the difference was 0.34 livestock. Cost-C of all livestock was Rs.22396.72 and gross return was Rs.42437.64.

**Key words : farm business, cost and returns**

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## Production and marketing of roasted *Rabi* Sorghum (*Hurda*) in Solapur District

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Mahatma Phule Krishi Vidyappeth ,Rahuri

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Sorghum, like pearl millet, is a low-cost source of energy, protein, iron, and zinc among all grains and pulses. In southern Indian states namely Maharashtra, Karnataka, Andhra Pradesh, Tamilnadu and Telangana,

sorghum is a staple food where it is consumed in a variety of ways. Ambil, Bhakari, Chaklya, Dried Dhapate, Kanya, Lahya and Thalipit are some of the local preparations. In recent years, there has been a greater focus on value-added products, indicating a shift toward commercial agriculture that is more market-driven. In most of the sorghum growing parts of the India there is a practice of roasting sorghum heads at the dough stage and eating the threshed grain as a delicacy. The panicles were buried in hot coals and ashes for several minutes to be cooked, following which the light green seeds were lightly beaten off the heads and hand winnowed. In Maharashtra this very popular snack is called *Hurda*. After *Makar Sankrant* (14th January) the demand for roasted sorghum increases. This paper is a modest attempt to investigate the economics of production and marketing of sorghum value added product with the specific objectives as to ascertain the input use and estimate the costs and returns; to access the marketing structure; to estimate the costs and margins in marketing and to ascertain the constraints in marketing of roasted *rabi* sorghum (*Hurda*).

Primary data for the year 2020-21 of 10 *hurda* vendors from outskirt of Solpaur city on required parameters were collected through personal interviews. Simple tabular analysis involving sums, averages, ratios and percentages were employed to estimate the cost of cultivation of sorghum for roasted sorghum (hurda). The cost of production of roasted sorghum (hurda) was evaluated by using fixed and variable costs involved.

The study was concluded as the family of *hurda* growers was comprises of 40.68, 35.59 and 23.73 per cent per cent of male, female and children, respectively having higher share of persons with upto primary level education (32.20%). Total holding and gross cropped area of *hurda* grower was estimated to be 4.63 ha and 5.27 ha, respectively with a cropping intensity of 126.08 per cent.

Local varieties of roasted sorghum viz. Surti, Gulbhendi, Kuchkuchi, Dudhmogra and some improved varieties namely, Phule Madhur, Phule Uttara were mostly preferred by the farmers. The cost of cultivation of sorghum for *hurda* was ` 26132.66/-, wherein the expenditure on hired human labour (16.97 %) and seed (13.52 %) were the major cost items of working capital. The total fixed costs involved in the preparation of *hurda* were estimated to be ` 30164.48, while total variable costs were ` 148764.22, Total cost of hurda production was `178928.70 with net income from *hurda* party were ` 260034.58 and B:C ratio was 2.45.

**Key words :**Production and Marketing, BCR

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# Comparative Economics of Production of Bt Cotton Hybrids in Parbhni District of Maharashtra

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Cotton (Gossypium hirsutum, G.barbadens, G.arboreum, G.harbaceaum) It is the gift of nature providing fiber for clothing since time immemorial. It is one of the most important commercial cash crop besides serving as a source of natural fiber and oil and providing raw material to the textile and oil industry. It contributes a major from of agriculture produce of growers which bringing then cash returns. It plays a vital role in Indian economy is concerned. It is one of the most important sources of foreign exchange, so it referred as “White gold”.

The major cotton producing countries are India, china, United States, Pakistan, Brazil, Turkey. The production during 2015-16 was 6.4 million metric tons in India, 6.5 million metric tons in china, 3.6 million metric tons in United States, 2.3 million metric tons in Pakistan, 1.5 million metric tons in brazil ,0.8 million metric tons in turkey. (USDA FEB.2016)

Maharashtra ranks first in area. The area under cotton in Maharashtra during 2015-16 was 38.27 lakh hectare and production and productivity were 75.00 lakh bales, 333kg/h respectively. Punjab ranks first in yield 529 kg/h and area was 4.50 lakh hectares. The cotton production in Gujarat during 2015-16 was 125 lakh bales and area was 30.06 lakh hectares. Telangana, Andhra Pradesh, Karnataka are important cotton producing state In India although the CAI's cotton production estimate for the 2015-16 cotton season is 408.50 lakh bales of 170 kg.(cotton statistics and news 2016)

Parbhani district was selected for study purposively. Multistage sampling technique was used for selection of district, tehsils and villages. Two Bt cotton hybrids Ajeet-199 Bt and Rashi-779 Bt cotton were selected for present study. Data were analyzed with the help of statistical tools like mean, percentage, functional analysis, frequency and percentage method. Area under Ajeet-199 Bt cotton was more (1.40 ha) followed by Rash-779 Bt (1.34 ha).Overall middle age cotton growers >36 to <50 years old) i.e. 43.75 per cent were mostly engaged in Bt cotton cultivation and most of them (46.87 per cent) acquired education of primary level. More than 76.56 per cent Bt cotton growers had agriculture as main occupation. Ajeet-199 Bt cotton was more profitable than Rashi-779 Bt cotton. Output-Input ratio of Ajeet-199 Bt cotton was 1.53 followed by Rashi-779 Bt 1.48, while Cost-C was higher (Rs. 47682.13) in case of Ajeet-199 Bt cotton than Rashi-779 Bt (Rs. 44589.64) cotton. At an overall level per quintal cost of production was Rs. 3234.88. Area, nitrogen, potash and hired human labour were found significant and can be increased in order to get the highest profit in the Bt cotton cultivation. High seed cost of Bt cotton, non-availability of labour on time, were major constraints faced by Bt cotton growers. Reduce the cost of Bt cotton seed, involvement of family members in cotton cultivation were suggested by Bt cotton growers.

**Key words :** Cost and returns , Output-Input ratio

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# An Economic Analysis of Raisin Production in Solapur District.

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A study was conducted in the year of 2021-2022. For study multistage sampling technique was used, in which Solapur District was selected purposively. The Pandharpur tehsil was selected as based on larger production of grapes.From Pandharpur tehsil four villages as Karkamb, Tulsi, Bhose, and Parite were selected on the basis of maximum number of raisin production units. From each village four raisin production units were selected, so total sixteen raisin production units were selected for study purpose. For analysis purpose descriptive statistics was used such as mean, tabular analysis, Fixed and variable costs concepts was used. The study revealed that total raisin production cost was Rs.13830023.8 and per tonne production cost of raisin was Rs.144817. The fixed and variable cost per Kg of raisin production was Rs. 17.36 and Rs. 127.4 respectively. The gross income received was Rs. 16712500 and per tonne gross income was Rs.144817. Net income from Raisin production was Rs. 2882476.2 and per tonne net income received was Rs. 30182. Benefit cost ratio was around 1.21. It was concluded that Raisin production was economically viable.

**Key words :** Cost ,reurns and BC ratio

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# High Productivity Dapoli-3- Finger Millet Variety Suitable for Natural Farming

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Agriculture is a globally occurring activity which related directly and powerfully to the present and future condition of environments economics and societies. While agriculture has provided for basic, social and economics need of people it has also caused environmental degradation which has promoted a burgeoning interest in its sustainability. A high yielding mid-late duration culture DPLN-2 was developed at Department of Agriculture Botany, College of Agriculture, Dapoli and released as Dapoli-3 during 2020 at state level and recommended by central variety released committee for Maharashtra state in 2021. Dapoli-3 has developed through pure line selection from local germplasm. Out of twenty one culture, the culture DPLN-2 was found promising in respect of yield over check Dapoli-1, Dapoli-2 and PR-202 in station, ,multilocation and adaptive trials. It yields an average of 2405 Kg/ha of grain under rainfed condition. Besides high yield culture has semi compact earhead, uniform maturity, non-lodging, continuous spikelets, non-shattering with moderate protein (7.52 %) and calcium (264 ppm) content. The weight of earhead of culture is 8.9 gm as compared to 7.2 gm of Dapoli-1. The culture recorded grain yield of 2405 Kg/ha which was 26.64% increase over the check Dapoli-1 (1899 Kg/ha) in station trails. It recorded a grain yield of 2014 Kg/ha which was 13.78 % increase over the check Dapoli-1 (1770 Kg/ ha) in multilocation trails conducted during *Kharif* 2016 and 2017 at 13 location whereas the mean grain yield recorded by culture DPLN-2 (1518Kg/ha) which was 12.19 % increase over check Dapoli-1(1353 Kg/ha) in adaptive trail conducted in Konkan and Goa region during *Kharif* 2019. It has given the mean yield of 3228 Kg/ha which was 5.76% increase over the national check GPU-45 (3052Kg/ha) and 12.98 % increase over the VL-376 (2857Kg/ha) in all India co-ordinated trails tested during *kharif* 2019. This culkture also give the better yield in lower dose of fertilizer. Due to its high yield and nutritional value the consumers preference is increasing day by day. India exported 5218 MT of ragi having the value in Rs. 1247 lakh. Therefore this crop in general and this variety in particular having the good prospective and economic return.

**Key words :** DPLN-2,cost and returns

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# Fine, high yielding non basmati rice variety Trombay Karjat Kolam Variety appropriate for Export Oriented Farming

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Rice is not only a major staple food item but also a way of life for millions of the people. Rice (*Oryza sativa L.)* occupies pivotal place in Indian Agriculture, as it forms the staple food for more than 70 per cent of the population, providing 20 to 25 per cent of agricultural income. Rice occupies largest area among all food crops in India. Rice is grown on 44.0 million hectares in India, which is largest in the world among all the rice growing countries with annual production around 143 million tonnes. Trombay karjat kolam is fine grain type, midlate duration, high yielding rice variety for the farmers of the Konkan region of Maharashtra state. India exporting basmati as well as non basmati rice in different countries india exported 9.63 mt of rice having Rs 25,582 crores value. fine rices having the good cooking quality non basmati fine rice having the huge demand in global market. A high yielding mid-late duration Trombay karjat kolam fine rice variety was develop and release for Maharashtra during 2018 collaboration with BARC Mumbai. These variety recommended by central variety released committee for Maharashtra state in 2019. Trombay Karjat kolam has developed through Hybridization followed by Pedigree method Dwarf stature and non-lodging. 130 to 135 days to maturity

(Midlate duration). Short slender grain type. 30.50 % increased over best variety check Karjat-4 in Station trial. 20.7 % yield advantage on overall mean of four years over check Karjat-4 in Konkan region of Maharashtra state co-ordinated trial (Quality Below 14gm). Trombay karjat kolam rice variety has recorded 18.95 per cent increased in grain yield over check Karjat 4 in Adaptive trials conducted on farmer's field during the year Kharif 2017. High milling (73.7 %), head rice recovery (67.98 %) and translucent kernel type indicating superior grain quality of rice variety BARCKKV 13 with acceptable amylose content (23.09). Moderately resistant to stem borer. Average grain yield 4.0 to 4.5 t/ha. Due to high yield, fine grain and good cooking quality these variety appropriate for large rice production in rice growing area.

**Key words :** BARCKKV 13,area and production

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## Survey of Rugose Spiralling Whitefly, *Aleurodicus Rugioperculatus* (Martin) on Coconut in Konkan Region

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The intensive survey of rugose spiralling whitefly (RSW), *Aleurodicus rugioperculatus* (Martin) was carried out in five districts of the Konkan region *viz*., Sindhudurg, Ratnagiri, Raigad, Thane and Palghar etc. during January, 2021 to assess the intensity of infestation and damage grade index. The intensity of infestation was statistically low in Thane (37.87%) followed by Sindhudurga (41.51%) and Ratnagiri (52.14 %) district. The highest intensity of infestation was recorded in Palghar (76.86%) followed by Raigad (74.50%). The damage grade index of all districts was medium. The maximum damage grade index was recorded in Raigad district (1.74) while the minimum was recorded in the Sindhudurga district (1.02). The damage grade index of Thane, Ratnagiri and Palghar were 1.56, 1.65 and 1.71, respectively. The overall results of the present study revealed that, the incidence of RSW recorded was more in the tehsils near to the coastal area and start decreasing as we moved away from the coastal area. The most prominent reason for this might be the humid and warm climatic conditions available in coastal area.

**Key words :** RSW, grade index

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## Effect of Natural Farming Practices on Yield, Economics and Soil Status in Rice - Groundnut Cropping Systems under Konkan Region

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Natural Farming is considered as agro-ecological based diversified farming system which integrates crops, trees and livestock with functional biodiversity. It is a chemical-free alias traditional farming method. Natural farming is an environmentally sustainable way of growing food. To study the effect of natural farming in rice – groundnut cropping systems a field experiment was conducted during *Kharif*-2020 and *Rabi*-2020-2021 in randomized block design with three replications at Regional Agricultural Research Station, Karjat, Dist. Raigad (M.S.). The rice variety *Karjat 9* and groundnut variety *SB – XI* was used with spacing of 20 cm x 15

cm and 30 cm x15 cm in respective crops. Total nine treatments were allotted randomly in both the crops without disturbance. The treatments having complete natural farming practices (Beejamrit + Ghanjeevamrit + Jeevamrit, Crop residue mulching, Intercropping and maintaining whapasa conditions) with deleting one practices in each treatment was included. The other treatments are recommended organic farming package and integrated crop management (50 % nutrient application through organic manures and 50% nutrient application through inorganic sources) + Prophylactic/preventive method of application by organic and need based pesticides for pest management were also tested. The one year data pertaining to yield and REY of *Kharif* rice and *Rabi* hot weather groundnut was showed that treatment having recommended organic farming package recorded significantly highest *Kharif* REY and *Rabi* REY and remained at par with treatments having integrated approach of crop management (50 % nutrient application through organic manures and 50% nutrient application through inorganic sources) + Prophylactic/preventive method of application by organic and need based pesticides for pest management over rest of the treatments under study. The economics of different treatments were worked out and it showed that the highest net returns and B:C ratio was recorded by treatment where integration of organic and inorganic sources were used with organically prevention methods used for control of disease and pests followed by complete package of organic farming. The soil chemical properties were analyzed after complete of sequence and results showed that all soil parameters were statistically non significant response.

**Key words :** Crop residue mulching,cost ,retuns andBCR

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# Doubling Farmers Income through Efficient Marketing and Market Intelligence

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Agriculture is essential to human survival and societal development and has long been recognized as the basis of India's national economy. Agriculture in India has been, and will continue to be so, in near future, the back bone of Indian economy. Past strategy for development of agriculture sector has focused primarily on raising of agriculture output and improving food security. The strategy did not explicitly recognise the need to raise farmers' income and to promote farmers' welfare. Farmers' income remained low in relation to income of those working in non-farm sector. In 2016, Hon. Prime Minister Narendra Modi-led government had set a highly ambitious target of doubling farmers' incomes by 2022. Doubling farmers' income is possible through increasing total output and better price realization in the market, reduction in production costs, improvement in efficiency of input use, diversification of product, efficient post-harvest management, value addition, etc. Out of these different strategies, one third of the increase in farmers' income is easily attainable through better price realization. In this context efficient agricultural marketing systems is most important. Market information and intelligence are crucial to enable farmers and traders to make informed decisions about what to grow, when to harvest, to which markets produce should be sent, and whether to store it or not. Efficient marketing means where all the important information is available to everybody involved at the same time, and prices change immediately according to this information A Market Intelligence system refers to systematic collection and processing of information from all the relevant sources to ascertain the changing trends in the agricultural marketing environment. In simple words, the producer/ farmer/ trader gathers data from all the available sources and process these into meaningful information that can be used in critical decision making. Market Intelligence is basically a process which provides information regarding what might happen in future market. Market Intelligence helps in maintaining competitiveness by working upon our strategic decisions. Price, product, place and period are the basic components of the market intelligence. To secure the future of agriculture and to improve livelihood of half of the India's population, adequate attention on efficient market systems and its

intelligence along with increasing the production needs to be given to improve the welfare of farmers and raise agriculture income.

**Key words :** Market Intelligence, efficient market systems

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## Effect of Dietary Supplementation of Active Dry Yeast on Growth, Feed Efficiency and Benefit Cost Ratio in Surti Goat Kids

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An experiment was conducted to evaluate the effect of yeast supplementation on growth, feed conversion efficiency and cost of feeding in Surti goat kids. A total of 16 male Surti goat kids of four months old were selected with average body weight of 7.53±0.13 Kg. Animals were randomly divided in to two groups with eight replication per group. Active dried yeast (*S. cerevisiae* CNCM I-1077) was supplemented in one experimental group at the rate of 2 % of DMI, and the second group without any supplementation was control. The feed intake was measured daily for 80 days and body weight was taken on first and last (80d) day of the experiment. The result shown that there was significant ($P< 0.05$) improvement in final body weight (11.99 vs 12.92 kg), feed efficiency (9.25 vs 7.78) and cost benefit ratio (1.53 vs 2.24) in supplemented group without affecting the feed intake between the groups. Hence it was concluded that supplementation of active dried yeast (*S. cerevisiae* CNCM I-1077) at 2% of dry matter intake would improve the growth, feed conversion efficiency and cost of feeding in surti goat kids and would fetch more economic return to the farmers.

**Key words:** Goat, Yeast, Growth, Feed efficiency, Economics

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## Socio-economic assessments of chickpea growers in Beed district of Maharashtra

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Chickpea (*Cicer arietinum) i*s one of the major pulse crop grown in India. Chickpea annual plant of the peas, widely cultivated for its nutritional seed. The multistage sampling design was used for selection of district, tehsils, villages and chickpea growers. In all 90 chickpea growers were selected to collect the data on socio-economic assessment of chickpea growers, land use patter and cropping patter. The percentage of chickpea grower's age are, up to 30 years age 23.33 per cent, from 30 to 45 years 45.55 per cent and above 45 year 31.33 per cent. Out of 90 chickpea growing respondents (46) 51.11 per cent were having farming as their main occupation. While (20) 22.22 per cent secondary and (24) 26.66 per cent tertiary occupation.The average size of chickpea growing male is 2.11, female 1.78 and children 1.2.16.66 percent chickpea growers have land up to 2 ha, 54.44 percent chickpea growers have land up to 2 ha to 4 ha and 28.88 percent chickpea growers have land above 4 ha.The total land holding was 3.01. Out of this land holding irrigated area was 52.15 and rain fed area was 47.84. Net cultivated area was 100 percent while average gross cropped area was 4.59 and cropping intensity was 151.67.Out of total gross cropped area 4.59., the share of area under chickpea was maximum (18.03%).

**Key words:** Chickpea, land holding , gross cropped area

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# Comparative Economics of Production of Bt Cotton Hybrids in Parbhani District of Maharashtra

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Cotton (Gossypium hirsutum, G.barbadens, G.arboreum, G.harbaceaum) It is the gift of nature providing fiber for clothing since time immemorial. It is one of the most important commercial cash crop besides serving as a source of natural fiber and oil and providing raw material to the textile and oil industry. It contributes a major from of agriculture produce of growers which bringing then cash returns. It plays a vital role in Indian economy is concerned. It is one of the most important sources of foreign exchange, so it referred as "White gold".

The major cotton producing countries are India, china, United States, Pakistan, Brazil, Turkey. The production during 2015-16 was 6.4 million metric tons in India, 6.5 million metric tons in china, 3.6 million metric tons in United States, 2.3 million metric tons in Pakistan, 1.5 million metric tons in brazil ,0.8 million metric tons in turkey. (USDA FEB.2016)

Maharashtra ranks first in area. The area under cotton in Maharashtra during 2015-16 was 38.27 lakh hectare and production and productivity were 75.00 lakh bales, 333kg/h respectively. Punjab ranks first in yield 529 kg/h and area was 4.50 lakh hectares. The cotton production in Gujarat during 2015-16 was 125 lakh bales and area was 30.06 lakh hectares. Telangana, Andhra Pradesh, Karnataka are important cotton producing state In India although the CAI's cotton production estimate for the 2015-16 cotton season is 408.50 lakh bales of 170 kg.(cotton statistics and news 2016)

Parbhani district was selected for study purposively. Multistage sampling technique was used for selection of district, tehsils and villages. Two Bt cotton hybrids Ajeet-199 Bt and Rashi-779 Bt cotton were selected for present study.

Data were analyzed with the help of statistical tools like mean, percentage, functional analysis, frequency and percentage method. Area under Ajeet-199 Bt cotton was more (1.40 ha) followed by Rash-779 Bt (1.34 ha).Overall middle age cotton growers >36 to

<50 years old) i.e. 43.75 per cent were mostly engaged in Bt cotton cultivation and most of them (46.87 per cent) acquired education of primary level. More than 76.56 per cent Bt cotton growers had agriculture as main occupation. Ajeet-199 Bt cotton was more profitable than Rashi-779 Bt cotton. Output-Input ratio of Ajeet-199 Bt cotton was 1.53 followed by Rashi-779 Bt 1.48, while Cost-C was higher (Rs. 47682.13) in case of Ajeet-199 Bt cotton than Rashi-779 Bt (Rs. 44589.64) cotton. At an overall level per quintal cost of production was Rs. 3234.88. Area, nitrogen, potash and hired human labour were found significant and can be increased in order to get the highest profit in the Bt cotton cultivation. High seed cost of Bt cotton, non-availability of labour on time, were major constraints faced by Bt cotton growers. Reduce the cost of Bt cotton seed, involvement of family members in cotton cultivation were suggested by Bt cotton growers.

**Key words:** Bt cotton hybrids, cost of production

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# International Trend Analysis of Indian Jute

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The study explores the export performance of jute in India for a period of 30 years starting from 1989-99 to 2018-19. The main objective the study was to analyse the growth rate and instability of jute in India. The secondary time series data of 30 years were split into three sub-periods i.e. Period-I (1989-90 to 1998-99), Period-II (1999-00 to 2008-09), Period-III (2009-10 to 2018-19) and Overall (1989-90 to 2018-19). The exponential function, coefficient of variation (CV) and Cuddy Della Valle's Instability index were used to fulfil the objective of the study. The growth rates in area of jute showed a decreasing trend but the production and productivity had increasing trend during the overall study period.The highest growth rate in area was observed during period-I and lowest during period-II. However, highest growth rate in production and productivity were recorded during period-I and period-II, respectively while, lowest growth was found during period-III.The growth rates of export quantity, export value, import quantity and import value of the jute showed increasing trend. Among all the parameters like area, production and productivity high volatility was observed under production during overall period because there was a decreasing trend in area of jute for cultivation. The export value showed highest instability among all parameters during overall period.

The study concluded that the jute has an export potential. Hence, there is a need to increase the productivity of jute which will ultimately help to increase the domestic production and initiate a systematic long term export planning at a national level to gain good foreign exchange through export.

**Key words:** Jute, Growth rate, Instability, Coppock's Instability Index

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# Production efficiency and profitability of major farming Systems in Tamil Nadu

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This study evaluates the performance of the predominant farming systems in Tamil Nadu using primary data from 192 farmers for 2020–21, and the standard cost and stochastic frontier production function methods. Seven different predominant farming systems were identified, of which the fruits and turmeric farming systems were profitable. The marginal and small farms were more diversified, whereas the large farms were specialized, with high-value crops. The productivity in all the farming systems can be enhanced up to 40% by adopting technologies such as the System of Rice Intensification (SRI), Sustainable Sugarcane Initiative (SSI), and fertigation.

**Keywords:** Farming systems, economic characterization, technical efficiency, crop diversification, agricultural technologies, and stochastic frontier production function.

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# An economic study of sericulture production in Parbhani district

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Sericulture is an agro-industry, the end product of which is silk. Silk is fibrous protein of animal organ produced by the silkworm for spinning a cocoon. Silk has natural sheen and inherent affinity for dyes, light weight, soft touch and high in durability. Because of these unique characteristics silk is termed as "Queen of Textiles".India has the second position of the world largest producer next to China. The present study was attempted to study the socio-economic characteristics, per quintal cost of mulberry leaves production, cost and returns in cocoon production. Multistage sampling design was adopted in the selection of district, tehsils, villages and sericulture farmers. In the first stage, Parbhani district was purposively selected on the basis of availability of area under sericulture production. In the second stage on the basis of area under sericulture production, two tehsils of Parbhani district was selected namely, Purna and Manwat. For analyzing the data in the present study the analytical techniques such as tabular analysis, functional analysis and frequency and percentage method were adopted. The result showed that the gross return from per hectare mulberry garden estimated was Rs. 263182.5 with cost of cultivation Rs. 130680.20. In regard to cocoon production the gross return from 4.16 batches was Rs. 279442.42 and from one batch it was Rs. 67173.66. Total cost from 4.16 batches calculated was 133507.2 on the other hand from one batch it was Rs. 32093.08. Net profit obtained was Rs. 145935.21 and Rs. 35080.58 from 4.16 and one batch, respectively. The output - input ratio obtained was 2.09 whereas per kg cost of cocoon production obtained was 215.82.

**Keywords:** mulberry, cost of cultivation ,cocoon production, output - input ratio

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# Comparative Economics of Exportable and Non - Exportable Onion Production in Ahmednagar District

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Onion is commercial important bulb crop grown since ancient time in the world. India produces a significant quantity enough to meet the demands for both domestic consumption and export. The present study was attempted to study cost and returns in exportable and non-exportable onion production.The study was conducted in Ahmednagar district of Maharashtra. Multistage sampling design was adopted in selection of district, tehsils and villages. Ahmednagar district was purposively selected as district ranks second highest in area and production in Maharashtra.In second stage Parner and Rahuri tehsil were selected purposively. Four villages were selected randomly from each tehsil. So the data was collected from 96 onion growers out of which 48 were exportable onion growers and 48 were non-exportable onion growers through pre-tested interview schedules for the year 2019-20. For analyzing the data in the present study the analytical techniques such as cost concept of Cost-A, Cost-B and Cost-C, Gross Returns and Output-Input ratio were emphasized.Arithmetic mean, percentage and ratio was achieved by tabular analysis.The result showed that the Per hectare output was 201.51 quintals in exportable farm and 183.29 quintals in non-exportable farms which obtained gross return of Rs. 463476.1and Rs. 311597.05, respectively. Per hectare cost of cultivation of exportable onion was Rs. 209497.9 and in non-exportable onion was Rs. 186872.87 which was mostly dominated by rental value of land, plant protection and hired human labour. Output-Input ratio was 2.21 and 1.66 in case of exportable and non-exportable onion production, respectively. Per quintal cost of production was Rs. 1039.63 in exportable onion

and Rs. 1019.53 in non-exportable onion. It found that, exportable onion production was more profitable than non-exportable onion production.

**Keywords:** Cost-A, Cost-B and Cost-C, Gross Returns ,Output-Input ratio

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# Export performance of Banana in India

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Banana (Musa paradisica L.) is an important fruit of tropical countries like India, China, Brazil, Philippines etc, belongs to **Musaceae** family and Musa genus to the order **Zingiberales**. Banana is reported to be grown in 130 countries in the world with a total production of 113918.763 thousand tones and area of 5637.508 thousand hectares in 2017 (Food and Agriculture Organization). India ranks first both in terms of area and production of Banana in the world contributing around 15 per cent of the total global area and about 29 per cent of the total world's production. The average productivity of banana in India is 37.90 Mt/ha. compared to the world average of 21.20 Mt./ha. (National Horticulture Board 2016).

The study is divided into four objectives that is growth and instability in area, production and productivity, export profile of banana, growth and instability in export of banana and direction of trade and export pattern of banana in India.The required secondary data for the present study have been collected from different sources. The data regarding area, production productivity and export of banana was collected from 1996-97 to 2017-18. This includes 22 years data. For the purpose of comparison, the period of study was divided into three periods i.e. Period-I: 1996-97 to 2006-07, Period-II: 2007-08 to 2017-18 and Overall Period: 1996-97 to 2017-18.The different analytical techniques used in the study such as Tabular analysis, Growth analysis, Instability analysis, Normalized Barry's Index and Markov-chain analysis were employed.Compound growth rate for area was 4.478 percent, 5.673 percent for production and 1.475 percent for yield obtained under banana which recorded statistically positive and significant compound growth rate at one per cent level. Coefficient of Variation of area was found to be 0.306 and Cuddy- Della Valle instability Index was 0.132. The coefficient of variation of banana production and yield were 0.382 and 0.115 respectively. Cuddy- Della Valle instability index for production and yield were 0.149 per cent and 0.069 per cent respectively. The results revealed that, highest instability was recorded in production series as compared to area and yield of banana.Top five banana importing countries during the study period measured in quantity were UAE, Nepal, Iran, Saudi Arab and Oman with their contribution in banana export was to (24.88 per cent), (21.69 per cent), (11.13 per cent), (10.80 per cent) and (7.81 per cent) respectively. In terms of value measured in rupees, top five banana importing countries with their contribution were UAE (33.02 per cent), Saudi Arab (14.68 per cent), Iran (12.57 per cent), Oman (9.13 per cent) and Kuwait (8.24 per cent) respectively.Where as in term of value measured in dollar to top five banana importing countries and their contribution to banana export were UAE (32.67 per cent), Saudi Arab (15.02 per cent), Iran (11.98 per cent), Oman (8.99 per cent) and Kuwait (8.21 per cent) respectively.

