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CONTENT

An Economic analysis of Market Integration of Pigeon Pea

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ABSTRACT

The district of Akola being a major producer of Pigeon Pea was selected for the study conducted with available data of over 20 years. The selected markets under annual study of Akola, Murtijapur and Akot markets showed increasing trend in arrivals and prices. The trends analysis of annual arrivals of Pigeon pea in Akola, Murtijapur and Akot markets was depicted trends values of arrivals in Akola (9396.33), Murtijapur (4575.39) and Akot (4608.67) market was found significant trend.The trends of prices of Pigeon pea determined by using linear function. The study that revealed the values of prices in Akola (237.72), Murtijapur (208.72) and Akot (239.42) market showed increasing trend and significant at 5 per cent level in 2000-01 to 2019-20. Akot APMC was highest growth rate of 4.82 per cent among selected APMC's followed by Akola and Murtijapur. There exists a high degree of association of prices between markets about i.e., Murtijapur and Akola 0.958, Murtijapur and Akot 0.932 and Akola and Akot 0.943, respectively.

Keywords: Trends in Arrivals and Prices, APMC, Pigeon pea, Market Integration, Seasonal Indices

INTRODUCTION

Area and production of Pigeon pea in India has been more or less stable at 16.56 lakh ha and 4.43 million tonnes, respectively during the year 2019-2020. India is the major producer of Pigeon pea accounting 90 per cent of total production and 80 per cent of total area of the world. India is the largest producer, consumer and importer of pigeon pea in the world. In India Pigeon pea is mainly grown in Maharashtra, Madhya Pradesh, Uttar Pradesh, Jharkhand, Andhra Pradesh and Karnataka. Maharashtra is the leading producer. Pigeon pea is grown in region of Maharashtra on 1195.50 (000'ha), with a production of 1084.32 (000'Tonnes) during 2019-20. The normal productivity was about 907 kg/ha. Highest production of Pigeon pea is from Maharashtra, which is around 30 per cent of national production. (Source: Ministry of Agriculture and Farmers Welfare, Government of India.)

The present study is selected with an extent to know the trends in arrivals and prices and market integration among the selected agricultural commodity. It is observed that the seasonal price fluctuation is mostly, due to poor storage facilities and inadequate market information. As demand for agricultural commodities are increasing, the supply plays an active role in determining the price of goods. Agricultural commodities are produced seasonally, but are required for consumption throughout the year. The increase and decrease in seasonal arrivals of agricultural commodities shows a direct relationship with the price. Thus, price is one of the most important determinants of profit or loss in the farm business and income of the farmers. Analysis of price and market arrivals over time is important for formulating a sound agricultural price policy. Fluctuations in market arrivals largely contribute to the price instability of the produce. In order to device appropriate ways and means for reducing price fluctuation of agricultural commodities, there is a need to have a thorough understanding of price behavior over time and space.

Objectives of the study are to study trends in market arrival and prices of Pigeon pea and to study the market integration of Pigeon pea in Akola District.

METHODOLOY

Akola district was purposely selected for present study, as it has a major proportion of the area under Pigeon Pea crop. The data were collected from Akola,

Akot and Murtijapur three major Agricultural Produce Market Committees, in this district and hence purposively selected. Pigeon pea was selected for present study as it would help the market functionaries to take fruitful decision and receive better price realization. The nature of data used for the study is entirely based on a secondary source of data. The required data were collected from the selected market committees from the published sources such as annual reports and maintained records of APMC and further complied to derive conclusion. The required data related to market arrival and prices of selected Pigeon pea crop was collected for the period 2000-01 to 2019-20, which includes 20 years of data.

Analytical tools and techniques:

Data was analyzed by using simple tabular analytical tools such as Mean, Frequencies, Ratios, and Percentages etc. Apart from this, functional analysis such as the trend in market arrivals and prices, Seasonal indices, Standard deviation, Coefficient of variation, Growth rate and the Pearson's correlation coefficient was worked out to derive a precise conclusion from the study. The procedure involved in the analysis is explained in the following sections.

a)Trends in market arrival and prices:

The analysis of price and market arrivals over time is important to know the fluctuations in them and also its helps to formulate appropriate ways and means for reducing price fluctuations of agricultural commodities. The time series data pertaining to monthly arrivals and prices of Pigeon pea was collected from APMC's, The following Linear functional form was used to estimate and examine the trends in market arrivals and prices.

M = a + bt equation 1
P = c + dt equation 2
Where,
M = Monthly market arrival of pigeon pea in quintals
P = Price of pigeon pea in rupees per quintals
a = Intercept.
b = Regression coefficient (rate of change in monthly market arrivals for a unit change in the time (dm/dt)
t = Time variable in years
c = Intercept
d = Regression coefficient (dp/dt)
The annual compound growth rates of arrivals and prices of Pigeon pea were worked out by using an exponential equation as below.

Compound growth rate (CGR) will be estimated by using exponential model, the formula,
CGR (r) = Anti log (B-1) x 100

b)Market integration:

Market integration of agricultural products gained importance in developing countries, due to potential application to develop the national economy. Market integration analysis examines how different markets over space are related. Efficient market integration enhances supply security, reduced price risks, prevent food shortage, reduce market entry barriers and support the effectiveness of macro-level economic policies. If agricultural markets are not integrated, then spatially distribute markets will not be able to respond to the price signals of isolated markets with surplus of food. Addition to this, poorly integrated markets may transmit inaccurate price information, thereby leading to inefficient product movement (Goodwin & Schroeder, 1991). Market integration was worked out by estimating bivariate Correlation coefficient (r) between price changes in different selected market. (Acharya and Agarwal 1994)

$$r = \frac{\sum(P11 - P1)(P21 - P2)}{\sqrt{\sum(P11 - P1)^2 (P21 - P2)^2}}$$

Where,
R= Simple correlation coefficient
P11=Price of the commodity in first market
P21= Price of the commodity in second market
P1= Mean of prices in first market
P2 = Mean of the prices in second market

RESULTS AND DISCUSSION:

1. Trend in arrival and prices of Pigeon pea: The time series data on annually arrivals and prices of Pigeon pea covering the time period of twenty years 2000-01 to 2019-20 was collected from Akola, Murtijapur and Akot APMC's. Trend in arrivals and prices of Pigeon pea was evaluated by using linear and exponential function and the compound growth rate was worked out.

1.1 **Pigeon pea Arrival:** The data of Pigeon pea from 2000-01 to 2019-20 was collected from Akola, Murtijapur, and Akot APMC's and analyzed. The trends of arrival of Pigeon peadetermined by using linear function in Table 1, the annual arrivals of Pigeon pea are presented.

Table 1 :Marketwise trends of arrivals for Pigeon pea (2000-01 to 2019-20)

Variables	Akola	Murtijapur	Akot
A	80187.88	17673.45	-17551.46
B	9396.33	4575.39	4608.67
R^2	0.64020	0.49139	0.63043
T	5.65*	4.17*	5.54*

*Significant at the 5 per cent level of significance

The trends analysis of annual arrival of Pigeon pea in Akola, Murtijapur and Akot markets was depicted in Table 1. The table reveals that, trends values of arrivals in Akola (9396.33), Murtijapur (4575.39) and Akot (4608.67) market was found significant trend. Compound growth rate was calculated by exponential linear function with respect to Pigeon pea arrival for selected APMC's during period i.e. (2000-01 to 2019-20) and the results were presented in the Table 2 .

Table 2: Marketwise compound growth rate of arrivals for Pigeon pea (2000-01 to 2019-20)

Variables	Akola	Murtijapur	Akot
A	4.98	4.42	4.26
B	0.02	0.03	0.05
R^2	0.63	0.53	0.54
T	5.42	4.37	4.51
CGR (percent)	2.35*	3.19*	4.83*

*Significant at the 5 per cent level of significance

Yearly growth rate of arrival was calculated with respect to Pigeon pea for all the markets and the same was given in Table 2. Akola, Murtijapur and Akot APMC showed positive growth rate which was significant at 5 per cent level of significance. In case of Akot APMC the growth rate was found highest 4.83 per cent among selected APMC's. It was indicating that the R 2 value of concerning APMC's Akola, Murtijapur and Akot were 0.63, 0.53 and 0.54, respectively. Similar finding was noted by Sahoo et.al (2017). Studied arrivals of Bengal gram and found that there was positive and significant growth rate had been observed in the prices of APMC of Bareilly and shujalpur, which was 0.78 and 0.49, respectively. There was inverse relationship between Arrival and Prices of Bengal gram in selected market.

1.2 **Pigeon pea Prices:** The trends of prices of Pigeon pea determined by using linear function given in Table 3, the yearly prices of Pigeon pea were given.

Table 3: Marketwise trends of Prices for Pigeon pea (2000-01-2019-20)

Variables	Akola	Murtijapur	Akot
A	861.05	960.97	914.11
B	237.72	208.72	239.42
R^2	0.67	0.63	0.72
T	6.08*	5.61*	6.88*

*Significant at the 5 per cent level of significance.

The yearly trends analysis of prices of Pigeon pea in Akola, Murtijapur and Akot markets was presented in Table3. The table reveals that positive trend values of prices in Akola (237.72), Murtijapur (208.72) and Akot (239.42) market showed increasing trend and significant at 5 per cent level. Yearly compound growth rate was calculated by exponential function with respect to Pigeon pea prices for selected APMC's during the period i.e., 2000-01 to 2019-20 and the same are presented in Table 4.

Table 4 :Marketwise compound growth rate of prices for Pigeon pea (2000-01 to 2019-20)

Variables	Akola	Murtijapur	Akot
A	3.12	3.13	4.26
B	0.03	0.03	0.04
R^2	0.79	0.77	0.54
T	8.17	7.74	4.50
CGR (percent)	3.40*	3.07*	4.82*

*Significant at the 5 per cent level of significance.

APMC's showed positive growth rate in the study period, which was significant at 5 per cent level of significance. Akot APMC was highest growth rate of 4.82 per cent among selected APMC's followed by Akola and Murtijapur. It was indicating that the R 2 value of with respect to APMC's Akola, Murtijapur and Akot were 0.67, 0.63 and 0.72 respectively. All APMC's indicated significant at the 5 per cent level of significance. Similarly, Verma, D. K., et.al. also observed the similar result of compound growth rates, which revealed that the wholesale prices of soybean crop recorded significant growth rates in selected markets of Southern Rajasthan. Also, Kachroo et.al. (2021) analyzed the prices and arrival of selected agricultural commodities and stated that positive and significant relationship of growth rate and prices of selected commodities with jeera showing the highest growth rate of 9.87 per cent in arrivals followed by turmeric 9.05 per cent.

3. Market Integration: Market integration is the relationship among the spatially separated markets. APMC's difference in the extent of integration and therefore, there variation in their degree of efficiency. The extent by which price of a commodity move together over a period of time in different markets located at varied distances from each other was an indicator of market integration for the commodity.

3.1 The market integration studied by Pearson Correlation

Table 5 :Market integration prices of Pigeon pea

Market	Murtijapur	Akola	Akot
Murtijapur	1	0.958**	0.932**
Akola		1	0.943**
Akot			1
Market	**Murtijapur**	**Akola**	**Akot**
Murtijapur	1	0.958**	0.932**
Akola		1	0.943**
Akot			1

**Significant at the 1per cent level of significance.

The relationship between two or more APMC's, which were spatially integrated indicated by APMC integration. Spatial integration was one of the most important indicators of effective function of APMC.

According to the results of the Pearson's correlation analysis of the prices of the Pigeon pea in the Akola, Murtijapur and Akot markets, there were very high degree of association of prices between these markets, with (Murtijapur and Akola), (Murtijapur and Akot) and (Akola and Akot) each having a Correlation coefficient of 0.958, 0.932 and 0.943, respectively.

The association was highly significant at the 1 per cent level of significance. Due to their proximity, the Murtijapur, Akola, and Akot market place have high degree of connectivity with one another. As a result, the price signal spread readily between market place. Ganga Devi et.al. (2019) reported the similar which explained the results of market integration exposed that there was positive and significant correlation was found for each market that means the wholesale prices of gram and Pigeon pea was integrated in all the selected markets. Bannor et.al (2016) also found positive influence of growth rate on market integration. The co-integration tests results indicate that, Tonk and Alwar: Tonk and Dausa: Bharatpur and Alwar and Sriganganagar and Dausa were integrated in the long run at lag one i.e., there was long run relationship between these two markets, hence the prices of the markets pair move together in a period.

3.2 Descriptive Statistics of price data of Pigeon pea: Descriptive Statistics portray the basic elements and features of the data under study. It provides concise summary about the variables taken into consideration and the observation that was recorded. It also serves as the basis of virtual analysis of quantitative data, when used with simple graphical analysis.

Table 6: Descriptive statistics of price data of Pigeon pea markets

Market	Mean	SD	N
Akola	3357.20	1714.75	20
Murtijapur	3152.60	1547.38	20
Akot	3428.10	1664.09	20

Descriptive statistics of price data of Pigeon pea markets presented in Table 6. The results revealed that maximum mean price per quintal was registered in Akot market with Rs.3428.10 per quintal, Akola market Rs. 3357.20 per quintal and Murtijapur market recorded mean price of Rs. 3152.60 per quintal during the study period. Highest Standard deviation in Akola market was 1714.75, followed by Akot 1664.09 and Murtijapur market was 1547.38.

CONCLUSION:

The study will be beneficial for formulation of economic policies and action to be taken on results of study. It is also useful for producers, traders, consumers and research workers along with Government. The verification of trends, fluctuations and relation between market arrival and prices and empirical study was carried out in Akola district. Collected data was analyzed with the help of simple statistical tool such as Mean, Frequency, Percentage, etc. The functional analysis such as Trends, Seasonal indices, Correlation coefficient, Standard deviation, Compound Growth Rate, Coefficient of variation, etc. were computed by well-known analytical procedure. The results of the statistical analysis of the selected crops in selected markets are summarized as follows.

1.Trend in Arrival and Prices of Pigeon pea

The time series data on annually arrivals and prices of Pigeon pea covering the time period of twenty years 2000-01 to 2019-20 was collected from Akola, Murtijapur and Akot APMC's. Trend in arrivals and prices of Pigeon pea was evaluated by using linear and exponential function and the compound growth rate was worked out. Trend in arrival of Pigeon pea: The data of Pigeon pea from 2000-01 to 2019-20 was collected from Akola, Murtijapur, and Akot APMC's.

Marketwise trends of arrivals of Pigeon pea (2000-01 to 2019-20)

The trends analysis of annual arrivals of Pigeon pea in Akola, Murtijapur and Akot markets was depicted trends values of arrivals in Akola (9396.33), Murtijapur (4575.39) and Akot (4608.67) market was found significant trend.

Marketwise compound growth rate of arrivals of Pigeon pea (2000-01 to 2019-20)

Compound growth rate was calculated by exponential linear function with respect to Pigeon pea arrivals for selected APMC's during period i.e. (2000-01 to 2019-20) Akola, Murtijapur and Akot APMC showed positive growth rate which was significant at 5 per cent level of significance. In case of Akot APMC the growth rate was found highest 4.83 per cent among selected APMC's.

Trend in Prices of Pigeon pea (2000-01 to 2019-20)

Marketwise trends of Prices of Pigeon pea (2000-01 to 2019-20)

The data of Pigeon pea from 2000-01 to 2019-20 was collected from Akola, Murtijapur, and Akot APMC's and analyzed for the current study. The trends of prices of Pigeon pea determined by using linear function. The study that revealed the values of prices in Akola (237.72), Murtijapur (208.72) and Akot (239.42) market showed increasing trend and significant at 5 per cent level.

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Comparative Study of Seasonal Pattern and Market Arrivals of Soybean in Latur District of Maharashtra

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A B S T R A C T

The present investigation was conducted on seasonal pattern of market arrivals of soybean in Latur district of Maharashtra. For workout the Seasonal pattern, secondary data was collected from 2002 to 2016 from publish government sources. Four markets were selected from Latur district namely Latur, Ausa, Udgir and Ahmedpur. Pearson Correlation coefficient (r) was calculated between market arrivals and prices of soybean for different years. The correlation coefficient between monthly arrivals and prices of soybean were negative in all the markets. This reveals that prices of soybean are governed by factors such as presence of processing units and competition prevailing between purchasers etc. in addition to the arrival of the crop. Correlation coefficients for all the markets in the corresponding months were significant at 1 or 5 percent level of significance. Thus, monthly arrivals of soybean and wholesale prices were significantly and negatively correlated in the corresponding months. When we compare the monthly arrivals and wholesale prices in subsequent months, then the relationship found significantly only in Ausa and Udgir markets. The pattern of arrivals of soybean in different seasons indicated that more than 70 per cent of the total arrivals of soybean were found in the peak season i.e. immediately after harvest. Market arrivals decreased subsequently in mid and lean seasons of the year.
K e y w o r d s: *Arrivals, Market, Seasonal, Prices and correlation*

Introduction

Soybean (*Lysine Max L.)* is one of the important oilseeds as well as a pulse crop. It belongs to family Leguminoseae, sub-family Papilionoideae and genus Glycine. It is mainly grow in Kharif season. Soybean reported to have originated in Eastern Asia or China has been over known for over 5000 years. Soybean contains good quality dietary fibre, which enables the human body to fight against diabetes (Anita *et al.,* 2007). Maharashtra is at the third position in area and production of soybean. Maharashtra occupied an area of 1.17 million hectare with the production of 0.97 million tonnes during *kharif* 2014 and productivity was 829 kg ha^{-}(Agricultural Statistics, 2014). The arrivals of soybean in the market are not uniform throughout the year. Generally, arrivals are more in the production season in the producing areas and lesser in the other seasons. Its market arrivals and prices exhibit a seasonal pattern. The seasonality in production causes fluctuations in prices from season to season. The fluctuation in prices causes wide variation in the income of soybean growers from season to season and year to year. The objective of present study was to know whether variability in the prices of soybean has intensified over time. If yes, then what were the factors that explain these variations in the prices of the soybean? The study of relationship between market arrivals and prices helps to know the effect of market arrivals on prices of soybean in different seasons of the year. Such a study is useful for the Government in regulating the available supplies, stabilizing the prices of soybean and bringing the stability in the income of soybean growers.

Materials and Methods

The present investigation is based on soybean which

is major oilseed crop cultivated in Latur District. Latur District has ten talukas. Four talukas out of these selected purposively based on highest area under soybean crop. One regulated market from each talukas of selected district having the highest arrivals of soybean selected for the study.