The compound growth rate of banana export to all countries measured in quantity, value in rupee and value in dollar was 8.31, 1.62 and -0.41 per cent per annum, respectively in period-I. During period-II, CGR of banana export measured in quantity was 16.73 per cent per annum. It was 26.54 and 20.33 per cent per annum for value in rupees and value in dollar respectively. During the overall period, compound growth rate of banana export was 17.72, 26.95 and 21.42 per cent per annum for quantity, value in rupee and value in dollar respectively. High instability in banana export in terms of quantity was recorded in Baharain i.e. 1.20 per cent followed by USA 1.18, Iran 1.13 per cent and Kuwait 0.69 per cent**.** Iran revealed highest instability in export of banana measured in dollar and rupees i.e. 1.12 per cent and 1.23 per cent, followed by Oman 1.01 per cent and 1.13 per cent, and Nepal 0.64 per cent and 0.84 per cent respectively.

The countries Saudi Arab, Baharain, Oman, Qatar, Maldives, Iran found most unstable importers of the banana in period-I and Nepal, UAE and Kuwait found most stable importers. UAE, Nepal, Saudi Arab, Oman, Qatar, Maldives, Iran are found most unstable importers in period-II and Baharain and Kuwait found most stable importers. In overall trade direction UAE and Kuwait found the most stable market, followed by Nepal. Baharain and Iran found most unstable country in importers of Indian banana.

**Keywords:** CGR, banana export, trade direction

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# Econometric Analysis of Grape Cultivation in Sangli District Of Maharashtra

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Grape (*Vitis vinifera*) is one of the most commercially important fruit crop in the world. It belonged to family Vitiaceae. It is believed to be originated in America near the Capsaicin Sea. Cultivation of the domesticated grape began in 6000-8000 year ago near East. The oldest known winery was found in Armenia, dating around 4000 BC. By the 9th century AD the city of Shiraz was known to produce some of the finest wine of Middle East. In 19th century , Ephraim Bull of Concourd, Massachusetts, cultivated seeds from wild *Vitis labrusca* vines to create the Concord grape which would become an important agriculture crop in United States.(Source: www.wikipedia.org ). The main grape growing pockets in Maharashtra are Nashik, Sangli, Solapur, Pune, Osmanabad. In area and production Nashik ranks first with 56.27 thousand hectare area and production was 1257.07 thousand metric tonnes. Sangli district is having second position with respect to area and production. In Sangli district total area under grape cultivation was 26106.71 hectare in the year 2019-20.(Source: District statistical office, Sangli) .Improved production technology, suitable climate in grape growing region, progressive entrepreneurship and easy availability of finance for the crop made it possible to increase the grape production and productivity. The present study was attempted, to estimate per hectare cost, returns and profitability in grape production. The study was conducted in Sangli district of Maharashtra. Multistage sampling design was adopted for selection of district, tehsil, villages and grape grower. In first stage Sangli district was purposively selected as area under grape cultivation was more concentrated in the district. In second stage Tasgaon and Miraj tehsils were selected purposively. In third stage 6 villages were randomly selected from each tehsil. So the total number of villages were became 12. In fourth stage 8 grape growers from each village were selected randomly. In all 96 grape growers were selected for the present study. To analyze the data descriptive statistical analysis tools were employed such as tabular analysis and functional analysis, to achieve the objective standard cost concept i.e. Cost-A, Cost-B, Cost-C, Gross Returns and Output-Input ratio were emphasized. Result revealed that, Per hectare establishment cost of grape orchard was worked out Rs. 568303.2. Assuming economics life of grape orchard 15 years and rate of interest 6 per cent amortized cost was 58478.4. Per hectare physical inputs and output was estimated , results revealed that the per hectare total male labour utilized were 550.85 man days of which of hired man days were 380.62 and family man days were 170.23. In case of female labours total of 230.31 man days were utilized of which hired female days were 190.26 and family female days were 40.05. No use of bullock labour while the use of machine power was 290.4 hours. 375 quintals of manure was used for cultivation and in case of fertilizers use of 308.24 kg phosphorous followed by 194.58 kg nitrogen and 94.24 kg potassium. On an average of plant protection, growth regulators and irrigation charges were Rs. 190491.42, Rs. 16022.4 and Rs. 8011.2 respectively. By using above mentioned physical inputs 355.98 quintals of grape was produced. Per hectare cost of cultivation was worked out, result revealed that, average yield obtained by respondent grape growers was 355.98 quintals, average per quintal price received by respondent grape growers was Rs. 5720 and gross return obtained per hectare was ₹ 2036205.6. Per hectare total cost production (cost-C) was Rs. 1130634.97 and per quintal cost of grape

production was Rs. 3176.12. It was clear from the result that, net return of grape cultivation was Rs. 905570.63 per hectare. Farm business income and family labour income i.e. profit at a cost-A and cost-B was Rs. 1392504.4 and Rs. 966652.13 respectively. The Output-Input ratio was 1.8. This shows the profitability of grape production. Results revealed that cultivation of grape crop is more beneficial to farmers comparatively other crops in the study area. The figure of Output-Input ratio revealed that, if one rupee invested in grape production, they received 1.80 rupees return. Price received from per quintal grape was Rs. 5720.

**Keywords:** Cost-A, Cost-B and Cost-C, Gross Returns ,Output-Input ratio

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# Economics of production and marketing of Pigeonpea in Hingoli district of Maharashtra state

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Pigeonpea (*Cajanus cajan*) is a often cross-pollinated, diploid, perennial grain. It is the fourth most important food legume in the world after Dry bean (*Phaseolus vulgaris* L.), field pea (*Pisum sativum*) and chick pea (*Cicer arientinum* L.). It is also known as Arhar, Tur , Red gram. Since its domestication in South Asia at least 3500 years ago, its seed have become a common food grain. It is an important legume crop of rainfed agriculture in semiarid tropics. The Indian subcontinent, eastern Africa and Central America, in that order, are the world's three main pigeonpea producing regions. Pigeonpea (*Cajanus cajan*) is one of the most important pulse crop in India in term of both area and production. For the purpose of present study three objectives was selected, to study the socio-economic characteristic of Pigeon-pea grower's, to estimate cost, return, and profitability in pigeon-pea production and to estimate marketed and marketable surplus of Pigeon-pea production. Multistage sampling design is adopted for present study amongst the pigeonpea was selected. In first stage Hingoli district is selected purposively because pigeonpea are grown on large scale in the district. In second stage talukas Viz. Sengaon and Aundha are selected. In Third stage from each taluka six villages were selected. List of farmers growing pigeonpea growers is collected from revenue record of six villages and from each village eight cultivator's growing pigeonpea were selected constituting a total sample size 96. The result revealed that, Area, production and productivity are positively significant in all period but CGR is negative in period-II. Per hectare total cost with regards to pigeonpea was Rs 33226.61 while cost-A was Rs.19269.43 and cost-B was Rs. 29118.54 Per cent, share of cost-A was 57.51 per cent while cost-B was 87.59 per cent. Among the various items of expenditure, the per cent share of rental value of land was predominant as 28.76 per cent followed by hired human labour 15.09 per cent, family human labour per cent 12.32 and machine labour 6.60 per cent of pigeon pea. Marketed and marketable surplus is equal in pigeon-pea production i.e. 8.82.

**Keywords:** Cost-A, Cost-B and Cost-C, Gross Returns ,Output-Input ratio,CGR, Marketing

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# Export Performance of Chilli in India

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This study was aimed at investigating the "Export Performance of Chilli in India". The nature of data for study is mainly based on secondary sources. The time series data of chilli export were obtained for 22 years from the year 1996-97 to 2017-18. the period of study was divided into different periods, i.e. Period I (1996-97

to 2006-07), Period II (2007-08to 2017-18) and Overall period (1996-97 to 2017-18 ). The data on export quantity and value were collected from Directorate General of Commercial Intelligence and Statistics (DGCIS), Government of India, National horticulture board. The export data of chilli was collected for HS code of 0904. To examine the growth in export of chilli from India compound growth rate (CGR) was computed based on its fit using non-linear models, especially the exponential model. Coefficient of variation and Cuddy-Della Valle Instability Index will be used to estimate the instability in export of chilli data. The study revealed that, the growth in chilli export was high in quantity during period-I than period-II, value in rupee and value in dollar was increased in period-II as compared to period-I.Instability in chilli export measured in quantity was high during period-I compared to period-II.Instability in chilli export was serious concerns which affect the prices of chilli in domestic market and reduce foreign earning. So export of chilli may stabilize by proving appropriate support. Hence, there is need to evolve policies directing higher production of chilli and formulate alternative management strategies and policies to boost chilli export in India.

**Keywords:** chilli, export, instability. Cuddy della index

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## Economics of Horticulture and Forestry

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Horticulture forms an essential and fundamental component in the economy of a country. Horticultural crops constituents a significant segment of the total agricultural production of a country. The importance of Horticulture can be materialized by its benefits like high export value, high per unit area yield, high returns per unit area, best utilization of wasteland, provisions of raw materials and industries, whole engagement by a grower, production of more food energy per unit area than that of field crops, better use of undulating lands and stabilization of women's empowerment by providing employment opportunities through processing, floriculture, seed production, mushroom cultivation, nursery preparation, etc. In addition fruits and vegetables, constituent the important energy- giving material to the human body. It also improves the economic condition of many farmers and it has become a means of improving livehood for many unprivileged classes too. Flower harvesting, nursery maintainance, hybrid seed production and tissue culture, propagation of fruits and flowers and food processing are highly remunerative employment options for women in rural areas Forest provides a wide range of economic and social benefit to humankind. These include contribution to the overall economy, for example through employment, processing and trade of forest product and energy and investment in the forest sector. They also include the hosting and protection of sites and landscape of high cultural, spiritual or recreational values. Maintaining and enhancing these functions is an integral part of sustainable forest management. Information on the status of and trends in socio- economic benefits is thus essential in evaluating progress towards sustainable forest management, together with more usual statistics on the predominantly environmental values considered under the other themes.Economic benefits are usually measured in monetary terms and may include income from employment in the sector ; the value of the production of goods and service from forest and the contribution of the sector to the national economy, energy supplies and international trade In , addition , the economic viability or sustainability of the sector to the national economy, energy supplies and international trade In, addition, the economic viability or sustainability of the sector can be assessed by measures such as the profitability of forest enterprises or the level of investments.

**Keywords:** floriculture, seed production, mushroom cultivation, nursery preparation

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# Economics of Production and marketing of *Summer* Tomato in Ahmednagar District of Maharashtra

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The present study was carried out in Ahmednagar district to know the resource use pattern, cost and returnsstructure, marketing efficiency and problems faced by farmers in production and marketing of *summer* tomto. The average per hectare cost of cultivation of *summer* tomato was ₹259279.62 and 980.08 quintal per hectare of main produce. The study as whole, the gross returns obtained were ₹470793.91 and with its B:C ratio was 1.82.The regression coefficient of manure, nitrogen, potash, phosphorus and irrigation were positive and significant, it indicates that there is scope to increase the use of resources to increase the production.

The per quintal cost of marketing of *summer* tomato through channel-I, channel-II, channel-III were ₹147.50, ₹ 180.00 and ₹ 364.60 , respectively. Price spread in marketing of *summer* tomato was maximum in channel-III due to large chain of intermediaries. Price received by the producer was maximum (₹1952.50 /q) in channel-I followed by channel-II (₹1670/q) and Channel-III(₹1285.40/q). The major problems in production and marketing of summer tomato *viz*; irregularelectric supply, high cost of inputs, high wage rates, non-availability of labour, and price variation in the market, costly packaging material, high transport and commission charges.

The study suggested for providing scientific knowledge about new technologies in production to the tomato growers. Farmer may produce quality produce of tomato withminimum cost of cultivation by using recommended package of practices.There should be the facility of dissemination of market information and marketing system should be need to reorganized, so that the farmers can get remunerative and higher prices for the summer tomato, and establish of tomato processing plants and cold-storage facilities are needed for fetching higher prices throughout year to the farmer.

**Keywords:** Production, marketing, market information and marketing system

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# Trends in export of Cashew nut kernels and Cashewnut shell liquid

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The present study aimed to find growth trends and direction of trade for two cashew nut products a) Cashewnut kernel and b) Cashewnut shell liquid. Growth rates of exports of selected processed products of cashew were computed for a period of 16 years (2003 -04 to 2018-19). Considering 2011-12 as the base year, growth rates at the constant price were worked out to give the real picture of export earnings The trade directions of Indian processed cashew product exports were analysed using the first order Markov chain approach. During the study period, Cashew nut kernel export growth has shown increasing trend, in case of quantity it was 25.53 per cent per annum and regarding export earnings it was 38.31 per cent per annum. The average quantity of cashew nut kernels export from India in last decade was 1678.50 MT. The top ten countries together shared about 93 .72 per cent of total export from India. The average export earnings in last decade were Rs.6680.23 lakh. It was concluded that the cashew nut kernel export has indicated a promising picture regarding growth in quantity as well as export earnings. However, it was also concluded that the average share of USA alone was 81.64 per cent (1370.34 MT) indicating dependency on one country and therefore export of cashew kernel need to diversified. USA was loyal importer of cashew nut kernels from India. USA has retained 94 per cent of its previous share as indicated by diagonal transitional probability value. UAE has retained 40 per cent of its previous share and found to be relatively stable importer for cashew nut kernels from India as indicated by its

'transitional probability value. USA, UAE, UK, Japan as well as other importers may be focused and overall export policy should planned accordingly as cashew nut processing in India is highly influenced by international market, import policy. The export of CNSL does not show a promising picture as far as growth rates of the majority of countries are concerned. The overall trend of CNSL export was negative. However, export to Spain has shown increasing trend, compound growth rate for quantity and values were positive and significant such as 59.69 per cent and 141.91 per cent, respectively. The CNSL export to Italy was also positive and significant both in terms of quantity and values. The compound growth rates regarding CNSL export to Italy were 95.5 per cent for quantity and 60.88 per cent in terms of values. The major importing countries (Top ten) contributed about 96.32 per cent share of total export indicating their dominance and importance than other countries. It was revealed that most major importing countries do not show a promising picture because growth rate of export to many of the major importers were negative. The USA was loyal importer of CNSL from India as indicated by transitional probability value (0.94).

**Keywords:** CNSL, export, trend, transitional probability, Markov chain

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# Export Oriented Farming

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The study uses a systematic approach to ensure the complexity and focus of scientific recommendations, analytical, abstract-logical, calculating-constructive, economic-statistical, economic-mathematical, monographic methods of research. The methodical approach to justifying the placement of organic agricultural products and food production, localizing it using method of mapping. The Based on the acceptance of mapping with allocation locally segments based on certain criteria or features based on the points-rating system. This allows us to distinguish local segments of industry production and organic farming using signs of geographical and behavioral segmentation. At the same time, the criterion of segmentation by geographical basis may be the natural and economic zoning of the area in question; the criterion of segmentation by behavioral basis may be the degree of need of the residents of the area for a particular product. In the end, the allocation of segments is reduced to ranking local zones of production and processing of organic agricultural products and markets, forming in them.The set of economic policies labelled economic liberalisation, stabilisation and structural adjustment adopted by developing countries over the last 15 years have had and are having a profound impact on the nature of the development process in these countries, and especially on their food security. It is the aspect of food security as affected by food availability and income shifts which is the focus of this paper. The paper argues that the undeclared aim of these policies appears to be the restricting of domestic income growth and absorption of the products of developed countries by the populations of developing countries in order to release resources for growth of the exportable products demanded by the developed world. In support of this the paper looks at the international division of labour in agricultural production in a historical perspective and contends that the theory of comparative advantage cannot explain either the history or the pattern of international specialisation because it contains a logical fallacy: relative costs cannot be defined at all for a large range of trade relations. The paper also comments on the new pattern of demands on tropical agriculture emerging in the developed countries and the new drive to obtain tropical importables on favourable terms.

**Keywords:** organic agricultural products , food production ,comparative advantage

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# Genetic variability studies in Red cowpea

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An experiment was conducted with twenty four genotypes in rabi season of 2020-21 at research and education farm, Department of Agriculture Botany, College of Agriculture, Dapoli. Observations were recorded on fourteen characters viz., days to first flowering, day to 50 per cent flowering, days to maturity, plant height at maturity (cm ), number of primary branches per plant, number of pods per plant, number of seeds per pod, pod length, 100 seed weight, dry matter yield per plant, seed yield per plant, harvest index (%), protein content (%) and iron content (ppm). A wide range of variation exhibited for yield and yield attributing traits among the genotypes under study. In general PCV was higher in magnitude than GCV. The analysis of variance revealed significant variation among the genotypes for all the characters studied. The estimates of mean sum of squares showed comparatively wide range of variation for the characters Iron content, dry matter yield per plant and days to 50% flowering while the lowest variation was recorded for number of primary branches per plant followed by Hundred seed weight. Appreciable heritability values were observed for the characters under study. Highest heritability estimates were recorded for the characters like iron content, protein content, dry matter yield per plant, number of pods per plant and harvest index. The lowest heritability estimate recorded for hundred seed weight, days to maturity, plant height at maturity and number of seeds per pod.

**Keywords:** Variability, GCV, PCV, heritability

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# Correlation and Path analysis Studies in Red Cowpea

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An experiment was conducted with twenty four genotypes in rabi season of 2020-21 at research and education farm, Department of Agriculture Botany, College of Agriculture, Dapoli. Observations were recorded on fourteen characters viz., days to first flowering, day to 50 per cent flowering, days to maturity, plant height at maturity (cm), number of primary branches per plant, number of pods per plant, number of seeds per pod, 100 seed weight, pod length (cm), dry matter yield per plant, harvest index (%), seed yield per plant, protein content (%) and iron content (ppm). The correlation study revealed that the characters viz., number of pods per plant, number of seeds per pod and harvest index showed highly significant positive correlation with seed yield per plant at both phenotypic and genotypic level. The path coefficient analysis revealed that the characters viz., pod length, plant height at maturity, hundred seed weight, dry matter yield per plant and harvest index exhibited positive direct effect on seed yield per plant at both phenotypic and genotypic level. On the basis of path analysis and correlation study for seed yield, it is concluded that selection on the basis of number of seeds per pod, number of pods per plant, dry matter yield per plant and hundred seed weight could help in genetic improvement of grain yield per plant in cowpea under study.

**Keywords:** Correlation, path analysis, character association study

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# Market Share and Concentration of Indian Sugar

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Sugar is an essential commodity derived largely from sugarcane which is an agricultural produce. It is the most preferred source of energy required for proper functioning of human brain and body.Because of these properties, there is a great demand for sugar in domestic and international markets. Therefore, looking at the importance of international market for Indian sugar present study was undertaken with the main objective of studying the market share and concentration of Indian Sugar along with growth rate and instability of international trade. For the study secondary data was collected from various published and unpublished sources. The time-series data so collected pertained to a 30- year period spanning from 1989-90 to 2018-19. The statistical tools like Compound Annual Growth Rate, Coefficient of Variation, Cuddy Della Valle's Index, Hirschman Herfindahl Index and TheilsEnthropy Index were used to obtain the necessary results.The study showed that, the production of sugar increased at the rate of 3.15 per cent per annum whereas, consumption of sugar increased at 3.63 per cent per annum in the entire period. The export of sugar had positive growth of 11.13 per cent per annum. The value of exported sugar witnessed a growth of 12.72 per cent per annum while, there was 1.43 per cent annual growth in unit price of exported sugar. On the other hand quantum of imported sugar recorded a positive growth of 25.86 per cent per annum, value of imported sugar grew at the rate of 28.68 per cent per annum while unit price of imported sugar recorded a positive growth of 2.08 per cent per annum.Myanmar had the lowest share of market in the initial years of study which increased gradually and became the highest shareholder of Indian sugar market at the end of study period. The Indian sugar was highly concentrated in a handful of countries.

**Keywords**:CGR, Coefficient of Variation, Cuddy Della Valle's Index, Hirschman Herfindahl Index and TheilsEnthropy Index

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# Economic Analysis of Organic Chickpea Production at Organic Farming Research and Training Center (Ofrtc), Mpkv, Rahuri.

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In India, organic farmers use an array of cultural and biological practices to build soil health, manage weeds and pests and increase biodiversity. As per the available statistics, India's rank 8$^{th}$ in terms of World's Organic Agricultural land and 1$^{st}$ in terms of total number of producers.(Source: FIBL & IFOAM Year Book, 2020). Total area under organic certification process registered under National Programme for Organic Production (NPOP) is 43.39 Million ha (2020-21).

The Organic Farming Research and Training Center, MPKV, Rahuri was started cultivation and research unit producing organic crops continuosly for two years i.e. 2019-20 and 2020-21 on operation holding of 16 ha.

The analysis is carried out by simple tabular method.The maximum per hectare cost involved was in the use of Heliokill followed by neem oil.The per hectare cost of cultivation i.e. cost 'C' worked out to Rs.85182.67 and Rs.92958.31 for the year 2019-20 and 2020-21 for organic cultivation chickpea respectively and benefit cost ratio was 1.13 for the year 2019-20 and 1.18 for the year 2020-21. Constraints in production and marketing of

organic chickpea are major problems faced by the OFRTC, MPKV, Rahuri was lack of funds and also markets are not well established. The concluded part is, per hectare cost involved for organic inputs was maximum in the use of neem oil followed by helio kill and magic (SLNPV).The machine power, seed, manure, hired human labour and plant protection were major items contributing more than 60 percent of the total cost for the production of organic chickpea.

**Keywords**: NPOP, SLNPV, OFRTC, cost of cultivation

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## Storability and cost economics of Onion (*Allium Cepa* L.) Crop as affected by Deficit Irrigation

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Deficit irrigation effect on bulb yield and storability of onions (cv. N-2-4-1) was studied during *rabi* season of 2012 and 2013 at Instructional Farm of the Department of Irrigation and Drainage Engineering, Mahatma Phule Krishi Vidyapeeth, Rahuri. Experiment was carried out in Randomized Block Design (RBD) with 27 treatments and two replications based on different combinations of the quantity of water stress during different crop growth stages. Water applied per irrigation and soil moisture contents before and after irrigation was monitored throughout the season. Onion bulbs were harvested at the end of season and weighed. Storage losses of onion crops are higher with less water stress and reduced with increase in water stress. Losses due to rotting, sprouting, and physiological weight loss were found higher in irrigated treatments. After six months of storage, the maximum cumulative weight loss (49.09 %) was recorded in onions irrigated at maximum stress treatment (T27), while the minimum (38.21. %) was recorded in (T4) treatment which is 20% stress during bulb development stage. Also the B:C ratio was 1.51 for treatment T4 which is 20% stress during bulb development stage and 0.91 for treatment T27 which is 40% stress during all growth stages.

**Key words**: Deficit, Storability, onion bulb, irrigation, storage losses.

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## Trends in Arrivals and Prices of Sorghum in APMC Ahmednagar

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Trends in Arrivals and Prices of Sorghum in APMC Ahmednagar was studied for 18 years (2003-04 to 2019-20) the result of the study reveals that the highest prices of sorghum crop were found in the year 2019, which was 257.82 per cent over the base year, while prices are more or less similar except the year 2019 and 2020 over the base year, while in the rest of years prices were ranged from Rs. 2000 per quintal to Rs. 4000 per quintal.In overall level, an arrival of sorghum was decreased by 5.83 per cent and a price was increased by 7.78 per cent. In case of prices the Co- efficient of variation ranges from 35.07 to 41.56 per cent, this clearly indicates that there was a less variation in the prices of the sorghum crop.The correlation coefficients of both crops were negative during the whole year indicating that increased arrivals resulted into decreased in prices; in this case the phenomenon of inverse relationship is proved.The maximum variation in arrivals was found in the month of February (92.72 %) followed by August (81.51 %), while less variation in arrivals was found in the month of April (56.745 %) followed by October (55.74 %). In case of prices the Co- efficient of variation ranges

from 35.51 to 41.56 per cent, this clearly indicates that there was a less variation in the prices of the sorghum crop.The less arrivals of sorghum was observed during the months of September to November, respectively.
**Key Words:** Arrivals and Prices, Co- efficient of variation

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# Comparative economics of different integrated farming systems in Ahmednagar district

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The present study was conducted to throw light on the economics of different farming systems and enable the academicians and policy makers to formulate and implement appropriate policies for a balanced, integrated and overall agricultural development. In view of this, study was carried out in Sonai village of Newasa tahsil of Ahmednagar district with the specified objectives. The results of the study revealed that, the per hectare added income over the crops only farming system was highest in C+D+G+S farming system with the tune of 28,62,186 followedby C+D+G+S+P, C+D+P, C+D+G+P, C+D+G and C+D with the additional income of Rs.8,78,036; Rs. 5,84,464; Rs. 2,99,239, Rs.1,70,253 and Rs. 1,61,442, respectively. Incremental Cost-Benefit Ratio (ICBR) was economically viable in all the farming systems over the crops only farming system. ICBR ratio was found highest in C+D+G+S (1.88) followed by C+D+G+P (1.67), C+D+G+S+P (1.39), C+D+G (1.24), C+D (1.10) and C+D+P (1.03). All the farming systems over crop only farming system are economically viable. C+D+G+S farming system is most economically viable followed by C+D+G+S+P,C+D+G, C+D and C+D+P. Therefore it is suggested that the farmers should follow the integrated farming system approach rather than crop only approach for sustainable and profitable farming.

**Keywords:** farming systems, ICBR ratio

## THEME- II

# Challenges and Prospects of Hitech Agriculture, drones, IT climate change etc

# Application of Blockchain in Agriculture

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Blockchain, the technology behind cryptocurrency, has brought a new revolution in the various field through its feature of decentralized public ledger, immutability, traceability, etc. Bitcoin is just an exemplary use of the Blockchain, to date, it is been used in various sectors like the agriculture supply chain, land records, health records, education, and many more. Its decentralized structure can provide reliability, transparency, invariance, accessibility, controllability, and data integrity. The common problems in food supply chains such as food traceability, food safety, and quality, food trust, and supply chain inefficiency can be addressed with the help of blockchain technology. Due to its characteristics of transparency, traceability, security, and decentralization, blockchain technology makes it possible to track the information related to the food's journey, price transparency, and farmer details in the entire supply chain. All parties, including producers, consumers, and government regulatory bodies, can thus be benefited. Many companies have started working on blockchain in the supply chain. In India Sahyadri farms have successfully adopted blockchain to track the movement of produce from farmer to consumer. Another example of successful implementation of blockchain is ifincain the coffee supply chain in America.Blockchain technology can also play a crucial role in keeping the track of the records and in determining the ownership. By connecting all the concerned Departments of Land record maintenance in a Blockchain Technology network, ownership can be determined easily, transfer of ownership can be done in lesser time. The Government of the Republic of Georgia is the first Government to introduce Blockchain Technology in Land Registry Management. The Georgians can register their lands and transact on Blockchain for the same thus, reducing the conflicts in the registration process and property exchange. The notary services for the ownership verification and proof of transaction are not required as such transactions are automatically added onto the digital ledger. Recently, the Government of Andhra Pradesh has partnered with a Sweden-based company Chromaway to build its Blockchain-based solution for land registry. The multiple Ethereum nodes (in the case of the Andhra Pradesh Blockchain land registry) will allow property deeds to be stored on a Government Land Registry. Thistechnology would facilitate asset ownership transfer from property seller to buyer, approved via Land Department, and it demonstrates possible integration with the other Government entities.

**Keywords:** blockchain, cryptocurrency, traceability, supply chain, price transparency, food journey.

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# Emerging Issues of Climate vulnerability for Major cultivated crops in Mandla district of Madhya Pradesh

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India is one of the largest producers of cereals, pulses and oilseeds in the world simultaneously affected with several climatic and non climatic factors during increasing farm income. An attempt has been made in this paper to finding the production issues of major cultivated crops in Mandla district of Madhya Pradesh state with ninety farmers who were selected though multi stage stratified random sampling from six villages. Crops like paddy, maize, wheat, Peas, soybean, mustard and Gram (Red, Black and Green and Gram) cover more than 90 per cent area of the total gross cropped area in the study area. In collected information, about 75 and 81 per cent Farmers were facing issues due to agro biological factors and climatic factors respectively. An average of 73 (81 per cent) farmer experienced with climatic factor which being affected their crop production. about 87 per cent farmers are facing issues of late onset of monsoon .Farmers are advised to soil health test community approach

and Custom Hiring Centre (CHCs) to overcome labour scarcity, timely beware with weather based crop advisories, Construction of dug well, Farm Pond or community irrigation.

**Key word: climate resilient agriculture, Crop Production, Livelihoods**

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# Assessment of Factors Governing Food Security Among Rural Households in Tribal District of South Gujarat: A Lesson for Future Planning

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The concept of food security basically stands on three pillars, food availability, food stability and food accessibility. Availability of food is associated with purchasing power and food insecurity is caused by poverty. If people do not have purchasing power, they have substitute of food reserves. Food insecurity and poverty are directly related to each other. So, the needs of the poor should be protected by improving their purchasing power, through proper planning of agricultural activities for future that can produce more employment and income generation programmes. Around 20.4 per cent of Gujarat's current population does not get enough calories from food as compared to the all-India figure of 13.4 per cent. Seven per cent of Gujarat's children suffer from severe malnutrition while another 44 per cent suffer from moderate malnutrition. The food consumption pattern of household is subject to various socio-economic characteristics including asset position and financial background. Hence, the problem of food insecurity is basically not found in all sections of the people, rather it is mostly confined to certain marginalized sections. It includes scheduled tribes (STs) as they are socially and economically disadvantaged due to their isolation both geographically as well as culturally from the mainstream population.Thus, the attempt has been made to study the major factors governingfood security in the Dangs district which is a tribal district of south Gujarat having 95per cent scheduled tribe population. Analysis was done with the help of Logistic Regression model. Results showed that out of eleven variables fitted into the model, six were found statistically significant predictors of households' food security. Household size, dependency ratio and age of the head of the household has significant negative association with food security whereas animal herd size and above poverty level status of household found to be positive influence on food security. Further, marginal effects of various factors on food security have also been estimated. The government should focus on awareness creation on effective family planning and the impact of large family size on ensuring food security, and awareness creation and capacity building for elder households through ensuring the availability and dissemination of accurate information should be strengthened. Government can initiate or strengthenold programmes for alternative income generation through facilitation of labour intensive schemes.

**Keywords:** Food security, logistics regression, food availability, poverty

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# Successful Adoption of Ajwain Seed Production Technology by the Farmers in a Changing Climate Scenario

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The present study deals with Ajwain, which is botanically known as Trachyspermum ammi L. This seed spice belonging to the family Apiaceae, is highly valued and medicinally important. It is also called by

other names such as Bishop's weed, Carom seed, Yaviniki, Omu etc.Ajwain is a native of Egypt and it is mainly grown in arid and semi-arid regions of the world such as Afghanistan, Pakistan, Iraq, Iran and India. In India, the major ajwain producing states are Pawar G.S Rajasthan, Gujarat, Madhya Pradesh, Andhra Pradesh, Telangana, Maharashtra, Uttar Pradesh, Bihar, West Bengal and Karnataka. Ajwain is an erect annual herb with straight stem. The seeds are strongly pungent and aromatic in taste.

Ajwain is a dryland crop which can be grown with very less amount of water and minimum inputs. In spite of this fact, the crop is grown in very less area and there is a scope for further expansion of area under cultivation of ajwain in dryland conditions of Marathwada region of Maharashtra state. We have conducted research on densities and date of sowing suitable to achieve more yield of ajwain. This is a new and unique study on this crop which would help the agriculture functionaries to guide the farmers regarding the cultivation problems of ajwain.

Since from many years Marathwada is in news for crippling drought. Depends upon our research findings efforts were made to change in cropping pattern suitable to climate change through Front Line Demonstration on Farmers Field by Vasantrao Naik Marathwada Agriculture University

Average annual rainfall for the region is 835.0 mm, selected villages from district Aurangabad and Hingoli and Latur were selected. Farmers have adopted this new crop because during last five years the market rates are ranging from Rs.5000/ to Rs.20,000/ for seeds of Ajwain and also for husks in range of Rs.500/ to 2000/ per quintal.

In a climate change scenario farmers are adopting this crop on large scale and become an alternative resilient crop for Marathwada region.

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# Utilization of Agricultural Residue as Briquetted Fuel Using Manually Hand and Pedal Operated Briquetting Machine

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Energy is basic requirement of human being. A major problem that confronts mankind today is the inadequate availability of energy as its conventional sources are fast exhausting. Energy is needed for heating, lighting and cooking in household and for virtually every industrial, commercial and transport activity. As the world population increases there is an increase in energy consumption and also due to increase in standard of living, energy demand also increases. Biomass seems to be a solution for future. The current availability of biomass in India is estimated at about 1,249 million tons per year. Biomass can be effectively used by three ways such as improved solid fuels i.e. pellets and briquettes, liquid fuels i.e. ethanol and gaseous fuels. Now a daysbriquetting technology plays an important role in the utilization of agricultural wastes for higher calorific value and high-energy utilization.

The manuallyhand and pedal operated briquetting machine utilizing dry mango leaves, cashew leaves, jackfruit leaves, rice husk and binding agent waste flour was designed and developed for 10 kg/h capacity(170 briquettes/h).The hand and pedal operated briquetting machine required less effort in the operation, whereby ODR, BPDS and Heart Rate rating was found to be more than light discomfort, 25.5 and 100.83 bpmrespectively.The results of the briquettes made from combination(15:15:15:10:5:20:20)of mango leaves, cashew leaves, jackfruit leaves, rice husk, saw dust, binding agent waste flour and cow dunghad maximum calorific value, bulk density, energy density ratio, shatter index, resistance to water penetration of 3605.80 kcal/kg, 446.32 kg/$m^3$,1.87, 87.78 percent, 82.87 percent respectively. The economic evaluation of manually hand and pedal operated briquetting machine revealed that, the net present worth, benefit cost ratio and payback

period was found to be Rs. 11,54,354.30/-, 2.30 and 1.24 years (14.94 months), respectively and revealed its economic feasibility.

**Keywords:** Biomass, Cashew leaves, Mango leaves, Briquette, Briquetting Machine

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## Development of Semi-Automatic Drying System for Wheat

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The objectives of this investigation were to develop the semi-automatic drying system for wheat, to test the work performance of the developed semi-automatic drying system for wheat.To achieve these objectives wheat (*KedarAnkur*) was dried in bin for four moisture content level (16%, 18%, 20%, 22%, 24%). To reach objectives: Temperature, relative humidity, moisture content, were assessed.

Drying of wheat from 16 % to 12 % m.c required 90 min. For drying of wheat from 18 % to 12 % m.c required 120 min. As time span increases m.c at bottom level in semi-automatic drying system for wheat decreases fastly as compared to top, middle, side. For drying of wheat from 20 % to 12 % m.c required 150 min. For drying of wheat from 22 % to 12 % m.c required 195 min. For drying of wheat from 24 % to 12 % m.c required 240 min. It was found that as time span increases moisture removal rate increases, gradually reduces as drying completed.

Drying process start initially (16% – 12% M.C) the temperature of the grain was 29.33 while at the end of the drying period, the temperature was 37.48 . Drying of wheat from 18 %-12% initially the temperature of the grain was 28.67 while at the end of the drying period, the temperature was 38.92 .Drying of wheat from 20 %-12% initially the temperature of the grain was 29.91 while at the end of the drying period, the temperature was 41.35 .Drying of wheat from 20 %-12% initially the temperature of the grain was 29.90 while at the end of the drying period, the temperature was 42. 09 .Drying of wheat from 20 %-12% initially the temperature of the grain was 30.03 while at the end of the drying period, the temperature was 45.07 .

Drying of wheat from 22 % -12% the relative humidity of the bin was 87.63% while at the end of the drying period, the relative humidity was 31.26 %. Drying of wheat 16 % -12% relative humidity of the bin was 89.25% while at the end of the drying period, the relative humidity was 52.42%. Drying of wheat from 18 % -12% the relative humidity of the bin was 92.94% while at the end of the drying period, the relative humidity was 51.75%.

Drying of wheat from 20 % -12% the relative humidity of the bin was 95.09% while at the end of the drying period, the relative humidity was 38.84 %. Drying of wheat from 22 % -12% the relative humidity of the bin was 98.51% while at the end of the drying period, therelative humidity was 40.60%.

**Keywords:** Semiautomatic drying system, Wheat, storage.

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## Design, Development and Performance Evaluation of Small Scale Grey Water Treatment Plant

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The design, development of grey water system was done by using locally available filtration and adsorbent media and its performance was evaluated.The media size and depth decided by

experiment were sand (0.42 mm), grit (6-8mm), gravel (15-25 mm), brick pieces (25-30 mm) and charcoal (12-16 mm) (Zaidun, 2011) having layer thickness of 450 mm,450 mm ,150 mm, 300 mm and 30 mm respectively.The hydraulic retention time (HRT) of designed filter was 1.33 hours at hydraulic loading rate of (HLR) of 3.77 m $day^{-1}$. The filtration area of one square meter would have capacity of 3770 $lit.day^{-1}$.Atsteadystate head of 1.5m,the overall performance of the combined system was82.70% BODremoval,85.10% COD removal, 78.78% oil and grease removal,69.23% Residual Sodium Carbonate removal (RSC), 21.33% reduction in Sodium Adsorption Ratio (SAR), and31.19%TD Sremoval, respectively, were noted. The pH of the entire system remained stable (7.32±0.5) throughout the experiment. The Calcium, Bicarbonate, Potassium, Nitrogen, Magnesium, Sodium, were also reduced after filtration by 20, 44.82, 48.76, 5.55, 33.33, 31.42 percent respectively. Generally, the final effluent was found to be suitable for arrange of uses such as toiletflushing,irrigationandfireprotection..

**Keywords**: Grey water**,** Grey water filter, Hydraulic retention time, Filtration area

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# Effect of different irrigation levels on growth and yield of strawberry under lateritic soils of Konkan region

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The experiment entitled, 'Effect of different irrigation levels on growth and yield of strawberry under lateritic soils of Konkan region' was conducted at the Department of irrigation and Drainage Engineering, College of Agricultural Engineering and Technology,Dapoli.The results of the experiment revealed that irrigation level $I_2$ (0.6 PE) individually gave superior results for growth and yield parameters of strawberry than rest of the irrigation levels. The irrigation level $I_2$ (0.6 PE) responded very pleasantly during year 2013-14 , 2014-15, 2016-17 to obtain the maximum yield and found significantly superior over other irrigation levels i.e. $I_3$ (0.8 PE), $I_4$(1 PE), $I_1$ (0.4 PE) and $I_5$ (1.2 PE) respectively. The pooled analysis also shown that the irrigation level $I_2$ (0.6 PE) obtained maximum yield of 14.82$t.ha^{-1}$among all applied irrigation treatments. The maximum water use efficiency was found in treatment $I_1$ (0.4 PE)followed by $I_2$(0.6PE),$I_3$(0.8 PE), $I_4$(1 PE),) and $I_5$ (1.2 PE), respectively in year wise as well as pooled means. Irrigation level $I_5$ (1.2 PE) responded positively to obtain the maximum average diameter of fruit, maximum mean polar diameter of fruit, maximum equatorial diameter of fruit and maximum geometric mean diameter of fruit and found significantly superior than other irrigation levels i.e. $I_4$ (1.0 PE) , $I_2$(0.6 PE) , $I_3$ (0.8 PE) and $I_1$ (0.4 PE). The maximum B: C ratio of (3.05) was observed in treatment combination $I_2$(0.6 PE) followed by $I_3$ (0.8 PE)(2.92),$I_4$(1.0 PE) (2.73)and $I_1$ (0.4 PE)(2.28) respectively. The experimental results concluded thatunder the lateritic soils of Konkan region, the strawberry *Var. Sweet Charlie*is to be cultivated by inline drip (16mm Ø, 0.3m spacing,4 lph) irrigation system with application of 321 mm irrigation depth coupled 25 micron silver plastic mulching along to get maximum monetary benefits (B:C ratio).

**Key words:** Mulch, WUE, Irrigation depth, Lateritic, Irrigation level

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# *Aeromonas :A* potential threat to farmed Tilapia in Pune, Maharashtra

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According to Food and Agriculture organization (FAO),Oreochromisniloticus (Tilapia) is commercially cultured species worldwide.Aeromonasveronii is an important pathogen causing septicemia and ulcer syndrome in farmed fishes. An increasing number of cases have demonstrated its significance as an aquatic zoonotic agent. Aim of the study was to identify reason of mass mortalities in Tilapia at West Coast

Aquatics, Pune Maharashtra.The diseased samples collected showed, lethargy, enlarged gall bladder and exophthalmia.The samples were subjected to biopsy,preliminary analysis and bacterial identification by biochemical methods. The isolates obtained were confirmed by Molecular characterization techniques as Aeromonasveronii, Aeromonashydrophila, Aermonasjundaei. In conclusion, Aeromonascan be regarded one of the major reasons for mass mortalities in Tilapia in the given study area. These results are of great importance for further improving the food safety assessment of farmed fishes.

**Keywords:** *Aeromonas*,*Tilapia,* molecular characterization, food safety

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# Farmer's Perception and Factors Influenting Adaptation Decisions to Cope with Climate Change

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The farmer's adaptation decision to cope with climate change has drawn considerable attention and recognition of the local and global scale's human-environmental approach. Climate change poses a real threat to farmers around the world. Agriculture is highly dependent on good weather, including high and low temperatures, rainfall, wind intensity, and many other variables. Estimates show that climate change might reduce global agriculture productivity by 17% by 2050. In this paper, we tried to understand the human dimension of adaptation decision of farmers in rural India.Agricultural production is apparently affected by climate-related shock in the area, which is usually manifested by the occurrence of pest and insect infestations as well as land degradation problems. It analyze the farmer's perception of climate change and socio-economic determinants of farm household which influence adaption decisions and adaptation strategies choices. The data is analyzed through descriptivestatistics and logistic regression. The study finds that 80 per cent of the surveyed farmers perceive and predict climate changes and choose to adopt. This study found that the key socio-economic variables such as the farmer's age, gender, household size, education level, off-farm income, and farm-size influence farmers' adaptation decisions. This study will help identify the critical household characteristics that may be integrated into future policy formulation and implementation to be integrated into future policy formulation and a successful adaptation future.Models like agroforestry and sustainable forestry plantations show a possible path for farmers around the world move to low-carbon agriculture and a more resilient agriculture, producing the necessary food to feed the world while restoring the land. In a world where the impacts of climate change are not just imminent but arriving, it is crucial to protect farms and farmers by finding a more resilient and sustainable model for agribusiness.

**Keywords:** farmer's adaptation decision, farmer's perception, climate change, policy formulation

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# Use of Drones in Agriculture: Potentials, Problems and Policy Needs

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The drone used for agricultural activities is known as agriculture drone. Drones are designed to carry the sensors that can provide real-time information about the crop status or livestock movement, so that decision on cultural operations and management is made efficiently and precisely. The drone can be either remotely controlled over wireless communication or can be programmed to travel the predefined path using complex navigation algorithms running on onboard controllers.In India, forty drone start-ups are engaged in enhancing the technological standards and decrease the agriculture drone's prices to make it affordable and popular among

farmers. The Maharashtra state government has been encouraging drone companies to work with them. Recently, Maharashtra government and World Economic Forum (WEF) Centre for the Fourth Industrial Revolution signed a MoU to explore the possibilities of using drones for several government initiatives. Farmers of Dahanu-Palghar tribal villages in Maharashtra have learned to use drones for organic farming, fish farming, crop rotation, bio-control, hydroponics, bio-waste management, beside also using drone-based technologies on their orchards and farms. However, the cost of drones, operational policy, and limited availability of technically trained pilots are specific blockage in drone market development in India. Hiring an urban drone team to conduct a survey for a remotely located small field is extremely expensive for any assessment & crop planning at the grassroots level. Just like custom hiring of farm implements scheme, farmers should be trained in drone operation and should be encouraged to form a group enterprise and own the drones. Due to the costs involved in purchasing drones, small and medium-scale farmers are reluctant to use drones. In addition to affordability and technical know-how, the lack of skilled pilots is a major preventive factor for UAV market development in India. The following policy reforms would encourage drone use in agriculture. Entrepreneurs providing drone services need to be encouraged by giving priority in registration and trainings on regulation. Training for drone operators for agricultural purpose should be made easily accessible and affordable for young entrepreneurs.

**Keywords:**Use of drones,Policy Needs, Fish Farming, Crop Rotation, Bio-Control, Hydroponics, Bio-Waste.

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# Climate Change and Its Impact in Marathwada Region

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The districts of Marathwada and Vidarbha witnessing maximum farmer suicides in Maharashtra face higher risk to climate change. A report by the National Bank for Agriculture and Rural Development (NABARD) recommends the state government to initiate policies and measures to adapt to climate changes that would be detrimental to the agro-sector in 14 districts affected by severe drought across Vidarbha and Marathwada. Area is selected from Marathwada region of Maharashtra state. It was found that 76.67 per cent having farming as their major occupation, 33.33 per cent respondents were marginal farmers, 66.67% reported that well as a main source of irrigation, 79.17%medium annual income, 63.33 per cent had medium awareness about crop insurance, 60.00% medium innovativeness category and 55.00% medium risk orientation. Findings showed that farmers have fairly high level of perception about climate change and its various dimensions. Change shows that, 54.17 % farmers had medium perception, 27.50% farmers had high perception about climate change followed by 18.33 % of farmers had low perception level about climate change. The impact of high temperatures, rainfall, and humidity will make outdoor work difficult for the farmers. In addition, increased incidences of heat stress and humidity will have a bearing on farming operations like weeding and harvesting. As part of its work with farmers in Maharashtra, ISC is working to promote sustainable cultivation practices, building an understanding of the likely impacts of climate change and improving resilience for the farming communities. The impact of high temperatures, rainfall, and humidity will make outdoor work difficult for the farmers. In addition, increased incidences of heat stress and humidity will have a bearing on farming operations like weeding and harvesting. As part of its work with farmers in Maharashtra, ISC is working to promote sustainable cultivation practices, building an understanding of the likely impacts of climate change and improving resilience for the farming communities.

**Keywords:** Climate change, impacts of climate change, awareness, perception.

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# Verification of rainfall forecast and role of weather based advisories in Latur district of Maharashtra state.

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The studies on verification of rainfall forecast and role of weather based advisories in Latur district of Maharashtra state was carried out during the year 2020. The result revealed the the rainfall accuracy reached its highest (88.7 %) in 2018 and its lowest (75.6 %) in 2020. On seasonal basis rainfall accuracy was highest (96.9 %) during the winter season and lowest (40.4 %) during the monsoon season. Winter (94.6 %) had the greatest average ratio score, while monsoon season had the lowest (73.2 %). The rainfall accuracy was observed maximum (88.76%) during 2018 for Udgir taluka and minimum (72.39%) during 2020 for Ausa taluka. On seasonal basis, the rainfall accuracy was highest during winter season and lowest during monsoon season. The highest accuracy was observed (98.0%) during winter season for Renapur taluka and minimum (36.7%) during monsoon season for Jalkot talukas.

Most of the farmers grown Soybean, Green gram, Pigeon pea and Cotton crops during *kharif* season. The farmers adopted the agromet advisories for management of different field operations realized benefit of 24.3 %, 20.3 %, 13.2 % and 24.8 % in Green gram, soybean, pegion pea and cotton crops, respectively. More income of AAS user farmerss have been noticed over Non-AAS users due to timely adoption of proper management strategies as per the weather condition. Agrometeorological Advisory Bulletins was used by the farmers from sowing to harvesting of the crop. As result of this farmers were economically benefited by saving the cost of sowing, fertilizer applications and spraying etc.

**Keywords:** Rainfall, forecast, AAS, AAB etc.

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# The constraints and suggestions offered by the betelvine farmers in Palghar District of Maharashtra

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Entrepreneurship development is concerned with the growth and development of people towards high level of competency, creativity and fulfillment. This approach helps people to grow in self control, responsibility and other abilities and then try to create a climate in which all clients may contribute to the limits of their improved abilities. The study was conducted in Palghar district of Konkan region of Maharashtra State. The data collected from Betel vine growers From Mahim and Kelve villages of Palghar district. Fifty farmers were selected for the study. (Mahim-25 and Kelve-25). Thus the sample consisted of **50** farmers from the district. Data were collected by using the interview schedule specially developed for the study. Un-established market channel for sale of produce (98.00 per cent), seasonal incidence of pest and diseases (96.00 per cent), unavailability of skilled labours for unique cultural practices (94.00 per cent), existing irrigation systems are not standardized (90.00 per cent), the erecting of mandap (Structure), planting and trailing is expensive (86.00 per cent) and the shelf life of the betelvine leaves is reduce during long distance transportation (North India, Pakistan and Bangladesh) (82.00 per cent) were major constraints reported by growers, while availability of advisor for timely guidance and research on integrated pest and disease management (100.00 per cent), establishment of supply chain for proper execution of produce (98.00 per cent), standardization of irrigation system and water requirement as per the soil type (90.00 per cent) research on soil health and nutrient management to improve the yield and quality of leaves (88.00 per cent), development of low cost technology for

erection of mandap (Structure) and alternate option for staking instead of '*Karvi*' sticks and research on soil health and nutrient management to improve the yield and quality of leaves (86.00 per cent) respectively, to develop the packaging techniques and transportation for improvement of shelf life and post harvest quality of leaves (82.00 per cent) and testing of other betelvine varieties at farmer's field (Kelve and Mahim) to identify other suitable variety for the region (82.00 per cent) were the suggestions given by the growers.

**Keywords:** supply chain, mandap, suitable variety, packaging techniques and transportation etc

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## High Throughput Phenotyping: A Platform of Hitech Agriculture

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Development of user-friendly data management tools and softwares to better understand phenotyping will increase the use of field-based high-throughput techniques, which have potential to revolutionize breeding strategies and meet the future needs of stakeholders. Recording trait data through sophisticated non-invasive imaging, spectroscopy, image analysis, robotics, high-performance computing facilities and phenomics databases. These modern phenomics platforms and tools aim to record data on traits like plant development, architecture, plant photosynthesis, growth or biomass productivity, on hundreds to thousands of plants in a single day, as a phenomics revolution. It is believed that this revolution will provide plant scientists with the knowledge and tools necessary for unlocking information coded in plant genomes. High-throughput phenotyping techniques and platforms help unraveling the genetic basis of complex traits associated with plant growth and development and targeted traits. To predict traits of interest, a reliable, precise, and fast large-scale process is required. Recently, a lot of effort has been put to develop automated platforms to expedite plant phenotyping. It relies on automated trait analysis to generate phenotypic data and involves automated sensing, data acquisition, and data analysis. The utilization of high-throughput phenotyping has quickened plant breeding efforts in screening a great number of plants at various phenological stages. Field assessment of plant performance is fast and encourages a powerful, whole life cycle assessment using less destructive means. Various imaging techniques such as visible light imaging, Fluorescence imaging, thermal imaging, imaging spectroscopy as well as tomographic imaging such as computed tomography, magnetic resonance imaging and positron emission tomography etc have emerged as promising methods for high-throughput phenotyping of crop and highlighting the use of high-throughput phenomics platform, particularly in the selection of improved crops in open field experiments. Certainly, in most cases, phenotypic data continue to be the most important forecast of biological outcomes such as plant health, disease-related traits, abiotic stress tolerance traits , mortality, and would be particularly useful for obtaining detailed measurements of plant characteristics, enhancing the capacity of plant physiologist and plant breeders towards crop improvement..

**Keywords:** plant development, architecture, plant photosynthesis, growth or biomass productivity

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## Hi-Tech Agriculture in India: Challenges and Opportunies

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Technology is the mainstay of the modern world, it will help farmer to explore new age opportunities and utilize them to create profitable avenues for Indian agriculture. Some of the aspects of farming need quicker hi-tech technological support. These are climate resilient agriculture system, artificial intelligence, drone

technology, availability of finance or credit facility and market link and access. These technologies increase in yield upto5 to 8 times high productivity per unit area. It also significantly saving in key inputs like water, fertilizer etc

**Keywords:** Hi-tech, Challenges, Credit

# Effect of Organic Nutrient Management in yield and Economics in rice-groundnut cropping system

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India have highest area under rice-based cropping system comprising 27.92 mha out of which rice-groundnut occupies 0.55 mha mostly confined to areas of Tamil Nadu, Andhra Pradesh, Odisha and Maharashtra (Sarangiand Lama, 2013). Among the cereals, rice is the world's single most important food crop, being the primary food source or staple food more than 50 % population of the world. About 90 % rice areas exist in Asia. The average rice yield in India is only 2.09 t $ha^{-1}$, as compared to 6.58 t $ha^{-1}$ in Japan and word average of 3.91 t $ha^{-1}$ (Shivayand Dinesh 2007). In maharashtra, rice is grown over an area of 14.99 lakh ha with an annual production 32.37 lakh tones. India has brought 4.89 m ha area under organic certification process.Oilseed crops are cultivated in more than 100 countries in a 29.60 million ha area with an annual production of 48.76 million tonnes and a productivity of 1647 kg $ha^{-1}$ (FAOSTAT, 2019). In India, groundnut is grown in a 4.73 million hectare area with a production of 6.73 million tonnes and the productivity 1422 kg $ha^{-1}$(FAOSTAT, 2019). In Maharashtra, groundnut is cultivated over an area of 291 thousand hectares with a production of 309 thousand metric tonnes and has a productivity of 1083 kg $ha^{-1}$ (Anonymous, 2020-21).

The experiment was laid out in Randomized block design with fifteen treatments of organic nutrient management. $T_1$: Absolute control (Without manures), $T_2$: 100% RDN through farmyard manure (FYM), T3: 100% RDN through vermicompost (VC), T4: 100% RDN through poultry manure (PM), T5: 100% RDN through green leaf manure (Glyricidia) (GLM), T6: 50% RDN through FYM + 50% RDN through VC, T7: 50% RDN through FYM + 50% RDN through PM, T8: 50% RDN through FYM + 50% RDN through GLM, T9: 50% RDN through PM + 50% RDN through GLM, T10: 50% RDN through PM + 50% RDN through VC, T11: 25% RDN through VC + 50% RDN through PM +BGA/ Inoculation with Rhizobium culture, T12: 25% RDN through VC + 50% RDN through GLM + BGA/Inoculation with Rhizobium culture,T13: 25% RDN through VC + 50% RDN through FYM + /Inoculation with Rhizobium culture,T14:Best recommended treatment of the NPOF trail RARS Karjat T15: 25% RDN through FYM + 25% RDN through VC + 25% RDN through PM + 25% RDN through GLM

The pooled data revealed that, application of 25% RDN through VC + 50% RDN through PM +BGA/Inoculation with rhizobium culture recorded significantly highest total system rice equivalent yield (195.7 q $ha^{-1}$) over rest of the treatments of rice-groundnut cropping system in year 2018-19 and 2019-20. The lower total system rice equivalent yield was observed in absolute control (117.1 q $ha^{-1}$). The economic analysis showed that, the application of 50% RDN through PM + 50% RDN through green leaf manure maximized the gross return (134908.76 ₹ $ha^{-1}$), net return (20015.84 ₹ $ha^{-1}$) and benefit cost ratio (1.18 ₹ $ha^{-1}$) which was followed by the treatment 25% RDN through VC + 50% RDN through PM +BGA/ Inoculation with Rhizobium culture. The lowest economic returns wereobserved in absolute control.

It can be concluded that, the application of 50 % RDN through PM + 50% RDN through GLM has highest total system equivalent yield and significantly influenced the economic parameters like gross return, net return and cost- benefit ratio in rice–groundnut cropping system.

**Keywords:** Rhizobium culture ,GLM, RDN ,gross return, net return and cost- benefit ratio

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## Development and Testing of Battery Electric Weeder

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Weeding operation is most important intercultural operations which aims at controlling unwanted plants between the rows. To overcome the limitations of traditional method of weeding, eco-friendly battery electric weederis expected to make a revolutionary change in the market with advantage of reducing the increased pollution, less dependence on fossil fuel and unexpected rise in fuel prices. By keeping the above facts, the present investigation has been carried out. The developed battery electric weeder had an electric motor of 350 W, 24 V BLDC capable to propelled the vehicle. The battery electric weeder was designed with an aim to traversing between the row crops of 45 cm spacing and it was tested on the experimental field for optimization of the operating parameters for soyabean crop. The independent parameters selected for optimization were three approach angles of sweeps (60°, 70° and 80°), three forward speed (2 km/h, 2.5 km/h and 3 km/h) and three depth of operation (2 cm, 3 cm and 4 cm). The RSM result showed that the weeder satisfactory perform with approach angle (70 degree), forward speed (2.437 km/h) and depth of operation (2.368 cm) with minimize specific draft of 0.323 N/mm and maximum weeding efficiency of 88.38 %. The theoretical field capacity, effective field capacity and field efficiency of battery electric weeder were 0.11 ha/h, 0.08 ha/h and 74.42 % respectively. The saving over the cost of operation was observed as 27.39 %. During the techno-economic feasibility of battery electric weeder the payback period was analysed to be 1.14 years of the machine operation. The breakeven point and benefit cost ratio were observed as 168 h/yr and 1.14 respectively. In overall the operation economic point of view the developed battery electric weeder has satisfactory performance.

**Keywords:** techno- economic feasibility, payback period, breakeven point and benefit cost ratio

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## Artificial Intelligence in Agricultural Development

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Agriculture plays a vital role in Indian economy. Government has set a target of doubling of farmer's income by the year 2022 as well as Agriculture export policy has set a target to increase agricultural exports to

over US$ 60 billion by 2022. The global population is expected to reach 10 billion people by 2050, which means double agriculture production in order to meet food demands which is about 70% increase in food production The traditional methods which were used by the farmers, were not sufficient enough to fulfill these requirements. Thus, new technologies were introduced.

Currently, farmers and growers have to spend 70% of their time monitoring andunderstanding the status of the crops rather than performing actual farm work. Hence, precise and advanced technologies are required to advance the agricultural sector. Additionally, for sustainable agriculture, the effects of climatic and environmental conditionsshould be minimal. The Internet of Things (IoT) gives producers better results becauseof "on-site monitoring" capabilities, allowing them to monitor farms remotely. Wirelesssensors help to continuously monitor crops with greater accuracy, and most importantly,they can identify issues at the early growth stages of crops/plants. The latest technologiesand tools enhance agricultural operations during the crop growth stages, such as crop harvesting, the transportation of cropping materials, and storage conditions. During thesedevelopmental stages of crops, advanced technology, such as the AI, plays a significantrole, making the process efficient for the growers.