These markets were Latur, Ausa, Udgir and Ahmedpur. Secondary data on monthly arrivals and prices of soybean in Southern Rajasthan were collected from the year 2002 to 2016, from the published records and reports of the Directorate of Economics and Statistics (DES), Directorate of Agriculture (DOA) and Maharashtra State Agricultural Marketing Board (MSAMB) Government of Maharashtra. Time series data on monthly arrivals and wholesale prices of soybean obtained from the offices of the respective regulated markets.

Relationship between market arrivals and prices

Monthly and yearly pattern of market arrivals and prices of soybean in selected Krushi Utpann Bajar Samiti were analyzed for the period 2002-03 to 2016-17.

Pearson Correlation coefficient (r) was calculated between market arrivals and prices of soybean for different years using the following formula.

$$r$$

$$S.E.(r) = \sqrt{\frac{1-r^2}{n-2}} \qquad \frac{\sum(Xi-\bar{X}).(Yi-\bar{Y})}{\sqrt{(Yi-\bar{Y})^2}}$$

For testing the significance of value of correlation coefficient, t test was used at n-2 degree of freedom.

$$t_{n-2} = \frac{r}{S.E.(r)}$$

Where,

$S.E.(r)$ = Standard error of correlation coefficient

r = Pearson correlation coefficient between arrivals and prices of soybean

X_i = Quantity of arrivals in i^{th} month /year, where i = 1…….n

$\bar{X}$ = Mean value of quantity of arrivals

$\overline{Y_i}$ = Price of soybean per quintal in i^{th} month / year

$\bar{Y}$ = Mean value of prices of soybean

$\overline{n}$ = Number of observations

t = t statistic

Results and Discussion

Seasonal Pattern of Arrivals of Soybean in Latur Market

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing seasons during the study period from 2002 to 2016 in Latur market are presented in Table 1 and graph is depicted in Fig. 1. The pattern of arrivals of soybean in different seasons indicated that about 77.28 per cent of the total arrivals were in the peak season i.e. immediately after the harvest of the crop within a period of 4 months. Arrivals decreased in the subsequent season's viz., in mid and lean season.

Seasonal Pattern of Arrivals of Soybean in Ausa Market

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing season during the study period from 2002 to 2016 in Ausa market is presented in Table 2 and graph is depicted in Fig. 2. The pattern of arrivals of soybean in different seasons indicated that on an average about 69.47 per cent of the total arrivals were in the peak season i.e. immediately after the harvest of the crop within a period of 4 months. Arrivals decreased in the subsequent season's viz., in mid (16.10%) and lean seasons (14.43%).

Seasonal Pattern of Arrivals of Soybean in Udgir Market

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing seasons during the study period from 2002 to 2016 in Udgir market is given in Table 3 and graph is depicted in Fig. 3. The pattern of arrivals of soybean in different season in Udgir market indicated that about 77.25 per cent of the total arrivals were in the peak season i.e. immediately after the harvest of the crop within a period of 4 months. Arrivals decreased in the subsequent seasons viz., in mid (13.6%) and lean seasons (9.15).

Seasonal Pattern of Arrivals of Soybean in Ahmedpur Market

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing seasons during the study period from 2000 to 2014 in Ahmedpur market are depicted in Table 4 and graph is depicted in Fig. 4. The pattern of arrivals of soybean in different seasons indicated that about 80.41. per cent of the total arrivals were in the peak season and decreased in the subsequent season's viz., in mid and lean seasons.

Comparative Study of Total Arrivals of Soybean in Each Season in Selected Markets during 2002 to 2016

Season wise total arrivals of soybean in all markets

are presented in Table 5. It was observed that in peak season, total arrivals were maximum in Ahmedpur market (80.41 percent) and minimum arrivals occurred in Ausa market (69.47 percent).

In case of Ahmedpur market data showed the distress sale by soybean producers due to many reasons. This area comes under the tribes area and situation of farmers is not good on the basis of financial condition, awareness about storage facility and knowledge of market i.e. prices. Ausa market area farmer's condition is better than others in case of all situations i.e. price, knowledge, financial condition, awareness and storage facility.

Table.1 Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2002 to 2016 in Latur Market (Quintals)

Year	Peak Season (October – January)	Mid-season (February-May)	Lean Season (June – September)	Total
2002-03	144575	16368	17431	178374
	(81.05)	(9.18)	(9.77)	(100)
2003-04	173899	29502	16270	219671
	(79.16)	(13.43)	(7.41)	(100)
2004-05	122286	6539	6580	135405
	(90.31)	(4.83)	(4.86)	(100)
2005-06	231426	13098	6541	251065
	(92.18)	(5.22)	(2.61)	(100)
2006-07	152363	3662	4754	160779
	(94.77)	(2.28)	(2.96)	(100)
2007-08	135874	13794	15088	164756
	(82.47)	(8.37)	(9.16)	(100)
2008-09	99099	15594	15905	130598
	(75.88)	(11.94)	(12.18)	(100)
2009-10	204359	13707	10425	228491
	(89.44)	(6.00)	(4.56)	(100)
2010-11	199519	25630	24698	249847
	(79.86)	(10.26)	(9.89)	(100)
2011-12	328352	53739	69011	451102
	(72.79)	(11.91)	(15.30)	(100)
2012-13	195011	82993	24396	302400
	(64.49)	(27.44)	(8.07)	(100)
2013-14	280450	47480	32944	360874
	(77.71)	(13.16)	(9.13)	(100)
2014-15	230618	58911	40579	330108
	(69.86)	(17.85)	(12.29)	(100)
2015-16	219286	76102	47896	343284
	(63.88)	(22.17)	(13.95)	(100)
2016-17	252323	34703	48779	335805
	(75.14)	(10.33)	(14.53)	(100)
Total	**2969440**	**491822**	**381297**	**3842559**
	(77.28)	**(12.80)**	**(9.92)**	**(100)**

Table.2 Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2002 to 2016 in Ausa Market (Quintals)

Years	Peak Season (October-January)	Mid-Season (February-May)	Lean Season (June-September)	Total
2002-03	110128(68.16)	44829(27.74)	6619(4.10)	161576(100)
2003-04	57433(75.15)	6329(8.28)	12658(16.56)	76420(100)
2004-05	56432(77.32)	36214(4.25)	12541(18.43)	105187(100)
2005-06	45769(82.27)	4547(8.17)	5316(9.56)	55632(100)
2006-07	88773(92.84)	3487(3.65)	3364(3.52)	95624(100)
2007-08	128477(75.21)	16027(9.38)	26316(15.41)	170820(100)
2008-09	105131(64.60)	24092(14.80)	33517(20.60)	162740(100)
2009-10	202290(71.19)	39028(13.73)	42853(15.08)	284171(100)
2010-11	304928(69.27)	101641(23.09)	33657(7.65)	440226(100)
2011-12	283722(72.31)	83021(21.16)	25609(6.53)	392352(100)
2012-13	316422(58.55)	13765(2.55)	210219(38.90)	540406(100)
2013-14	342446(78.73)	29807(6.85)	62696(14.41)	434949(100)
2014-15	310478(70.81)	92998(21.21)	35002(7.98)	438478(100)
2015-16	294820(63.07)	122281(26.16)	50345(10.77)	467446(100)
2016-17	293646(62.91)	106954(22.91)	66199(14.18)	466799(100)
Total	**3001236(69.47)**	**695545(16.10)**	**623165(14.43)**	**4319946(100)**

Figures in parentheses are percentages of row total

Table.3 Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2002 to 2016 in Udgir Market (Quintals)

Years	Peak Season (October-January)	Mid-Season (February-may)	Lean Season (June- September)	Total
2002-03	687 (65.30)	152 (14.45)	213 (20.25)	1052 (100)
2003-04	861 (67.64)	165 (12.96)	247 (19.40)	1273 (100)
2004-05	632 (60.83)	228 (21.94)	179 (17.23)	1039 (100)
2005-06	2962 (61.77)	1419 (29.59)	414 (8.63)	4795 (100)
2006-07	156 (53.24)	114 (38.91)	23 (7.85)	293 (100)
2007-08	12515 (94.95)	254 (1.93)	412 (3.13)	13181 (100)
2008-09	8435 (69.41)	2218 (18.25)	1500 (12.34)	12153 (100)
2009-10	1988 (77.08)	245 (9.50)	346 (13.42)	2579 (100)
2010-11	1522	469	164	2155

	(70.63)	(21.76)	(7.61)	(100)
2011-12	593	182	47	822
	(72.14)	(22.14)	(5.72)	(100)
2012-13	1095	57	65	1217
	(89.98)	(4.68)	(5.34)	(100)
2013-14	654	131	119	904
	(72.35)	(14.49)	(13.16)	(100)
2014-15	521	42	17	580
	(89.83)	(7.24)	(2.93)	(100)
2015-16	193	187	68	448
	(43.08)	(41.74)	(15.18)	(100)
2016-17	1255	131	223	1609
	(78.00)	(8.14)	(13.86)	(100)
Total	**34069**	**5994**	**4037**	**44100**
	(77.25)	**(13.60)**	**(9.15)**	**(100)**

Figures in parentheses are percentages of row total

Table.4 Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2002 to 2016 in Ahmedpur Market (Quintals)

Years	Peak Season (October-January)	Mid-Season (February-May)	Lean Season (June-September)	Total
2002-03	1106	337	106	1549
	(71.40)	(21.76)	(6.84)	(100)
2003-04	1620	349	230	2199
	(73.67)	(15.87)	(10.46)	(100)
2004-05	1719	396	190	2305
	(74.58)	(17.18)	(8.24)	(100)
2005-06	1590	490	216	2296
	(69.25)	(21.34)	(9.41)	(100)
2006-07	1014	762	213	1989
	(50.98)	(38.31)	(10.71)	(100)
2007-08	1334	329	257	1920
	(69.48)	(17.14)	(13.39)	(100)
2008-09	1536	439	306	2281
	(67.34)	(19.25)	(13.42)	(100)
2009-10	3398	1253	557	5208
	(65.25)	(24.06)	(10.70)	(100)
2010-11	14214	2731	1166	18111
	(78.48)	(15.08)	(6.44)	(100)
2011-12	5704	1693	389	7786
	(73.26)	(21.74)	(5.00)	(100)
2012-13	6701	285	519	7505
	(89.29)	(3.80)	(6.92)	(100)
2013-14	3096	155	291	3542
	(87.41)	(4.38)	(8.22)	(100)
2014-15	1270	72	226	1568
	(80.99)	(4.59)	(14.41)	(100)
2015-16	14730	575	786	16091
	(91.54)	(3.57)	(4.88)	(100)
2016-17	10087	499	1026	11612
	(86.87)	(4.30)	(8.84)	(100)
Total	**69119**	**10365**	**6478**	**85962**
	(80.41)	**(12.06)**	**(7.53)**	**(100)**

Figures in parentheses are percentages of row total

Table.5 Comparative Study of Market Arrivals of Soybean in Each Season in Selected Markets (Quintals)

Regulated Markets	Peak season	Mid-season	Lean season	Total
Latur	2969440	491822	381297	3842559
	(77.28)	(12.80)	(9.92)	(100)
Ausa	3001236	695545	623165	4319946
	(69.47)	(16.10)	(14.43)	(100)
Udgir	34069	5994	4037	44100
	(77.25)	(13.60)	(9.15)	(100)
Ahmedpur	69119	10365	6478	85962
	(80.41)	(12.06)	(7.53)	(100)

Figures in parentheses are percentages of row total

Table.6 Correlation Co-efficient Between Monthly Arrivals and Wholesale Prices of Soybean in Selected Markets: during 2000 to 2014

S. No.	Particulars	Correlation Co-efficient (r)			
		Latur	Ausa	Udgir	Ahmedpur
1	Correlation co-efficient between wholesale prices and monthly arrivals of soybean in the corresponding months	-0.54*	-0.68**	-0.71**	-0.57*
2	Correlation co-efficient between wholesale prices and monthly arrivals of soybean in the subsequent months	-0.38 NS	-0.70**	-0.74**	-0.47 NS

** Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level NS – Non-significant

Relationship between Monthly Arrivals and Wholesale Prices of Soybean

The correlation coefficients were worked out firstly between wholesale prices and arrivals of the soybean in the corresponding months and secondly between wholesale prices and arrivals of the soybean in the subsequent months. The correlation coefficients between average wholesale prices and market arrivals in the corresponding months and also between the prices and arrivals in the subsequent months has been presented in Table 6. The value of correlation coefficient between monthly wholesale prices and arrivals of soybean in Latur. Ausa, Udgir and Ahmedpur markets in the corresponding months were -0.54, -0.68, -0.71, -0.57 and in the subsequent months were -0.38, -0.70, - 0.74, -0.47, respectively.

Correlation coefficient for all the markets in the corresponding months were significant at 1 or 5 percent, Thus, monthly arrivals of soybean and wholesale prices of it were significantly and negatively correlated in the corresponding months. When we compare the monthly arrivals and wholesale prices in subsequent months, then the relationship found significant only in Ausa and Udgir markets.

A clear seasonal pattern in arrivals of soybean was observed. The highest arrivals were in peak season (October-January) and after that, there was subsequent decrease in arrivals. The reason for low market arrivals in mid and lean season was because of lack of proper storage facility with the farmers. The correlation coefficient between monthly arrivals and prices of soybean were negative in all the markets. Wholesale prices of corresponding month was more closely related to soybean market arrivals than the wholesale prices of subsequent months.

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Peak and Slack Period in Arrival and Prices of Pigeon Pea

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ABSTRACT

The study was undertaken to analyse the peak and slack period in arrival and prices of Pigeon pea. The Akola district was purposely selected for present study, as it has a major proportion of the area under Pigeon Pea crop. The arrivals and prices data for selected Pigeon pea crop year wise data were collected from the official records of APMC. Based on availability of data, latest 20 years data from 2001 to 2020 were collected.

Result revealed that Among the selected markets the highest arrivals were in the year 2018–2019 (286.79 per cent), in Akot APMC market followed by Murtijapur APMC market (269.16 per cent), whereas the lean period of arrival in the year 2013 – 2014 (15.52 per cent) in Akot APMC. The highest indices of prices of Pigeon pea were registered in the year 2015-16 (241.13 per cent)in Murtijapur market, followed in 2015-16 (239.78 per cent) in Akola market. The lowest indices of arrivals were registered in the year 2001-02 (29.72 per cent) in Akot market. The correlation between arrivals and prices of Pigeon pea between Akola (0.75) and Akot (0.57) market showing the positive and statistically significant.

Keywords: *arrivals and prices, lean period, significant, statistically, indices, correlation*

INTRODUCTION

Agriculture is most important base for development and plays a vital role in the Indian economy. Over 65-70 per cent of the rural families depend on agriculture. Agriculture has got a main role in Indian economy as the most vital sector. Indian agriculture sector produces 20.2 per cent of India's gross domestic product (GDP) and gives occupation to 50-60 per cent of the countries manpower (Source: National Statistical Office (NSO), M/O Statistics & PI). India is the world's biggest producer of paddy, wheat, pulses, spices and various spice products. Indian agriculture has encounted impressive growth over last few decades. According to DES (Directorate of Economics and Statistic), the food grain production has inclined from 50.82 million tonnes in 1950-51 to 314.51 million tonnes during 2020-21 highest ever since Freedom. From the starting, agriculture is contributing a wide portion to our national income. In 1950-51, agriculture and other agriculture related activities gives about 59 per cent of the overall national income. Although the proportion of agriculture decrease gradually with improvement of other sectors, but the share remained very high as comparative to that of the developed countries of the world. For example, the share of agriculture has decreased to 54 per cent in 1960-61, 48 per cent in 1970- 71, 40 per cent in 1980-81 and then to 20.2 per cent in 2020-21, whereas in United Kingdom and United State of America. Agriculture contributed only 3 per cent to the national income of these countries, which are called to be developed.

Cajanus cajan is a leguminous browse plant, the common names are Pigeon pea, red gram, Congo pea, Gungo pea, No eye pea. Cajanus cajan is cultivated on large scale in twenty-two countries of the world and it is the sixth most important legume food crop. The cultivation of the Pigeon pea goes back at least 3,500 years. Archaeological finds of Pigeon pea dating to about 3400 years ago (14th century BC) have been found at Neolithic sites in Kalaburaga, Karantaka (Sanganakallu) and its border areas (Tuljapur Garhi and Gopalpur in Orissa) and also the south Indian states, such as kerala, where it is called Tomara Payaru. From India, it travelled to east Africa and West Africa. It came to the American continent, probably in the 17th century. It is well

adapted to arid and semi-arid tropical and sub-tropical climates.

The present study is selected with an extent to know the seasonal price fluctuation among the selected agricultural commodity due to poor storage facilities and inadequate market information.

METHODOLOGY

The study was based on secondary data collected for 20 years from 2000-01 to 2019-20, various sources using appropriate analytical techniques to satisfy the objective.

A) Peak and slack in arrival and prices:

Seasonal indices are those periodic movements in business activity which occur regularly over period of time and have their origin in the year itself. Since such variations repeats during a period of twelve months, it was calculated and with higher accuracy level. To obtain a statistical description of a pattern of seasonal variation, it is desirable to first free the data from the effects of trend, cycles and irregular variations. Once these other components had been eliminated, seasonal index was calculated in index form as a measure of seasonal variation. Thus specific seasonal index refers to the seasonal changes during a particular year. To examine the peak and slack period, monthly seasonal indices was worked out by using simple average method.

$$\textbf{Seasonal indices} = \frac{Xi}{\bar{X}} \times 100$$

Where,

Xi = monthly average for 1 years

$\bar{x}$ = mean of 12 month, average

B) Standard deviation:

Standard deviation is the measure of dispersion. This measure of dispersion was estimated by squaring the deviation of each observation from the mean, adding the squares and dividing it by the total number of observation (n) and extracting the square root.

$$\textbf{Standard deviation} = \sqrt{\frac{\sum_1^n (Xi-X)2}{n-1}}$$

Where,

X_i = arrivals/ prices

$\overline{X_i}$ = Mean of arrivals / Prices

i = 1, 2, 3…..n

N = number of years / month

C) Coefficient of variation:

The variability in arrivals and prices of Pigeon pea in selected APMC during the period of study was calculated by using coefficient of variation. Coefficient of variation is defined as the "Percentage variation in the mean as the standard deviation being stated as the total variation in the mean". The coefficient of variation of each market was worked out by comparing the variability present in market arrivals and prices.

$$\textbf{C.V.} = \frac{SD}{mean} \times 100$$

Where,

SD = Standard deviation
Mean = Arithmetic mean
CV = Coefficient of Variation

D) Correlation between arrival and prices:

For achieving one of the objectives of the study i.e. to study the relationship between market arrival and prices, the method of correlation was used. The correlation for the arrivals and prices of Pigeon pea was calculated. The correlation is the measure of degree of relationship amongst two series i.e. arrivals and prices. The formula used for calculating the Pearson's coefficient of correlation (R_{xy}).

$$\mathbf{R_{xy}} = \frac{COV(X,Y)}{dx.dy}$$

Where,

x = Arrival mean
y= Price mean
r = Correlation coefficient
Cov (x,y) = Co- variation between x and y
dy= Standard deviation of y
dx= Standard deviation of x

For the significance of correlation coefficient (r) formula used was as below.

$$\textbf{t test} = \frac{r\sqrt{n-k}}{\sqrt{1-r^2}}$$

Where,

r = Correlation coefficient,

n = number of observation
k = number of parameter

RESULTS AND DISCUSSION

Seasonal indices of arrival and prices of Pigeon pea:

The seasonal indices were evaluated in the percentage of arrivals and prices of Pigeon pea in the selected markets. Seasonal indices of Pigeon pea in Akola, Murtijapur and Akot market was worked out by using simple average method for the period of 2000-01 to 2019-20 years and monthly one year of 2020 and the results obtained were presented in this section.