For the improvement of the agriculture sector, scientists, researchers, and engineers are developing many new technologies and methods to monitor crops and related field data. Several manufacturing agencies are approaching to provide various devices/tools such as robotsand IoT sensors, to collect real-time data at much higher resolutions. For this purpose, federal and non-federal agencies are working together to enhance the IoT applications to sustain food safety and security. AI is a fundamental approach for advancement and benefits in agriculture, which are well planned,managed, and automated. According to this information, between 2017 and 2022, theworld's advanced agricultural industry is expected to grow by 19.3% in one year and reachUSD 23.14 billion in 2022.

**Key words:** Artificial Intelligence, Agriculture development, IoT and latest technologies in agriculture

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# Climate Change and Indian Agriculture

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Climate and agriculture are intensely interconnected with global processes. Even asmall change in climate affects agriculture adversely decreasing the productionrate. Climate change effect through global warming phenomenon increases theaverage atmospheric temperature, which has become a mega trend changing theglobal future significantly. In 1972, the club of Rome Report officially confirmedthat the global warming as an international issue; and the World MeteorologicalOrganization (WMO) and United Nations Environment Programme (UNEP) alsodeclared that Carbon dioxide (CO2) is the principal cause of climate changebecause of its highest contribution in global warming.

Economic losses from naturaldisasters are rising globally, andagriculture sector is highly vulnerableto these disasters. According to theUnited Nations Office for DisasterRisk Reduction (UNISDR) (2018),disaster-hit countries experienceddirect economic losses to the tune ofUS$ 2908 billion during 1998–2017, of the total losses, 77 percent weredue to climate related disasters it is also expected that climate change can shave 11 to 14 per cent off the global economic output by 2050.Climate change impacts are morepronounced on agriculture sector inthe recent past. Government of India'seconomic survey (2018) estimatedthat the annual loss of US$ 9-10billion was due to the adverse effectsof climate change and India may loss 3 to 10 per cent of its GDP annually by 2100.

Agriculture is the main occupation for 50 percent of population in India. Agriculture and allied sectors contribute 20.2 per cent of the Indian GDP (Economic Survey). Farming activities are carried out by the

selection of crop which is specific to suit climate, soil type, resource availability, *etc.* Therefore, farmingproduction and productivity iscompletely dependent on climaticconditions.Climate change has impact on agriculture through droughts, floods, heat waves, storms and melting of glaciers that adversely affect the agriculture scenario in India.

Govt. of India took several initiatives for formulating most efficient missions aiming to combat global warming and for climate change adaptation, schemes like National Mission on Sustainable Agriculture (NMSA), PradhanMantriFasalBimaYojna (PMFBY), Soil Health Card (SHC), Green India Mission (GIM), National Water Mission (NWM), PradhanMantri Krishi SinchayeeYojna (PMSKY), Paramparagat Krishi Vikas Yojna (PKVY), National Action Plan on Climate Change (NAPCC) and State Action Plan on Climate Change (SAPCC), Agricultural Contingency Plansand National Innovations onClimate Resilient Agriculture(NICRA), etc,.

**Key words:** Climate change, Agriculture, Policies and Government initiatives

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# Role of High-tech Agriculture in Development India

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High-tech farming mainly refers to agricultural operations involving the latest technologies. It is a capital intensive agriculture since large capital outlay is required towards purchase of specialized equipment, maintenance of assets, training of labour, etc. Hi-tech agriculture mainly relates to commercial farming system aimed at catering to the needs of both, domestic as well as export markets. It uses farming technology to increase yields, ensures high quality (usually pesticide-free) and realizes increased market value. Growing temperate vegetables in a tropical climate and developing disease-resistant plants through genetic engineering are common examples of hi-tech agriculture.

High tech agriculture have the advantages like Increase in yield up to 5 to 8 times – high productivity per unit area,significant saving in key inputs like water (up to 50.00%), fertilizers (25.00%) andpesticides, better growth and uniformity in quality and feasible even in undulating terrains, saline, water logged, sandy & hilly lands. High tech agriculture solves the issues related to the demand and supply of agricultural commodities, it is usefull in the areas with the limited land and water resources it also provides opportunity to the small and marginal land holders for adopting intense production technologies.

Activities such as soil less agriculture, protected cultivation under green house, Hydroponics, Aeroponics and Vertical farming have the potential for productivity enhancement and investment.

**Export prospects of Hi-tech Agriculture**

- Fresh fruits and vegetables - India's exports of fresh fruit and vegetable during 2020-21 stood at Rs. 9940.95crore. An increasing acceptance of new products with market development efforts has been witnessed lately given the fact that there is a good international demand for certain fruits and vegetable products.
- Floriculture is being viewed as a high growth Industry. The liberalizedeconomy has given an impetus to the Indian entrepreneurs for establishingexport oriented floriculture units under controlled climatic conditions. There aremore than 300 export-oriented units and majority of which (50%) are located inSouthern States of Karnataka, Andhra Pradesh & Tamil Nadu. India's total exportof floriculture has been Rs. 575.98crore in2020-21.
- Processed fruits and vegetables: India's exports for processed fruits andvegetables stood at Rs.36946.20crore during 2020-21. Due to special efforts of theMinistry of Commerce and Industries, Govt. of India and APEDA, theinternational demand for Indian processed fruits and vegetables has set a risingtrend during last few years.
- Animal products: Indian boneless meat of bovine animals has very goodinternational acceptance. During 2020-21, export of animal products recorded atits peak of Rs.27,155.56crore.

- Other processed products: Among the other products, Guar gum and Shelledgroundnut contribute major share of Indian exports. During 2020-21, export ofother processed products were recorded at Rs.36,946.20crore.
- Cereals: Amongst the agro export products, cereals contribute maximum to theextent of Rs.74,490.83crore as recorded during 2020-21. Major commoditiesbeing Basmati and parboiled rice amongst the cereals exported.

The important promotional interventions of Government departments towards high value agriculture sector include:Incentives/subsidy support for adopting high value agriculture productiontechnologies especially under National Horticulture Mission and otherprogrammes of National Horticulture Board.Export facilitation and promotional interventions of Agricultural & ProcessedFood Products Export Development Authority (APEDA)/ Marine ProductsExport Development Authority (MPEDA). Promotional interventions of Commodity BoardsProgrammes like precision farming supported by the State Governments withfocus on high value crops.

**Key words:** High tech agriculture, Prospects, and latest technologies in agriculture

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# Vermicompost- A Source of Livelihood Security

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The term vermicomposting refers to the use of earthworms for composting organic matter and the latest biotechnology which helps in giving biofertilizers in the term of vermicompost, for agricultural uses and a high priority protein (earthworm biomass) for supplementing the nutritional energy needs of animals or a faster rate. Vemicomposts especially, earthworms cast are the final product of vermicomposting. Vemicomposting is basically a process of composting with earthworms (*Eisenia foetida, Perionyx excavatus, Eudrilus eugeniae*) and can be done virtually anywhere either in indoor or outdoor conditions. Organic wastes used for composting animals dung (cattle dung, sheep dung, goat dung, and poultry droppings), mushroom agricultural wastes (after harvesting and threshing of the produce), forestry wastes (wood-saw, peels, saw dust leaf litter (mango, guava, oranges etc. from residential areas) paper and cotton clothes. The material needed for vermicomposting, on weight basis, is three parts of dry biomass (chopped into pieces of less than 10 cm) and two parts of wet dung. The biomass and dung are mixed well and wetted to have an overall moisture content of 30 – 40 percent. This can be readily estimated by farmers. At this moisture level, a ball made by pressing the substrate particles together breaks up when dropped. If it does not break up, the moisture content is too high whereas if the substrate is too dry a ball cannot be made. The substrate is made into a bed of a suitable length that is 100 cm wide and 50 cm high, and is kept covered with a wet gunny (loose canvas or other coarse material). A simple shed can be constructed to provide shade for several beds. After two weeks, 200 earthworms are introduced for every 100 kg of substrate. The substrate is stirred and turned once a week, water is sprinkled if it is too dry and the bed remade. After about 45 days the vermicompost will be ready for use. Vermicomposting is also affordable for resource poor small and marginal farmers. Therefore, vermicompost use is more economical than synthetic organic fertilizer. So, economic viability, environmental stability, and enhancing livelihood quality are the major causes for its worldwide adoption in food production. The task of vermicompost making developed into an income –generating activity. In particular, it became an attractive opportunity for landless people in villages. Self help groups (where 10-20 likeminded people work together with a common aim) are actively associated in collecting and selling the vermicompost. The activity has become a permanent source of income to the members. People in the area have also started organic farming of vegetables which is low cost and good for environment and health.

**Keywords**: source of livelihood, vermicompost, Self Help Group, Bio-fertilizer etc.

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# Buffalo: An important animal component for sustainable agriculture produce

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The Krishi Vigyan Kendra, Dhule is engaged in conducting the On Farm Trials, Frontline demonstration, Vocational trainings, Extension Activities, etcfor sustainable production of farm income based on the suitable cropping systems of Dhule district.Livestock is an important component for continuous income to farm families to meet the requirement as sustainable income. Wherever, amongst the livestock cattle, buffalo, sheep, goat, poultry birds etc. were available to farmers as they can manage it with the available resources. Accordingly, one of our ex-trainee farmer Mr. Shri.Laxman Rajputfrom Tavkheda village of Tahasil-Shindkheda, District- Dhule,was interests to rear buffalos for income generation and approach to KVK, Dhule for technical guidance during rearing of buffalos. He has 6 ha of land with traditional crops like Sorghum, Bajara, Wheat, Gram etc. During 2018-19 he started his dairy with 4 buffalos with available resources. Initially he faces the problems of availability of green fodder throughout year. To overcome this problem KVK, suggested that the sowing of perennial fodder crops yearly availability of green fodder. Accordingly, KVK, provide the sets of perennial fodder crop Hy.Napier variety Phule Jayvant, Phule Gunvant, also supplied the rooted slips of Phule Marvel all these varieties released by MPKV, Rahuri. These fodder crop varieties have high yielding ability with somewhat drought tolerance. Thereafter during summer month's scientists of KVK has been given demonstration of silage preparation for availability of green fodder in summer. However scientist has also guide regularly on their feed ration in particular computation of concentration feed to minimize the feed cost. Initially he produced the 15 lits of milk daily from 4 buffalo with having net profit Rs 1.20 lakh annually. Where ever with all efforts of farmer and regular technical backstopping of KVK,hasten the milk production near up to 100 lit daily from 23 buffalos, which leads to net profit of Rs.7 lakh during 2021-22, with gradually increase the number of raising buffalos and daily milk production. He also generated employment to 3 farm families throughout year. In conclusion milk production of buffalo farm of Mr.Rajput is increased with net profit about 5 times more than that of the initial year. Hence, buffalo is defiantly one of the most important components to increase income of farmer with scientific management.

**Key words:** Buffalo, Milk, Fodder, KVK etc.

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# Production of Bio-control agents (*Trichogrammatidschilonis*)

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The Krishi Vigyan Kendra, Dhule engaged in conducting the On Farm Trials, Frontline demonstration, Vocational trainings, Extension Activities, etcfor sustainable production of farm income based on the suitable cropping systems of Dhule district. In Dhule district, the magnitude of losses in Cotton due to Pink Bollworm Infestation was 97.25% in the year 2017-18. Farmers had to bear a loss of approximately 80% of the total production which amounted uptoRs. 50000- 55000/ ha of gross income.During farming,one of our ex-trainee entrepreneur Mr. SaklenShaikh, from Sakri,Tahsil-Sakri,District- Dhulenoticed that the shortage of bio control agents in market over the control of Cotton Pink BollWorm, which leads the reduction of cost of production and plays important role against the control of the same. So he was interested to start the production of bio-pesticide particularly trichocard and approachedKrishi Vigyan Kendra, Dhule for technical guidance of the production of bio-pesticide i.e Trichocard production. Accordingly, he took four days skill training on the Production and utilization of Bio-agents (*Trichogrammatids*) for sustainable Agriculture organized by KVK, Dhule. Later on, he establishedthe bio production unit in the year 2018-19, with the name of Nature bio agent with trichocard (*Trichogrammatids*spp.) production in particular under the technical backstopping of the KVK and Liaison with

Department of Agriculture,Dhule for financial support for the same. Initially he invested of Rs. 14 lakh for units of 16 x 16sq.ft. and 15x40 sq. ft.sizes. With capacity of the 40000 trichocard produced annually in this unit and it can fetch a price of Rs. 100/- per card. The net profit estimated for the above capacity is Rs. 26 lakh.As a marketing point of view he approached KVK with Department of Agriculture,Dhule and Nandurbar, he covered the more than 11100 farmers of Dhule district and around 7200 farmers of Nandurbar District. Moreover, he sold the same to the farmers directly with word of mouth publicity and earned the Rs.675600/- by selling of the trichocard. In addition, he gave the regular employment to three farm families too. This technology is cost effective,which helps in reducing the cost of production approximately by Rs. 1800/ha (no. of sprays eliminated).This is also eco-friendly and relief in reducing the hazardous effects of chemical pesticides too. They accord production proves that this production giving outeffective tools for fostering entrepreneurship amongst educated as well as School dropouts.

**Keywords:** Cotton, PBW, Bio pesticide, Trichocard, KVK etc.

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## Livelihood Analysis of Gillnet Operators of Ratnagiri, Maharashtra State

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Gillnets are special interest of small scale fishermen due to its low investment, high energy efficiency and simply operated with the help of both motorized as well as country crafts. The present study conducted to analyze livelihood of gillnet operators of Ratnagiri block, Maharashtra. Total 120 gillnet operators were randomly selected from thirteen coastal villages in the study area, and interviewed using interview schedule prepared as per DFID livelihood framework. The study found that maximum gillnet operators were Hindus, in age group 45 to 55 years, had secondary level of education. As per sustainable livelihood framework the five capitals were considered such as physical, human, financial, natural and social capital. The study found that physical capital of gillnet operator were recorded with 0.585 average component score, similarly human, financial, natural, social capital were scored 0.415, 0.336, 0.592 and 0.438 respectively. It was revealed that gillnet operators had average availability of physical, human, natural and social capital, whereas poor availability of financial capital due to poor income and lack of financial assistance, which was negatively affected to livelihood of gillnet operators. To improve livelihood status of gillnet operators state government needs to provide financial assistance as well as training and extension services to gillnet operators to improve their livelihood status.

**Key words:** Livelihood analysis, gillnet operators, fishermen, Ratnagiri.

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## Study on Farmers Attitude, Knowledge and Practices related to Organic Farming in Ratnagiri District

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Ratnagiri DistrictThe study was conducted in Ratnagiri district of Konkan region. From Ratnagiri district Dapoli and Khedtahasil were selected purposively and Villages were selected with the help of list obtained from SDAO, Dapoli. According to list maximum number of organic farmers were located in Velavi

and Dabhilvillages of Dapolitahsil and Ayani and Vadi-malade villages in khedtahsil. In all there were 180 organic farmers in the selected villages. From each village 25 respondents were selectedrandomly for the study. An interview schedule was specially designed, in line with the objectives, to collect the needed information. The data were collected by personally interviewing 100 selected organic farmers.

The analysis of data revealed that majority of the respondents were middle age group, secondary education, medium family size, medium category annual income, small land holdings and followed by marginal land holdings, medium livestock possession, medium social participation, medium level mass media exposure, medium level innovativeness. Majority respondents had adopted organic farming practice at medium level and also medium level of knowledge about organic farming. Majority (69.00) per cent respondents favorable attitude towards organic farming, followed by 18.00 per cent respondents had most favorable and 13.00 per cent respondents had unfavorable attitude towards organic farming.A critical analysis of association between personal variables and attitude of farmers towards organic farming, showed that the variables such as age, education, livestock possession, mass media, social participation, innovativeness, knowledge and organic farming practices followed by the respondents had significant association with their attitude towards organic farming. The other variables such as size of family, farm size, annual income and organic farming experience had no association with their attitude towards organic farming. Majority of the respondents pointed out need of training on different components and aspects of bio-fertilizer technology, composting / vermi-composting methods, its application methods and rate of application and grading /packaging and marketing of organic produce. Major constraint faced by respondents in cultivation of organic farming werelack of knowledge about organic plant protection management,high cost of organic manures and biofertilizers,lack of demand for organic produce in local market, lack of skill regarding preparation and usage of organic inputs.

Key words : Organic farming, Attitude, knowledge and practices related organic farming

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# Design a single window Agriculture Education and Training platform prototype with high user engagement

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India's agricultural sector employs a large proportion of the population (about 44%) of the workforce, most of whom are illiterate and have no formal or informal skills training. This presents a challenge and an opportunity to empower the youth and workers present in India with a view to improving their productivity and improving their salaries. Also, Smartphone penetration in Rural India (Tier II /III) has risen from 9% in 2015 to 25% in 2018. This growth figure shows how rapidly mobile penetration is happening in Rural India. This gives an edge for introducing a platform which has simple games for user engagement with the help of it, farmers can learn agricultural skills very easily. The main objective of this study report is to analysing existing Agriculture Education Training (AET) platforms and designing a prototype which will solve all the possible loopholes found during the research. This study is useful for investigating, review and analyse existing agriculture E-learning services and identifying various factors responsible for their inefficient operation. The purpose is to measure and evaluate the relevant information containing the product/business portfolio of different ICT initiatives operating in the Rural India.

In this report, the data and figures are collected in the year 2021 by extensive primary as well as secondary research of the reports and research papers related to the concerned topic. Rigorous secondary research is done to study used cases in ICT in Agriculture through books, ICAR websites, agriculture related YouTube channels, available applications on play store, Journals, Reports and Research papers. The study used survey to collect primary data from 300+ respondents. The data collected is analysed through MS Excel, TABLEU and SPSS SOFTWARE. The study uses complete empirical and quantitative data for determining, review and analyse the existing AET platforms. Results shows Existing Agriculture Education Training

Platforms (AETs) are out-dated, have less user engagement, low user retention and low penetration. Gamification is remedy for all these problems with developed content for engaging users. Multi lingual with innovative designs increase retention rate. It is observed that designing a business model would help generate revenue at the same time be pocket friendly as to motivate farmers to be interested in it. From study, it is recommended to design Krishi Saral, a single window, multi lingual gamified application platform in joint collaboration with private sectors, educational institutions and Government bodies (Gram panchayat, zilla parishad) which will be highly integrated can utilize all possible government resources and can be lucrative in terms of revenue.

**Keywords-** Agriculture, AETs, Farmers, Rural India, Business model

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## Grafting Robotics AHitech Technology For Vegetable Cultivation

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India is one of the leading nations in agriculture and allied fields. As per the global scenario India is one of the leading producers of horticultural crops in the Globe. Horticultural crops cover 13.08 % of the total area under agriculture and contribute to about 28 % of the GDP.These crops accounts for 37 % of the total exports of agricultural commodities. Grafting has been used in agriculture for a long time, mainly to propagate ornamentals and fruit trees with selected superior matrices for commercial planting or for germplasm conservation purposes in breeding programs. It has been reported that grafting started to be used in 1,560 BC in China. Currently, it is widely used to study systemic long-distance signaling in plants.

In India farmer doing traditional practice for cultivation of vegetables.The cultivation of the vegetable belonging to the family under *Solanaceae* and *Cucurbitaceae*by developing seedling. The develop seedling is used for the direct transplanted in the field. This seedling affected by various root born disease and pathogen it gives the savior effect on the production. Grafting is the best solution for development of good quality of seedling disease and pathogen free and effective for the stress resistance result of this improve the production.Most of the time when grafting is performed by the manually it having 50 % chances of survival of these grafted plants and the skill person can make170 to 200 hundred plant in one hour while same practice by robotic vegetable grafting will gives us 600 to 650 plant with less mortality i.e. only up to 7%, the cost of production of the manually grafted plant is 7.85 rupees per plant and by vegetable grafting robot it is 3.45 rupees per seedling, More number of good grafted seedling develop by the vegetable grafting robot with affordable rate and resistance to disease and stress help to increase the productivity of crop.

**Keywords:** GDP, grafting robot, stress resistance

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## Hitech Aerial Surveying Drones in Agriculture to Monitor Crop Growth.

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Hitech agriculture is the adaptation of latest and advance techniques like as high yielding methods. Hitech agriculture can also protect the environment through reducing the use of agrochemicals.Precision farming and measurements have already established paradigms in order to increase farm productivity and quality, as well as improving working conditions through reduction of manual labour. Many modern farmers already using high tech solutions, eg.digitally controlled farm plants and also unmanned aerial vehicles (UAVs)

for monitoring and forecasting. Drones are available at affordable prices and are capable of imaging ground data with corresponding geographic locations. Multispectral and RGB cameras equipped drones offer the advantage of imaging the near infrared portion of the electromagnetic spectrum over the crops.Multispectral cameras are used for quantifying the state of the monitored vegetation in terms of chlorophyll content, leaf water potential, the normalizes difference vegetation index (NDVI) ,ground cover and leaf area index. Thermal cameras have demonstrated high potential for the detection of water stress in crops due to the increased temperature of the stressed vegetation. In precision agriculture, from the reflectance measurements, it is possible to quantify the chlorophyll absorption, water deficiency and nutrient stress etc. Hitech aerial surveying drones equipped with advanced multispectral sensors are being used to accumulate data on the basis of growth of the crop. Farming is facing many economic challenges in terms of productivity and cost-effectiveness, and the increasing labour shortage partly due to the depopulation of rural areas, as well. Reliable detection, accurate identification and proper quantification of factors affecting plant health, is critical to be kept under control in order to reduce economic expenditures, trade disruptions and even human health risks. Thus, a more advanced agriculture needs to be set, characterized by the adoption of ad hoc production processes, technologies and tools derived from scientific advances, research and development activities.

**Keywords:** expenditures, trade disruptions, NDVI, UAVs

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# Climate Smart Agriculture and Advisory Services: Methodologies and Future Implications

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Climate change is becoming a more important topic in the world today. Agriculture is most affected by changing climatic circumstances because it is dependent on regional meteorological characteristics such as temperature, rainfall, humidity and so on in the long run. Agricultural productivity, in terms of quantity and quality of crops. Agricultural practises, through changes in irrigation and agricultural inputs such as herbicides, insecticides, and fertilizers; environmental effects, particular in relation to frequency and intensity of water drainage, soil erosion, reduction of crop diversity; rural space, through loss and gain of cultivated lands, land speculation, land renunciation and hydraulic amenities; adaptation, as plants may become more or less competitive. Due to global warming, world agriculture is expected to suffer a significant reduction this century. Given that agriculture accounts for around 16 percent of India's GDP, a 4.5 to 9% reduction in output suggests a cost of climate change of up to 1.5 percent of GDP every year. Agriculture must become "climate smart" in order to address some of the complex challenges posed by climate change, which means increasing agricultural productivity and incomes in a sustainable manner, adapting and building resilience to climate change, and reducing and/or eliminating greenhouse gas emissions where possible. Climate-Smart Agriculture (CSA) aids in the attainment of long-term development objectives. By jointly addressing food security and climate challenges, it integrates the three dimensions of sustainable development (economic, social, and environmental). Technology development and information dissemination, strengthening farmers' capacity, facilitation and brokering, and advocacy and policy support are all ways that extension providers can help with CSA. It helps to achieve CSA by disseminating climate information and technologies on production practises for climate change adaptation through innovative approaches like plant clinics and participatory video (Digital Green, a case study from India), climate smart villages, climate trainings and workshops, and so on. To assist farmers, it is crucial to understand the role of extension in CSA and the various extension approaches utilised in CSA.

**Keywords**: Climate Change, Food Security, Climate Smart Farming, Sustainable Agriculture, Farming Advancement.

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# Integrated farming system approach for climate resilient farming for sustainable livelihood and food security

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Climate-resilient technologies can play a crucial role to sustain gains, which are also in line with India's international commitments like Land Degradation Neutrality. Incentives are vital for the adoption of these technologies to reclaim degraded lands and increase yield.. Whether we are talking about tackling climate change, addressing malnutrition of all kinds, improving farm profitability, or providing safe food for all citizens, agro-ecology can address all of these at the same time. Conventional chemical or transgenic agriculture paradigms on the other hand have no solutions to the above challenges, and are certainly part of, or responsible for the problem. Land and water resources are already overexploited in many parts of India. India's share in the total land area of the world is just 2.4%, but it supports 18% of the global population. The average size of operational landholding has declined significantly.

There is overwhelming evidence that if farmers follow integrated farming systems with a mixture of crops and livestock along with the wider adoption of modern technology like precision farming, they can double their income and make farming climate-resilient at the same time.In the near future, India needs to increase its agricultural production at least by 30% not only to meet its growing domestic demand and exports and also to boost farmers' income and employment. Given the limited scope for increasing domestic demand, farmers have to focus on export-oriented crops such as plantations, horticultural crops, commercial crops like cotton and chillies with precision farming technologies to meet export quality standards.The predominantly irrigated areas and dryland areas are different in their agricultural practices and opportunities.

**Keywords**: Climate-resilient, Land Degradation, transgenic, precision farming

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# Tunnel Man of India – The Story of Organic Farmer who Converted Barren Land Into Fertile

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This successful story is about Amai Mahalinga Naik, a 68 year old farmer who transformed the barren land into an organic farm with 300 arecanut palms, 75 coconut trees, 150 cashew trees, 200 banana saplings and pepper vines. Back in 1978, Naik was awarded with a barren land from his landlord for his loyalty towards him. He converted that barren land into an fertile arecanut farm by using the ancient irrigation method of Suranga, as there was no water source for irrigation nearby. As hiring workers for digging would have been highly expensive, he took up the task himself & started digging tunnels for nearly 6 hours a day. After digging up one tunnel to the depth of 40 kolu (100ft), he used to give up & start digging in nearby area. Likewise in four years, he dug around 4 tunnels of 112.5 ft each. But the tireless Naik, again started to dig tunnel at an elevated place. And at 50 ft, he found moisture on ceiling. Again he started to dig his 6$^{th}$ tunnel in further uphill, finally he found the water for irrigation. The next immediate work he did was levelling the land & make the plot suitable for farming. He single handedly carried over 6,000 laterite stones from his workplace to build retaining walls and prevent soil erosion in his farm. He also constructed 300 percolation pits in the hills surrounding the farms

for rainwater harvesting. This 68 year old man was conferred with Padma shri on 2022 for his successful work towards promoting natural farming. Now he is serving as an real life example of successful organic farmer in India, popularly called as Miracle Man of Mangaluru and Tunnel Man of India.

**Keywords:** ancient irrigation method of Suranga, rainwater harvesting

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## New Trend in Maharashtra Agriculture - Drone Technology

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Sangli district has been grounds for pioneering agriculture and irrigation works in western Maharashtra. From cooperative movement to drip irrigation, innovation has been the sign of cultivation in the region. Drone technology introduced by Prateek Patil, social impact entrepreneur and adopted by Raja ram Bapu Sugar Factory in Sangli in 2020-21 has not only reduced time and efforts of farmers but also increased profitability. Conventionally the farmer sprays his crops physically which is costly and time consuming. This technology utilizes only 10 liters of water, saving almost 150 liters of water and it takes only 5 to 10 minutes to spray fertilizers and permitted pesticides on 1 acre of sugarcane as opposed to 4 to 5 hours earlier. The crop at any height can be effectively reached and 4 nozzles guarantee comprehensive and equal distribution of chemicals.it is flexible across climate conditions and helps in reduction of 25-50 percent quantity of chemicals used. The quality of yield of crops has been found to increase by 20 to 30 %.it also has an additional advantage of generating employment for the local youth. Currently, the factory uses a 10 liter Octocopter drone. The line of drone technology has already covered 3200 acres of sugarcane area benefitting more than 2000 farmers in Walwa, Sangli. Each drone is currently covering 9 to 12 acres in a day. This initiative opens a great path into precision agriculture in Maharashtra, providing new ways for farmers to manage crops, ensure the efficiency of inputs and maximize productivity, quality and yield. This method gives a 97% accurate estimate of yield of sugarcane crop.

**Keywords**: drone technology, profitability, efficiency etc.

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## Study of shifts in cropping pattern for cotton and pigeonpea in Bharuch district of Gujrat

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Agriculture occupies a very important and distinguished position in the economy of India.In fact, in almost all the plansnearly one-fourth of the total outlay has been emabrkes for the agricultural sector.Cropshifting is intended to give a wider choice in the production of a variety of crops in a given area so as to expand production-related activities on various crops and also to lessen risk.The assessment of shifts in cropping patterns in different regions is crucial for a better insightinto the agricultural development process. In order to accesstheshifts in cropping patterns Hierarchical clustering methods, especially ward minimum variance methods wereutilized. The principal component approach for clustering the objects (i.e.theyears) with the same nxpdatamatrix,was utilized. Various crop characteristicslike area, production and productivity were clustered on the basis of similar periods (years) .Datamatrixrepresentsthe same data base of observations forn years on each of p variables $X_1$, $X_2$,…..$X_p$ 'these p variables represent a crop characteristic (area/ production/ productivity) corresponding to thep crops that define the cropping pattern of the region. The result of the shifts inarea, production and productivity under the cotton crop over 25 (1995-2020) years is represented by 4 clusters for cotton and tur crops. The compound growth rate and instability were also indicated the significant and positive

growth rate was observed with a low level of instability while in the case of tur medium growth rate accompanied by high instability. The results of shifts in crop characteristics i.e. area, production, and productivity under cottoncropfromthe period I to IVshowed positive but divergent shifts inarea with increasedproductivity. Almost a similar shift was observed in production except for periods III to IV. Thisalso indicates that there was technological impact during recent years in an increasing area withproductivity like Bt cotton better irrigation etc and While in case of tur, area and productionshowed negative shift form period I to IV at Bharuch districts in spite of better technological intervention in tur with improved variety.