1) Seasonal indices of arrivals of Pigeon pea:

The annual seasonal indices of arrivals of Pigeon pea in Akola, Murtijapur and Akot computed and the results were presented in Table 1.

It was observed that in Akot APMC, annual seasonal indices of arrivals were highest in the year of 2018-19 (286.79 per cent) followed by 2017-2018 (269.80 per cent), and 2019-2020 (253.17 per cent), whereas lowest arrivals were during the year 2013-2014 (15.52 per cent), 2007-2008 (34.38 per cent) and 2001-2002 (36.80 per cent), respectively.

In Akola APMC the seasonal indices of arrival were highest in the year 2011- 12 (165.56 per cent) followed by 2017-18 (162.08 per cent), and 2016-2017 (151.62 per cent), whereas lowest seasonal indices were observed in the year of 2000 - 2001 (51.34 per cent), 2004-2005 (56.57 per cent) and 2006-2007 (59.96 per cent), respectively. In Murtijapur APMC the seasonal indices of arrivals were highest in the year 2017-2018 (269.16 per cent) followed by 2011-2012 (180.93 per cent) and 2018-2019 (178.62 per cent), whereas lowest seasonal indices were observed in the year of 2007-2008 (27.76 per cent) followed by 2002-2003 (43.52 per cent) and 2009 - 2010 (54.45 per cent), respectively.

Table 1. Marketwise yearly seasonal indices of arrivals of Pigeon pea 2000-01 to2019-20

(Per Cent)

Sr. No.	Year	2000-01 to 2019-20		
		Akola	Murtijapur	Akot
1	2000-2001	51.34	54.43	47.94
2	2001-2002	71.22	63.44	36.80
3	2002-2003	77.15	43.52	38.84
4	2003-2004	73.90	58.35	61.96
5	2004-2005	56.57	64.97	39.80
6	2005-2006	63.36	69.04	39.18
7	2006-2007	59.96	68.01	63.85
8	2007-2008	60.73	27.76	34.38
9	2008-2009	73.71	56.67	51.80
10	2009-2010	67.22	54.45	43.09
11	2010-2011	115.14	106.93	47.45
12	2011-2012	165.56	180.93	122.05
13	2012-2013	132.27	126.54	84.75
14	2013-2014	118.14	127.65	15.52
15	2014-2015	104.19	113.44	125.80
16	2015-2016	150.55	106.46	128.26
17	2016-2017	151.62	140.90	208.75
18	2017-2018	162.08	269.16	269.80
19	2018-2019	130.27	178.62	286.79
20	2019-2020	115.00	88.74	253.17

Among the selected markets the highest arrival were in the year 2018–2019 (286.79 per cent), in Akot APMC market followed by Murtijapur APMC market (269.16 per cent), whereas the lean period of arrival in the year 2013 – 2014 (15.52 per cent) in Akot APMC market were observed in selected markets.

Similarly, Mahalle *et.al.* (2014) results were found regarding the increasing trend in arrivals for washim, Yeotmal, Nandura and Shegaon market, where as decreasing trends in arrivals in Akola, Latur and Nanded.

2) Marketwise variation of arrivals of Pigeon pea (2000-01 to 2019-20):

The annual Mean, Standard deviation and Coefficient of variation (CV) for arrivals of Pigeon pea in Akola, Murtijapur and Akot market were estimated presented in Table 2.

Table 2. Market wise variation of arrival of Pigeon pea (2000-01 to 2019-20)

Year	2000-01 to 2019-20		
	Mean (Qtl.)	SD	CV (per cent)
Akola	178849.45	69475.99	38.84
Murtijapur	65715.10	38614.12	58.75
Akot	81239.60	70103.80	86.29

It was observed that, mean arrivals of Pigeon pea during study period was highin Akola market 178849.45 quintals, whereas Murtijapur and Akot APMC's showed the arrivals as 65715.10 and 81239.60 quintals, respectively.

The Standard deviation was highest in the Akot market (70103.80), followed by Akola market (69475.99) and the lowest in the Murtijapur market (38614.12). The value Coefficient of variation of arrivals for Pigeon pea during the study period were observed 38.84 per cent, 58.75 per cent and 86.29 per cent Akola, Murtijapur and Akot, respectively. The maximum Coefficient variation observed in Akot market because Standard deviation observed in Akot APMC highest comparatively Akola and Murtijapur market.

3) Market wise monthly seasonal indices of arrivals of Pigeon pea (2019-20)

The monthly seasonal indices of arrivals of Pigeon pea in Akola, Murtijapur and Akot were computed and the results presented in Table 3.

The seasonal indices of market arrivals of pigeon pea in the selected markets were presented in Table 3. Monthly seasonal indices were calculated in order to ascertain the long run seasonal variations in arrivals of Pigeon pea.

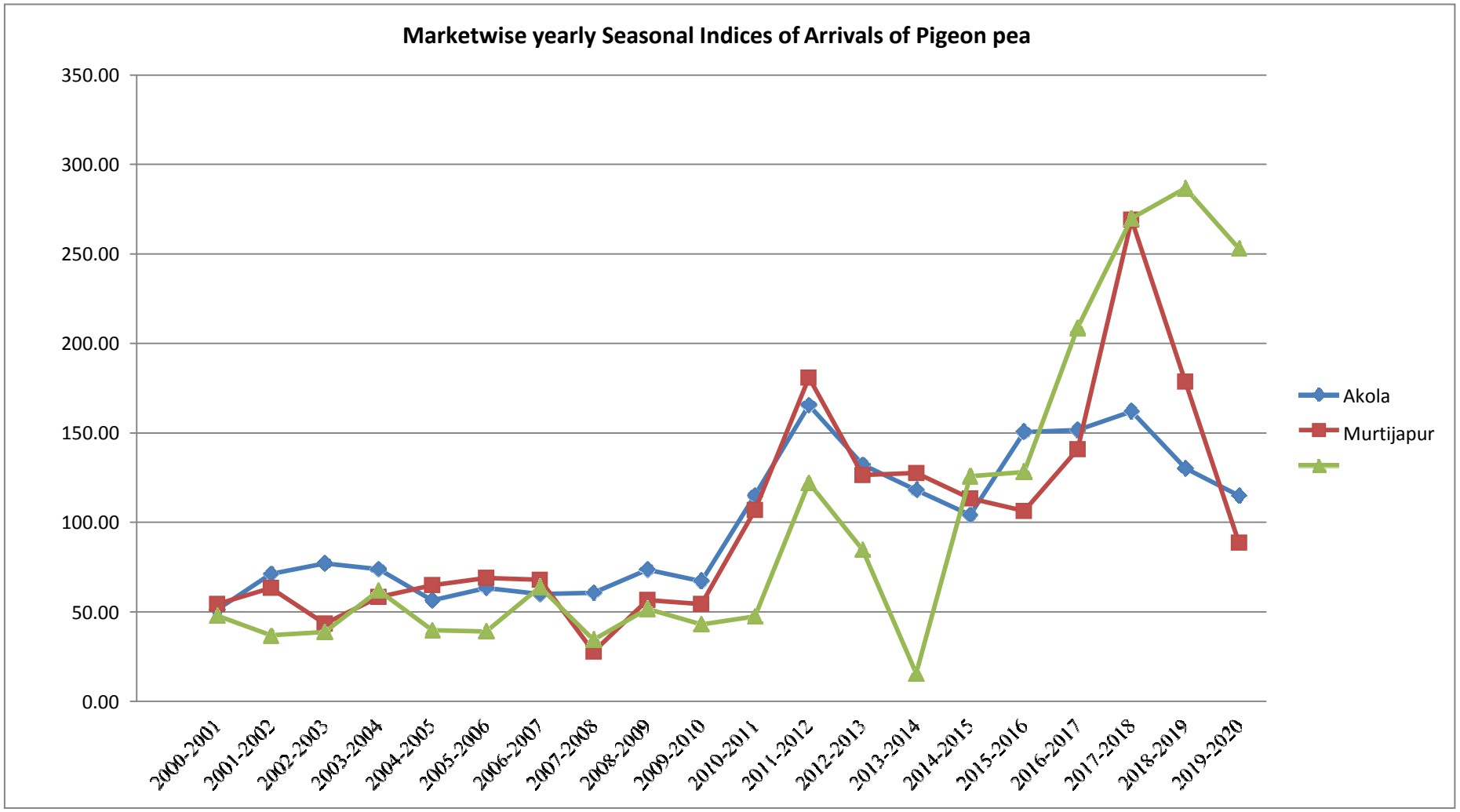

Fig. 1: Marketwise yearly seasonal indices of arrivals of Pigeon pea 2000-01 to 2019-20

Table 3. Market wise monthly seasonal indices of arrivals of Pigeon pea 2019-20

(Per cent)

Month	Akola	Murtijapur	Akot
January	58.06	53.51	131.56
February	396.80	78.34	282.81
March	248.57	123.81	204.78
April	63.37	66.28	52.11
May	114.15	57.44	178.39
June	152.09	248.43	151.95
July	61.02	72.18	35.60
August	41.42	37.82	49.38
September	29.65	36.58	37.18
October	16.81	200.11	22.20
November	8.73	136.64	4.37
December	9.28	88.81	49.62

The results showed the existence of seasonality in all the markets. Higher indices of market arrivals of Pigeon pea were noticed immediately after harvest in both Akola, and Akot which reached peak, during February (396.80 and 282.81), respectively. Gradually started arrivals decreasing from July and were in October, November and December. The market from February to June was glutted with Pigeon pea produce because mostly the farmers sold their produce immediately after harvest. The higher markets arrivals were found in APMC's (more than 110 per cent) to be significant in the months of February, March, May and June in the selected markets.

Among the selected markets the highest arrivals were in the month of February (396.80 per cent) in Akola market followed by Akot market (282.81 per cent) and Murtijapur market showed highest in the month of June (248.43 per cent) followed by October (200.11 per cent), whereas the lowest arrivals in the month of November (4.37 per cent) in Akot APMC market. Devi *et.al*. (2019). Recorded similar results during the monthly pattern arrivals of gram and Pigeon pea in selected market reported maximum arrivals of gram in Rajkot market in the month of September (292.90 per cent) and minimum in the month June (94.09 per cent). Also, More,S.S. *et.al.* (2015) noted that the arrivals of Pigeon pea in Latur market were seasonal (January to May), maximum arrival of Pigeon pea were recorded in the month of January followed February and March.

4) Market wise variation of monthly arrivals of Pigeon pea 2019-20:

Monthly Mean, Standard deviation along with Coefficient of variation (CV) ofarrival for Pigeon pea in Akola, Murtijapur and Akot market were estimated to study the trends and distribution of arrivals and prices. The results obtained were depicted in the following Table 4.

Table 4. Market wise variation of monthly arrival of Pigeon pea 2019-20.

Year	2019-20		
	Mean (Qtl)	SD	CV (per cent)
Akola	15342.58	17889.77	116.60
Murtijapur	37613.16	24931.80	66.28
Akot	6787.58	5963.93	87.86

It was observed that mean arrivals of Pigeon pea during period was high in Murtijapur market 37613.16 quintals. Followed by Akola market 15342.58 quintals and lowest in the Akot market 6787.58 quintals. The Standard deviation was highest in the Murtijapur market (24913.80), followed by Akola market (17889.77) and the lowest in the Akot market (5963.93). The Coefficient of variation of in arrivals of Pigeon pea, during the study period was observed that 116.6 per cent, 66.28 per cent and 87.86 per cent in Akola, Murtijapur and Akot markets, respectively.

5) Seasonal indices of prices of Pigeon pea:

The marketwise annual seasonal indices of prices of Pigeon pea in Akola, Murtijapur and Akot were computed and presented in Table 5.

Fig.2. Market wise monthly seasonal indices of arrivals of Pigeon pea 2019-20

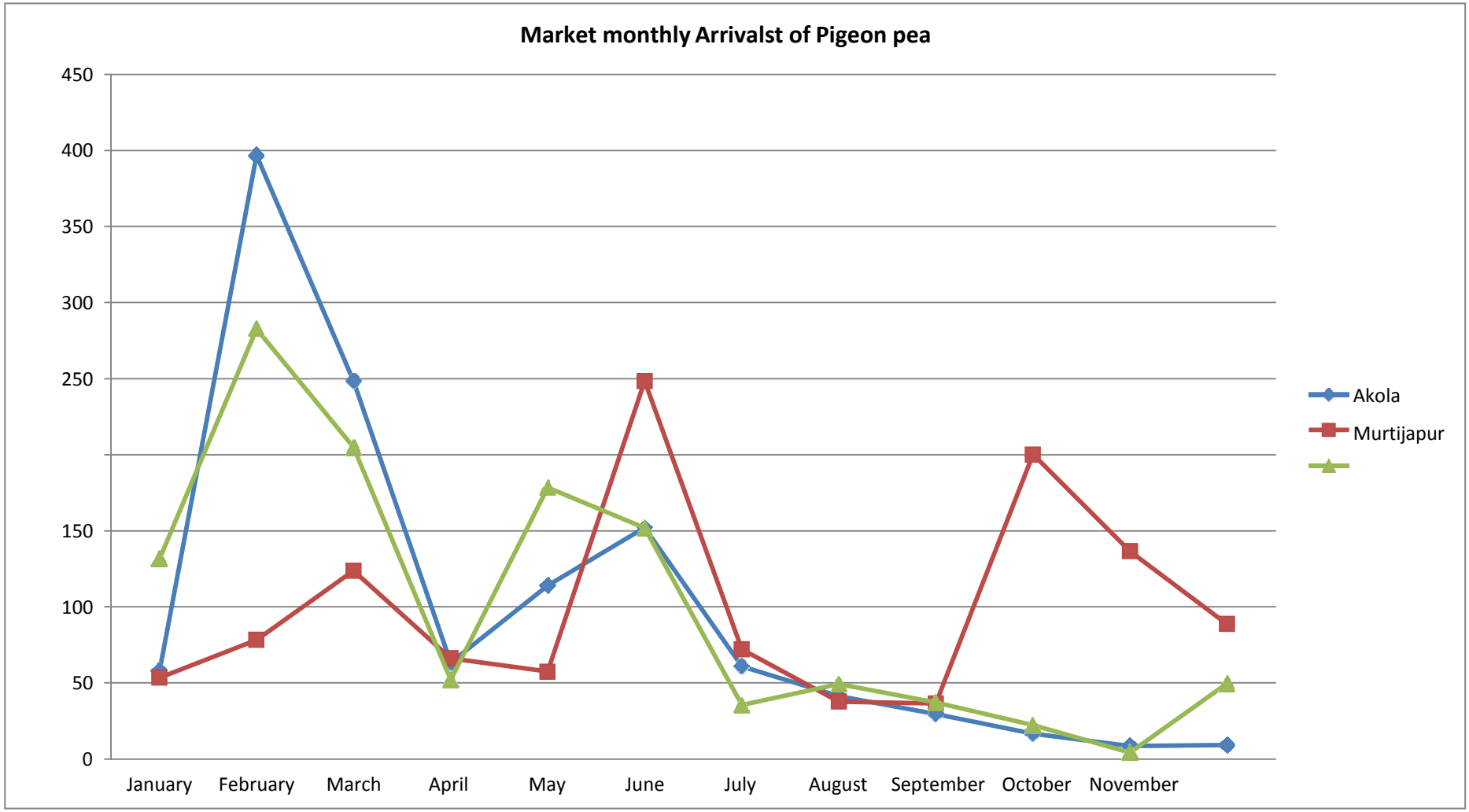

Table 5. Marketwise yearly seasonal indices of prices of Pigeon pea 2000-01 to2019-20

(Per Cent)

Sr. No.	Year	2000-01 to 2019-20		
		Akola	Murtijapur	Akot
1	2000-2001	46.85	50.75	44.05
2	2001-2002	45.69	47.58	29.72
3	2002-2003	51.38	53.92	79.05
4	2003-2004	60.47	57.10	46.53
5	2004-2005	49.51	63.44	41.57
6	2005-2006	52.90	52.40	48.13
7	2006-2007	51.20	71.69	60.41
8	2007-2008	70.53	73.05	67.03
9	2008-2009	88.38	79.30	80.95
10	2009-2010	79.44	106.74	127.77
11	2010-2011	119.71	97.95	104.72
12	2011-2012	94.63	90.12	110.79
13	2012-2013	112.83	118.44	107.76
14	2013-2014	122.36	87.77	122.75
15	2014-2015	157.66	147.66	160.44
16	2015-2016	239.78	241.13	206.47
17	2016-2017	166.63	161.77	170.36
18	2017-2018	119.71	126.88	126.78
19	2018-2019	130.32	112.73	127.62
20	2019-2020	139.99	159.58	137.10

It was observed from the table that the highest seasonal indices of prices of Pigeon pea for Akola market were registered in the year 2015-16 (239.78 per cent) followed by 2016–17 (166.63 per cent) and 2014–15 (157.66 per cent), whereas lowest prices were observed in the year 2001-02 (45.69 per cent), 2000-01 (46.85 per cent) and 2004-05 (49.51 per cent), respectively.

In Murtijapur APMC the seasonal indices of prices were highest in the year 2015-16 (241.13 per cent) followed by 2016-17 (161.77 per cent) and 2014-15 (147.66 per cent). Whereas, lowest seasonal indices observed in the year of 2001-02 (47.58 per cent), 2000-01 (50.75 per cent) and 2005-06 (52.40 per cent).

In Akot APMC the seasonal indices of prices were highest in the year 2015- 16 (206.47 per cent) followed by 2016-17 (170.36 per cent) and 2014-15 (160.44 per cent). Whereas, lowest seasonal indices were observed in the year of

2001-02 (29.72 per cent) followed by 2004-05 (41.57 per cent) and 2000-01 (44.05 per cent).

The highest indices of prices of Pigeon pea were registered in the year 2015- 16 (241.13 per cent) in Murtijapur market, followed in 2015-16 (239.78 per cent) in Akola market. The lowest indices of arrivals were registered in the year 2001-02 (29.72 per cent) in Akot market.

6) Market variation of arrivals and prices of Pigeon pea:

The Mean of prices of Pigeon pea in selected APMC's along with Standard deviation and Coefficient of variation were calculated and presented in Table 6.

Table 6. Marketwise variation of prices of Pigeon pea (2000-01 to 2019-20)

Year	(2000-01 to 2019-20)		
	Mean (Rs)	SD	CV (per cent)
Akola	3357.20	1714.75	51.07
Murtijapur	3152.60	1547.38	49.08
Akot	3428.10	1664.09	48.54

It was observed that, Mean of Pigeon pea during study period was highest in Akot market 3428.10 Rs /quintal, whereas Akola and Murtijapur APMC's showed prices 3357.20 and 3152.60 Rs/quintal, respectively.

The results of Standard deviation showed that highest Standard deviation was recorded in Akola (1714.75) and Akot (1664.20) while lowest Standard deviation was recorded in Murtijapur (1547.38) APMC's.

The Coefficient of variation in prices of Pigeon pea, during study period was observed that 51.07 per cent, 49.08 per cent and 48.54 per cent Akola, Murtijapur and Akot, respectively. The maximum variability observed in Akola market. Similarly, results were reported by Joyal *et.al.* (2021) revealed noted that the Coefficient of variation in yearly prices of pear millet the prices ranged from 19.93 to 22.42 per cent

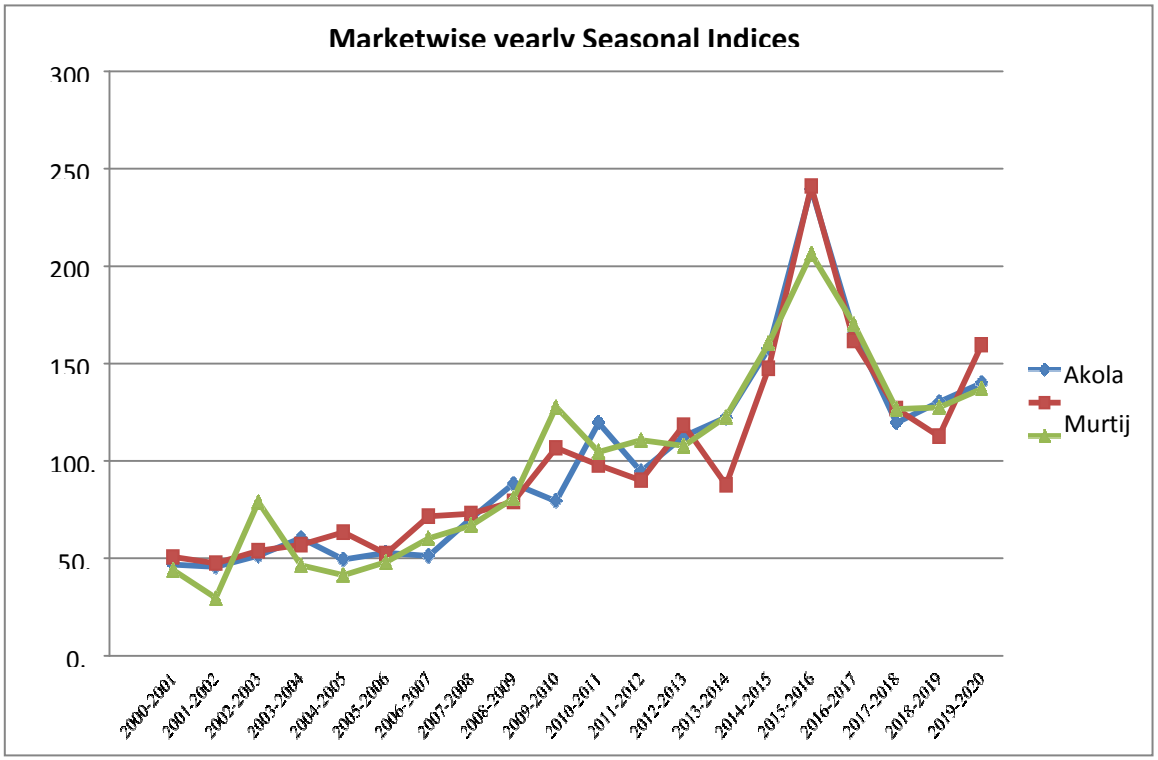

Fig. 3 Market wise yearly seasonal indices of prices of Pigeon pea 2000-01 to 2019-2

7) Market variation monthly seasonal indices of prices of Pigeon pea (2019-20)

Table 7. Monthly seasonal indices of prices of Pigeon pea 2019-20

(Per cent)

Month	Akola	Murtijapur	Akot
January	89.45	104.98	91.75
February	90.44	108.04	92.04
March	92.41	84.44	91.84
April	93.40	89.44	96.55
May	89.71	84.69	97.51
June	103.29	122.43	97.51
July	100.82	119.07	98.47
August	96.37	96.74	101.84
September	107.99	94.96	106.16
October	123.55	91.98	130.76
November	115.64	99.72	103.76
December	96.88	103.14	91.84

The marketwise monthly seasonal indices of prices of Pigeon pea were computed and presented in Table 7.

It was observed that in Akola APMC, monthly seasonal indices of prices were highest in the month of October (123.55 per cent) followed by November (115.64 per cent) and September (107.99 per cent), whereas lowest prices were during January (89.45 per cent), followed by May (89.71 per cent) and February (90.44 per cent), respectively.

The highest seasonal indices of prices of Pigeon pea were registered in the month June (122.43 per cent) followed by July (119.07 per cent) and February (108.04 per cent) in Murtijapur APMC, whereas lowest seasonal indices observed in the month of March (84.44 per cent), May (84.69 per cent) and April (89.44 per cent).

In Akot APMC the seasonal indices of prices were highest in the month of October (130.76 per cent) followed by September (106.16 per cent) and November (103.76 per cent). Whereas, lowest seasonal indices of prices observed in the monthof January (91.75 per cent) and March (91.84 per cent). Similar results were obtained by Andhalkar G.K. (2011), showed that the highest arrivals as well as price variation occurred in Amravati APMC and the highest price index observed in the month of July to September and August to November.

8) Market variation of monthly prices of Pigeon pea:

Table 8. Market variation prices of Pigeon pea 2019-20

Year	2019-20		
	Mean (Rs)	SD	CV (per cent)
Akola	5058.50	551.46	10.90
Murtijapur	3691	451.76	12.23
Akot	5204.16	562.82	10.81

The monthly Mean of prices of Pigeon pea in selected Akola, Murtijapur and Akot APMC's along with Standard deviation and Coefficient of variation were calculated and presented in the Table 8.

Akot market recorded highest Mean for prices (Rs. 5204.06) followed by Akola market (Rs. 5058.50) and lowest Mean indicated in Murtijapur market (Rs. 3691). The results of Standard deviation showed that highest Standard deviation was recorded in Akot market (562.82), while lowest Standard deviation in Murtijapur market (451.76) followed by Akot market (562.82).

The Coefficient variation for prices of Pigeon pea, during study period was observed as 12.23 per cent, 10.90 per cent and 10.81 per cent Murtijapur, Akola and Akot, respectively.

9) Correlation between arrivals and prices of Pigeon pea

The degree of relationship between yearly market arrivals and prices of Pigeonpea was studied by computing Pearson's coefficient of correlation analysis, given in table 9.

Table 9. Correlation between arrival and prices 2000-01 to 2019-20

Market	Correlation coefficients
Akola	0.75**
Murtijapur	0.42
Akot	0.57**

**.Significant at the 1 per cent level of significance

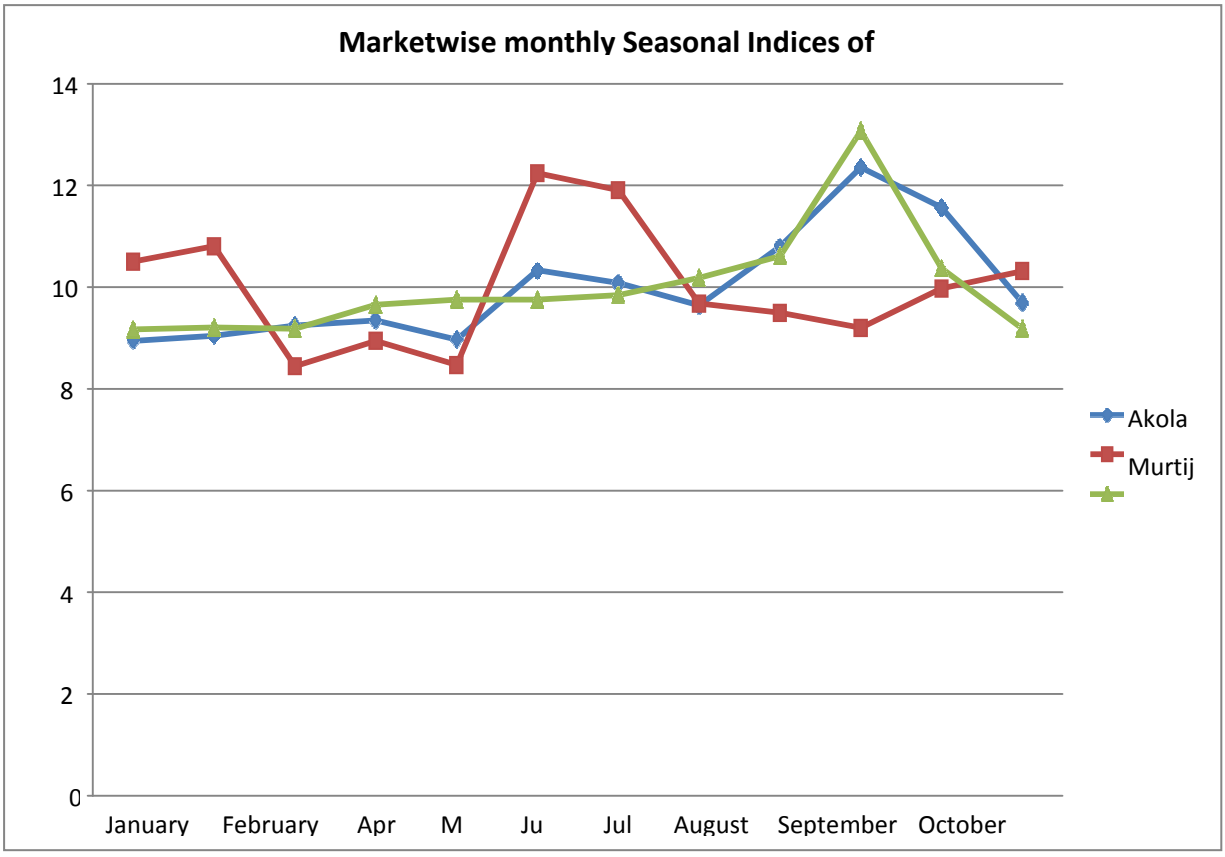

Fig. 4. Monthly seasonal indices of prices of Pigeon pea 2019-20

It was observed that in positive correlation between prices and arrival in Akola(0.75) and Akot (0.57) markets. However, these correlation coefficients were statistically significant at one percent level of significance. However, in Murtijapur market, (0.42) the correlation between arrival and prices was indicated statistically positive. This positive and significant Correlation coefficient was attributed to the off-season supplies of Pigeon pea, which fetched higher prices.

Table 10. Monthly Correlation between arrivals and prices Pigeon pea 2019-20

Market	Correlation coefficients
Akola	-0.482
Murtijapur	0.302
Akot	-0.521

The degree of relationship between monthly market arrivals and prices of Pigeon pea was studied by computing correlation analysis, and given in Table 10. Results indicated the negative correlation between prices and arrivals in Akola and Akot market. However, these Correlation coefficients were statistically non significant. Whereas, in Murtijapur Market, the correlation between arrivals and prices was positive and statistically non-significant. This negative and non-significant Correlation coefficient could be attributed to the off-season supplies of Pigeon pea, which fetch lower prices.

CONCLUSIONS

Seasonal indices of arrival and prices of Pigeon pea:

Marketwise yearly seasonal indices of arrivals of Pigeon pea 2000-01 to 2019-20

Among the selected markets the highest arrivals were in the year 2018–2019 (286.79 per cent) in Akot APMC market followed by Murtijapur APMC market (269.16 per cent), whereas the lean period of arrival in the year 2013 – 2014 (15.52 per cent) in Akot APMC market were observed among the selected markets.

Mean, Standard Deviation, and Coefficient of variation of arrivals of Pigeon pea (2000-01 to 2019-20)

It was observed that, mean arrivals of Pigeon pea during study period was high in Akola market 178849.45 quintals, whereas Murtijapur and Akot APMC's showed the arrivals as 65715.10 and 81239.60 quintals, respectively.

The Standard deviation was highest in the Akot market (70103.80), followed by Akola market (69475.99) and the lowest in the Murtijapur market (38614.12). The value Coefficient of variation of arrivals for Pigeon pea during the study period were observed 38.84 per cent, 58.75 per cent and 86.29 per cent Akola, Murtijapur and Akot, respectively. The maximum Coefficient variation observed in Akot market because Standard deviation observed in Akot APMC highest comparatively Akola and Murtijapur market.

Marketwise monthly seasonal indices of arrivals of Pigeon pea (2019-20)

Among the selected markets the highest arrivals were in the month of February (396.80 per cent) in Akola market followed by Akot market (282.81 per cent) and Murtijapur market showed highest in the month of June (248.43 per cent) followed by October (200.11 per cent), whereas the lowest arrivals in the month of November (4.37 per cent) in Akot APMC market

Mean, Standard Deviation, and Coefficient of Variation of arrivals of Pigeon pea(2019-20)

It was observed that mean arrivals of Pigeon pea during period was high in Murtijapur market 37613.16 quintals. Followed by Akola market 15342.58 quintals and lowest in the Akot market 6787.58 quintals. The Standard deviation was highest in the Murtijapur market (24913.80), followed by Akola market (17889.77) andlowest in the Akot market (5963.93). The Coefficient of variation of in arrivals of Pigeon pea, during the

study period was observed as 116.6 per cent, 66.28 per centand 87.86 per cent in Akola, Murtijapur and Akot markets, respectively

Seasonal indices of prices of Pigeon pea (2000-01 to 2019-20) Market wise yearly seasonal indices of prices (2000-01 to 2019-20)

The highest indices of prices of Pigeon pea were registered in the year 2015- 16 (241.13 per cent) in Murtijapur market, followed in 2015-16 (239.78 per cent) in Akola market. The lowest indices of arrivals were registered in the year 2001-02 (29.72 per cent) in Akot market.

Mean, Standard Deviation, and Coefficient of variation prices of Pigeon pea(2000-01 to 2019-20)

It was observed that, Mean of Pigeon pea during study period was highest in Akot market 3428.10 Rs per quintal, whereas Akola and Murtijapur APMC's showed prices as Rs 3357.20 and Rs 3152.60 per quintal, respectively. The results of Standard deviation showed that highest Standard deviation was recorded in Akola (1714.75) and Akot (1664.20) while lowest Standard deviation was recorded in Murtijapur (1547.38) APMC.

The Coefficient of variation in prices of Pigeon pea, during study period was observed that 51.07 per cent, 49.08 per cent and 48.54 per cent for Akola, Murtijapur and Akot, respectively. The maximum variability observed in Akola market..

Market variation monthly seasonal indices of prices of Pigeon pea (2019-20)

Among the selected markets the highest prices were in the month of October (130.76 per cent) in Akot market followed by Akola market (123.55 per cent) and Murtijapur market showed highest in the month of June (122.43 per cent) followed by July (119.07 per cent), whereas the lowest prices in the month of March (84.44 per cent) in Murtijapur APMC market.

Mean, Standard deviation, and Coefficient of Variation of prices of Pigeon pea(2019-20)

Akot market recorded highest Mean for prices (Rs. 5204.06) followed by Akola market (Rs. 5058.50) and lowest Mean indicated in Murtijapur market (Rs. 3691). The results of Standard deviation showed that highest Standard deviation was recorded in Akot market (562.82), while lowest Standard deviation in Murtijapur market (451.76) followed by Akot market (562.82).

The Coefficient variation for prices of Pigeon pea, during study period was observed as 12.23 per cent, 10.90 per cent and 10.81 per cent Murtijapur, Akola and Akot, respectively.

Correlation between arrival and prices of Pigeon pea 2000-01 to 2019-20

The degree of relationship between yearly market arrival and prices of Pigeon pea was studied by computing Pearson's coefficient of correlation analysis. It was observed that in positive correlation between prices and arrival in Akola (0.75) and Akot (0.57) markets. However, these correlation coefficients were statistically significant at one percent level of significance. However, in Murtijapur market, (0.42) the correlation between arrival and prices was indicated statistically positive. This positive and significant Correlation coefficient was attributed to the off-season supplies of Pigeon pea, which fetched higher prices.

Monthly Correlation between arrival and prices Pigeon pea 2019-20

The degree of relationship between monthly market arrival and prices of Pigeon pea was studied by computing correlation analysis. Results indicated the negative correlation between prices and arrivals in Akola and Akot market. However, these Correlation coefficients were statistically non significant. Whereas, in Murtijapur Market, the correlation between arrivals and prices was positive and statistically non-significant. This negative and non-significant Correlation coefficient could be attributed to the off-season supplies of Pigeon pea, which fetched lower prices.

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Income and Employment Generation of Milk Producers in Vidarbha Region of Maharashtra State

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ABSTRACT

The study was conducted in the Vidarbha region of Maharashtra State to examine the income and employment generation through the operation and management of dairy activities in milk production. Vidarbha region was purposively selected due to its relatively low milk production and productivity as compared to other parts of the state. in the of The Bhandara and Yavatmal districts from the Vidarbha region of Maharashtra State were surveyed to provide the data from 210 milk producrs. There were 52.38 percent small herd milk producers, 32.38 percent medium herd milk producers, and 17.62 percent large herd milk producers. The income and employment generation from dairying activities was estimated by using tabular methodology. Women in households with a small herd size generate 71.53 mandays per year, while men in the same category generate 94.90 mandays. At the same time, a household with a medium-sized herd will generate 104.90 man-days for women and 130.90 man-days of labour men. The large herd size group of dairy producers generates 325.30 mandays of employment per year per household, with men contributing more (171.60) than women (117.30). The buffalo produced the highest average income from the big herd size category, which was Rs.94778.18, followed by the small and medium herd size categories, which generated Rs.91834.92 and 88019.03 respectively.