***Key words: Cropping pattern , clustering methods, principal component analysis cotton , tur***

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## Climate Change and its Impact in Marathwada Region

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The districts of Marathwada and Vidarbha witnessing maximum farmer suicides in Maharashtra face higher risk to climate change. A report by the National Bank for Agriculture and Rural Development (NABARD) recommends the state government to initiate policies and measures to adapt to climate changes that would be detrimental to the agro-sector in 14 districts affected by severe drought across Vidarbha and Marathwada. Area is selected from Marathwada region of Maharashtra state. It was found that 76.67 per cent having farming as their major occupation, 33.33 per cent respondents were marginal farmers, 66.67% reported that well as a main source of irrigation, 79.17%medium annual income, 63.33 per cent had medium awareness about crop insurance, 60.00% medium innovativeness category and 55.00% medium risk orientation. Findings showed that farmers have fairly high level of perception about climate change and its various dimensions. Change shows that, 54.17 % farmers had medium perception, 27.50% farmers had high perception about climate change followed by 18.33 % of farmers had low perception level about climate change. The impact of high temperatures, rainfall, and humidity will make outdoor work difficult for the farmers. In addition, increased incidences of heat stress and humidity will have a bearing on farming operations like weeding and harvesting. As part of its work with farmers in Maharashtra, ISC is working to promote sustainable cultivation practices, building an understanding of the likely impacts of climate change and improving resilience for the farming communities. The impact of high temperatures, rainfall, and humidity will make outdoor work difficult for the farmers. In addition, increased incidences of heat stress and humidity will have a bearing on farming operations like weeding and harvesting. As part of its work with farmers in Maharashtra, ISC is working to promote sustainable cultivation practices, building an understanding of the likely impacts of climate change and improving resilience for the farming communities.

**Keywords:** Climate change, impacts of climate change, awareness, perception.

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## Role of Climate Change and Risk Management in Farming

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The strong trends in climate change already evident, the likelihood of further changes occurring, and the increasing scale of potential climate impacts give urgency to addressing agricultural adaptation more coherently. There are many potential adaptation options available for marginal change of existing agricultural systems, often variations of existing climate risk management. We show that implementation of these options is likely to have substantial benefits under moderate climate change for some cropping systems. However, there

are limits to their effectiveness under more severe climate changes. Hence, more systemic changes in resource allocation need to be considered, such as targeted diversification of production systems and livelihoods. We argue that achieving increased adaptation action will necessitate integration of climate change-related issues with other risk factors, such as climate variability and market risk, and with other policy domains, such as sustainable development. A crucial component of this approach is the implementation of adaptation assessment frameworks that are relevant, robust, and easily operated by all stakeholders, practitioners, policymakers, and scientists. The price adjustments reduce the response of agricultural sector to climate change in particular with respect to production and income changes. The technical adaption of crops to climate change may result in a change production and land use by a factor between 1.4 and 6 relative to no-adaptation situation. Factors influencing adoption of adaptation strategies include age and education of the household head (the decision-maker of adaptation strategies), family size, households' distance to market, farmers' association with agricultural-related institutions, number of farm plots under cultivation, past climate change experience, access to climate information, belief in climate change, and attitudes towards adaptation. The findings of this study provide insights into designing agricultural adaptation strategies and integrating them in climate change programs and policies.

**Keywords:** Climate Change, risk management, Adaption, climate variability.

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# Biochar as Miracle Material – A Way to Mitigate Climate Change and Increase Soil Health

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Burning of crop residue increasing the greenhouse gases such as $CO_2$ and negatively affecting the soil health. It was estimated that total cereals and fibre crop contribute 58% and 23% and remaining 19% was from sugarcane, pulses, oilseeds, and other crops by burning of crop residues. Out of 82 MT surplus residues from cereal crops, 44 MT is from rice and 24.5MT from wheat which is mostly burnt on-farm. In case of fibre crops approximately 80% of the residue are from cotton and this residue are burnt on-farm. The residue burning in the agricultural field leads to loss of valuable biomass and nutrients which releases toxic gases which is approximately as one ton of paddy straw on burning releases 3 kg particulates matter, 60 kg CO, 1460 kg $CO_2$ 199 kg ash and 2 kg $SO_2$, 20% Nox, 7% $N_2O$ and 0.66% $CH_4$.The proper solution for this problem is, to utilize the agriculture waste generated for production of the biochar.Biochar has highly porous structure, makes it attractive option for soil amendment as it improves water holding capacity of the soil by increasing the total surface area of the soil.Biochar can draw down carbon from the atmosphere into the soil and store it for hundreds to thousands of years. It also found that biochar helps build organic carbon in soil up to 20 percent (i.e 3.8 percent) and can reduce nitrous oxide emissions from soil by 12 to 50 percent, which increases the climate change mitigation benefits of biochar.Mitigating greenhouse gases emissions and ensuring adequate global food supplies represent last two decade's most difficult challenges. Although global food production has benefited from chemical fertilizers, environmental problems have emerged as a result of their use. Additionally, overuse of fertilizers can result in hardened soil, decreased soil fertility, polluted air and water, and the release of greenhouse gases. There is an urgent need to find an alternative to chemical fertilizers that, ideally, can be sourced in abundant amounts, promotes global food production, enhances $CO_2$ capture, and does not effect on soil health or damage the environment. Conversion of crop waste into biochar helps to offset global warming gases emission and improve the soil health under changing climate.Biochar, the charcoal-like material sometimes touted as a miracle cure for global warming, might first gain economic attraction as a weapon against local air pollution.Biochar is produced when plant matter, manure, or other organic material is heated in a zero- or low-oxygen environment. The carbon the had previously absorbed via photosynthesis is thus captured in solid forms; the resulting biochar can take the shape of sticks, pellets, or dust.When biochar is inserted in soil, the

effect is to remove carbon from the atmosphere and store it underground, where it does not contribute to global warming. Biochar also brings agricultural benefits by boosting soil's fertility and its ability to withstand drought or flooding; it can also rid soil of heavy metals and other pollutants.Johannes Lehmann, a professor of agricultural science at Cornell University and one of the world's top experts on biochar, has calculated that if biochar were added to 10 percent of global cropland, the effect would be to sequester 29 billion tons of $CO_2$ equivalent - roughly equal to humanity's annual greenhouse gas emissions.

**Keywords:** Biochar, Biomass resources, Agriculture waste, climate change, soil health, Bio fertilizer.

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## Determinants of Farm Level Adaptations to Climate Change

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Agriculture is inherently sensitive to the climatic conditions, and is one of the most vulnerable sectors to the impacts of global climate change. Adaptation is indubitably an imperative component of any policy response to the climate change in this sector. The study examines the farmer's adaptation strategies to climate change in South Gujarat region of Gujarat state based on cross section data collected from 2400 households. The study has estimated a multivariate probit model and for comparison a univariate probit models. The results have indicated that the majority of farmers are engaged in the adaptive strategies to climate change. The model results confirms that out of eight adaptation strategies that the farmers are aware of the 'use of improved varieties' was ranked first among the farm adaptive measures, while the 'change in drainage system' was ranked as least utilized. Socio economic factors such as age of household-head, education level of household-head, family size, farm size, family income, gender and farming experience of household-head were found significantly related to adaptation strategies. The coefficient for access to credit, farmer's annual income and information on climate change has been found positive and statistically significant. The farmers who are sentient regarding changes in climatic conditions have higher chances of taking appropriate adaptive measures. The possession of heavy machinery has revealed a positive and significant influence on farm mechanization, land use pattern and crop diversification. Policies aimed at to improve the critical factors that influence the climate adaptation strategies.

**Key words:** Climate, Adaptation, Probit model etc.

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## Garcinia Gummi-Gutta: Beyond Nutritional Value Crop for Konkan Region

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The Western Ghats is the centre of origin and diversity of a number of economically important food and spice crops. The genus *Garcinia* is an important component of the flora of the Western Ghats and is well known for their edible fruits and nutraceutical properties.

*Garcinia gummi-gutta* is an evergreen tropical native underexploited tree species of *Garcinia*, which belongs to the *Clusiaceae (Guttiferae)* family. In spite of its incredible medicinal and nutritive properties, it is not cultivated systematically on orchard scale. It is mostly confined to as roadside plant, in forests, wastelands and seashores.

Ripe *Garcinia gummi-gutta* fruits are rich in vitamins, minerals, micro-nutrients, and phenolic compounds. Fruit rind is used in refreshing drinks, for making pickles, dried rind in curries and also as a substitute for tamarind in South India. Apart from their traditional uses, *Garcinia* fruits have useful medicinal properties for curing diseases and disorders including cancer, anti-obesity, coronary heart diseases etc. The fruit

is anti-helminthic, appetizer, cardio-tonic, useful against piles and dysentery. Hydroxyl citric acid (HCA) extracted from *Garcinia gummi-gutta* fruits is used against obesity, which is available in the form of tablets. Hydroxyl citric acid (HCA) inhibits the conversion of carbohydrates into fats, works on enzymes which play an important role in the synthesis of fatty acids and in transforming sugars into triglycerides and lipids thereby slowing production of fats and controlling bad cholesterol. The fruit is rich in Garcinol (voracious free radical scavenger) and guttiferone K; it acts as an antioxidant, anti-inflammatory, anti-bacteria and anti-carcinogenic agent, neuroprotective and has a positive effect in regulating Alzheimer's disease. It also inhibits the formation of histamine, hence beneficial against allergies. Neutraceutical products like HCA, garcinol etc would create more domestic and international demand for *Garcinia gummi-gutta* fruits. Hence, there is an immense scope for exploitation of *Garcinia gummi-gutta* cultivation in Western Ghats and Konkan Region of Maharashtra.

**Key words:** Garcinia ,HCA, Alzheimer's disease

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## Soil Compaction due to Machinery Traffic and its Effect on Yield

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Soil compaction due to machinery traffic in the fields has been shown to cause yield reduction in various crops. It inhibitsplant growth by deteriorating soil structure, causing poor aeration and water movement, and increasing mechanical impedance to root growth.Experiments were conducted on clayloam soil on the fields of Mr.Govind Pimple in Ukkalgaon village of Manwattahsil of Parbhani districtto investigate the yield-loss effects of soil compaction due to machinery traffic on green peas.Using the estimated models and compaction area percentage for various tractor sizes, farm level yield losses were established.Experimental yield losses increase continuously with increase of tractor size but estimated farm level losses first go down and then eventually go up.Yield losses due to machinery traffic are about 2.5 to 4.2 times the cost of machinery itself. For green pea production, 30 kW is the most economical size of a tractor. The relationship between the total economic costs and number of passes can indicate the net savings one can generate by making fewer passes.

**Keywords :**soil compaction, machinery traffic, yield losses, green pea

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## Precision Agriculture Technology for Management of Soil System

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To maximize the productivity from the restricted natural resources and to meet the forthcoming demand and challenge we have to divert towards new technologies. It's conjointly sure that even in developing countries, convenience of labour for agricultural activities goes to be in brief offer in future. The time has currently arrived to use all the trendy tools available by using data technology and agricultural science along with each other for improved economic and environmentally sustainable crop production.In India fragmented landholdings, heterogeneity of crops and livestock and concept of farm families in the rural conditions are the hurdles in using technology.Increasing population in association to climate change requires a commensurate increase in agricultural productivity. Key to this challenging task is to ensure sustainable soil productivity while maintaining high crop yields and reducing environment pollution. Thus, to recover from all these factors, a sensor technology for nutrient management is a good way to achieve such goals.

**Keywords:** precision agriculture, agricultural productivity, sensor technology, nutrient management

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# Energy Requirement in Different Farm Operation

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Energy use in agriculture has been increasing since green revolution in the late sixties. The pattern and rate of growth of demand for energy sources is influenced by a number of factors such as increasing population, growing urbanization, rising house hold income and changing life style.The power necessary for agricultural production is provided by human labour, draught animals and engine-driven machinery. Energy analysis is based on field operations (land preparation, sowing, interculture, harvesting, and residue management) as well as on the direct (fuel and human labour) and indirect (machinery) energy sources involved in the crop production process.Animal energy was found maximum (439.07 MJ/ha) for small farmers and minimum (68.03 MJ/ha) for large farmers in various farm categories. Human energy was found maximum (343.44 MJ/ha) for marginal farmers and minimum (145.83 MJ/ha) for large farmers in various farm categories and for machine energy was found maximum (4148.65 MJ/ha) for large farmers and minimum (900.40 MJ/ha) for small farmers.
**Keywords:** animal energy, human energy, machine energy, field operation, energy analysis

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# Soil Fertility Evaluation and Nutrient Index Approach in Some Soils of Sindhudurg District of Maharashtra

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The experiment was conducted to investigate the soil fertility status of the Sindhudurg district. The study consisted of field survey for collection of soil samples and their analysis for chemical and physical properties at department of Soil Science and Agricultural Chemistry, Regional Fruit Research Station Vengurle, Soil fertility evaluation of an area is an important aspect in context of sustainable agriculture production. The macro nutrients govern the fertility of soils and control the growth and yields of crops. In the present investigation four blocks was selected in the district Sindhudurg of Maharashtra and studied the available macronutrient status in the soils using Parkers Nutrient Index approach made with the study of 29 sub-surface soil samples collected from farmers field from different villages of Kudal, Kankwali and Vaibhavwadi block with the help of khurpi in zigzag motion. Collected soil samples were analyzed for pH, Electrical Conductivity,(EC) Organic Carbon (OC), Nitrogen (N), Phosphorus (P), Potassium (K) The Results reveals that the pH ranged from 4.5-6.4 with mean of 5.8 moderately acidic in nature, E.C. ($dSm^{-1}$) ranged from 0.031-0.172 with mean of 0.066, Organic carbon ranged from 1.11-6.74 with mean value of 2.47 gkg-1 and available nitrogen, phosphorus, and Potassium were ranged from 147.3-445.3, 4.7-16.4 and 81.3-720.86 kg $ha^{-1}$, respectively.

**Key words:** Soil fertility, Organic matter, Macronutrients, Nutrients index

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# Assessment of Soil Erosion by USLE Model using GIS and Remote Sensing Techniques

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Agriculture is the major source as well as victim of non-point source pollution and sediment is most important ingredient of non-point source pollution along with pesticides and fertilizers.Thus estimation of soilloss and identification of critical area for implementationof best management practice is central to success of

soilconservation programme.Quantitative assessment of average annual soil loss in micro-watersheds of Ambika watershed of South Gujarat region was made using the well-known USLE with a view to know the spatial distribution of average annual soil loss in the watershed. The use of GIS and remote sensing data enabled the determination of the spatial distribution of the USLE parameters. Annual average soil loss for the entire watershed was estimated as 22.41 $tha^{-1}yr^{-1}$. The micro-watershed prioritization indicated that 50 micro-watersheds are falling under moderately high to very high category which required immediate attention for soil conservation treatment. As the average slope of all these micro-watersheds varies from 5-8%, contour bunds and terraces were recommended to reduce soil erosion in these micro- watersheds. The annual average soil erosion for the entire watershed is reduced to 17 $tha^{-1}yr^{-1}$ from 22.41 $tha^{-1}yr^{-1}$ after incorporating the effect of suggested soil conservation measures. The cumulative effect of soil conservation treatment on soil erosion for priority class 1 to 3 was analyzed. Reduction in the area affected by average soil erosion magnitude from 7.5% to 0% for priority class 1, 49.75% to 37.19% for priority class 2 and from 22.41% to 17.63% for priority class 3 was observed. Hence, remote sensing and GIS technology can be used as an alternative to conventional method of soil loss estimation and subsequent prioritization of micro watersheds for implementing soil conservation practices.

**Keywords**:Remote sensing; Soil erosion; GIS; USLE; Priority

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# Economic Prosperity and Environmental Friendly Climate Smart Integrated Farming System Model Including Agronomic, Horticultural and Agro-forestry Crops with Livestock modules

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Climate smart agriculture (CSA) is an integrated approach to managing landscapes cropland, livestock, forests and fisheries etc., that address the interlinked challenges of food security and climate change. This approach also helps to transform agri-food systems towards green and climate resilient practices. The integrated farming systems (IFS) are vulnerable to climate change and must adapt to maintain and improve productivity and its stability. IFS has potential to decreasing the cost of cultivation, increasing the efficiency of natural resources and ultimately protecting the farmers, especially small and marginal ones, from huge losses in case of weather vagaries. IFS are one of the approaches towards transforming the idea of sustainable development from concept to reality. Thus, IFS are helpful for conservation of natural resources. Considering the Agro-climatic conditions, natural resources, land holding of farmers and farmer's needs of Konkan region, an ideal integrated farming system model including agronomic, horticultural and agro-forestry crops for small and marginal farmers has been developed on an area of 1.00 ha at Regional Agricultural Research Station, Karjat, Dist. Raigad under All India Co-ordinated Research Project on Integrated Farming Systems. The IFS model comprised different enterprises *viz.,* crops and cropping systems on an area of 0.50 ha, horticulture component (fruit crops + nursery) 0.40 ha, livestock components namely, dairy, goatary and poultry on area of 35.75 $m^2$ each (107.25 $m^2$), vermicompost unit on 18.00 $m^2$ and rest of the land (874.75 $m^2$) is used for operational and other purposes. This region is dominated by rice based cropping systems due to high rainfall. Therefore, the total production of the model is converted in terms of Rice Equivalent Yield (REY). The average of six years data showed that the total production of 47-09 t REY was obtained from 1.00 ha area. In terms of economic returns, the gross and net returns were Rs. 7,15,957/- and Rs. 5,05,404/-, respectively with B: C ratio 1.42. Six years average employment generation through present IFS model was found to be 1085 man days and its value was Rs. 2,04,819/- which contributed 40.53 % in the total cost of production. The average total cost of production of the IFS model

was Rs. 5,05,404/- ha$^{-1}$, which included outside purchase for Rs. 1,93,250/- ha$^{-1}$ (38.24 %), value of recycled material within the system of Rs. 1,07,336/- ha$^{-1}$ (21.24%) and for farm labours costing Rs. 2,04,819/- ha$^{-1}$ (40.53 %). The data showed that as far as the demand of essential foods for a family of 6 members per annum is considered, the annual production in this model was surplus for cereals, oilseeds, milk, fruits and vegetables commodities. The present IFS model has sink carbon from different sources was 21433.01 CO2-e in kg. However, the sources of carbon from different enterprises were 13501.09 CO2-e in kg. This means the net Green House Gas emission in IFS model was -7931.92 CO2-e in kg. This indicate the friendly relationship to the environment.

**Keywords**: CSA ,IFS model, essential foods, labours costing

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# Climate Change Mitigation through Resource Management Technology in Rice Based Cropping Systems

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The effects of climate change on Agriculture are becoming more obvious and pose serious threats and challenges to food security and sustainability in Agriculture. To explore ways of mitigating the negative effects of climate change on Agriculture through resource conservation and management of cropping systems, a field experiment was conducted consecutively for six years from 2010-11 to 2015-16 in a split plot design with three replications at Regional Agricultural Research Station, Karjat, Dist. Raigad (M.S.). The main plot treatments were two tillage systems (minimum tillage and conventional tillage) and four cropping systems (*Kharif* rice followed by *Rabi* cowpea, brinjal, sweet corn and grain *Amaranthus*). Sub plot treatments comprised two mulching treatments (no mulching and mulching @ 3 t ha$^{-1}$ rice straw to *Rabi* crops) and two fertilizer levels (RDF : Recommended dose of fertilizers and 125 % RDF).

The pooled results of 6 years revealed that conventional tillage resulted in significant increase in grain yield of *Kharif* rice by 1.29 q ha$^{-1}$ (2.84 %) as against minimum tillage which produced grain yield of 45.42 q ha$^{-1}$. The straw yield of rice followed similar trend to that of grain yield. The yield of main produce and by produce of *Rabi* crops was not influenced significantly due to tillage systems. The total Rice Equivalent Yield (REY) and net returns of the system were not significantly influenced due to tillage methods. The B: C ratio of the system was identical under minimum tillage (2.16) and conventional tillage (2.16) indicating that *Kharif* rice and *Rabi* crops can be grown under minimum tillage. The 'Rice-cowpea' cropping system produced significantly the highest grain (48.45 q ha$^{-1}$) and straw (58.19 q ha$^{-1}$) yields of *Kharif* rice over rest of the systems studied. Crops grown after *Kharif* rice *viz*. brinjal, sweet corn, grain *Amaranthus* and cowpea produced 11.18, 280.37, 218.40 and 7.95 q ha$^{-1}$ fruit, cob, grain and grain legume yields and 22.27, 67.17, 337.46 and 70.78 q ha$^{-1}$ by-produce yield, respectively. Since the different crops were grown in *Rabi* season their yields were converted into REY. 'Rice-Brinjal' cropping system produced significantly the highest REY (373.66 q ha$^{-1}$) over rest of the systems. 'Rice-Sweet corn' system recorded significantly higher REY (310.36 q ha$^{-1}$) as compared to 'Rice-Grain *Amaranthus*' (113.55 q ha$^{-1}$) and 'Rice-Cowpea' (108.82 q ha$^{-1}$) systems, however, latter two systems were at par with each other. The 'Rice-Brinjal' cropping system realized maximum and significantly higher net returns (Rs. 3,23,139/- ha$^{-1}$). However, B:C ratio (2.94) was significantly the highest in 'Rice – Sweet corn' cropping system over rest of the cropping systems except 'Rice – Brinjal' cropping system (2.69). Mulching of rice straw @ 3 t ha$^{-1}$ to *Rabi* crops significantly increased grain and straw yields of *Kharif* rice as well as main produce yield of *Rabi* crops as compared to no mulching, however, by produce yields of *Rabi* crops did not differ significantly. Mulching of rice straw to *Rabi* crops @ 3 t ha$^{-1}$ significantly increased total REY (232.95 q ha$^{-1}$), net returns (1,85,424/- ha$^{-1}$) and B:C ratio (2.17) of the system as compared to no mulching. Application of 25 per cent higher dose over recommended dose of fertilizers (RDF) produced

significantly higher rice grain yield (47.50 q $ha^{-1}$), straw yield (56.77 q $ha^{-1}$) and main produce yield (133.24 q $ha^{-1}$) of *Rabi* crops as compared to application of RDF. Further, application of 25 per cent higher RDF produced significantly higher system REY of 233.69 q $ha^{-1}$ as compared to application of RDF (219.51 q $ha^{-1}$). Application of 25 per cent higher RDF to both *Kharif* and *Rabi* crops caused significant increase in net returns (1,88,048/- $ha^{-1}$) and B:C ratio (2.21) of the system as compared to RDF. Minimum and conventional tillage did not exhibit significant effect on chemical properties of soil measured after harvest of *Rabi* crops. 'Rice-Cowpea' cropping system recorded numerically higher values of organic carbon (1.10 %) and available N (228.06 kg $ha^{-1}$) as compared to other cropping systems, however, the differences were found to be non-significant. There was no any significant effect of different cropping systems on available $P_2O_5$ and $K_2O$ content of soil determined after harvest of *Rabi* crops. Mulching of rice straw @ 3 t $ha^{-1}$ to *Rabi* crops significantly increased organic carbon (1.10 %), available N (228.20 kg $ha^{-1}$), available $P_2O_5$ (24.48 kg $ha^{-1}$) and available $K_2O$ (274.38 kg $ha^{-1}$) content of soil as compared to no mulching. Application of 25 per cent higher recommended dose of fertilizers significantly increased the organic carbon content (1.10 %), available $P_2O_5$ (24.51 kg $ha^{-1}$) and available $K_2O$ (273.07 kg $ha^{-1}$) contents of soil as compared to RDF, however, there was no any significant effect of fertilizer levels on available N content of the soil measured after harvest of *Rabi* crops. Thus, on the basis of 6 years data it can be concluded that to get higher yields and economic returns, 'Rice-Brinjal'and 'Rice-Sweetcorn' systems be grown with minimum tillage by applying 125 % RDF to both the systems and 3 t $ha^{-1}$ rice straw mulch to *Rabi* crops to mitigate climate change effects through resource conservation and management of cropping systems.

**Keywords**: *Rabi* crops, Mulching, RDF, Rice-Brinjal'and 'Rice-Sweetcorn' systems

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# Assessment of Climate Change and Agriculture in Salebhata Catchment, Odisha Using Climate Models

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Water is the most vital replenishable natural resource and foremost requirement for all forms of life as without water, life will simply cease to exist. The availability of freshwater in India has been declining continuously (Kumar, 2003; Arjunan et al., 2009). Salebhata catchment in Ong River basin, Odisha, plays an important role in agriculture of western Odisha. Thought ample of fresh water is available still it is in critical situation for gratifying the water demand for agriculture as well as other water use sectors due to climate change and geographical location of the catchment. Therefore, a climate change impact reckoning was carried out to assessment of corollary on rabi and kharib crop in Salabhata catchment. In order to assess the temporal impact of climate change under both RCP scenarios for salebhata sub-watershed, monthly mean streamflow was estimated for different years during 2010 to 2030.Trend analysis was carried out by Mann-Kendall test on future climatic data for above periods.The future climatic data of Coordinated Regional Downscaling Experiment (CORDEX) East Asia models namely, HadGEM3-RA, SNU-MM5, YSU-RSM and RegCM4 with two scenario RCP 8.5 and RCP4.5 were used for the future stream flow estimation on Ong River for Salebhata catchment. Model calibration and validation was based on the past climatic data trend of 2000 to 2009.The result shows that the existing water demand of Salebhata was 491 MCM for period 2000-2009 and cumulative stream flow projection of model SNU-MM5 with scenario RCP 8.5 is highest where as model RegCM4 with scenario RCP4.5 is lowest for the period of 2011-2030.

**Keywords.**: Climate change, Downscaling, WEAP, CORDEX, Mann-Kendall test

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# Evaluations of Seed Priming on Growth and Yeild of Chickpea (*Cicer Arientinum* L.)

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The present experiment entitled "Evaluation of seed priming on growth and yield of chickpea (*CICER ARIENTINUM* L.)" was conducted during Rabbi 2019 at experimental field of Pulses Research unit, Dr. PDKV, Akola to assess the suitable priming treatment for chickpea crop (variety: JAKI-9218). The experiment was laid out in randomize block design in three replication. The morpho-physiological traits viz. germination %, plant height, number branches, dry matter content, number of day required to 50% flowering were taken.. The morpho physiological i.e. plant height, number of branches, dry matter content, germination % showed significant increase in chickpea crop when seed priming was carried out with potassium nitrate for 4 hours. The number of days required to 50% flowering were recorded least in seed priming GA3 for 4 hours. Protein content also recorded significantly higher in seed priming with potassium nitrate for 4 hours. Yield and yield attributes were also significantly increased in seed priming with potassium nitrate for 4 hours. It is concluded that seed priming were with potassium nitrate for 4 hours recorded higher morpho-physiological characters over priming treatment and control.

**Keywords**: seed priming, Germination, Growth parameters. GA3, Potassium nitrate

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# THEME-III

# Tourism, Success stories of Agri-entrepreneurship, Group dynamics Role of Public policies etc

# AAPLA GAON : A Case Study of Shri. Vanlaxmi Agro-Tourism

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The Maharashtra state is a bio-diverse state with nine Agro-Climatic Zones and varying soil types suitable for agricultural development. The rural families are mainly engaged in farming and to some extent in agri-related businesses. The farmers' income is not consistent because of many factors such as unpredictable environment and more unpredictable crop yield, fluctuating market prices for agricultural products, unawareness of technology, unexpected and huge expenses, government policies, etc. The state has 45.23 per cent urban population, which is much higher than the national average of 31.16 per cent. Most of the city people like to visit and experience villages for excursion. If these people get proper facilities of accommodation, bed and breakfast, they can satisfy their desire to learn about agriculture, taste the bucolic cuisine and enjoy rural life at economic prices. No doubt, it naturally tends to give opportunity to the farmers and villagers to start and develop Agro-Tourism Centers so as to add one sure source of income.