Key words - Income, milk producer's, dairy farmers, Employment

INTRODUCTION

India's dairy industry has grown substantially after the beginning of Operation Flood in the 1970. In 2018–19, India produced 387 grammes of milk per person, per day, a rate of rise that well outpaced the country's average recommended dietary allowance for milk. Milk production in India is increasing at a growth of over 5 percent annually and has the potential to increase at an even higher rate for a long time because the productivity of India's milch animals is notably low in most of the country's states. Enhancing productivity and moving towards a food system approach should be the future focus of milk production expansion efforts.

Dairy expansion would benefit the country by increasing milk output, ensuring a steady supply to urban areas and milk processing units, and providing rural areas with new oppotunities for employment and economic growth through income generation. In addition to supplying technological inputs and services, the dairy industry is also tasked with encouraging farmers to raise high-yielding milch animals in order to increase overall production. Increased human labour absorption and higher revenue to rural households may also result from better care and management for high-yielding milch animals. Therefore, the present study was conducted to examine the income and employment generated by milk producer through dairy farming in the Vidarbha region of Maharashtra.

METHODOLOY

EMPLOYMENT

It was studied with the help of tabular analysis using averages and percentages. The total actual time spent in different activities per day was converted into man days by assuming eight working hours. So, for the present study ,one day work of women labour is taken as equivalent to 0.67 man day (3 women = 2 men). Similarly, child (both girl and boy) labour was considered equivalent to 0.5 man day (4 children = 2 men). In this way, number of hours per day in different types of activities were calculated and aggregated to work out the gender wise labour utilization in dairy operations.

INCOME

It was worked out by adding the value of milk and imputed value of dung produced by milch animals in the sample household.

Gross Income = (Quantity of milk × Prevailing price of milk + Quantity of dung × Price of dung).

RESULT AND DISCUSSION

Employment Generation

Human resources is a crucial input for executing various dairy tasks and accounts for approximately one-fifth of the overall cost of milk production in rural regions (Singh and Chauhan, 2015). This necessitates the participation of men, women, and children in the different operations and activities of dairy farming that generate employment. It has been analyzed and studied how milk producers with varying herd sizes utilize labour per day to accomplish a variety of operations in their dairy farming. The average yearly labour requirement in man-days for dairy farming has been estimated for the household sample of the study region. The annual employment generated by milch animals in various herd size categories and each milk cow was analyzed.

The study concluded that buffalo was the most important factor in generating employment in dairy farming, followed by Crossbred cows. Producers with local cows tend to produce less milk, reducing the number of available dairy farming jobs. Women in households with a small herd size generate 71.53 mandays per year, while men in the same category generate 94.90 mandays. At the same time, a household with a medium-sized herd will generate 104.90 man-days for women and 130.90 man-days of labour men. The large herd size group of dairy producers generates 325.30 mandays of employment per year per household, with men contributing more (171.60) than women (117.30). The overall employment generated with an increasing trend as the number of milking animals increased. Pant and Sharma (1995) and Sharma and Sharma (2004) made similar observations in their study of the semi-arid region of Rajasthan.

Table .1. Labour-use by members of households across different herd-size categories

(human-days/ household / annum)

Herd-size category	Members			
	Men	Women	Children	Total
Small (1-2)	96.14 (53.57)	73.67 (40.53)	11.78 (10.04)	181.59 (100)
Medium (3-4)	132.38 (51.37)	116.47 (41.18)	17.22 (7.43)	266.07 (100)
Large (5 and above)	182.76 (52.74)	132.08 (36.05)	39.12 (11.20)	353.96 (100)
Average	137.09 (52.52)	107.41 (38.83)	22.71 (8.65)	267.21 (100)

Note: Figures within the parentheses indicate the percentage in respective totals

An examination of the proportion of work done by men, women, and children within a household indicated that the proportion of work done by women in dairying activities was higher than that done by men. It was discovered that women make the most significant contribution to the labour used in the dairying activities. An examination of the utilization of family labour in various activities of dairy firm was carried out. This examination focused on men, women, and children. It was discovered that the most time spent was 0.56 hours of men and 0.65 hours of women each day in carrying fodder from the fields.

This discovery was consistent with Meena's past research, which she had conducted (2008). The women spent their in preparing dairy products such as curd, khoa, etc. was 0.31 hours per day. It was discovered that women spent an additional 0.59 hours each day selling milk because they had to personally transport their milk to milk collection facilities to sell it. It was discovered that children were involved in all dairy activities to some extent, except milking.

Table 2. Average labour-use in different activities in dairy enterprise across herd-size categories
(hours/ day)

Particulars of operations	Members			
	Men	Women	Children	Total
Bringing fodder	0.56	0.67	0.13	1.35
Chaff cutting	0.19	0.26	0.07	0.52
Feeding	0.24	0.38	0.14	0.76
Grazing	0.45	0.34	0.09	0.88
Giving water	0.24	0.32	0.14	0.70
Cleaning cattle shed/ animals	0.25	0.29	0.11	0.65
Health care	0.09	0.05	0.00	0.14
Milking	0.45	0.34	0.00	0.79
Making milk products	0.06	0.29	0.00	0.34
Marketing of milk and milk product	0.17	0.34	0.09	0.63
Miscellaneous works	0.31	0.26	0.16	0.73
Total time spent	3.00	3.50	0.93	7.43

Income generation

The average size of milking animals generated an overall gross revenue of around Rs 212076.29 per household on an annual basis. This amount was highest for household with a large number of bovine population of Rs. 381857.39, and it was lowest for small herd size population of Rs. 142286.92.With reference to the various species of milch bovines, the buffalo produced the highest average income from the big herd size category, which was Rs.94778.18, followed by the small and medium herd size categories, which generated Rs.91834.92 and 88019.03 respectively. It's possible that the higher milk yield and higher fat content in buffalo milk, which ultimately led to a larger revenue, as compared to other species of milch bovines.

In aggregate terms, the average income from crossbred cow milk production was highest in the medium herd size group, which was around Rs 58647.72. This was followed by the large and small herd size categories, which were Rs.55796.36 and Rs.52881.82 respectively.

The poor performance of local cows is reflected in the local cows' milk milk production. The income earned from small herd size category was approximately Rs 14903.15, followed by medium and large herd size category incomes of Rs 13014.61 and Rs.12528 respectively. It has also been reported by Dixit (1999), Bardhan et al. (2004), and Singh et al. that the local cow milk production has a negative net return (2004).

Table:3 Average income generation by milch bovine on different herd size categories of sample household
(Rs./ animal /annum)

Particulars of milch bovines	Herd Size category		
	Small	Medium	Large
Local Cow	17562.62	13729.79	12816.00
Crossbred Cow	48432.00	58882.76	67449.35
Buffalo	87314.29	92681.74	95897.87
Overall income	153308.91	165294.29	176163.22

The negative performance of local cow is reflected in the negative net returns; nonetheless, the assertion should not be made too strongly. The low milk production of these cows was a major contributor to this predicament. These animals are an integral part of the farming system as a whole, thus that must be kept in mind. So, local farmers continue to raise cows for draught power and extra cash. It is not acceptable to just accept the low output of local animals without making any effort to improve their breeding, feeding, and management.

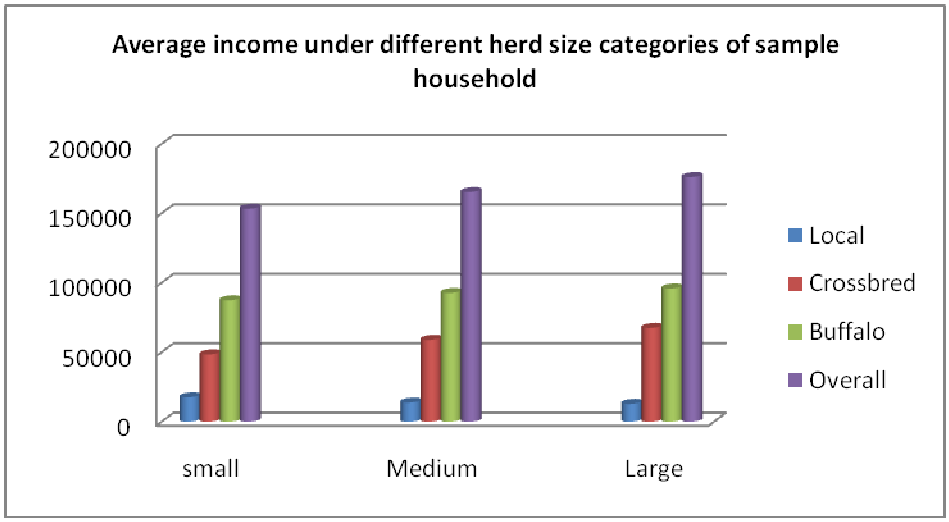

Figure :1 Average household income per annum different herd size category

CONCLUSIONS

The foregoing explanation makes it clear that milk producers in the Vidarbha region of Maharashtra have witnessed successful financial returns from their dairy farming business. The employment of people and the money they earn are two factors that will boost economic expansion. As a result, dairy industries and dairy cooperatives are viewed as a more reliable means of support for bovine keepers' families, as they provide more opportunities for productive employment. The research concluded that the area's economic growth would be best served by a larger infusion of milk producers, and recommended that measures be implemented to this end.

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An Economic Analysis of cow dung based Vermicompost production and Marketing in Gothan under Godhan Nyay Yojna in Jashpur District of Chhattisgarh

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ABSTRACT

The study is based on an Economic Analysis ofcow dung based vermicompost production and marketing in Gothan under Godhan Nyay Yojna in Jashpur District of Chhattisgarh. In this research 3 model gothan and 3 non model gothan for the study were selected. And analyzed the cost and returns and marketing pattern of cow dung based Vermicompost in Jashpur district of Chhattisgarh. The total cost per kg of Vermicompost produced in the Non-Model Gothan was 6.32 Rupee, and the Model Gothan had the total cost per kg 5.69 Rupee. The total cost of Vermicompost production in non model was more than the total cost of Vermicompost production in model Gothan.Vermicompost overall production cost per kg was Rs. 6.00 Rupee. Model Gothan net income was Rs. 4.31, and Non-Model Gothan Net Income was Rs. 3.68. The overall Net Income was Rs. 4.00 per kg. And The Overall Input-Output Ratio was 1:1.66.andVermicompost majorly sold to farmer throughCooperative Society from the selected Gothans.

Keywords: *Total cost, gross income input-output ratio, cow dung based vermicompost, Gothan, Godhan Nyay Yojana.*

INTRODUCTION

The Godhan Nyay Yojna (GNY) scheme has only been running for around three years. The Hon'ble chief minister of Chhattisgarh, Shri Bhupesh Baghel, launched it on July 21, 2020. Indeed, the plan was novel in its application of collected cow dung to the production of organic manure. Chhattisgarh GNY Scheme currently pays Rs. 2 per kilo gramme for excrement. The Gothan is where cow manure is bought and sold. Godhan Nyay's plan to integrate traditional tribal economies with global markets is noteworthy. Compost biogas and biomass generation would both benefit from the use of organic manure made from cow manure.

Since it contains organic matter, cow dung can be used as a chemical fertilizer alternative (Garg and Kaushik 2005; Yadav et al. 2013; Belanger et al. 2014) and as a soil conditioner (Yadav et al. 2013). To promote the use of organic fertilizer and discourage the use of chemical fertilizer, Women Self-Help Group (WSHG) members collect cow dung from Gothan and make it into vermin-compost, which is then supplied to farmers at a price of 10 rupees per kilogramme. Dung is used to create many different things, including organic fertiliser, diyas (clay lamps), vases, idols, bags, and so on.

The farming community of the country would greatly profit from this plan if it were adopted on a nationwide scale. The world's largest herd of cattle is located in India, followed by Brazil and the United States. About 65% of the world's cattle are located in India, Brazil, and the United States, according to the 2020 World Cattle Inventory Ranking of Countries. Approximately 30.70 percent of the world's animal population lives in India.

METHODOLOGY

Chhattisgarh state consists of 33districts in total of which the district of Jashpur was randomly selected for the study. Out of the entire 8 blocks in

Jashpur district, Bagicha block has the highest number of gothans; hence, Bagicha block was purposefully selected. Selected Gothans were divided into two categories. Model Gothan and Non -Model Gothan. In which 6 Gothans were selected, in that 3 Modal Gothans (Jurgum, Pandrapath, and Kurrong), or 3 Non-Modal Gothans (Ghughri, Bimda, and Pasiya Gothan) were taken.

Collection of Data

Primary data were collected from selected respondents through personal interview methods with well-designed interview schedule to meet the different objectives of the study. Secondary data were collected from various public sources, including government agencies and offices including the Department of Agriculture and Horticulture and official websites.

Analytical Tools

Cost concept:

1. **Total cost**
   Total cost = Total Fixed Cost + Total Variable
2. **Profitability Concepts**

A. Gross Income
It is defined as total value of main product Gross Income =Physical Production × Price/kg and the same is expressed in rupees/kg.

B. Net Income
Total Cost Value deducted from gross margin called Net Income.
Net Income= Gross Income – Total Cost and the same expressed in rupees/ qtl.

C. Input –Output Ratio (IO Ration)
Input –Output Ratio =Gross Income/Total Cost

Marketing channel

A marketing channel is a set of interdependent organizations/marketing agencies involved in the process of marketing of product or processed products as identified in the selected Gothan.

RESULTS AND DISCUSSION

Cost and returns of Vermicompost Production

The cost and return of Vermicompost are shown in Table 1.The table clearly shows that the Non-Model Gothan had the total cost per kg of Vermicompost production 6.32 Rupee and the Model Gothan had the total cost per kg of Vermicompost 5.69 Rupee.The total cost of Vermicompost production in non model was more than the total cost of Vermicompost production in model Gothan.Vermicompost overall production cost per kg was Rs. 6.00 Rupee.

According to table1.The cost of cow dung was on average the highest, amounting to Rs. 4.3 (71.66%), followed by the cost of culture at Rs. 0.75 (12.5%), the cooperative bank commission fee at Rs. 0.5 per kg (8.33%), the cost of packging at Rs. 0.435 (7.25%), and the cost of jute bags at Rs.0.02 (0.33%).

The average returns from producing Vermicompost are shown in Table No.2 As far as we know the government set the price of Vermicompost at Rs. 10 per kg Model Gothan had the net income at Rs. 4.31, while Non-Model Gothan had the net income at Rs. 3.68. The overall Net Income was Rs. 4.00 per kg.Input-Output Ratio is represented by the ratio of gross income to total costs, which was high in model Gothan 1:1.75 and low in non-model Gothan 1:1.58. The Overall Input-Output Ratio is 1:1.66.

Table 1.Cost of Vermicompost Production (Rs. / kg)

Particular	Model Gothan		Non – Model Gothan		Overall	
	Qty	Value	Qty	Value	Qty	Value
Cow Dung (2 Rs./Kg)	2	4 (70.29)	2.3	4.6 (72.79)	2.15	4.3 (71.54)
Culture(250 Rs./Kg)	0.003	0.75 (13.18)	0.003	0.75 (11.87)	0.003	0.75 (12.48)
Jute Bag (0.21Rs./Piece)	1	0.02 (0.35)	1	0.02 (0.31)	1	0.02 (0.33)
Cooperative Society/ Bank Commission @ 5%	0.5 (8.79)		0.5 (7.91)		0.5 (8.31)	
Packaging Cost	0.42 (7.39)		0.45 (7.12)		0.44 (7.32)	
Total Cost	5.69 (100)		6.32 (100)		6.01(100)	

Table 2 Total Cost, Gross Income and Net Return of Vermicompost production

S .No.	Particular	Model Gothan	Non- Model Gothan	Overall
1.	Total cost (Rs.)	5.69	6.32	6.01
2.	Production (kg.)	1	1	1
3.	Gross income (Rs./kg)	10	10	10
4.	Input – output ratio	1:1.75	1:1.58	1:1.66
5.	Net income (Rs./kg)	4.31	3.68	3.99

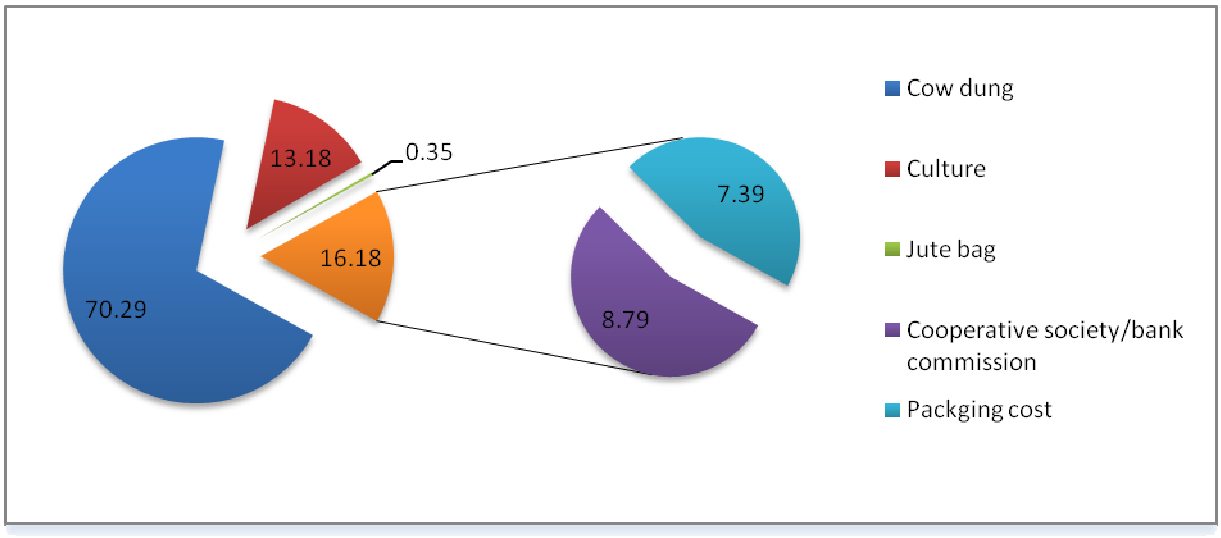

Fig 1:Cost of Vermicompost Production under Model Gothan

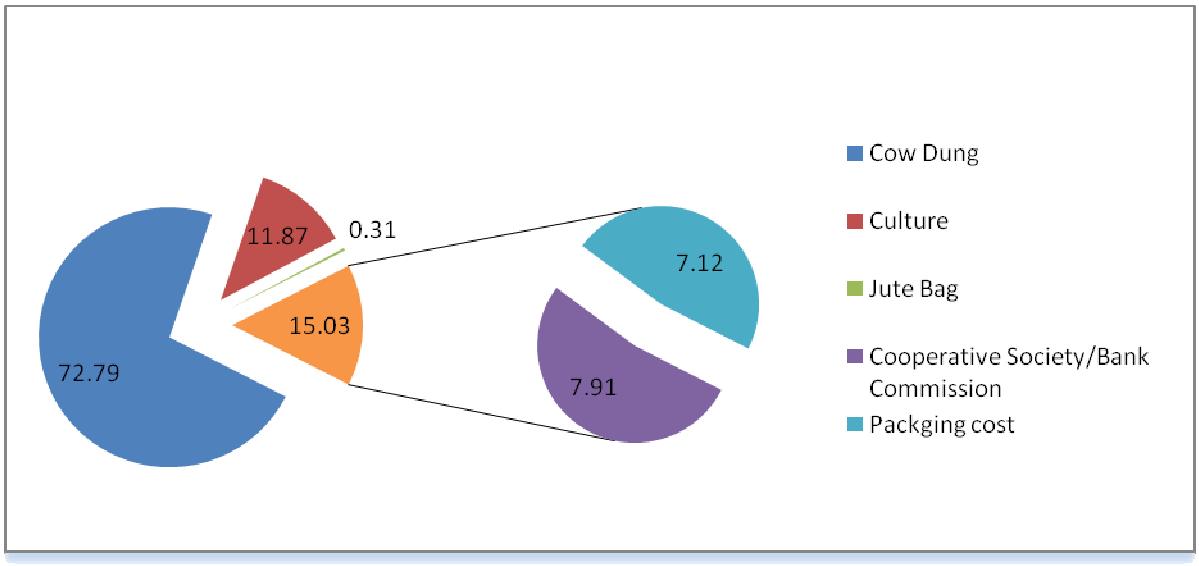

Fig 2: Cost of Vermicompost Production under Non Model Gothan

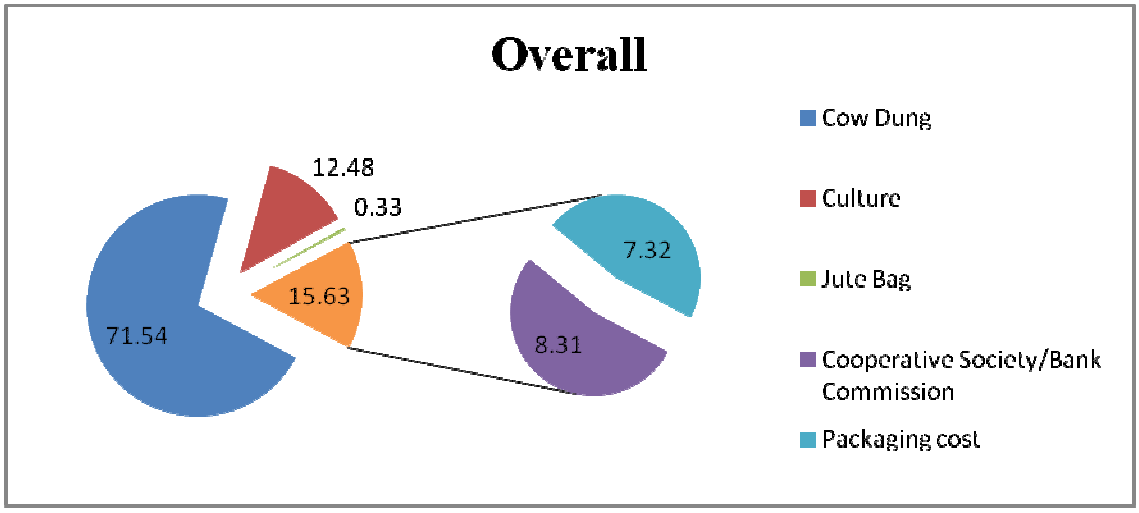

Fig 3:Cost of vermicompost overall

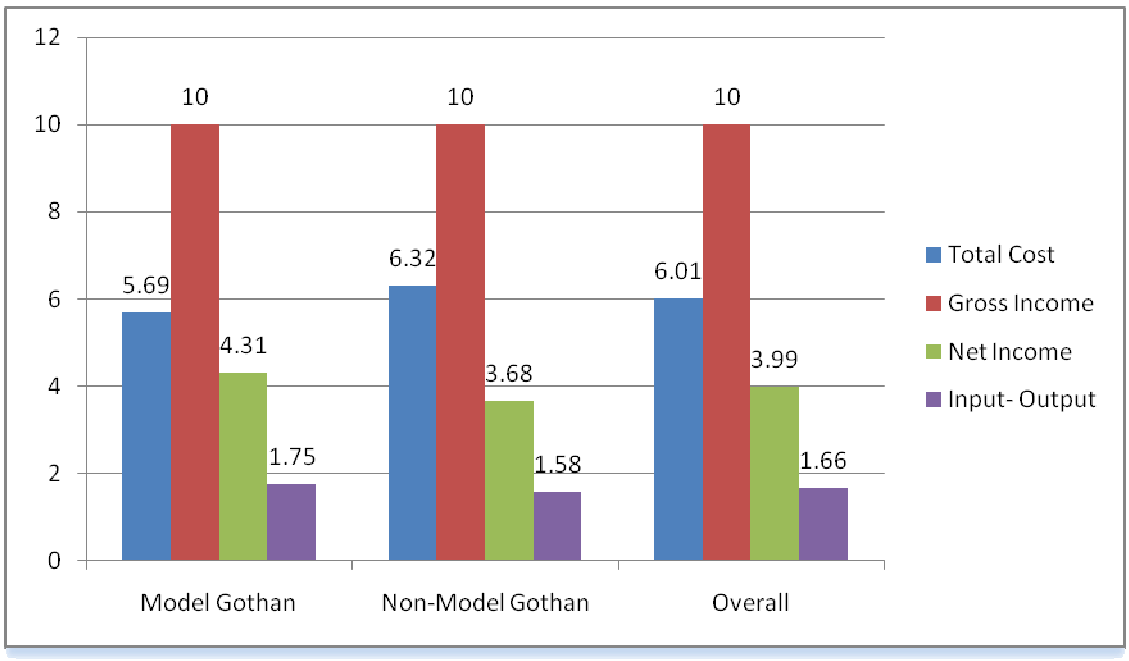

Fig 4: Total Cost, Gross Income and Net Return and Input –Output Ration of Vermicompost Production.

Marketing of Vermicompost

The current wholesale price of vermicompost is 10 Rupees per kilogramme, as decided by the state government. In this plan, Gothans will not be selling their produce directly to the farmers. Vermicompost is produced and distributed through cooperative societies. The Primary Agricultural Credit Cooperative Society (PACS) and the Large Size Multipurpose Society in tribal areas provide short-term crop loans to farmers, and the value of the loan must account for the inputs that are provided.(LAMPS).

Marketing Channel

SHG ⟶ **Cooperative Society (PACS & LAMPS)** ⟶ **Consumer**

CONCLUSIONS

The current research was conducted in order to do an economic analysis of the production and selling of cow dung-based vermicompost in Gothan, which is part of the Godhan Nyay Yojana in the Jashpur district. The study found that the price of vermicompost produced by non-model Gothans was more expensive than that produced by Model Gothans. The Model Gothan produced the highest net income, while the Non-Model Gothan produced the lowest, and the Vermicompost produced by the selected Gothans was primarily marketed to farmers through cooperative societies.

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Disposal Pattern of Rose in Pune District of Maharashtra: An Economic Analysis

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ABSTRACT

Rose is cultivated in open field as well as in protected cultivation. In India having diverseclimatic condition which supported to the more and more floriculture production. The study was conduct in the Pune district ofwestern Maharashtra. A total of 30 polyhouses were selected, and theiroperation was taken into consideration for the years 2021-2022.In the case of the disposal pattern of rose, a negligible amount of product was consumed forfamily consumption, gifts to relatives, and as kind wages. Most products (99.34%) are sold in the market through various channels. There were three major marketing channels observed in the study area that were preferred by growers, namely, Producer–CommissionAgent-Wholesaler-Retailer-Consumer(Localmarket), Producer–Commission Agent-Wholesaler-Retailer-Consumer (Distant market), Producer–Exporter agency. The highest quantity was disposed of through channel I(63.20%) followed by channel II(28.06%) and channel III(8.20%) respectively.

***Key words**: Rose, marketing cost, marketing channel.*

INTRODUCTION

Agriculture and horticulture are rapidly emerging and lucrative sector for changing age-old subsistence farming practices, particularly in rainfed, dry lands, hills,arid, and coastal agro-ecosystems. Horticultural crops provide us with high productivity, higherbenefits, greater employment potential, less water requirement, and easy adaptability to adversesoil conditions. The aesthetic value of flowers and ornamental plants, their use in community events,overall gratification in working with them and high revenue making power are attracting modern entrepreneurs to invest money in the floriculture industry. The demand for floras and ornamental plants for different needs like religious, official ceremonies ,parties, house ornamentation, marriages, memorials, etc. is rising.

The rose, also recognized as *Rosa* spp. in botany, rose, acclaimed as the queen of flowers,is undoubtedly one of the utmost beautiful of nature's creations. Rose is cultivated in open field as well as in protected cultivation. In India having diverseclimatic condition which supported to the more and more floriculture production. Floriculture is fastest growing industry and in India marginal farmer aresuitableto productionofflower whichhas considerable demandin world market. The Indian floriculture industry produces flowers like roses, tuberoses, anthuriums, carnations, marigolds, etc. In addition to poly and greenhouses, open farm environments are alsoused for farming. In 2021–2022, India exported floriculture goods worth a total Rs. 771.41 crores(or $103.47 million) (APEDA). United States, Netherlands, Germany, United Kingdom, UnitedArab Emirates, Canada and Italy were the leading importers. In India, there are more than 300units cantered on exports. The four states of Tamil Nadu, Madhya Pradesh, Andhra Pradesh and Karnataka produce more than 50 per cent of the products used in floriculture. The Indian floriculture industry is poised to increase its share of global trade thanks to the technical associations from foreign companies.

METHODOLOGY

The study was conduct in the Pune district ofwestern Maharashtra because flower cultivation in polyhousesis becoming a new venture there. Pune district has the highestconcentration of polyhouses out of the six districts in westernMaharashtra. A total of 30 polyhouses were selected, and theiroperation was taken into consideration for the years 2021-2022. With the aid of a schedule specifically created for roseflowers grown in polyhouses, information was gathered fromthe selected polyhouse owners on

different aspects. The data was analysed that used tabular analysis to determine disposal of rose flower.

Selection of grower

A sample of 30 polyhouse rose growers was selected randomly from three selected tahsils on the basis of area under hi-tech rose production in polyhouses. The rose growers were grouped into three categories, namely small, medium, and large growers on the basis of area under hi-tech rose cultivation.

Table 1 Distribution of sample of rose cultivators

Category	Area (Ha)	Number of sample selected
Small	0-0.10	10
Medium	0.10-0.20	10
Large	>0.20	10

RESULTS AND DISCUSSION

Average cost of marketing

The table2 reveals that the primary cost component at overall level was commission, which attributed for Rs. 786769 (36.71%) of the total marketing expense. Transport cost was the next significant cost Rs.730004 (34.06 per cent) followed by cost incurred by grading andpackagingRs.595952(27.80%) and other charges Rs.30332(1.41%). Additionally, the marketing expenses for various size groups of farms were examined separately.

Table 2Average cost of marketing (Rs. Sets of flowers)

Sr.No.	Particular	Size of farm			
		Small (N=10)	**Medium (N=10))**	**Large (N=10)**	**Overall (N=30)**
1.	CostofGradingandpackaging	480590 (29.24)	528836 (31.19)	733263 (24.57)	595952 (27.80)
2.	CostofTransportation	445022 (27.08)	404136 (23.83)	1337381 (44.81)	730004 (34.06)
3.	Commissionsoftheagent	689388 (41.95)	732912 (43.22)	882638. (29.57)	786769 (36.71)
4.	Othercharges	28166 (1.71)	29716 (1.52)	31061 (1.04)	30332 (1.41)
	Total cost	**1643167 (100.00)**	**1695601 (100.00)**	**2984343 (100.00)**	**2143058 (100.00)**

(Figures in the parentheses indicates percentage to total cost)

The marketing costs for various products in various size groups of farms, however, didnot vary significantly. From table 2, it reveals that the cost of commission agents for small,medium, and large size groups of farms were Rs. 689388 (41.95%), Rs. 732912 (43.22%) and Rs. 882638 (29.57%), respectively. In respect of transportation cost it was Rs. 445022(27.08%),Rs.404136(23.83%) and Rs.1337381(44.81%) for small, medium, and large size groups of farms respectively. Similarly, grading cost was Rs.480590 (29.24%), Rs.528836(31.19%)andRs.595952(27.80%)for small, medium and large group respectively.

In the case of the marketing of products, most of the growers marketed their productsthrough the commission agent. Small and medium-sized groups sell their products in their localmarket, whereas large groups sell it in distant markets. It is seen from table that marketing costfor rose more in large size group as compare to other two groups. Other marketing charges were negligible as compared to others operations charges incurred.

Disposal pattern of rose

To know the quantity of farm produce marketed as well as used for home consumption, the disposal pattern per farm was studied, and the results are presented in Table 3.

It was observed from Table 3 that the total production of roses at the overall level was 29718 sets, of which 99.34 per cent of the produce was sold

in the market and a negligiblequantity, i.e., 0.16 per cent (48 sets), was kept for family consumption, 0.22 per cent (66 sets) was given as a gift to relatives, and0.27 percent(81 sets), etc.

Table 3Perfarm disposal pattern of rose (No.of sets/farm)

Sr. No.	Particular	Small	Medium	Large	Overall
1.	**Total quantity produced (Sets)**	**11360 (100.00)**	**21550 (100.00)**	**56245 (100.00)**	**29718 (100.00)**
2.	**Disposal**				
a)	Family consumption	25 (0.22)	41 (0.19)	80 (0.14)	48 (0.16)
b)	Gift to relative	30 (0.26)	52 (0.24)	116 (0.21)	66 (0.22)
c)	Kind wages	39 (0.34)	62 (0.29)	140 (0.25)	81 (0.27)
d)	Sold in market	11266 (99.17)	21395 (99.28)	55909 (99.40)	29524 (99.34)

The total production of rose flowers in the small group was11360 sets, out of which 99.17 per cent was sold in the market, a negligible quantity, i.e., 0.22 per cent (25 sets), was keptfor family consumption, 0.26 per cent (30 sets) was given as a gift to relatives, and 0.34 per cent(39 sets) was given as a kind wage. The total production of roseflowers in the medium group was 21550 sets, out of which 99.28 percent was sold in the market, a Negligible quantity, i.e., 0.19 per cent (41 sets), was kept for family consumption, 0.24 per cent (52 sets) was gifted to relatives, and 0.29 per cent (62sets) was given as kind wages. The large group produced a total of 56245 sets of rose flowers, of which 99.34 per cent were sold in the market, a negligibleamount, or 0.14 per cent (80 sets), were kept for family consumption, 0.21 per cent (116 sets) were given as gifts to relative, and 0.25per cent (140sets) were given as kind compensation.

Channel-wise disposal pattern of rose

Agricultural products transfer from producers to consumers through marketing channels.The various functionaries who assist these movements throughout the entire marketing systemwere involved in the entire process. In order to dispose of the farmers' produce, marketing channels are crucial. The selection of sales channel had a significant impact on both the proportionate but also absolute share of the producers in the consumer's rupee. To evaluate themarket's structure and performance and to suggest potential improvements to the current system, it was crucial to study these channels.

The availability of different modes of transportation, the distance and location of markets, the price of the produce, the cost of transportation, the quantity that can be sold, and thefarmers' financial circumstances all have an impact on the farmers' decisions regarding agency for the sale of roses. Three marketing channels were used by a few farmers to market their roses:

i)Producer–CommissionAgent-Wholesaler-Retailer-Consumer(Localmarket)

ii)Producer–CommissionAgent-Wholesaler-Retailer-Consumer(Distantmarket)

iii)Producer–Exporteragency

The distribution of producer farmers adopting different marketing channels in the sale of their roses was presented in table 4.The purchase of the rose was undertaken by the commission agent at the local market. The data in the table shows the relative importance of the different agencies in the over all marketing system.

The table 4 reveals that per cent respondent farmers disposed off their produce through the commission agent. Table also depicts that 55976 sets (63.20 %) of the marketedsurplus of different farm size groups was purchased by the commission agent and marketeddirectly to wholesalers at flower markets inside the Maharashtra state, and the remaining 25332sets(28.60%)was marketed at flower markets outside the Maharashtra state, such as NewDelhi, Jaipur, and Guwahati.

Table4 Disposal of cut roses through different channel

Sr. No.	Marketing Channel	Qty.(Average no. sets disposed)	Percentage of produced disposed	No. of farmer engaged
1.	Producer–Commission Agent-Wholesaler -Retailer-Consumer (Local market)	55976	63.20	20
2.	Producer–Commission Agent-Wholesaler- Retailer- Consumer (Distant market)	25332	28.60	10
3.	Producer– Exporter agency	7262	8.20	10

It is concluded from table 4 that the commission agent played a significant role in the marketing of roses, both in terms of the number of farmers who utilised it and the quantity of roses sold through this agency. This might be because they provided immediate payment for the produce and covered all marketing expenses (such as grading cost, transportation cost and packaging cost etc.). The seasonal market demand for roses is another factor that affects price fluctuations. The study also revealed that small and medium-sized farmers in the local market sell their produce through commission brokers. When large group of farmers sell their produce to export organisations during the winter (January and February), when demand is high in Europe and the global market, and also, they are engaging in business with distant markets through the commission agents.

CONCLUSIONS

At the overall level, the total marketing cost for hi-tech rose farm was Rs. 2143058. where the commission agent's charge varies from 29.57 per cent to 41.95 per cent in different groups. The cost of grading and packaging ranges from 24.57 to 29.24 per cent and the cost of transportation accounted for 27.08 to 44.81 per cent in the size of the group. All the marketing charges generally increase as the size of the group increases. In the case of the disposal pattern of rose, a negligible amount of product was consumed forfamily consumption, gifts to relatives, and as kind wages. Most products (99.34%) are sold in the market through various channels. There were three major marketing channels observed in the study area that were preferred by growers, namely, Producer–CommissionAgent-Wholesaler-Retailer-Consumer(Localmarket), Producer–Commission Agent-Wholesaler-Retailer-Consumer(Distant market), Producer–Exporter agency. The highest quantity was disposed of through channelI (63.20%) followed by channel II(28.06%)and channel III(8.20%)respectively.