Now a days, the major development in Agro-Tourism is taking place all around the world in its different forms. It gives people the chance to breathe fresh air, learn about rural environment, ride horses, pick fruits, feed animals, milk cows and participate in actual work of farm and buy produce directly from a farm. Agro-Tourism is a form of niche tourism in which farms are used as tour destinations for educational and recreational purposes. Agro-Tourism Center is the location where tourist from urban areas can come and spend their weekends and holidays in a village with agricultural atmosphere at a very economic cost. Agro-Tourism integrates agriculture with pleasure and gives the benefit of agriculture and tourism activities to the tourists that deliver economic benefits to concerned farmer and villagers.In view, the present exercise was carried out to identify the facilities, packages, activities and SWOT analysis of Shri. Vanlaxmi Agro-Tourism Center (Aapala gaon) , Beldare Tal. Karad Dist. Satara which was established in the year 2013. The data pertaining to the current year 2021-22 was grabbed by paying personal visits to the selected ATC and also by desk approach. This agro-tourism centre is located 310 Kilometers away from Mumbai, the capital city of Maharashtra. Its road distance from Pune and Satara is 180 and 65 Kilometers. It is 17 and 90 Kms away from Karad and Chiplun railway stations, respectively. While, its distance from Pune and Kolhapur airports is 170 and 90 Kilometers, respectively. This agro-tourism centre is situated aside of the Karad-Chiplun road.

The results indicated that this is an ideal ATC wherein different rural and agricultural amenities have been erected for the enjoyment of urban tourists. This ATC is offering packages for one day, overnight and double overnight picnics providing indigenous food/cousins and residence. The facilities established are Vitthal Temple, Cottage, Bamboo House, Conference Hall, Indoor Games, Swing, Nakshatra Garden, Zodiac Garden, Spider Net, Delicious Banquet, Kutirs, etc. The agricultural activities available in this Agro-Tourism Centre are Poultry, Vermi Compost, Dairy, Goatary, Open Byre, Jaggery Unit, Hydroponic, Jute Bag Jumping, Rain Dance, Tractor Safari, Bullock Cart Safari, Horse Riding, Camp Fire, Spider Net, Laughing & Joy, Local Songs, Recreation, etc. Covid-19 had adversely affected on the activities of Agro- Tourism. However, the situation presently is gearing up with liberilisation of the Covid restriction. Nowadays, 100 tourists arrive on Saturday/ Sunday/ Public Holiday and 25-30 on other days.

The selected ATC is a recipient of two Memorial Awards during 2016-17 and 2019-20 for effectively running the Agro-Tourism in rural area. It has the strengths of strong supplementary source of income for farmers, employment generation and rural development and weakness of comparatively low growth, less educated farmers, so need varied trainings and lack of government support. Whereas, its opportunities cover the immense scope of growth, more farmers can be beneficiaries, government support can increase the outreach and government lands can be converted as ATCs. The threats of said ATC were noticed that the climatic conditions and rampant migration from farming to other sectors.

The study suggested that there should be awareness for implementation of perfect models, effective training programmes, more consultancy services, government support with agro-tourism policies, supportive

agro-tourism financing, product and service quality control, strategic partnership development and marketing programmes.

**Key words:** Agro-Climatic Zones ,ATC, Agro-Tourism

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## Present status of Agriclinics and Agribusiness Centers Scheme in India with special reference to Gujarat State

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AC & ABC Scheme was launched by Government of India, April 2002 with the objective to supplement the public extension system through committed private extension services at free or nominal cost to educated and trained candidates in a self employment mode. The present study was conducted to study the present status and progress of AC & ABC scheme in India with a special focus on Gujarat state. The secondary data were collected for the period of year 2002 to 2019. In India, among the various agencies, highest training network of AC & ABC scheme provided by NGOs followed by agribusiness companies. States such as Maharashtra, Uttar Pradesh and Tamil Nadu states have the leading and have remarkable achievement. Other state like Karnataka, Bihar and Rajasthan have also exhibited fair degree of progress. Gujarat holds the Eighth rank in India in terms of number of candidates trained and agri-venture established. Dairy/Poultry/Piggary/Goatary followed by ACABC and Agriclinics are the major ventures established under this scheme. In Gujarat state, total nine Nodal Training Institutes provide training to agripreneurs for establishing the various agri-ventures and out of these agencies, International School for Public Leadership (ISPL), Ahmedabad and Shashwat Sheti Vikas Pratishthan (SSVP), Amreli have trained highest number of candidates. Junagadh, Amreli and Rajkot districts were leading in training and establishment of major agri-ventures like Agriclinics and Agribusiness Centres, Dairy/Poultry/Piggary/Goatary and Agri-Clinics.

**Key words:** AC & ABC scheme, SSVP

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## Role of public policy NREGA in employment generation in Maharashtra

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The National Rural Employment Guarantee Scheme (NREGA) came into existence after the enactment 'National Rural Employment Guarantee Act (2005) in September 2005. The scheme initiated in 200 districts was subsequently enlarged twice to to cover all the 593 rural districts of the country. The goals of scheme are strong social safety net for the vulnerable groups by providing employment source, empowerment of rural poor. The significance of NREGA lies in the fact that it creates a right based framework for wage employment programme.

The present study attempts to examine the role of National Rural Employment Guarantee Scheme (NREGA) in the state of Maharashtra with focus on employment guaranteed, works undertaken, strengths, bottlenecks and strategies for strengthening the programme. The study is undertaken in Western Maharashtra, at micro level based on the data available and reports from beneficiaries of the scheme and government officials. It was observed that only 34 per cent households registered under NREGA received job cards in Western

Maharashtra. This proportion was highest in the Kolhapur district (51 to 55 per cent). Only 10-15 per cent of households belonging to SC and ST category received job cards against 75 per cent for other categories. The Nandurbar district showed significantly high proportion of job cards issued to ST category. While Sangli district has highest proportion of SC population in the Western Maharashtra. The Scheme Act aims at creating durable assets and strengthening the livelihood resource base of rural poor people. The actual employment generation is much below than 100 days in a year in most of the districts of Western Maharashtra expect Nandurbar district.

The works under taken through NREGA were rural irrigation, water conservation and harvesting, drought proofing and land development. The number of water conservation activities accounted the maximum share in total works carried out under NREGA, followed by rural irrigation and drought proofing. Thus, the works under NREGA in western Maharashtra mainly related to irrigation and water conservation activities.

The wages offered under NREGA are low, which could be due to improper measurement of productivity and lack of information to workers regarding wage rates. However, the NREGA is the much better scheme than other employment related programmes.

**Key words:** NREGA, employment generation, empowerment

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# Agristartups and rural devlopment

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Agriculture plays a vital role in India's economy. Over 58% of the rural households depend on agriculture as their principal means of livelihood. However, the use of technology in the agricultural industry has been limited in India. As a result, the agriculture industry in India contributes merely 17-18% to its GDP. The agro based industry saw a growth at a CAGR of 16.4% over FY10 to FY18.However, in the last couple of years, India has seen a rise in the number of agritech start-ups that are not only making technology more accessible but also helping these farmers to improve their lives.Despite a pandemic-hit year, agritech start-ups in 2020 saw over $300 million of investments.Currently, 8% or 1294 of the total recognized start-ups in the country are in Agri startups space as per the Economic Survey of 2019-20. Of these, 54% are classified as Agri-tech while the rest are in the field of dairy farming, food processing and organic agriculture.Agri-tech is a sector that has a promising potential, as the sustainable growth of agriculture systems offers synergistic opportunities for collective growth of capital investment and agriculture.Over the last decade, the sector is being streamed with the stream of educated youth, fired by the ideas, passion and innovations to launch newer kinds of technology and business models to lift the face of agriculture from primitive to hi-tech one.From ICT apps to farm automation and from weather forecasting to drone use and from inputs retailing and equipment renting to online vegetable marketing, and from smart poultry and dairy ventures to smart agriculture and from protected cultivation to innovative food processing and packaging, its proliferation of all innovations and technology driven powerful startups set to revolutionize the food and agriculture sector.These startups are at present capable to address intrinsic challenges of Indian agriculture happening from the starting and are now able to offer right techniques, information, and efficiencies to small-scale farmers exclusively for pre-harvest operations and post-harvest use cases.

**Key words:** *Agriclinics, Agribusiness centers, agri-ventures, agripreneurs*

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# Role of Public (Agricultural) Policy in India

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The pandemic lockdown across the country has brought economic activity to a near halt. Amid this situation, the government is expecting that agriculture sector could be a silver lining for the Indian economy. According to the NITI Aayog, the agriculture sector is estimated to grow at a rate of 3 per cent for the year 2020-21.The Indian agricultural sector is also on the verge of a significant transition. The government, through the new agricultural policy, allows farmers to sell their produce to whomever and wherever they want. Farmers would have to harness new innovations to match the changing dynamics and stay updated with market knowledge. The ambitious farm liberalization agenda of the government in the form of three bills, which were currently enacted in the legislation, could be a new way of engaging food producers and their buyers. These three bills would work to reduce inefficiencies through productive investments and allow free trade between farmers and buyers. This new policy would also provide a requisite forum for buyers to avail the correct remuneration to sell their goods.In September 2020, three agri reform bills—The Farmers 'Produce Trade and Commerce (Promotion and Facilitation), the Farmers' (Empowerment and Protection) Price Assurance and Farm Services Agreement and the Essential Commodities (Amendment) Act—were introduced by the government as a step to raise farmers' incomes in the coming years. According to the Ministry of Agriculture & Farmers' Welfare, the new law would create an environment where farmers and traders will have the right to choose between selling and buying agricultural products. It will facilitate barrier-free interstate and intrastate trade and trade outside the physical premises of markets notified under the 'State Agricultural Produce Marketing Legislation'.

**Keywords:** Publicpolicy**,** Agricultural policy,farmers and traders,etc.

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# Group Dynamics Approach in Farmers Producer Organization

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A group can be defined as several individuals who come together to accomplish a particular task or goal. Group dynamics refers to the attitudinal and behavioral characteristics of a group. Group dynamics concern how groups form, their structure and process, and how they function. Group dynamics are relevant in both formal and informal groups of all types. In an organizational setting, groups are a very common organizational entity and the study of groups and group dynamics is an important area of study in organizational behavior. According to Tuckman's theory, there are five stages of group development: forming, storming, norming, performing, and adjourning. During these stages group members must address several issues and the way in which these issues are resolved determines whether the group will succeed in accomplishing its tasks. A Producer Organization (PO) is a legal entity formed by primary producers, viz. farmers, milk producers, fishermen, weavers, rural artisans, craftsmen. A PO can be a producer company, a cooperative society or any other legal form which provides for sharing of profits/benefits among the members. In some forms like producer companies, institutions of primary producers can also become member of PO.Any individual or institution can promote a PO. Individual persons or institutions may promote PO using their own resources out of goodwill or with the noble objective of socioeconomic development of producers. If, however, the facilitating agency wishes to seek financial and other support, then they have to meet the requirements of the donor/financing agency. Institutions can be built for promoting common interests of members/producers. The limitation is that surplus generated by such a PO cannot be divided among members by way of dividend etc

**Keywords**:Group dynamics, FPO,socioeconomic development,cooperative society,etc.

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# Role of Public Policies for Agricultural Development in India

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Public policy is the principled guide to action taken by the administrative executive branches of the state with regard to a class of issues, in a manner consistent with law and institutional customs. The phrase 'public policy' is used in everyday parlance during the discussions in public domain with respect to the policies such as agriculture policy, health policy, foreign investment policy, economic policy, labour policy, education policy and so on. A policy is defined as a course of action and policy framed by the government and impacting the people, at large, is called a public policy. It comprises a set of intentions or purpose, a description of the direction in which the government intends to move or introduce reforms, the actors involved and the measures to be taken. Public policy plays one of the most crucial role in governance and drives the social and economic development. Public policymaking can be described as a dynamic, intricate, and interactive system in which public problems are discovered and solved by developing new policies or reforming the older ones. There are various models of Public Policy formulations and Implementation (PPFI) and also various methodologies/stages to facilitate adaption of those models.The important role of the public policy is to make the society to lead a better life and to maintain the delivery of the goods and services are significant, it is regarded as the mechanism for developing economic-social system, a procedure for determining the future and so on.The Government has taken up certain projects for developing the nation on a global scale. These projects involve several factors of economic, political, social, financial, health and wellbeing, education, employment etc., These are as follows, Ayushman Bharat-National Health Protection Scheme, Swachh Bharat Mission, Make In India, Pradhan mantra Jandhan Yojana, PradhanMantriUjjwala Yojana, Digital India, PradhanMantriSurakshaBima Yojana, Atal Pension Yojana, Skill India, BetiBachao, BatiPadhao.

**Keywords:** Public policy, public problems,PPFI

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# Crop Diversification: Success Story of a Farmerette

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Agricultural intensification increased crop productivity but simplified production with lower diversity of cropping systems, higher genetic uniformity, and a higher uniformity of agricultural landscapes. Associated detrimental effects on the environment and biodiversity as well as the resilience and adaptability of cropping systems to climate change are of growing concern. Crop diversification may stabilize productivity of cropping systems and reduce negative environmental impacts and loss of biodiversity, but a shared understanding of crop diversification including approaches towards a more systematic research is lacking. Here, we review the use of 'crop diversification' measures in agricultural research.This is indeed a story of diligent farmerette means a women who is a farmer or farmhand.Smt. Sangeeta Walmik Sangle is a small farmer and holding 2 hectare land. She has a family of 6 members. She is the leader of Rajhans Krushi Vidnyan Mandal at Satygaon.The group has 20 members. Initially ATMA, Nashik helped in group formation and motivation. After getting training on improved technology in Guava and Pomegranate. She also got training on Dairy Farming from ATMA, Nasik. At present her cropping pattern includes cultivation of Guava with Red Pumpkin and Pomegranate with Drumstick. She also grows Onion, Grapes and Vegetables under shade net. She sells her produces at various markets namely Thanpada KalyanMahadev Complex at Thane, Sant Shiromani Shree Sawata Mali ShetkariAthwade bazaar, Mumbai and taluka level markets. By the inspiration from Dairy farming Training by ATMA, she purchased 4 cows and get monthly income Rs. 18,000/-. She is also earning Rs. 1.40 lakh from

Drumstick (4 tonnes @Rs.35/kg) and Rs. 1.5 lakh from Red pumpkin (yield 15 tonnes).She has been awarded with KrushthonYuva Sanman-2018 (Innovative Women Farmer). She received Shetkari Gut Nyondani Award by ATMA, Nasik. She also received Krishi Gaurav Award by Jai Kishan Farmers Forum.

**Keywords**: success story, women farmer, ATMA, group formation.

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## Drumstick Farming: A Successful Enterprise

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Odisa and Moringa Drumstick saplings and Drip irrigation systems were distributed free of cost to farmers with the help from NGOs dedicated towards social causes like Manavlok Ambajogai & Save Indian Farmers(SIF). Using this opportunity, farmers have received huge income by taking drumstick crop on barren land with the efficient use of water. This is indeed a story of diligent successful farmer Mr. Shripati Chamnar, from village Yelda, which is located in Ambajogai block of Beed district from Maharashtra, India. He has been able to take higher crop production of drumstick in such often drought affected area facing water scarcity. Subsequently Shripathi came to know about both Manavlok and Save Indian Farmers (SIF). Also drumstick is having lots of demand in market due to its medicinal use. With this idea in mind, Shripati chamnar implemented drumstick farming in his once infertile farm field.Shripati planted 1600 drumstick saplings in two acre. These saplings were sowed at distance of 10 x 6 feet & in depth of 1×1 feet respectively. He used Jiwa-amrut, cow dung as manure/fertilizer which means to be pure organic farming due to this he was able to reduce extra expenditure. Productions of drumstick started after 6 month from this drumsticks sapling were planted. Usually, drumstick crop is not prone to any disease, insect. Drumstick tree need less space gives high production less expenditure with high income for farmer.Actually, these saplings were watered 5 to 6 days in a week and harvest was taken in a week. Every drumstick is approximately 2 to 2.5 feet. 5 to 6 such drumsticks will weight approximately 1 kg. It cost 60 to 70 rupees per kg in market. In the same drumstick fields, he has also taken mixed crops of ladies finger, bringer, tomato & maize. Shripati is now expecting income of at least two lakhs from 4000 kg of drumstick crop production this season. With low investment he could earn steady income this year. Thus results in improvement in their standard of living and quality of life.

**Keywords**: Successful enterprise, drumstick,Jiwa-amrut, etc.

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## Impact of Group Dynamics on Organizational Productivity

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The study investigates the impact of group dynamic on organization productivity, although team work is very crucial for achieving the goals and objectives of the organization it has been neglected which results in poor productivity of the organization. In organizations group dynamics provides strength, builds trust, motivates people and develops creativity, communication, conflict resolution skills and help the organization to get better output. It creates bond among employees which will help them in giving their best to the organization. It also enables the employees to understand the importance of collaboration and co operation.it helps in collective decision making and problem solving which will lead to overall productivity of the organization. Group

dynamics has become a significant piece of current day organizations have advanced from custom of individual work designation to collaboration which improves the exhibition of the association by improving imagination, correspondence, critical thinking aptitudes and so forth. Misunderstanding among team member, poor or ineffective communication and lack of cooperation among some team members are some of the constrains which reduces the impact of teamwork and group dynamics .Effective group dynamics is essential for success of any business Therefore, this research paper seeks to examine the impact of group dynamics on organization productivity. This research study analyzes the impact of group dynamics on organizational productivity on the employees of a private organisation. The study was guided by the following objectives: To identify the relationship between teamwork and productivity, examine reasons for communication breakdown in teams, analyze the level of co-ordination, to understand the ways of conflict resolution. A self-structured questionnaire was used in the data collection. The research study used correlation techniques in order to analyze the relationship between two variables that was group dynamics and Organization Productivity. There was clear evidence that group dynamics is positively related with organization productivity. The result of the study shows that there was a significant positive impact of group dynamics on organizational productivity.

**Key words:** Group dynamics, organization productivity, communication, coordination, conflict resolution.

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# Group Dynamic Approach for the Development of Organization

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Leadership is central to determining the success or failure of an organization. Leadership is defined in this paper as a relationship between one or more individuals and one or more other individuals within the framework of the social unit called a group. One part of the group is being called leader or leaders, while the other part is comprised of followers. In this relationship the activities of the followers are initiated, stimulated, and sometimes even determined and controlled by the leader. leadership influences on organizational team performance and the large literature on leadership and team/group dynamics, we know surprisingly little about how leaders create and handle effective teams. Leadership is currently one of the most talked about issues in business and organization. It is hard to turn on the television, open a newspaper or attend a conference without coming across numerous references to leaders, leadership and leading. A search of the Amazon.com website in Spring 2003 revealed 11,686 results for the word ‘leadership’ alone and similar searches of the Ebsco business and management publications database reveal an exponential increase in the number of published articles on leadership, from 136 in 1970-71, to 258 in 1980-81, 1,105 in 1990-91, and a staggering 10,062 in 2001-02 . Leadership is currently one of the most talked about issues in business and organization. It is hard to turn on the television, open a newspaper or attend a conference without coming across numerous references to leaders, leadership and leading. A search of the Amazon.com website in Spring 2003 revealed 11,686 results for the word ‘leadership’ alone and similar searches of the Ebsco business and management publications database reveal an exponential increase in the number of published articles on leadership, from 136 in 1970-71, to 258 in 1980-81, 1,105 in 1990-91, and a staggering 10,062 in 2001-02. In this article, we focus on leader–team dynamics through the lens of “functional leadership.” This research intends to explain effective leadership and how it can bring positive change that helps the organization to improve and be innovative in the current business environment. Effective leadership and change management will be discussed in this article and also how leadership affects other factors, for instance trust, culture and clear vision, in the organization as it facilitates the change. Leadership is one of the main factors in bringing positive change to the organization; if there is no leadership in the organization they will not be able to change in the direction they desire and could experience negative change instead.

**Keywords :** Group dynamic approach, Functional leadership, organizational development

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# Role of Public Policies for The Upliftment of Farmers in Agricultural Development

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Agricultural policy describes a set of laws relating to domestic agriculture and imports of foreign agricultural products. Governments usually implement agricultural policies with the goal of achieving a specific outcome in the domestic agricultural product markets. Policies are important in providing guidelines and directions to be followed in improving domestic agriculture production, and thus reduce poverty. It also helps farmers to use improved inputs. Policies also help commercialization of small holder agriculture and increased value addition. The relationship between government policy and agricultural supply requires analysis on multiple levels. The approaches taken by government to agricultural production are shaped by ideas of economic development, economic interests, the prescriptions and requirements of international agencies (such as the World Bank and the International Monetary Fund) and regimes, local environmental conditions, legacies of national and sub-national institutions among others. Research on agricultural production, policy and public health requires attention to all of these factors and efforts to piece together this puzzle into a comprehensive understanding of how these factors intersect. This review focuses on national level policies and programs as one piece of this puzzle with an attempt to situate these policies in the broader international political economy. As a first step in what is hoped will be greater attention to agriculture and unhealthy commodities as they relate to disease burden and health more generally, this review focuses on the national level recognizing that government policy is one of the more direct and tangible factors shaping agricultural production. The National Agro Food Policy (2011-2020) set a direction that the production of agro food commodities will grow around 4% a year in order to achieve a self-sufficiency level and enable to produce sufficient food for local consumption and generate income from export markets.The objective of this scoping review is to identify lessons from government policies and programs that have attempted to shift agricultural production in some way, whether this means policies to enhance crop production, induce crop substitution or shift to some other type of employment.The policy seeks to actualise the vast untapped potential of Indian agriculture and aims at achieving a growth rate in excess of 4% per annum in the agriculture sector.

**Keywords :** Agricultural production, national agro food policy.

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# Employment Generation through Agritourism in India

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Agri-tourism is a new concept in the tourism sector of Indian economy and it is related to the farming activities which provides better opportunities to experience rural farming life and taste of local genuine food. Today all the tourists want to escape from the daily hectic life of cities and desire to stay in peaceful environment of rural areas enriched with farming activities. After that Agri-tourism Development Corporation affiliated and motivated more than 200 farmers to operate Agro-tourism centers in different villages of Maharashtra. Further more, Agro-tourism business spread out in the different parts of India such as Kerala, Goa, Tamil Nadu, Karnataka, West Bengal, Punjab, Rajasthan, Uttarakhand, etc. Today many Indian farmers especially from Pune and Maharashtra currently are considering the use of agro tourism as a mode of diversifying their farm operations. Agri-Tourism Development Corporation in India is pioneer in the development and marketing of agri-tourism concept in India which has 218 affiliated farmers and operates agri-tourism centers in their respective villages in the state of Maharashtra in 2014.Today it is estimated that 90

million farmers are living in 6.25 lakh villages producing food grains and almost 26 percent of GDP of Indian economy comes from agriculture sector. Therefore, here it is urgent need to make some serious efforts to boost the Agri-tourism sector which may be very helpful to generate employment, poverty alleviation and sustainable human development. Agritourism gives producers an opportunity to generate additional income and an avenue for direct marketing to consumers. It is true that during the year 2000, 26.4 lakh foreigner tourists visited India and they showed an interest in Agri-tourism activities. In this regard we need proper recognition of agri-tourism industry, government supported policy structure of agri-tourism, education of the farmer and farm owner, proper financing solution for its enhancement, liability and risk management programs, product and service quality improvement. Moreover, a Public Private Strategic Partnership Development Model may be created to boost the agri-tourism sector in India.

**Keywords:** Agro-Tourism, Employment Generation, Agricultural Farms, Public Awareness.

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## Participation of Rural Women in Agri-Entrepreneurship

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Women play an important role in the development of Indian economy. In the recent years on par with men women have capacity to run the agribusiness in her way. Women entrepreneurs based on women women participation in equity and employment of business enterprise. Accordingly, " An enterprise owned and controlled by a women having a minimum financial interest of 51% of the capital and having at least 51% of the employment generated in the enterprise to women. a women runs enterprise Nowadays unemployment plays a major role among the graduates in India. Even women have not possible to work in marketing field as compared to men But in agribusiness point of view, the women graduates have actively in getting training from Agri-Clinic and Agni-Business Centre and start their own agribusiness after complete the training. The Centre for Entrepreneurship Development (CED) provides skill oriented training for two decades to women agri graduates. This program has been exclusively sponsored by National Institute for Agricultural Extension Management to empower the women in agribusiness. Agripreneurship have the potential to contribute to a range of social and economic development. Agripreneurship has potential to generate growth, diversifying income, providing widespread employment and entrepreneurial opportunities in rural areas, though is an intricate process of mobilizing, stimulating needs, inculcating entrepreneurial competencies, facilitating linkages with other agencies, mentoring and hand holding. The present study has been attempt to generate awareness and to understand meaning rationale for diversification. At the end some major problems faced by Indian women entrepreneurs and steps taken by the government for up-liftment of Indian women entrepreneurs. The compilation of research demonstrate the trans formative potential of women agricultural entrepreneurs, as well as the need for deeper commitment to support and learn the best practices to promote women's leadership in agri-entrepreneurs.

**Keywords** : Women agri-entrepreneurs, entrepreneurship development, agribusiness.

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## Status of Agri-tourism in Konkan Region of Maharashtra Sate

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Agri-tourism includes a wide variety of activities, including buying produce direct from farm stand, navigating, corn maize, slopping hogs, picking fruit, feeding animals or staying at a bed and breakfast on a farm. The purpose of the study was to examine the status of agri-tourism centers in the Konkan region. It was

observed that maximum (42.50 per cent) agri-tourism enterprises were established during '2011-2015', regarding the distance from main road, 37.50 per cent of the agri-tourism centers were located at distance 'up to1 km', majority of the agri-tourism center owners (45.00 per cent) had 'medium' farming experience between '6 to 22 years', 85.00 per cent of the agri-tourism center owners had arranged 'owned capital' for starting the agri-tourism enterprises, Initial investment slightly more than two-third (67.50 per cent) of the agri-tourism center owners had 'medium' initial investment, 60.00 per cent of the agri-tourism centers were 'medium' charges (655/-Rs. to 1453/-Rs.) for a day' stay per person and 57.50 per cent of the agri-tourism center had 'medium' employment generate. The 'Exploratory' research design was used for the present study.All five districts of Konkan was covered under the study. A pilot survey were carried out in five districts namely Palghar, Ratnagiri, Raigad, Sindhudurg and Thane of the Konkan region, to know the actual operational agri-tourism centers. With the help of the pilot survey, a list of well operational working agri-tourism centers was prepared and from the list 40 operational agri-tourism centers was selected for the study.Collected data were classified, tabulated and analysed by using statistical methods like frequency, percentage, mean and standard deviation.

**Key words:** Agri-tourism, Konkanand Maharashtra

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## Agro-Eco –Tourism A New Dimension to Agriculture Enterprises

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Doubling farmer's income is tough task but it can be achieved by finding out new avenues, for generating non-farm income farmers can establish Agro-tourism. Agro-tourism is defined as a place where the tourists visit the farm and/or get acquainted with different aspects of farming and/or purchase farm fresh vegetables, fruits and other processed products. It also refers to gaining knowledge about rural people, their style of living, their culture and food habits etc. active involvement. Agro-Eco-Tourism is the latest concept in the Indian Tourism industry, which normally occurs on farmer's farm, whereby the urban tourists go the farmers home; stay like a farmer, engage in farming activities, experience the bullock cart, tractor ride, fly kites, eat local food, wear traditional clothes, understand the local culture, enjoy the folk songs and dance, buy fresh farm produce and in turn the farmer maintains home and farm hygiene, greets new tourists, sells his farm produce at a better price, earns a livelihood all year round. By combining agriculture and tourism, Agro- Eco-Tourism offers rural experiences to urban residents and economic diversification to farmers. Agro- Eco-Tourism is the new value added agricultural business, for improving the incomes and potential economic viability of small farms and rural communities.

**Key words:** Doubling farmer's income, Agro-Eco –Tourism and Agriculture Enterprises

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## Agri-tourism Enterprise in Konkan Region of Maharashtra State

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The study was conducted in Konkan region of Maharashtra. Konkan region includes Thane, Palghar, Raigad, Ratnagiri and Sindhudurg districts with the objectives to study the profile of the agri-tourism center

owners, to study the status of agri-tourism in Konkan region, to study the prospects of agri-tourism in Konkan region and to identify the problems faced by the agri-tourism center owners and to obtain their suggestions to promote agri-tourism. The sample was comprised of randomly selected 40 respondents from five districts, which was personally interviewed with the help of specially designed interview schedule.The personal and socio-economic characteristics of the agri-tourism center owners namely age, education, family size, land holding, cropping pattern, agri-tourism experience, annual income, infrastructure availability, innovativeness, source of motivation and risk orientation. In the present study descriptive objective is status, prospects and problems of agri-tourism center owners, which were quantified by suitable procedure. Statistical tool like frequency, percentage, mean, standard deviation, "SWOT" analysis were used to analyze the data.

It was observed that, more than three fifth (65.00 per cent) of the agri-tourism center owners belonged to 'middle' age group, with graduation and above level of education (67.50 per cent), 'medium' family size (70.00 per cent), 'small' land holding (35.00 per cent), grown 'rice crop' in *kharif* season (90.00 per cent), in *rabi* season 'vegetables' (85.00 per cent), as a perennial crops 'mango' 'self-motivation' (82.50 per cent) and 'medium' risk orientation (50.00 per cent).Maximum (42.50 per cent) agri-tourism enterprises were established during 2011-2015 year, distance 1.01 to 3 km from main road (37.50 per cent), located between 8.01 to 27 km distance from tahsil headquarters (67.50 per cent),center (82.50 per cent), irrigation source is 'tube-well' (82.50 per cent), development of agricultural area, residential structure-(cottages) and kitchen and space for recreational activities (100.00 per cent).It was observed that, accommodation facilities at the beginning 'single room' (32.50 per cent) and 'single dormitory' (52.50 per cent), local visitors 'medium' category (67.50 per cent), outside state visitors 'low' category (52.50 per cent), regarding agri-tourism activities information about fruit 3.or orchard plants (92.50 per cent), fruits production (92.50).