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Indian Budget and Agriculture

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ABSTRACT

Budget is an estimate of income and expenditure for a set period of time.. A government budget is an annual statement of the estimated receipts and estimated expenditure of the government during a time period. Time Period - Generally a fiscal year. In India fiscal year is taken from 1st April to 31st March. Surplus budget and balanced budget is one type of hypothetical myth in the universe right now. There is no such country which is following the policy of surplus and balanced budget. India follows the policy of deficit budget. The Indian budget expenditure has shown some irregularity in funds allocation since 2013. Total funds allocated was Rs. 16,65,297 crores in 2013-14 which was decreased by 7.79 per cent in the next year 2014-15. The total funds allocated in 2023-24 is Rs. 45,03,097 crore which is 14.15 percent of 2022-23. Indian budget expenditure is somewhat irregular over the years since 2013 but expenditure incurred to the agricultural sector is somewhat constant and wondering in between 9 to 11 percent of total budget expenditure since 2013 to 2023.

Keywords: *Surplus and balanced budget, Revenue Receipts, Revenue Expenditures*

INTRODUCTION

Surplus budget and balanced budget is one type of hypothetical myth in the universe right now. There is no such country which is following the policy of surplus and balanced budget. The Indian budget expenditure has shown some irregularity in funds allocation since 2013. Total funds allocated was Rs. 16,65,297 crores in 2013-14 which was decreased by 7.79 per cent in the next year. The funds allocation went negative of – 0.97 percent in 2015-16 as compared to the previous year allocation. First time the allocation showed galloping high of about 34.34 per cent in the 2018-19 compared to 2017-18.

Objectives of the budget: Generally budget is prepared with an major point of view like; reallocation of resources, to reduce inequalities in income and wealth, management of public enterprises, to achieve economic growth and stability, to reduce regional disparities.

METHODOLOGY

The study is carried out on the basis of secondary data available on website of Indian budget. Union Budget Expenditure of India from the year 2013-14 to 2023-24 and provision to Agriculture sector over the years since 2013 to 2023 are depicted for the study. Types of budget are indicated as Surplus budget = Revenues more than expenditure. Means we have planned to get more in return than the expenditure that we have incurred, Deficit budget = Revenues less than expenditure. Means we are getting less in return as compared to the amount of money that we have incurred and Balanced budget = Revenues equals expenditures. Means we are getting exactly what we have incurred in the country for the society . Surplus budget and balanced budget is one type of hypothetical myth in the universe right now. There is no such country which is following the policy of surplus and balanced budget. India follows the policy of deficit budget.

Components of budget : Two main components ;

1) Revenue Budget: Revenue aspect of the government budget.

a) Revenue Receipts b) Revenue Expenditures

2) Capital Budget : Capital aspect of the government budget and it consists of: -

a) Capital Receipts b) Capital Expenditures

RESULTS AND DISCUSSION

Indian Budget

Defined by Article 112 of the Indian constitution and is also called “Annual Financial Statements(AFC)”. Indian budget is presented on 1st

February (until 2016, last working day of February). Presented by Finance Minister, in Parliament. The nodal agency to prepare budget is " Budget Division" of DEA (Dept. of Economic Affairs). Most importantly this financial bill has to be passed by Lok Sabha till 1st of April to come into effect (i.e before the start of financial year). And since 1947, total 73 annual budgets had come into effect (till 2022).

Table 1: Year wise Union Budget Expenditure of India (2013 to 2023) :

Year	Budget estimates (In Crores)	% increase/decrease over previous year
2013-14	16,65,297	11.70
2014-15	17,94,892	7.79
2015-16	17,77,477	**-0.97**
2016-17	19,78,000	11.28
2017-18	21,47,000	8.54
2018-19	29,20,484	**34.34**
2019-20	27,86,349	**-4.60**
2020-21	30,42,230	9.18
2021-22	34,83,236	14.50
2022-23	39,44,909	13.25
2023-24	45,03,097.45	14.15

The Indian budget expenditure has shown some irregularity in funds allocation since 2013. Total funds allocated was Rs. 16,65,297 crores in 2013-14 which was decreased by 7.79 per cent in the next year. The funds allocation went negative of – 0.97 percent in 2015-16 as

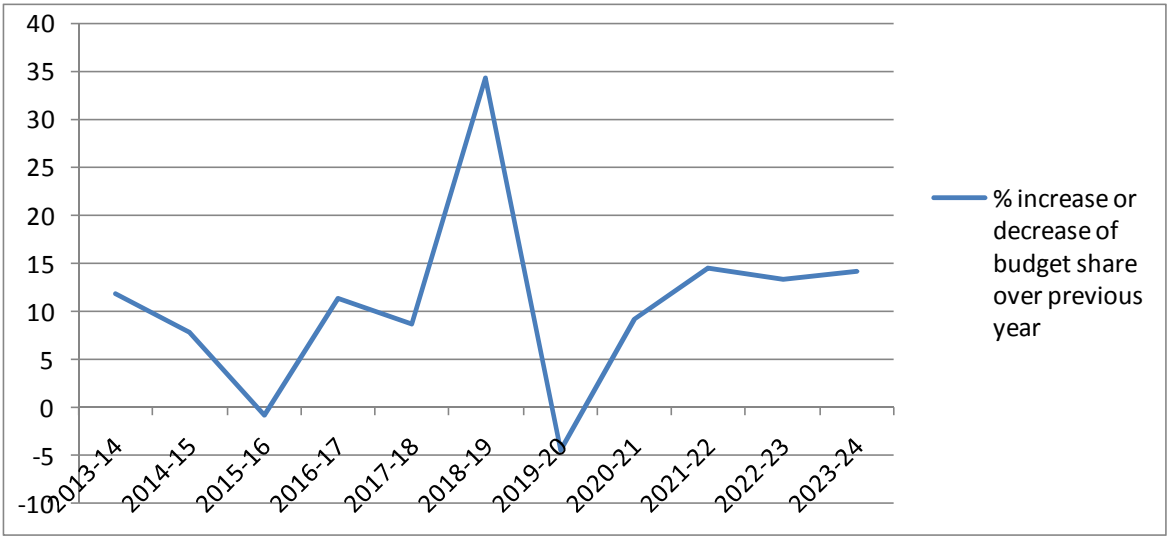
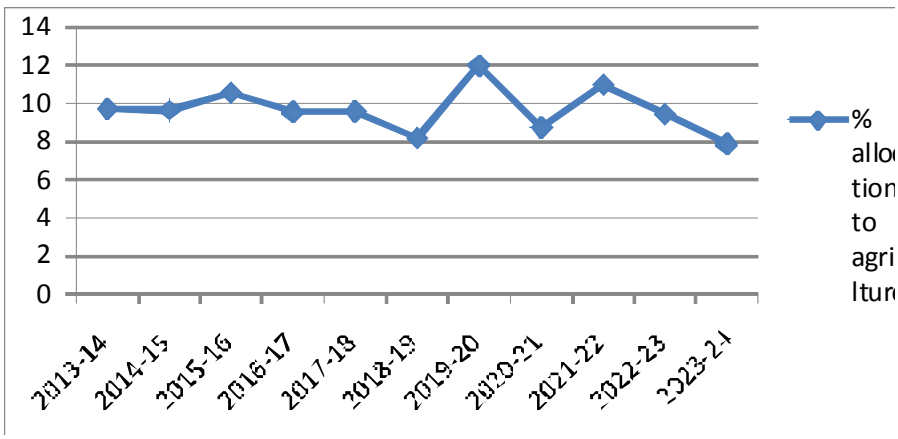


Table 2: Provision to Agriculture sector over the years since 2013 to 2023 :

Year	Total allocation	% allocation with respect to overall budget expenditure
2013-14	1,61,571.94	9.70
2014-15	1,73,073.69	9.64
2015-16	1,87,856.42	10.57
2016-17	1,88,562.01	9.53
2017-18	2,06,092.29	9.60
2018-19	2,39,882.00	8.21
2019-20	3,33,969.71	11.99
2020-21	2,65,418.35	8.72
2021-22	3,82,203.70	10.97
2022-23	3,70,678.50	9.40
2023-24	3,54,180.98	7.86

compared to the previous year allocation. First time the allocation showed galloping high of about 34.34 per cent in the 2018-19 compared to 2017-18. The possible reasons for this all time high might be era of financial inclusion in India and also during that period central government was looking after the financial stability of every states to curtail down the effects of GST implementation in the year 2017. Very soon in the next year in 2019-20, funds allocation again went negative by – 4.60 percent as compared to the funds of 2018-19. The total funds allocated in 2023-24 is Rs. 45,03,097 crore which is 14.15 percent of 2022-23.

The pattern of funds allocation to the agricultural sector is totally different as compared to overall budget allocation. Indian budget expenditure is somewhat irregular over the years since 2013 but expenditure incurred to the agricultural sector is somewhat constant and wondering in between 9 to 11 percent of total budget expenditure since 2013 to 2023. Budget provision to agriculture was Rs.1, 61,571.94 crores in year 2013-14 which was increased up to Rs.3, 54,180.98 crores in 2023-24. Provision in the budget to agriculture shown highest increase in terms of percent allocation was in year 2019-20 which was almost 12 percent (11.99) and in contrary it showed lowest decrease in allocation in the recent budget during 2023-24 which was only 7.86 percent (first time below 8 percent) of total budget amounting Rs.3, 54,180.98 crores.



Year wise Allocation to various allied sectors of agriculture during 2013 to 2023 :

The funds allocated to agricultural sector every year in the union budget is distributed to various allied sectors of agriculture for all-round development of agriculture. Those sectors are crop husbandry, soil and water conservation, animal husbandry, dairy development, fisheries, forestry and wildlife, plantations, food storage and warehousing, agricultural research and education, agricultural financial institutions, cooperation.

The following table shows allocation made to all the allied sectors of agriculture since 2013 to 2023 :

Table 3 :Year wise Allocation to various allied sectors of agriculture during 2013 to 2023 :

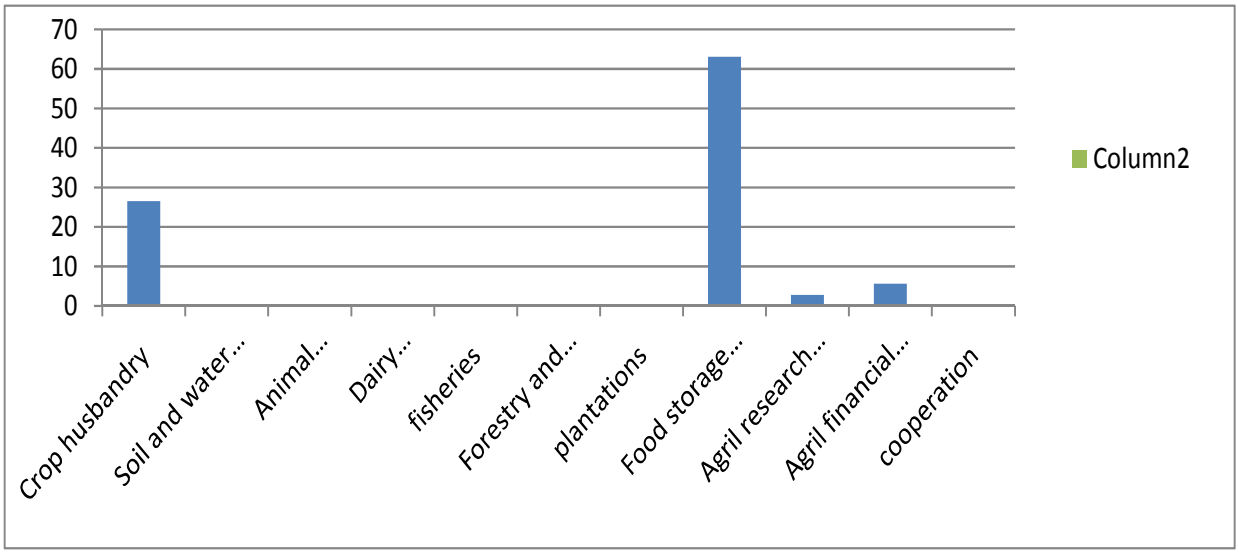
Year	Crop husbandry	Soil and water conser-vation	Animal husbandry	Dairy develop-ment	fisheries	Forestry and wildlife	plantations	Food storage and warehousing	Agril research and education	Agril financial institutions	Co-operation
2013-14	54,578.91	20.91	541.46	983.64	214.73	824.44	583.76	91,469.26	5422.27	6155.01	97.00
2014-15	41,681.23	20.77	474.73	889.98	250.41	475.23	495.26	1,15,842.52	5777.58	6312.01	100.40
2015-16	39,868.86	20.83	330.39	1029.93	320.52	372.97	514.72	1,25,444.31	5943.89	13,067.01	99.92
2016-17	25,756.97	20.96	303.58	982.50	269.24	415.70	335.63	1,38,217.66	6236.64	15084.88	117.00
2017-18	30,923.85	22.51	430.68	1284.00	140.09	444.48	434.40	1,51,091.19	6469.55	13584.94	117.00
2018-19	39,811.00	25.43	593.62	1323.37	137.51	567.35	423.02	1,74,875.62	7368.46	13,610.68	117.00
2019-20	1,13,763.30	28.70	1072.88	1073.74	249.69	668.80	526.40	1,91,835.99	7584.37	16,421.91	126.20
2020-21	1,10,865.07	30.34	1816.28	769.50	218.40	608.97	681.74	1,22,027.90	7820.10	19,213.20	365.50
2021-22	99,175.49	28.30	1850.35	841.00	400.41	591.50	555.40	2,51,654.30	7857.70	17,815.78	343.57
2022-23	1,22,137.34	30.10	2175.67	837.78	526.76	599.00	621.95	2,15,643.22	8013.39	17,732.99	156.40
2023-24	1,15,378.94	36.60	2650.19	849.02	562.61	601.63	672.89	2,00,682.43	8941.93	21190.04	116.04
Average	**72176.45**	**28.83**	**1112.71**	**987.68**	**299.12**	**560.91**	**531.38**	**1,61,707.67**	**7039.62**	**14,562.59**	**159.64**

It is observed that out of the total budget provide to agriculture the major share is contributed by food storage and warehousing sector which was almost 63.08 percent of total agricultural budget during the period of 2013 to 2023. Followed by storage and warehousing, the sector of crop husbandry demands about 26.51 percent of funds from the agricultural budget during the said period above. After crop husbandry the share of agricultural financial institutions is around 5.66 percent during this period. Most importantly the funds allocated to agricultural research and education was only 2.85 percent of total agricultural budget in the last decade.

The descending order of allied agricultural sectors in terms of budget expenditure will stand like; food storage and warehousing › crop husbandry › agricultural financial institutions › agricultural research and education › other sectors.

Table 4: Per cent allocation to major fields of agricultural sector in budget over the years

	Crop husbandry	Soil and water conservation	Animal husbandry	Dairy development	fisheries	Forestry and wildlife	plantations	Food storage and warehousing	Agril research and education	Agril financial institutions	cooperation
2013-14	33.78	0.01	0.33	0.61	0.13	0.51	0.36	56.61	3.35	3.81	0.06
2014-15	24.08	0.01	0.27	0.51	0.14	0.27	0.29	66.93	3.33	3.65	0.06
2015-16	21.22	0.01	0.18	0.55	0.17	0.20	0.27	66.78	3.16	6.96	0.05
2016-17	13.66	0.01	0.16	0.52	0.14	0.22	0.18	73.30	3.31	8.00	0.06
2017-18	15.00	0.01	0.20	0.62	0.06	0.22	0.21	73.31	3.14	6.59	0.06
2018-19	16.60	0.01	0.25	0.55	0.06	0.24	0.18	72.90	3.07	5.67	0.05
2019-20	34.06	0.01	0.32	0.32	0.07	0.20	0.16	57.44	2.27	4.92	0.04
2020-21	41.76	0.01	0.68	0.29	0.08	0.23	0.26	45.98	2.95	7.24	0.14
2021-22	25.95	0.01	0.48	0.22	0.10	0.15	0.15	65.84	2.05	4.66	0.09
2022-23	32.95	0.01	0.59	0.23	0.14	0.16	0.17	58.17	2.16	4.78	0.04
2023-24	32.58	0.01	0.75	0.24	0.16	0.17	0.19	56.66	2.52	5.98	0.03
Average	**26.51**	**0.01**	**0.38**	**0.42**	**0.11**	**0.23**	**0.22**	**63.08**	**2.85**	**5.66**	**0.06**



Distribution of funds to major fields of agriculture

After a careful investigation, it will to know that almost 98.10 percent of agricultural budget is consumed by only four allied sectors i.e food storage and warehousing, crop husbandry, agricultural financial institutions, agricultural research and education. And out of these four sectors , major share is of food storage and warehousing i.e 63.08 percent.

Table 5: Distribution of funds to major fields of agriculture

	Average % Allocation (2013 to 2013)		Average Allocation (2013-2023)
Crop husbandry	26.51	Total 98.10 %	72176.45
Food storage and warehousing	63.08		1,61,707.67
Agril research and education	2.85		7039.62
Agril financial institutions	5.66		14,562.59
Other sectors(*)	1.43		3679.57
Other miscellaneous agril. Programmes(**)	0.47		----

Other sectors (*) = Soil and water conservation, Animal husbandry, Dairy development, fisheries, Forestry and wildlife, plantations, cooperation.

Other miscellaneous agril. Programmes (**) = certain amount of fund in the budget every year is set aside for agriculture with the name of "Other Agricultural Programmes ' '

CONCLUSIONS

The nodal agency to prepare budget is "Budget Division" of DEA (Dept. of Economic Affairs). Most importantly this financial bill has to be passed by Lok Sabha till 1st of April to come into effect (i.e before the start of financial year). And since 1947, total 73 annual budgets had come into effect (till 2022). . First time the allocation showed galloping high of about 34.34 per cent in the 2018-19 compared to 2017-18. The possible reasons for this all time high might be era of financial inclusion in India and also during that period central government was looking after the financial stability of every states to curtail down the effects of GST implementation in the year 2017. Very soon in the next year in 2019-20, funds allocation again went negative by – 4.60 percent as compared to the funds of 2018-19. The total funds allocated in 2023-24 is Rs. 45, 03,097 crore which is 14.15 percent of 2022-23. After a careful investigation, it will to know that almost 98.10 percent of agricultural budget is consumed by only four allied sectors i.e food storage and warehousing, crop husbandry, agricultural financial institutions, agricultural research and education. And out of these four sectors , major share is of food storage and warehousing i.e 63.08 percent.