**Key words:** agri-tourism center, land holding, cropping pattern, agri-tourism experience, annual income, infrastructure availability

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# Problems faced by the Agri-tourism Centers in Konkan Region of Maharashtra State

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The present study was conducted in Konkan region of Maharashtra state, with the objectives to identify the problems faced by the agri-tourism centers in Konkan regionIt was observed that lack of training for agri-tourism (65.00 per cent), weak communication skills (70.00 per cent), lack of co-ordination between agriculture and tourism department (100.00 per cent), low awareness in farmers as well as in tourists regarding agri-tourism (90.00 per cent), low level of entrepreneurial culture (80.00 per cent), 65.00 per cent of the agri-tourism center owners faced problem of lack of road facilities, high cost of construction material (80.00 per cent), lack of transport facilities (95.00 per cent), frequent failure in telephone connectivity (80.00 per cent), lack of government support (100.00 per cent), maintenance cost is high (85.00 per cent), lack of technical and managerial skills (62.50 per cent), high cost in advertisement of agri-tourism center (70.00 per cent) and lack of co-operation in rural people (75.00 per cent). The 'Exploratory' research design was used for the present study.All five districts of Konkan was covered under the study. A pilot survey were carried out in five districts namely Palghar, Ratnagiri, Raigad, Sindhudurg and Thane of the Konkan region, to know the actual operational agri-tourism centers. With the help of the pilot survey, a list of well operational working agri-tourism centers was prepared and from the list 40 operational agri-tourism centers was selected for the study. Collected data were classified, tabulated and analyzed by using statistical methods like frequency and percentage.

**Key words:**Agri-tourism Centers, Konkan and Problem

# Economic Analysis of Krushiraj Agro-tourism Centre in Maharashtra State

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Maharashtra state is the pioneer to develop and promote the Agri-tourism in India. Agri-tourism Development Corporation (ATDC) was incorporated in 2005. The main activities include operating its Agri-tourism centre along with encouraging more farmers to take up Agri tourism, conducting training and research programs. Agro-tourism has potential to boost up the economic condition of agrarian economy. The keeping in view of importance of Agro-tourism in Maharashtra state the study was under taken on Krushiraj Agro-tourism Centre in Pune district.

The result of Agro-tourism centre indicated that, the initial investment for establishment of Krushiraj Agro-tourism centre (KATC) was Rs 66,56,500. The fixed cost incurred for ATC was RS 73,22,150. Major items of cost were land, infrastructure facilities, irrigation facility and hand tools & machinery. Out of that land has highest costing of Rs 38,50,000. Variable cost of agro-tourism centre (ATC) was Rs 26,21,910. Benefit cost ratio was worked out and it was 1.18, which shows that ATC has economical profitable business. The payback period of ATC was 7.7 years. By considering the fixed cost, per head variable cost and per head charges, the breakeven point(BEP) was also calculated in monetary term it was Rs 98,94,797 and in physical (No. of Visitors) 9,635. The internal rate of return (IRR) of KATC was worked out to 16.70 per cent. The major problem faced by ATC owner was insufficient capital investment, lack of knowledge of entrepreneurship and fluctuations of tourism arrivals in a year. It can be concluded that, Krushiraj Agro-tourism Centre Agro-tourism is economical viable entrepreneur and have potential capacity to support the agricultural economy of the rural India.

**Keywords:** ATC, KATC, IRR, B:C ratio, BEP.

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# Impact Assessment of Farm Ponds on Beneficiaries and Non-beneficiary Farmers for Gram cultivation

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The present study entitled, 'Comparative economics of farm pond beneficiary and non-beneficiary farmers of Malegaon tahasil of Washim district. The study was undertaken to examine the impact of farm ponds on production of major crops. For the present study, 50 beneficiary farmers having farm ponds and 50 non-beneficiary farmers without farm ponds on their field were selected from Malegaon tahasil of Washim district. 10 villages from Malegaon tahasil were selected purposively and, from each village sufficient samples of beneficiary and non-beneficiary farmers were taken randomly for comparison. The selected farmers were classified into three categories *viz*., small, medium, large according to their land holding. The primary data was collected from the farmers by survey method and cost concept *i.e*., cost 'A', cost 'B' and cost 'C' was used for the analysis of data. It is observed from the study that in case of beneficiary farmers at overall level the Output-input ratio at cost 'C' was 1:65, while in case of non-beneficiary farmers it was 1:40. It shows that the beneficiary farmers were more profitable than non-beneficiary farmers.

**Keywords:** farm ponds, beneficiary and non-beneficiary, cost 'A', cost 'B' and cost 'C'

# Challenges and Strategies for promotion of Agrotourism in Goa

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In this paper an attempt has been made to study challenges and strategies to promote Agrotourism in Goa. The study was conducted altogether on 20 agritourism host farmers and 100 agritourists.Bardez and Ponda taluka from North-Goa district and Canacona and Sanguem taluka from South-Goa district respectively, selected for the study.The major challenges in proper management were high cost of land development and initial investment, weak communication skills of staff, Inability to introduce more activities and lack of specific policy for promotion of agritourism. Farmers of South-Goa districtwere found to be better placed with respect to cost of labour and Farmers of North-Goa district were found to be efficient in policy initiatives by government. All the stakeholders agreed that proper policy level research along with public-private partnership for promotion and sustainability of agritourism is much essential. Farmers' ability to successfully integrate this enterprise to suit their socioeconomic and agro-ecological conditions would further enhance its profitability and sustainability. Simple percentage values, tabular and statistical analysis was applied to interpret, analyze and present the data.

**Keywords:** Agrotourism, socioeconomic , agro-ecological profitability and sustainability

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# Agro-Tourism: A Sustainable Business Development Model For Goa

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Goa is often referred to as the “Pearl of the Orient” and the Beach Capital of India. Its natural beauty, unique heritage and a delectable mix of cultures, along with friendly and hospitable people, make it perhaps the most attractive tourist destination in India. Tourism is the back bone of Goan economy, with 40% of the population directly or indirectly dependent on it. The sector has shown strong growth with total tourist arrivals increasing from 2.3 million in 2005 to 7.8 million in 2017, an annual growth of nearly 11%. The state has a rich forest cover of more than 1424 $km^2$ of which about 62% has been brought under Protected Areas of Wildlife Sanctuaries and National Park.Goa's wildlife sanctuaries boast of more than 1512 documented species of plants, over 275 species of birds, over 48 kinds of animals and over 60 genera of reptiles. The total forest and tree cover constitutes 56.6% of the geographic area.After Covid-19 pandemic farmers, who had given up cultivation for decades are moving back to the occupation. In all likelihood, nature, wildlife, traditional occupation like agriculture, fishing will be preferred over beaches and temples & churches in the months ahead.Goa State Agriculture Department has reported more than five-fold increase in demand for vegetables & sale of seeds. Government of Goa including Agriculture, Biodiversity, Fishery, Forestry and Revenue department can come together and facilitate growth of Agro- Tourism in Goa. This will also provide opportunity to Goan Agricultural Graduates to gain employment and become self-sufficient.

**Keywords:** Agrotourism, employment , Wildlife Sanctuaries and National Park.Goa's wildlife sanctuaries

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# Success story of Agri entrepreneur of Goa

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Mrs. Pereira a resident of CorlimGoa runs a successful home scale enterprise by Virgin Coconut Oil Production. She started the business in 2014 – 15 and today is eager to expand and step into value addition. Mrs. Pereira attended training in KVK during 2014 and tried Virgin coconut oil preparation using scrapping coconut by hand and going through the tedious process of making the oil. Today she makes 70 liters oil per month and sells through the pharmacies and private medical practitioner and she gets Rs. 350 per liter as net profit and Rs. 25,000/- monthly. Making the oil is viable and can be taken up as sustainable business. She has her own brand VITA which is sold at Rs. 1000/- liter. Her future plans are to go in for making soap and also increase the sale for which she will approach Goa Bagayatdar after increasing the production 100 liters per month.Another entrepreneurMr. Sufiyan Shaikh claims to be the first farmer in Sattari taluka to have taken up farming of various vegetables especially organic cabbage. He did so in Brahmakarmali in an area of 3000 sq mts. Including cabbage he cultivates other crops such green chilies, brinjal, pumpkin, cucumber and radish. He spent around Rs 2.5 lakh to cultivate the same. It takes 30 days to carry out vegetable farming and 60 days for harvesting. “Cabbage farming involves zero maintenance.He advises the state government to make provision such that Goan farmers could use modern technology in agriculture sector. Most Goan farmers are using the age-old method of farming. If we use modern technology, our vegetable business will be profitable.

**Keywords:** VITA, KVK, modern technology, Cabbage farming

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# Group Dyanamics in Contract Farming: A Boon for Sustanable Agriculture

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Group dynamics deals with the attitudes and behavioural patterns of a group. It can be used as a means for problem-solving, teamwork, and to become more innovative and productive as an organization. The concept of group dynamics will also provide you with the strengths, success factors and measures along with other professional tools. The term ‘group dynamics’ means the study of forces within a group. Since human beings have an innate desire for belonging to a group, group dynamism is bound to occur. In an organization or in a society, we can see groups, small or large, working for the well-being. The social process by which people interact with one another in small groups can be called group dynamism. A group has certain common objectives and goals. Because of which members are bound together with certain values and culture. The Government of India's National Agricultural Policy envisages that private participation will be promoted through contract farming and land leasing arrangements to allow accelerated technology transfer, capital inflow and assured market for crop production, especially of oil seeds, cotton and horticultural crops. National Agricultural Policy of GoI has also recognised contract farming as an important aspect of agri-business and its significance for small farmers. The Inter -Ministerial Task Force on Agricultural Marketing reforms observed that contract farming was becoming increasingly important. Same incentives in Maharashtara i.e. Tata Chemicals Ltd. assured quality of grapes for export and improving brand name 'Tata Grapes" in Nashik District, S. H. Kelkar Group of companies in availability of tissue culture plantingmaterial and marketing facility by the

company in Patchouli (Aromatic oil plant) in Mumbai, Champagne India Limited in Easy availability of planting material in Production of grape wine in Pune district and Venkateshwara Hatcheries Private Ltd. gives technical inputs and marketing of product is assured and all recurringexpenditures are borne by the company in Contract Broiler Farming in Maval Block of Pune district.

**Key words:** Group dynamics, Contract farming, National Agricultural Policy, Agriculture Marketing

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## Economic Empowerment- A Succes Story of Dairy Farm Women

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Dairy farming has been an important part of the agricultural scenario for thousands of years. India being a predominantly agrarian economy has about 70 per cent of its population living in villages, where livestock play a crucial role in the socio-economic life. Livestock provide high-quality foods such as milk, cheese, butter, ghee, etc. India is not only one of the top producers of milk in the world, but also the largest consumer of milk and milk products in the world. Due to the shortfall in supply, we have to import significant amounts of milk products to meet internal demand. This is indeed a story of diligent farmerette means a women who is a farmer or farmhand. Smt. Asha Ramkrushn Devre, 50 years old, a small farmer and holding 2 Acer land at Dongargaon Village of Akola district having a family of 4 members. Initially she has started dairy farming with two buffaloes; she again purchased 4 buffalos and gradually increases up to 9 buffalos. She is rearing the buffalos through Low cost Farm Investment (Kaccha Farm) and provided an open area ranching for all cows during full day time. She maintained green and dry fodder ratio throughout the year for good health of their animals. She is also the member of Self Help Group through that she has attended the training from Dr. PDKV, Akola regarding milk & milk product. From unsold milk she makes value-added milk products and preparation of vermicompost from west dairy products. This vermicompost is farther she used for organic vegetable cultivation. She is a role model in the sector of dairy farming in her area and an example to other fellow farmer for rearing of animals for economic empowerment through low cost management.
**Keywords**: Success story, Farm Women, Dairy farming, Economic empowerment.

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## A success story of Progressive farmer: Organic Farming

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Krushi vigyankendra Killa- Roha since more than 13 years in Raigad district efficiently and effectively engaged in transfer of University technologies among the farmers from grass root level through different Innovative extension activities like OFT's, FLD's, Trainings, demonstrations, Group discussion, Farmers Scientists Forum, Ex trainee sammelan, Diagnostic visits, Farmers Rallies, etc. As a result, farmers started adopting different technologies under KVK guidance. Mr. Santosh Divakar, a farmer of Yashwantkhar, of RohaTaluka of Raigad District is very popular among organic farmers in Konkan region and doing organic farming under the guidance of KVK Raigad, MS. After the traditional farming in 4-5 years he was forced to change his farming practices for increasing the yield of crops by adopting latest University technologies under KVK guidance. As a result, he started using high yielding varieties, fertilizers, pesticides etc. KVK Raigad

created awareness about soil health and quality produce.There was a quantum jump in his yields because of adopting improved practices. Then, he started practicing organic farming thinking thatit would help in reducing the cost of cultivation and would reduce the pH of the soil. In the initial years he had the problems of pests and diseases and soil was also not good enough to give better yield. He immediately contacted KVK scientist and officials from department of Agriculture for discussing the problems in farming. He owns five excellent dairy cows of *Gir* species. The cows supply valuable manure. He makes good profit from selling the milk. He started preparing vermicompost with farm wastes and cow dung (FYM). He also started preparation of organic inputs like *Jeevamrut, Dashaparni Ark etc*on his own farm.They are applied in the field as and when necessary.He is paddy farmer and follows paddy-pulses-vegetables cropping system in his farm.He started fresh water fish farming as a subsidiary farming activity by rearing Indian Major Carps under the guidance of KVK, Raigad.His net income through organic paddy was Rs.16000 from one acre of paddy crop.He has good kind of outreach activities and awarded by prestigious institutes.

**Key words**: Traditional farming, KVK, Success, organic farming, Jeevamrut, Dashaparni ark, paddy-pulse-vegetable cropping system, fish farming

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# Cage to Consumer Live Edible Fish: A success story of Innovative Farmer Entrepreneur

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Cage fish culture, in the inland water bodies is relatively new scenario of the country, brings in new opportunities for optimising fish production from the reservoirs and lake. The cage fish farming in India has the potential to enhance the reservoirs production manifold and developing new skills among fishes and entrepreneurs to enhance their earning.

India has a wealth of reservoirs numbering 19,370 with an estimated area of 3.5 million ha at full capacity. At present it is estimated that around 14000 cages have been installed in different reservoirs of the country which are producing around 16 % of the current reservoir fish production and generates around 75 lakh mandays of labour by cage aquaculture in the country.

Mr. Hasan Mhaslai progressive fish farmer of Krishi Vigyan Kendra, Killa-Roha from village Gove, Post Poogaon, Tal. Roha, Dist-Raigad initiated cage culture of Monosex Tilapia at Pavan lake Tal. Maval, Dist-Pune. A case study method has been used to study the entrepreneurship development of this farmer. Information was collected from Mr. Mhaslai through focused group discussion (FGD). Initially Mr. Mhaslai was engaged in edible fish seed production and ornamental fish breeding, rearing and its marketing. His willingness, interest, experience in fish culture and profitability in Tilapia cage culture motivated him to take up fish cage culture with the help of active technical support and motivation by Scientist of Krishi Vigyan Kendra, Roha, Raigad. He started cage culture by installing thirty-four (34) floating cages (6 m X 4 m X4 m) at Pavana lake, Pune. The quantifiable output of the attempt was production and marketing of quality Tilapia fish. From this attempt he earned net profit of Rs. 50,000/- by selling 2500 kgs of fish from single cage.

Mr. Mhaslai faced challenges in marketing like long market chain more commission to brokers/middleman, change in taste and low price to fish. He addressed the issue by innovative method of live fish transport and establishing edible live fish sale counters retail shop at Kolad, Tal. Roha Maharashtra where he used all glass tank of 70" X 24"X16" with biofiltration techniques having 15 kg. display capacity of fish for attracting the consumers. Mr. Hasan Mhaslai's experience showed that cage fish farming in India and Maharashtra has the potential to enhance the reservoir production manifold. Thus, unemployed rural youth, fishmen and SHGs can undertake cage fish farming and establishing edible live fish sale counters retail shop as an alternate livelihood activity.

**Key words:** Cage fish culture, Entrepreneur, live fish sale, Economics.

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# Where there is a will, there is a way"- A success story of young entrepreneur

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Many farmers are quitting agriculture nowadays and moving to cities in search of employment opportunities and better livelihood. There are so many reasons behind this situation. But, under such challenging circumstances Mr. Ganesh Bhagat, a young medical worker finds a way towards sustainable income from farming and allied enterprises. A focused interview method has been used to collect the information.Mr.Bhagat approached Krishi Vigyan Kendra, Roha- Raigad, Maharashtra for technical guidance to improve various farm activities in his farm. He took training on poultry and fish farming from KVK.He started working with various social forums and conducted various programmes for community development.

The Integrated Farming System (IFS) model on his farm includes farming of cereals, pulses and vegetables. Also, poultry unit, fishery unit, mango and coconut cultivation, fruit crop nursery, vermicompost unit are key units of earnings. He established the farm in a scientific manner which resulted in good income generation and employment generation to needy people too.The turnover of his farming activity is more than Rs. 5.00 lakh per year and gives approximately 550 days employment to agriculture labourer. Mr. Bhagat taken initiative for claiming remuneration from Government and Insurance company against the natural calamities like *nisarg*cyclon in the district through farmers organization. He received many awards and certificate of excellence work in agriculture field. His journey says a strong will power, ability to work hard finds a pathway for the success.

**Key words:** Integrated Farming System (IFS) model, *nisarg*cyclon, income generation, entrepreneur

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# Strengthening livelihood of tribal people through backyard poultry farming

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Krishi Vigyan Kendra, Killa-Roha intervened to make backyard poultry farming as more productive and economically viable by introducing improved breeds like Kaveri, Giriraja and Vanaraja. 42 days old chicks were supplied to hundred individual farmers from tribal population under Tribal Sub Plan. They were trained regarding management practices such as feeding, watering and vaccination, etc.The study wasconducted to assess the knowledge gained and adoption of the technology along with the limitationsfaced by respondents. It was found that moderate knowledge (83%) was gained by the respondents onthe improved poultry farming and adoption was satisfactory with 61 and 22 percentages in moderatelygood and high categories respectively. In Raigad district the benefit-cost ratio in Kaveri and local breeds are recorded as2.82 and 2.02, respectively.There is great scope and opportunity for improved desi poultry farmingin the area. The farmers were very much enthusiastic to adopt the technology of improved backyardpoultry farming on commercial basis. Only drawback is availability of inputs like quality chicks, feeds,and medicines etc. with less knowledge about new and improved breeds and marketing.

**Key Words:** Livelihood, backyard Poultry farming, Kaveri.

# Innovative Farm Pond-Cage Integration Fish Farming Model for the Sustainable Aquaculture and Entreprenership Development - Economics and Export Potential

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Aquaculture is an important component of rural development as its better source of protein and generates additional revenue for farmers in salt affected areas. The farm ponds are constructed by farmers with intention to store water for irrigation of the agricultural crops and livestock. Recently these farm ponds are being utilized by many farmers for fish culture. As far as the management is taken into consideration, there are certain problems in the culture of fish in farm ponds due to more depth of farm ponds. The most important amongst all management aspects is fish harvesting due to depth of pond and sloppy nature of plastic lined farm ponds. In order to overcome this problem farm pond-cage integration fish farming model was developed at Khar Land Research Station, Panvel under DPDC, Raigad funded project. This model was successfully demonstrated on a farmer's field at Khandpe, Karjat to culture Pangasius fish. The yield of 12.96 tons of Pangasius was harvested from the 10 cages. The said technology was successfully demonstrated at five different locations in the Raigad district of Maharashtra. Now the said model is being followed and replicated by many farmers in the Maharashtra state. The details of the model, its economics and the entrepreneurship opportunities will be presented and discussed in the conference.

**Keywords**- Cage culture, farm ponds, Pangasius, Success story

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# Successful Farming Entrepreneur by Adopting New Crops Cultivation under Changing Climatic Scenario of Maharashtra.

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Climate change refers to long term shifts in temperature and weather patterns. These shifts may be natural, such as through variations in solar cycle or by human activities. Agriculture sector in India is vulnerable to climate change. Higher temperature tend to reduce crop yields and favour weed and pest proliferation. Climate change can have negative effects on irrigated crops both due to temperature and changes in water availability.Farming business in Maharashtra passing through an increasing risk of climate change which is likely to impact on production of major crops. Late onset of monsoon and intermittent dry and wet spells has great impact on farming Viz., dry spell affects the germination of Soya bean and Cotton, water logged soils and humid conditions will promote rot leading to loss of soil nutrients and fertilizers, high rainfall during pod maturation of pulses leading to bursting of pod or insitugermination,great challenge for wheat cultivation is high temperature etc. To overcome these and many problems farmers are doing lots of adjustments by replacing traditional crops byimproveing crop productivity and quality . As per new technologies, hitech agriculture practices and certain successful adaptation farmers are interested in cultivation of new crops and are following new farming practices under changing climate. By using smart phone technologies farmers are interested in knowing daily weather fluctuations and precautionary guidelines from scientists to protect their crops, know the nutrient requirement, knowledge of pest and disease incidence and management of cultivated crop at different growing conditions. Farmers have improved access to technology like poly house, glasshouse can be used to

improve plant quality even under changing climate. Farmers are using rain water harvesting techniques at farm level to reduce water stress during summer season.

By adopting new released varieties of crops farmers are growing crops in off seasons and also adjustments in different regions with variable climates. Earlier we know that for potato cultivation Himachal Pradesh and Punjab were the suitable regions but now a days farmers from Pune i.e. SatgaonPathar also cultivating potatoes in their farms and earns good money by selling them. Pune and Satara district accounts 72% area and 76% of potato production from Maharashtra. A farmer from Jagaji Village of Osmanabad has successfully cultivating apples in area that is known for dry and hot weather.Few farmers from Jalgaonare trying their hand at cultivating Saffron to reap profit amid growing agrarian distress. Saffron a relatively new crop and farmers from area of Mahableshwar too cultivating it. Farmers from Marathwada also cultivating Date Palm crop, Dragon Fruits, Grapes and many more.Farmers are also trying to cope up with changing climate by adopting new crop which may lead to provide them better economics.

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## Indian Solution to Indian Problem: A Success Story ofLoss Free Cowshed

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Dr. Kishore Mathpati, 41, is a veterinary practitionerfrom Phaltan village in the Satara district of Maharashtra. He created the 'Tota Mukta Gotha,' or Loss-Free Cowshed,' module of scientific dairy management methods. Nowadays, the dairy industry is not developing in line with consumer demand, and milk yield per cow is decreasing. Crossbred cattle currently produce more milk, but they are difficult to keep as draught animals. They are disease-prone, and the length of their breastfeeding period decreases with each generation. Indigenous breeds are well-suited to Indian climatic conditions, provide high-yield milk, and bulls can be utilised as draught animals. Owing to passion for conservation of Gir cow, he registered his dairy training institute by name 'KrushnaDugdhaPrashikshanwasanshodhankendra, Phaltan. He has been providing training and consulting services based on the concept of 'Tota Mukta Gotha.' Initially, he compiled a list of procedures and organised them into a three-day training session, namely: 1) scientific practises of Gir cattle management. 2) Preparation of a bankable project proposal for a dairy unit (Gir breed). 3) Management strategies to extend the lactation duration of cows to 3-5 years without using concentrate feed. In the Satara district, Dr.Mathpati trained 200 farmers from ten villages.Dr.Mathpati personally monitors all operations until the learners start their own Dairy unit when the training is completed. The institute is maintained by two staff and has an annual turnover of Rs.10 lakhs. Under the supervision of Dr. Kishore Mathpati, ATMA, Pune region, and Abhinav Farmers Club, Pune, have collaborated with the institute and are conducting training for dairy farmers.

**Keywords:**Successful entrerprise, Dairy Farming, Management strategies, Loss freecowshed.

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## Sericulture Farming – An Inspirational Story

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Mr. DashrathVithobaShende and Mrs. LatikaDashrathShende belongs to asmall village Mahim, Taluka- Sangola, in Solapur district of Maharashtra state, Indiaand hails from an agricultural family. He spent his early childhood assisting his familyin doing agricultural work and cultivating vegetable crops. Sangola

taluka in Solapurdistrict is well known because of its extreme dry environmental conditions and waterscarcity. Dairy farming is the major occupation practiced in this area. Mr. DashrathShende owns 2 acres of land and used to cultivate vegetable crops like brinjal and tomato. He was desperately striving hard to over come the financial issues of the family but the unpredictable environmental conditions of the area made it difficult to do so.Hence, he decided to try something that will help him to generate good income andachievebetter standardof living fromonly 2acresofland.In the mid of the year 2015 he visited a sericulture farm, underwent the training programme for near about20-25 days and learnt in detail about the remarkable benefits of the sericulture farming. From the year 2016 he adopted sericulture farming in his own land. During the initial stages he faced many challenges. Spraying ofpesticides and fungicides on mulberry plant led to the entry of toxic chemicals in theleaves of the plant which led to the death of the silkworm at instar stage before the formation on cocoon due to the residual toxic effect of the insecticides and fungicides in the leaves and Mr.Shendehad to sufferthe loss. But without getting discourage the over came such challenges and climbed the ladder of success. In sericulture farming the rearing of instars, specially till third instar stageshould be done very carefully because it is more prone to fungal, bacterial and viraldiseases.Mr.Shende have constructed as hed having dimensions of 25x 60 fee twhich have cost him about 4 lakh rupees. The rearing area has proper ventilation system andappropriate conditions are maintained for proper rearing.Mrs. LatikaShende is a rolemodel for all the women farmers in the area. She helps in the day-to-day activitiescarried out at the sericulture farm, pays crucial attention towards every aspect and alsocarries out proper observations. Mr. and Mrs. Shende personally carry out all theoperations in the farm till the arrival of cocoon stage. On the arrival of cocoon stage cocoon collection is the major activity that is followed.Ten to twelve aboursare hired to harvest the cocoons. The harvested cocoons are then sent to Ramnagar in Karnatakastate where further processing takes place. Till date average profit earned per batch byMr.andMrs.Shende is nearly70-80 thousand.Since last4-5 years the minimum profit earned for a batch is 52 thousand and maximum profit earned for a batch is 1 lakh 53 thousand.The cocoon costs up to 500-600 Rs per kg,depending upon the quality of the cocoon. Quality can only be maintained by proper care and timely following all the necessary operations.Mr.Shendesays that,“Proper management,timely observations,love for the work and hardwork is his key to success”. Mr. Shende is now one of the progressive farmer of the Sangola district.Inspite off acing many challenges hetookup Sericulture farming, gave apromising career and is aninspiration to many farmers of the area.

**Keywords**sericulture , cocoon stage ,bacteria ,.Inspite

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# Present status of Agriclinics and Agribusiness Centers Scheme in India with special reference to Gujarat State

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AC & ABC Scheme was launched by Government of India, April 2002 with the objective to supplement the public extension system through committed private extension services at free or nominal cost to educated and trained candidates in a self employment mode. The present study was conducted to study the present status and progress of AC & ABC scheme in India with a special focus on Gujarat state. The secondary data were collected for the period of year 2002 to 2019. In India, among the various agencies, highest training network of AC & ABC scheme provided by NGOs followed by agribusiness companies. States such as Maharashtra, Uttar Pradesh and Tamil Nadu states have the leading and have remarkable achievement. Other state like Karnataka, Bihar and Rajasthan have also exhibited fair degree of progress. Gujarat holds the Eighth rank in India in terms of number of candidates trained and agri-venture established. Dairy/Poultry/Piggary/Goatary followed by ACABC and Agriclinics are the major ventures established under this scheme. In Gujarat state, total nine Nodal Training Institutes provide training to agripreneurs for

establishing the various agri-ventures and out of these agencies, International School for Public Leadership (ISPL), Ahmedabad and Shashwat Sheti Vikas Pratishthan (SSVP), Amreli have trained highest number of candidates. Junagadh, Amreli and Rajkot districts were leading in training and establishment of major agri-ventures like Agriclinics and Agribusiness Centres, Dairy/Poultry/Piggary/Goatary and Agri-Clinics.

**Key words:** *Agriclinics, Agribusiness centers, agri-ventures, agripreneurs*

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## Group dynamics in organizational development

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Group dynamics refers to the attitudeinal and behavioural characteristics of a group. Group dynamics concern how groups form, their structure and process, and how they function. Group dynamics are relevant in both formal and informal groups of all types. There are four key elements in groupdynamics such as group member resources, structure (group size, group roles, group norms, and group cohesiveness), group processes (the communication, group decision making processes, power dynamics,conflicting interactions, etc.) and group tasks (complexity and interdependence).Each group has uniquewholeness qualities that become patterned, by way of members'thinking, feeling and communicating into structured sub systems.The group finds someway to maintain balance while moving through progressive changes, creating its own guidelines & rules and seeking its own goals through recurring cycles of interdependent behavior. Group dynamics" elaborates the effects of the roles and behaviours being played by an individualas they maintained membership with in agroup a brief review of integrative small group learning models that have appeared in the educational psychology literature,thisarticle then looks into the group dynamics literature and describes one of that field'smostwell-documented findings: that interactions among group members changes one what predictably over time.How the orists from various traditions with in educational psychology might explain and explorethe phenomenon of "group development" is proposed, followed by a description of the theoretical and practical features of an increasingly popular post-secondary instructional strategydesigned to stimulate group development and leverage it to instructional ends. So group dynamics can becalled as a life base of a team. In organizational development, group dynamics refers to the understandingof behaviour of people in groups that are trying to solve a problem or making a decision. Group dynamicsconcerns organizational success because it consists of various groups and a lot depends on how groups form, how they configuration and process,and most importantly how they function.Groups help organizations in accomplishing important tasks. Groups are important to improve organizational out puts and to influence the attitudes and behaviour of members of the organization.

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## Critical Analysis of Issues and Challenges in Mgnrega

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MGNREGA, a demand driven scheme, launched by Government of India on 2005, aims to enhance the livelihood of the rural people by providing them 100 days of guaranteed employment to those who are willing to do unskilled manual work. The present study was about the 'Critical analysis of issues & challenges in MGNREGA'. UN advisor Usha Mishra Hayes in her book, "Social Protection: Lands of Blossoming Hope", which is about the policies that influences the social protection system in Asia & Africa, quoted MGNREGA as successful scheme that has provided protection from starvation to vulnerable sections of the population and also this project often has created socially and economically useful infrastructure for the community and contributed

to its overall development in India. But the current ground realities are posing serious challenges to this landmark scheme.

People's Action for Employment Guarantee and LibTech India came up with several findings about MGNREGA's implementation in the financial year of 21. The cut in 34 per cent for the allocation of MGNREGA in the FY 21 budget shows that 90 per cent of the annual allocation for this scheme had already been exhausted. The representative sample of 18 lakh invoices were taken for this study across 10 states, the researchers have found that 71 percent of the payments were delayed beyond the mandated seven-day period at the central government level and 44 percent exceeded 15 days. The Inadequate allocations and the resultant inability to clear the dues each year is a recurring issue every year suppresses genuine demand from workers, who are often discouraged to seek work as a result. Another findings related to March 2021 circular by Union government states to present the separate caste based bills on labour wages. This has resulted in many caste based payment delays. The Non SC, non ST workers, accounted for around 85 per cent of all workers, were facing much longer payment delays. While the formal economy is slowly bouncing back to its normal conditions after pandemic, the informal economy is still struggling to get back to it's normal level. The continued high demand for MGNREGA jobs is the reflection of this weakness. So, the government must look forward to bridge the gaps in MGNREGA. It's failure to do so, will not only affect the living standard of marginalized people but also it can even drag the entire rural economy as whole.

**Key words:** MGNREGA, guaranteed employment

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# Agritourism in India: A Multidimensional Study

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Agri tourism is a concept made popular in India by Pandurang Taware. World Agritourism day to celebrate on 16 May. The state of Maharashtra is the pioneer state to develop and promote Agri Tourism in the country**.** This Agri Tourism model has been replicated in 328 Agri tourism centres across 30 Districts in Maharashtra**.** which has helped to conserve, enhance the village environment, village traditions and culture, customs, village arts and handicrafts**.** Agri tourism model gives the authentic experiences to the visitors by showcasing village culture, agriculture, traditions that has helped gain sustainable supplementary income source and generated local employment**.** The concept of Agri tourism is very simple, whereby the urban tourists go the farmers home; stay like a farmer, engage in farming activities, experience the bullock cart, tractor ride, fly kites, eat authentic food, wear traditional clothes, understand the local culture, enjoy the folk songs and dance, buy fresh farm produce and in turn the farmer maintains home and farm hygiene, greets new tourists, sells his farm produce at a better price, earns a livelihood all year round. ATDCI(Agri Tourism Development Corporation India) Corp survey in 2014 2015 , 2016 shows that 0.40 million, 0.53million ,0.7 million tourists have visited these centers respectively totally generating 35.79 million Indian rupees to farmer's family, generated jobs to women and youth in the rural communities.This created a win win situation for not only the farmers or the tourists but also for the Government.Not only was the farmer happy to stay in the farm and the tourist satisfied to buy farm fresh produce, but the Government accepted us with open arms as Agriculture Tourism was given a major boost in Maharashtra Tourism Policy 2016. In India and most of Maharashtra is some of the successful Agri tourism stories.In particular story about Abhishek Mala Agri-Tourism Center,Pakan,For the last 16/17 years we have planted and produced a lot of crops in agriculture,from orchards to vegetable crops.The question became very serious. Therefore,we have decided to start a joint venture with agriculture from 2003-2004. The main purpose is to make agriculture traditional we used to get money twice sugarcane and sorghum.Although 100 to 125 days of money is coming in for perennial meals and other programs, we are developing our agriculture with the money that will come from this.This has provided employment to 50 people in the village including us and since 2007 we have set up "Anjali Mahila Bachat Group".

**Keywords:** gritourism, Models, Popularity,Farmer,Employment,Govt.acceptance,Success stories etc,.

# Dynamics of Livestock Development in Rajasthan

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Livestock make a major, although largely underestimated, contribution to rural development in developing countries. The inclusion of livestock diversifies and increases total farm production and income, provides year-round employment and disperses risk. This study was undertaken to cover the state of Rajasthan by collecting secondary data from various publications of national and state government, to study the temporal change in composition of livestock population followed by growth pattern of livestock population, density of livestock animals, output from livestock sector and gap between demand and supply of livestock products in the year 2012-13.The temporal composition of different species of livestock animals in Rajasthan had increased noticeably during the period from 1956 to 2012 with an increase of 78.04 per cent. The population of cattle, buffalo, sheep and goat showed an increase in population, while the population of camel and other livestock animals were found to decrease during the study period. The density of livestock animals per Sq. Km. was found to follow the same trend as the population. The livestock outputs like milk, eggs and meat were found to increase in production showing a positive compound growth rate and the wool production was found to decline in production in the study period. The per capita availability of milk, egg and meat were found to increase through 1985-86 to 2012-13, but only the milk output of the state could meet the ICMR recommendation, while egg and meat output shows a deficit. It was found that the number of veterinary hospitals and Artificial insemination centres have increased, while the number of dispensaries and mobile veterinary clinics have been constant and declining. Thus the facilities made available in terms of number of adult cattle units served and area covered per veterinary institute have decreased. The number of artificial insemination, castration and treatment done through the years have declined. The area of fodder cultivated had increase, while the area of range land have decreased, thus an increase in fodder area per Adult Cattle Unit, grazing pressure and decrease in grazing intensity. There has been an increase in the number of Dairy Cooperative Societies and its members and decrease in the milk procured per day per DCS showing that the increase in the number of DCS are more than the increase in milk output. The various factors affecting the milk production in Rajasthan i.e. number of artificial insemination done, the number of castrations done and the number of memberships in dairy cooperative societies have positive and significant impact on milk output, while the area under permanent pasture have significant and negative impact on milk output. The results of feed and fodder resources shows that the overall dry matter availability has increased because of the increases in total crop residues and concentrated feed. The gap between the availability and requirement of feed and fodder in terms of dry matter in Rajasthan was moved from a deficit of 31.1 percent to surplus of 3.50 percent over a period of 30 years. Hence the study shows the need for improvement in indigenous cattle by cross breeding through Artificial Insemination, improvement in infrastructural facilities to improve livestock and its products and measures to protect range land.

**Keywords:** Livestock population, livestock products, infrastructure availability.

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# Continuous Solar Biomass Hybrid Drying System:A Technology for Sustainable Agriculture and Green Entrepreneurship

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Drying, particularly of crops, is an important human activity and globally the use of dried products is widespread. For preservation, quality improvement and processing purposes, moisture must often be removed from both organic and inorganic materials. Small-scale drying based on electricity, coal, LPG and other fossil

fuels is normally expensive. Moreover, the combustion of fossil fuels emits greenhouse and other gases. Solar drying is an attractive option to solve some of these problems. Several ways can be used to evaluate the technical performance of solar dryers but economic and practical issues will often be more important in determining their acceptability. The importance of dried foods cannot be overestimated. Grains, fruits, vegetables, spices, meat, fish, nuts and beverages such as tea and coffee are all dried and consumed in large quantities around the world. However, an inherent problem of solar drying is that it depends entirely on the weather and is not possible to use during night-time. Keeping in view the extended drying hours and to improve quality by minimizing losses due to microbial development on product during night hours biomass assisted air heating system can be retrofitted to solar tunnel dryer which will serve the purpose of continuous drying. These dryers are capable of providing a high-quality product independent of the weather and with a low labour requirement.The importance of food drying is likely to increase. The global population is predicted to exceed eight billion by the year 2025. The shortage of energy is an issue in many countries. Biomass is locally available in rural areas of developing countries and is often the cheapest source of energy. In addition, biomass fuels can provide an uninterrupted supply of thermal energy needed for continuous operation of dryers. Continuous solar drying system powered by biomass and solar energy is a potentially important option for small-scale operations since it combines the advantages of drying systems operated by solar energy alone and those operated by biomass alone. Solar energy and bioenergy can be used to heat the air up to a range of temperature needed for drying of most of the fruits and vegetables, efficiently and economically without compromising in quality of the final product. Continuous type solar biomass dryer is completely protected from rain, insects and dust in order to retain the quality as compared to open sun-dried product. Many agro-industries and prospective farmers are facing difficulties in drying operation as well as in maintaining the quality of the agricultural produce.Drying is one of the most important operations in agro processing industries which consume large amount of energy. The shortage of energy is an issue in many countries. Solar energy is an obvious energy source for drying various products, particularly food crops. Many crops are harvested in the summer months and are usually dried at temperatures below 70 C - a temperature which can be readily attained by solar technology. Available briquette can be used in biomass combustor for hot air generation during off sunshine hours. Hence, the retrofitting biomass-based air heating system with drying chamber offer great potential for continuous drying applications in agro-industries as well as onsite drying on the farmer's level for bulk drying of fruits and vegetables. This novel technology is very viable and valuable one.

Keywords – Drying, Solar drying, biomass, solar energy, solar biomass dryer

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# Evaluation of Successful Agribusiness Model

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Agri-Business is now emerging sector with the development. To promote the income of farmers and to increase processing of agricultural produce, the agribusiness model is needed to be evaluated. As initiatives, a successful agribusiness model 'Mitraya Farmer Producer Company Ltd' is identified. The data is collected for the financial year 2021-22. The costs and returns, break-even analysis, channel are analyzed.

From the results, it is found that the net return of the company is Rs 2.27 crores in year 2021-22. The return per rupee invested is Rs 1.33. The Break Even Point for the company is 239.54 tons. The main constraint for company is lack of technical knowhow for export oriented production.

**Keywords** : Vegetable Export, Agribusiness

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# A Case study of Ratnagiri Krishi (Kaju) Prakriya Sahkari Sanstha Maryadit, At- Gavane, Tal- Lanja

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An attempt has been made in the present investigation to study the management and procurement of raw material, processing and distribution of kernels of Ratnagiri Krishi (Kaju) Prakriya Sahkari Sanstha Maryadit, Gavane through the case study. The data is based up on the information obtained by conducting the personal interview of the officials of the processing unit and from the annual reports of the unit for the period of eight years 2010-11 to 2017-18.The management of procurement of raw material, processing and distribution of kernels by the processing unit was studied in accordance to its major areas. The average capital investment in cashew nut processing unit was RS. 419.18 lakh, in which share of working capital was 61.66 per cent and that of fixed capital was 38.34 per cent. The capacity utilization in cashew nut processing units was to the extent of 15.62 per cent of the installed capacity. After the processing of one quintal of cashew nut, the recovery was 25.17 kg of kernels, 69.77 kg of shells, 2.87 kg of testa and 2.19 kg of rejection. The business performance of cashew nut processing unit as observed through financial test ratios showed that processing unit was more efficient. The ratio analysis highlighted the need to undertake suitable remedial measures for efficient use of assets and improved self-performance of the cashew nut processing unit.

The cost of processing of one quintal of cashew nut was RS. 7748.59 whereas the benefit cost ratio was 0.85 in processing unit and the benefit cost ratio at variable cost was 0.95. The average gross value added as a result of processing of one quintal of cashew nut was 57.57 per cent. The average net value added was 51.81 per cent. On an average, for the 7 years of study , the per cent utilization of installed capacity per day was 15.62 per cent. Major problems faced by the firm where non availability of quality of raw material , shortage of raw material , unavailability of skilled labours , low grade recovery , higher labour cost , market competition etc. suggestion made to overcome these problems where training on grade specification to employee, value addition of kernels mechanized processing technology should be adopted , quality parameters for procurement of raw cashew nut should be strictly followed etc. To increase kernel grade recovery proper quality parameters should be followed while procurement of raw cashew nut along with mechanized processing technology and training to skilled labour. Different value added product like salted kernels, masala kaju etc. need to be prepared to attract the consumers.

**Keyword**: case study, cashew nut, value addition

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# Agri-Tourism: An Innovative Way Towards Economic Development of Rural South Konkan, Maharashtra.

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Due to the deterioration of the environmental situation in the world, many countries are interested in a strategy of "green growth" that combines efforts in the field of economics, ecology, sociology, health care, and technology. One of the environment friendly activities is agro tourism. Konkan region have a huge natural and recreational potential for agro tourism, which has a high socio-economic importance for municipalities in terms of the development of small and medium-sized businesses, creation of additional jobs and formation of the added value of the tourist product. However, there are negative factors; low level of infrastructure development, lack of a recognizable brand, poor transport accessibility to the objects of agro tourism, seasonality of agricultural products, weak state financial support for the development of entrepreneurship in rural areas and lack of investors' interest.

Agro-tourism, which is a product of tourism depending on agricultural environment, agricultural products and accommodation in agricultural areas, becomes more and more important tourism activity in all over the world. Environmental awareness within the scope ofagro tourismpaves the way for the protection of natural resources. Also, providence of sustainability increased thesignificance of this tourism. By utilizing the most frequent indicators used in studies regarding sustainability, Konkanagrotourisms tend to develop more environment friendly agricultural methods, which have a positive impact on biodiversity, landscape and natural resources.

**Keywords:** Agro-tourism, environment,sustainability

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# Entrepreneurship Development through Organizing Training Programmes on Novel Value Added Products of Tuber Crops

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Entrepreneurship development appears to be the best substitute to find employment opportunities, income generation, poverty reduction and improvements in nutrition, health and overall food security in the national economy. Agriculture is considered as the main economic activity which adds to the overall wealth of the country. Entrepreneurship is one of the key drivers for economic development. Konkan region of Maharashtra is well known for diversified production of horticultural crops. Tuber crops are the important group of horticultural crops grown by farming community in Konkan. The tribal's and marginal farmers of this region grows almost all types of tropical tuber crops *viz.,* sweet potato, aerial yam, lesser yam, greater yam, *Xanthosoma,* colocasia, elephant foot yam, arrowroot etc. in their homestead/ backyards for their own consumption as well as income generation through marketable surplus. The tribal's in this region have been growing local varieties with following traditional package of practices. Thus, tuber crop production in this region is naturally organic or eco friendly. Ultimately tuber crops have played a key role in their daily diet. These crops are energy bank in nature as well as rich in minerals, vitamins, alkaloids, antioxidants and dietary fibers. Therefore, under changing agro climate and rising of food and nutritional security problems, tuber crops has great scope and played an important role. The tribal's in this region consumed these crops in the form of cooked/ boiled or making vegetables. But these tuber crops are amenable to processing and diversified value added products could be made from them. For popularization of these tuber crops and increase in the consumption of people in the daily diet, Tuber Crops Scheme Dapoli Centre has developed delicious recipes. These value added products of tuber crops were popularized through organizing training programmes of women's Self Help Groups with the help of Department of Agricultural Extension, College of Agriculture, Dapoli, State Department of Agriculture, ATMA, Raigad and Thane District, NGO's. In all 14 training programmes were organized at different places in Konkan region. Through these trainings total 774 women's were trained. The feedback received from the trainees was encouraging and the women's liked these products very much. Some of the women come forward and prepared these products through their Self Help Groups. The women reacted that such type of programmes should be conducted on large scale so that Self Help Groups will get a new avenue for their entrepreneurship in Konkan region.

**Keywords:** , tuber crops Self Help Groups, ATMA

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# Group Dynamics in Organisational Development

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Group dynamics refers to the attitudinal and behavioral characteristics of a group. Group dynamics concern how groups form, their structure and process, and how they function. Group dynamics are relevant in both formal and informal groups of all types. There are four key elements in group dynamics such as group member resources, structure (group size, group roles, group norms, and group cohesiveness), group processes (the communication, group decision making processes, power dynamics, conflicting interactions, etc.) and group tasks (complexity and interdependence).Each group has unique wholeness qualities that become patterned, by way of members' thinking, feeling and communicating into structured sub systems. The group finds some way to maintain balance while moving through progressive changes, creating its own guidelines & rules and seeking its own goals through recurring cycles of interdependent behavior. Group dynamics" elaborates the effects of the roles and behaviors being played by an individual as they maintained membership within a group. a brief review of integrative small group learning models that have appeared in the educational psychology literature, this article then looks into the group dynamics literature and describes one of that field's most welldocumented findings: that interactions among group members change somewhat predictably over time. How theorists from various traditions within educational psychology might explain and explore the phenomenon of "group development" is proposed, followed by a description of the theoretical and practical features of an increasingly popular post-secondary instructional strategy designed to stimulate group development and leverage it to instructional ends. So group dynamics can be called as a life base of a team. In organizational development, group dynamics refers to the understanding of behaviour of people in groups that are trying to solve a problem or making a decision. Group dynamics concerns organizational success because it consists of various groups and a lot depends on how groups form, how they configuration and process, and most importantly how they function. Groups help organizations in accomplishing important tasks. Groups are important to improve organizational outputs and to influence the attitudes and behavior of members of the organization.

**Keywords:** Group dynamics , organizational outputs

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# Agricultural Development of Solapur District of Maharashtra State

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Agriculture is the backbone of Indian economy. It has been the livelihood of the Indian people since ancient times, and is still the largest source of livelihood for the Indian people. Agriculture sector which employs more than 50 percent of the total workforce in India and contributes around 17-18% to the country's GDP. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Many efforts had been taken for improving the agriculture situation in India. To increase the production by adopting new improved technology for that initiate the Five Year Plans from 1950-51. It has given priority for agriculture sector and paid attention purposively in each plan towards agriculture development. Solapur district was purposively selected for present study because Solapur district has made progress in agricultural development due to increase of major rivers. The district is provided with Bhima right bank canal and Neera and Man left bank canals. Similarly Seena and Bhogawati are two seasonal rivers at north side of the district. The Ujani dam on the Bhima river, built serving around 500 sq km of the district, has helped

many farmers grow water-intensive crops. The various selected parameters are land utilization, cropping pattern, area, production, productivity of major crops, irrigation facilities and the socio-economic development etc. In analytical techniques tabular analysis and functional analysis such as linear and compound growth rate was used to analyze data. Among the Solapur district area under the forest was increased from 2.15 per cent i.e. 320.00 ha to 2.37 per cent i.e. 353.00 ha during the period of 2003-04 to 2017-18. Area under barren and uncultivable land was increased from 4.23 per cent to 4.87 per cent during the period 2003-04 to 2017-18. Land under non-agricultural use was increased from 150.00 to 160.00 hectares during the period of 2003-04 to 2017-18. The net sown area was increased from 9184.00 to 10416 hectares i.e. 61.72 to 70.00 per cent of total geographical area. The cropping intensity of district was increased from 108.1 to 119 during 2003-04 to 2017-18. Area under Total cereals increased from 6724.00 to 8323.00 hectares during the 2003-04 to 2017-18. The percentage change was 23.78 per cent. Area under Total pulses was 410.00 ha which was increased up to 1351.00 hectares i.e. 4.28 to 10.85 per cent during the year 2003-04 to 2017-18. The percentage change was 229.51 per cent. The total area under the Oilseed was increased from 382.00 to 614.00 hectares i.e. 3.99 to 4.93 per cent during year 2003-04 to 2017-18. The area under Total food grains are also increased from 74.62 to 77.41 percent of gross cropped area.The area under the forest was highly significant at 1 per cent in overall period. Land under the non-agriculture use was also highly significant at 5 per cent and 1 per cent for period I and overall. A cultivable waste land was negatively significant at 5 per cent for period II and positively significant at 1 per cent for period overall. The land under permanent pasture was highly significant at 1 per cent for period I and overall and negatively significant at 5 per cent for II period. The growth rate for area under the wheat was highly significant at 1 per cent for period I and for maize was also significant at 1 per cent and 5 per cent for period I and overall. Area under the other cereal was negatively significant for period I. The area under the mug crop was positively significant at 5 per cent during II period and udid also positively significant for II period at 1 per cent. Irrigation is the key factor in agricultural development. The factor use of modern inputs ultimately results in increase of productivity. The area under Surface irrigation and other than the well was decreased from 915.00 hectares to 855.00 hectares i.e. -6.56 per cent from the year 2003-04 to 2017-18. At the same time the area under well irrigation was increased from 1585.00 to 1643.00 hectares i.e. 3.66 per cent. The proportion of net irrigated area to net area sown has decreased from 27.22 per cent to 23.98 per cent. The proportion of gross irrigated area to gross cropped area has decreased from 30.12 per cent to 23.55 per cent during 2003-04 to 2017-18.

**Keywords:** GDP. net irrigated area, gross irrigated area

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# Success Stories of Women Agri- Enterpreneurs in India

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Women play an important role in the the development of Indian economy. In the recent years on the par with men, women have capacity to run the agribusiness in her way. Nowdays unemployment plays a major role among the graduates in india. Even women have not possible to work in marketing field as compared to men. But in agribussiness point of view, the womensgradutes have actively in getting training from agribussiness and agri clinic centre and start their own agri business after complete the training. The centre for Entrepreneurship D evelopment (CED) provides skill oriented training for two decades to women agri graduates. This programme has been exclusively sponsored by National Institute for Agricultural Extension Manangement to empower the women in agribussiness. CED concentrate on horticulture and women development through urban landscape. Nowdays unemployment plays a major role among the graduates in india. Even women has not possible to work in marketing field as compared to men. But in agri- bussiness point of view, the women graduate actively in getting training from agri clinic and agri business Centres and start their own agri- bussiness centre after complete the training. The Centres for enterpreneurship development ( CED) provides skill oriend training for two decades to women agri. Graduates. This programme has been exclusively sponsored by National Institute of Agricultural Management to empower the women in agri.

Bussiness CED concentrates on horticulture and women development to urban landscape. Today green space has become a very significant factor in the interior as well as exterior setting. The use of cut flowers, pot plants and food crops has improved the quality of human life significantly. CED offers 50 acres of land of industrial women agri- bussiness graduate who got training on landscape. In indiaindia several women agri.grabuates have successfully doing agri. Bussiness and earn more profit.

**Key word:-**Agribussiness, agrienterpreneur, rural development, Indian agriculture, primary sector, etc.

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# Economic Evaluation of Drones applications in Agriculture

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India is primarily an agrarian economy. Agriculture remains the chief source of income for the majority of the rural households. India's economy is also heavily dependent on the agricultural produce that constitutes a major portion of its exports as well. However, despite mounting importance of agriculture, the sector is still far behind in technological advancements. Crop failure due to adverse weather conditions and uncontrolled pests issues have been the key contributors to this scenario. Moreover, Indian farmers are even now dependent on monsoon rains for irrigation and use age-old methods for other farming practices. Hence, the quality and quantity of agricultural produce is sometimes compromised in spite of the relentless efforts of farmers.

Drone technology has gotten most of the recognition in the industry because of its diversity and considered the future for the agrarian community. The military initially used them. However, other sectors quickly embraced unmanned aerial vehicles (UAVs) when they learned about its widespread applications.

Only after complete recognition of drones characteristics can one gain in-depth knowledge about agriculture drones. Typically, drones include a navigation system, GPS, multiple sensors, high-quality cameras, programmable controllers, and tools for autonomous drones. The DJI is one such familiar drone utilized by the industry. Most farmers currently use satellite imagery as an introductory guide for farm management. Furnished with modern technology, Unmanned aerial vehicles (UAVs) can get more precise data than satellites for precision agriculture. They then process the data captured into agri-tech software to produce beneficial knowledge

Drones can help farmers to optimize the use of inputs (seed, fertilizers, water), to react more quickly to threats (weeds, pests, fungi), to save time crop scouting (validate treatment/actions taken), to improve variable-rate prescriptions in real time and estimate yield from a field.
Drone services are costly initially. Over time it will be cheaper than human labour because of the sheer economies of scale. Let us give this new application a chance. Suppose a group of farmers hires a drone for one cluster, cost per farmer will come down. Also, we will have to factor in the cost of human health in manual spraying versus spraying by drones.

A lot of drone-based agricultural projects are undergoing in India. Consider the following real-life scenarios:

- On 26th January 2022, the Government of India has also released a certification scheme for agricultural drones, which can now carry a payload that does not include chemicals or other liquids used in spraying drones. Such liquids may be sprayed by following applicable rules and regulations.

- On 23rd January 2022, to promote the use of drones for agricultural purposes and reduce the labour burden on the farmers, the government of India has recently offered, a 100% subsidy or 10 lakhs, whichever is less, up to March 2023 to the Farm Machinery Training and Testing Institutes, ICAR Institutes, Krishi Vigyan Kendras & State Agriculture Universities.
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Additionally, a contingency fund of Rs.6000/hectare will also be set up for hiring Drones from Custom Hiring Centres (CHC). The subsidy and the contingency funds will help the farmers access and adopt this extensive technology at an inexpensive price.

- On 16th November 2020, the Indian government granted the International Crops Research Institute (ICRISAT), to use of drones for agricultural research activities. With this move, the government hopes to encourage budding researchers and entrepreneurs to look at budget-friendly drone solutions for more than 6.6 lakh Indian villages
- The Department of Agriculture estimates that the service of a drone that it has the capacity to carry about 10 Kg pay load will cost Rs.350-450 per acre.

**Key words:** Drone technology, navigation system Kilogram, Acre

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# New opportunities in Internet of Things in Indian Agriculture

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Agriculture plays a vital role in the Indian economy. Over 70 per cent of rural households depend on agriculture and hence, is the backbone of Indian economy. Agriculture sector contributes about 17% to total GDP and provides employment to over 60% of the population. India has to feed its growing population with the available scarce resources without causing adverse effects on environment. Food grain production increased tremendously after 1960s by means of HYV and chemical fertilizers. In recent years, there has been an increasing focus on technologies that boost Indian agriculture in revolutionary approach. Among various technological development and intervention in Indian Agriculture, Internet of Things'(IoT) is a revolutionary to improveyields, increase productivity and farming processes in cost-effectiveness with new technology such as IoT. In particular, IoT can make agricultural and farming industry technology that represents future of communication and computing. Its application in Indian farming has tremendous processes more efficient by reducing human intervention through automation.

In this study, the aim to analyze recently developed IoT applications technologies, in agriculture and farming industries likes sensor based data collections, and sub-verticals such as water management and crop management, IoT based smart farming system to monitor crop field with the help of sensors (light, humidity, temperature, soil temperature etc.) and automating irrigation systems etc. IoT can help in both the endeavors—social and technological change. Farmers can gain many things from IoT to enhance their farm produce and income. IoT can solve challenges of environmental benefits such as ground water conservation, rain-water harvesting, lowering of carbon footprint due to reduced energy consumption, prevention of fertilizer run-off and soil erosion etc. This paper discusses about present status of IoT, its application in agriculture, NABARD's role and how far GramworkX is an Aristech startup that fully realizes IoT in agriculture. Indian online media your story has given it the most explicit description, it "helps in precision farming by integrating field data, weather patterns, and crop information to drive agronomic advice to farmers." By monitoring multiple farming parameters with IoT devices and calculating them with its ML prediction algorithms, GramworkX can support farmers on farming by its Kisan appr this technology can be promote soas to taken to the farmer's field and the benefits of adopting such novel and innovative technologies in Indian Agriculture.

Here is the some Indian agriculture start up for precision farming. Aarav Unmanned Systems develop drones for farming. Based on 3D geographical topography information provided by these drones, farmers can adjust their farming strategies towards fertilization, irrigation, or pesticide. Just like Aibono, Aquvaconnect, BharatAgri CropIn,Fasal,Gramworks Indian Aristech Startups: Product Quality Control.Intello lab,4S (Original 4Sure),Agdhi etc. Component for smart farming are Processor, Sensers, Single Conditioning and Power Management Connectivity and positioning. Plenty of connectivity technologies can be used to realize smart farming. LoRa technology, among all, is most frequently applied due to its characteristics of long-range transmission and low power consumption. It is especially suitable for outdoor monitoring, for instance, REYAX LoRa modules are already applied in soil, water, and livestock monitoring. With Semtech SX1262 / SX1276 SoC engines, REYAX LoRa modules can typically transmit at least 4.5 km, and as far as 15 km in a mild environment.

**Key words:** Internet of Things IoT; agricultural, smart farming, sensor data, automation, precision agriculture farming, artificial intelligence

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