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Profitability, Resource Use Efficiency and Constraints in Rainfed Groundnut Production in Andhra Pradesh

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ABSTRACT

The present study was carried out in Anantpur district of Andhra Pradesh considering sixty sample rainfed groundnut producers. The data were collected through survey method and collected data were analyzed using different cost and profitability concepts and resource use efficiency was estimated using Cobb-Douglas production function. Groundnut production was found to be profitable under rainfed condition and present yield levels are higher than the break even yield in all the size group of holdings. The yield of groundnut in the area can be increased by increasing the efficiency of human labour, seed, manure and fertilizer and reducing the expenditure on machine power and plant protection chemical. The major constraints in rainfed groundnut production as reported by the sample farmers were unavailability of labour, high cost of seeds and lack of knowledge about insect-pest management.
Keywords: *Rainfed groundnut, profitability, resource use efficiency, break-even yield and production constraints*

Introduction

Groundnut (*Arachishypogaea*) is the major oilseed and supplementary protein rich food crop of the world. It is fourth most important source of edible oil and third most important source of vegetable protein. Groundnut seeds contain 50 per cent high quality edible oil, 25 per cent digestible protein and 20 per cent carbohydrates. Worldwide groundnut is grown over 100 countries and developing countries constitute 97 per cent of the area and 94 per cent of the global production. The production of groundnut is mainly confined to Asia and Africa, with 56 per cent & 40 per cent of the global area and 68 per cent & 25 per cent of the global production, respectively (Madhusudhana, 2013). Though India leads in area and production of groundnut in the world, but productivity was lower by 100 $kgha^{-1}$ as compared to the world average. It is grown over 7.5 million hectares area with production of about six million tons(Madhusudhana, 2013).India is the second largest producer of groundnut and its oil after China. It accounts for around 25 per cent of the total oilseed production of India. About 70 per cent of the area and production has been concentrated in the four states viz. Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka. In these state this crop is mainly grown as rainfed crop and therefore its production is highly vulnerable to rainfall deviations. Among the states, Andhra Pradesh occupied second place with 7.8 lakh ha area and 8 lakh tons of production. It is mainly grown in Krishna, Godavari Delta region of Andhra Pradesh, Anantapur, Kurnool, Chittoor, Cuddapah, Warangal, Nalgonda, Srikakulam, Visakhapatnam and Mahaboobnagar districts. With the consideration of importance and vulnerability of groundnut production in Andhra Pradesh, the present study was carried out to study profitability, yield gap, resource use efficiency and production constraints.

Material and Methods

Andhra Pradesh state is having 13 districts, out of these districts Anantapur being one of the important groundnut producing districts was selected purposively for the present study. Out of 63 blocks (|Mandals) of Anantapur district, one development block i.e, Mudigubba block (Mandal) was selected on the basis of acreage under groundnut. From the selected block (Mandal), three villages were selected purposively on the basis of maximum area under groundnut. A list of groundnut growing farmers of each selected village was prepared separately and further stratified on the basis of their size of land holdings viz. small (upto 2 ha), semi medium (2.01 to 4.00 ha) and medium (4.01 to 10.00 ha), as the groundnut production is confined to these size groups only.

Twenty farmers from each size group were selected randomly, thus total sixty groundnut growing farmers were selected for the purpose of this study. Both primary and secondary data were collected. Primary data from the farmers were collected through personal interview method and pertain to the agricultural year 2017-2018. The collected data were analyzed using standard cost and profitability concepts. For estimation of resource use efficiency Cobb-Douglas production function was used considering yieldha^{-1} as dependent variable and human labour (hrs ha^{-1}), machine power (hrs ha^{-1}), seed (kg ha^{-1}), manure and fertilizer (kg ha^{-1}) and plant protection chemicals (l ha^{-1}) as independent variables. Constraints of production were also assessed on three aspects i.e. sociological, economic and technological.

RESULTS AND DISCUSSION

Cost of Cultivation

The data on cost of groundnut cultivation, estimated on rupees per ha basis were presented in table 1. The total cost of groundnut cultivation on sample farms was Rs.43763.61 ha^{-1}, total variable cost was 77.98 per cent and the share of material input cost was maximum (36.50%) followed by human labour cost (19.57%), cost of power use (14.80%), and interest on working capital (7.08%).Fixed cost was 22.02perc ent with rental value of land 19.55 per cent and interest on fixed capital was 0.74 per cent. In total human labour use, the value of hired human labour was comparatively higher than the value of family labour. Among the materials used, value of seed was higher than the value of fertilizer, manures and plant protection chemicals. The share of machine power was more than the bullock power. With respect to the size of holding, the total cost of cultivation of groundnut was maximum on medium size of holdings (Rs 44427.91 ha^{-1}) and minimum on small size of holdings (Rs 43000.13 ha^{-1}). The material cost, power use cost and total variable costs increases with increase in farm size while identical trend was observed in case of fixed cost irrespective of size of holdings. This clearly indicated that the main component of cost in rainfed groundnut production is input material cost, which constitutes about 47 per cent of the total variable cost.

Table 1: Component wise cost of cultivation of groundnut on sample holdings (Rsha^{-1})

S. No.	Particular	Size group			Overall Average
		Small	Semi medium	Medium	
		A Labour cost			
1	Family labour	2683.33(6.24)	2282.03(5.20)	2419.43(5.44)	2461.59(5.62)
2	Hired labour	5927.38(13.78)	6169.44(14.06)	6225.35(14.01)	6117.39(13.95)
3	Total labour	8610.71(20.02)	8451.47(19.26)	8644.78(19.45)	8568.98(19.57)
		B Material cost			
1	Seed	9128.16(21.22)	9447.60(21.53)	9573.32(21.54)	9383.02(21.43)
2	Fertilizer &manure	3266(7.59)	3502.90(7.98)	3463.60(7.79)	3410.83(7.78)
3	Plant protection chemicals	3119.71(7.25)	3176.64(7.24)	3257.00(7.33)	3184.45(7.27)
	Total material cost	15513.87(36.07)	16127.14(36.76)	16293.92(36.67)	15978.31(36.5)
		C Power use			
1	Bullock power	2169.01(5.04)	2230.50(5.08)	2344.16(5.27)	2247.89(5.13)
2	Machinepower	4105.63(9.54)	4257.48(9.70)	4336.39(9.76)	4233.16(9.67)
3	Total power use	6274.64(14.59)	6487.98(14.79)	6680.55(15.03)	6481.05(14.80)
		D Total variable cost			
	Human labour	8610.71(20.02)	8451.47(19.26)	8644.78(19.45)	8568.98(19.57)
	Material cost	15513.87(36.07)	16127.14(36.76)	16293.92(36.67)	15978.3(36.50)
	Power use	6274.64(14.59)	6487.98(14.79)	6680.55(15.03)	6481.05(14.80)
4	Interest on working capital	3039.92(7.06)	3106.65(7.08)	3161.92(7.11)	3102.83(7.08)
	Total variablecost	33438.54(77.76)	34173.24(77.90)	34781.17(78.28)	34131.18(77.98)
		E Fixed cost			
01	Land revenue	176.39(0.41)	176.39(0.40)	176.39(0.39)	176.39(0.40)
02	Rental value of land	8552(19.88)	8607(19.62)	8514(19.16)	8557.66(19.55)
03	Depreciation	518.73(1.20)	582.39(1.32)	612.45(1.37)	571.19(1.30)
04	Interest on fixed cost	313.87(0.73)	324.38(0.73)	343.90(0.77)	327.38(0.74)
	Total fixed cost	9561(22.22)	9690.16(22.09)	9646.74(21.71)	9632.62(22.00)
F	Total cost	43000.13(100)	43863.40(100)	44427.91(100)	43763.18(100)

(Figures in parentheses show percentage to total cost)

Generally, for estimation of cost of cultivation of crops seven cost concepts are used as per the norms of Commission of Agricultural Cost and Price (CACP), Government of India. The cost of cultivation of groundnut on sample farms using these cost concepts wereworked out and data on the same are presented in table 2.From the given data it was observed that cost A_1, that is the paid out cost of groundnut cultivation was Rs 32417.16 $ha^{-1}$and this shows an increasing trend with increase inland holding. The cost of cultivation of groundnut at cost A_2 + imputed value of family labour was Rs. 34878.76 $ha^{-1}$and this shows increasing trend with increase in size of holding.

Table 2: Cost of Cultivation of Groundnut as per the Different Cost Concept on Sample Holding

(Rs ha^{-1})

S. No.	Particular	Size group			Overall Average
		Small	Semi medium	Medium	
1	Cost A_1	31450.93	32649.99	33150.58	32417.16
2	Cost A_2	31450.93	32649.99	33150.58	32417.16
3	Cost A_2+ family labour	34134.26	34932.02	35570.01	34878.76
4	Cost B_1	31764.80	32974.37	33494.48	32744.55
5	Cost B_2	40316.80	41581.37	42008.48	41302.21
6	Cost C_1	34448.13	35256.40	35913.91	35206.14
7	Cost C_2	43000.13	43863.40	44427.91	43763.81
8	Cost C_3	47300.13	48249.70	48870.61	48410.14

Normally, farmers were cultivating the crop in their own land but it has an imputed rental value of Rs 8557.66 $ha^{-1}$and thus cost B_2 was Rs 41320.21 ha^{-1}. The cost C_1 increases significantly on medium size group of holdings as compared to small and semi medium size group of holdings. The cost C_2 found to be Rs 43763.81 ha^{-1} and cost C_3 was found to be Rs 48410.81 ha^{-1} which reflects in imputed value of managerial allowances at 10 per cent of cost C_2.

Cost of Production

The data on cost of production of groundnut in rupees per qtl is presented in table 3**.** The cost A_1depict increasing trend with increase in size of holding. On overall average basis, cost A_2 was found to be Rs. 3504.89 q^{-1} which shows an increasing trend with increase in size of holding. The cost A_2 + imputed cost of family labour was Rs. 3770.67 q^{-1}.The cost B_1 varies from Rs. 3426.62 to Rs 3648.63 q^{-1} from small to medium size group of land holding. The cost B_2 was found to be higher on medium size group of holding as compared to small and semi medium holdings. The Cost C_3 varies from Rs 5102.49 to Rs 5323.59 q^{-1} on different size group of holdings. This revealed that groundnut production under rainfed condition is not confirmative with the hypothesis of large scale economy. The MSP of groundnut for agricultural year 2017-18 was Rs. 4450 q^{-1} (Rs. 4250 + Rs.200 bonus) and at present cost structure on sample holdings, the rainfed groundnut is profitable upto cost B_1 andC_1,if sale at MSP.

Table 3: Cost of production of groundnut on sample holding (Rsq^{-1})

S. No.	Particular	Size group			Overall Average
		Small	Semi medium	Medium	
1	Cost A_1	3392.76	3510.75	3611.17	3504.89
2	Cost A_2	3392.76	3510.75	3611.17	3504.89
3	Cost A_2+ family labour	3682.22	3756.13	3874.72	3770.67
4	Cost B_1	3426.62	3545.62	3648.63	3540.29
5	Cost B_2	4349.16	4471.15	4576.08	4465.46
6	Cost C_1	3716.08	3791.01	3912.73	3806.60
7	Cost C_2	4638.63	4716.49	4839.64	4731.58
8	Cost C_3	5102.49	5188.13	5323.59	5204.73

Profitability from groundnut cultivation

The overall productivity of groundnut under rainfed condition was 9.25 q $ha^{-1}$and it was higher on semi medium followed by small and medium size group of holdings.

Table 4: Profitability from groundnut on sample holding (Rsha^{-1})

S. No.	Particular	Size Group			Overall Average
		Small	Semi medium	Medium	
1	Yield (q ha^{-1})	9.27	9.30	9.18	9.25
2	Cost of Cultivation (C_3)	47300.13	48249.7	48870.61	48410.14
3	Gross income	51315.35	51647.68	51086.18	51349.73
4	Price of main product	4708.75	4780.83	4858.24	4782.60
5	Net income	4015.35	3397.98	2215.57	3209.59
6	Family labour income	10998.55	10066.31	9077.70	10047.52
7	Farm investmentincome	12881.09	12329.36	11073.47	12094.64
8	Income at cost A_2+ Familylabour	17181.09	16715.66	15516.17	16470.97
9	Farm business income	19864.42	18997.69	17935.60	18932.60
10	Input- Output ratio (A_2 + FamilyLabour)	1.50	1.48	1.44	1.47
11	Input- Output ratio at cost C_3	1.08	1.07	1.04	1.06

From the empirical findings, it has been observed that overall cost of groundnut cultivation was Rs 48410.14 ha^{-1}, irrespective of the farm size holding and it was varied from Rs 47300.13 to Rs 48870.61 ha^{-1} for small to medium farms size. Overall gross return was found to be Rs. 51349.73 and net income Rs. 3209.59 ha^{-1}. On overall basis family labour income,farm investment income and farm business income were Rs. 10047.52, Rs. 12094.64 and Rs. 18932.60 ha^{-1} respectively. The income at Cost A_2+ family labour cost was 16470.970 ha^{-1} and this shows decreasing trend with increase in size of holding. The input-output ratio at Cost A_2+ family labour cost was 1.47 and at cost C_3 it was1.06, revealing that return over an expenditure of rupee one in rainfed groundnut production is higher than one. Evan at cost C_3 it was profitable on all size group of holdings on account of higher than MSP prices in the market.

Yield gap and break even yield

The data on yield gap and break even yield of groundnut are presented in table 5. The yield of demonstration plots was observed to be 13.27 q ha^{-1}. The actual yield of groundnut was higher than break even yield in all size groups of holding thus revealing that at given cost and product price the rainfed groundnut production was profitable business. The actual yield was higher for semi medium (9.30 q ha^{-1}) followed by small (9.27 q ha^{-1}) and medium (9.18 q ha^{-1}) size group of holdings. The overall yield gap of 4.02 q ha^{-1} was recorded with more or less identical yield gap on different size group of holdings. The overall break even yield was found to be 8.81 q ha^{-1}. The break even yield varies from 8.67 to 9.02 q ha^{-1} from small to medium size group of holdings. This revealed that there are still chances to increase productivity of groundnut under rainfed condition in the area since there is a gap of about 4 q ha^{-1}. This gap can be bridge through better management practices for efficient use of resources by providing effective training and demonstrations of production technologies on farmer's fields. Govindraj *et al*, 2009 also reported that improved technologies of groundnut production for resource poor farmers assist in improving productivity.

Table 5: Yield gap and break even yield of groundnut on sample holding(qha^{-1})

S. No.	Particular	Size group			Overall Average
		Small	Semi medium	Medium	
1	Demonstration yield	13.27	13.27	13.27	13.27
2	Actual yield	9.27	9.30	9.18	9.25
3	Yield gap II	4.00	3.97	4.09	4.02
4	Break even yield	8.67	8.75	9.02	8.81

Resource use efficiency

Cobb- Douglas production function was used to examine the resource use efficiency in groundnut production. The R^2 and the adjusted R^2 for fitted production function clearly indicated that it explains 98.80 per cent variation in yield from groundnut due to included independent variables (Table 6). The overall result of production function analysis clearly indicate that the variables X_1(human labour), X_3 (seed), X_4 (manure and fertilizer) contribute significantly towards the yield of groundnut. An increase in one hour of labour brings about 38 kg increase in yield of groundnut for given set of data. Similarly one kgof additional seed brought 9 kg increase in yield. The increase in 2 kg of yield of groundnut has been bought by one kg increase in manure and fertilizer. The increasing return to scale (1.12) was observed in rainfed groundnut production in the study area.

Table 6: Production function coefficients of groundnut on sample holding(N=60)

S. No.	Variables	b	SE	t
1	Constant or intercept	0.83	0.18	4.61
2	X_1 Human labour	0.38*	0.07	5.43
3	X_2 Machine power	0.39	0.74	0.53
4	X_3 Seed	0.09*	0.09	1.00
5	X_4 Manure & fertilizer	0.02*	0.02	1.00
7	X_5 Plant protection chemical	0.24	0.29	0.08
8	Return to scale	1.12		
9	R^2%	98.80		
10	Adjusted R^2%	98.69		

(*Indicate significance at 5% probability level)

Constraints of groundnut production

The constraints of groundnut production are presented in table 7. From the data it is observed that the major economic constraint is high cost of improved seeds as reported by 83.33 per cent of the sample holdings. This problem is more vigorous for small farmers as compared to semi medium and medium size group of farmers. The second most important constraint was low market rate of produce at the time of harvesting,81.66 per cent of the groundnut growers reported this problem, with a little variation over different size group of holdings. The third important constraint was inadequate credit facilities for purchasing of inputs (76.66%). The other constraint reported by farmers wereunavailability of improved seeds (55%)followed by village level accessibility of inputs (53.33%)and problem of quality inputs (46.66%). The major sociological constraint were unavailability of labour, (85%) followed by lack of access about latest technologies (75%), followed by cutting off of young family members from farming (70%) and the least serious problem is high mental stress due to economic hardship. The first and most important technological problem reported by the farmers was lack of knowledge on insect, pest and disease management (78%), this is followed by lack of knowledge about seed treatment (76%), lack of knowledge on location specific improved varieties and lack of knowledge on improved agronomical practices of groundnut (55%). The overall result of constraints of groundnut production revealed that unavailability of labour, high cost of improved seeds and low market rate of produce at the time of harvesting were the major constraints in the study area. Kathmale *et al* (1996) also reported similar problems for groundnut production in Maharashtra State.

Table 7: Major constraints of groundnut production on sample holding

S. No.	Particular	Size group			Overall (60)	Ranking
		Small	Semi medium	Medium		
A. Economic constraints						
1	High cost of improved seed	18 (90)	16 (80)	16 (80)	50 (83.33)	i
2	Inadequate credit facilities	16 (80)	15 (75)	15 (75)	46 (76.66)	iii
3	Poor quality of inputs	10 (50)	8 (40)	10 (50)	28 (46.66)	Vi
4	Non availability of Improved seeds	13 (65)	9 (45)	11 (55)	33 (55)	iv
5	Accessibility of inputs at village level	9 (45)	11 (55)	12 (60)	32 (53.33)	V
6	Low rate of produce at the time of harvesting	16 (80)	16 (80)	17 (85)	49 (81.66)	ii
B. Sociological Constraints						
1	Unavailability of labour	18 (900	17 (85)	16 (80)	51 (85)	i
2	Disconnect of younger from agriculture	15 75)	13 (35)	14 (70)	42 (70)	iii
3	Lack of awareness	14 (70)	16 (80)	15 (75)	45 (75)	ii
4	High mental stress due to economic hardship	13 (35)	15 (75)	13 (35)	41 (68)	iv
C. Technological Constraints						
1	Lack of knowledge on location specific improved varieties	11 (55)	12 (60)	10 (50)	33 (55)	iii
2	Lack of knowledge about seed treatment	14 (70)	17 (85	15 (75)	46 (76)	ii
3	Lack of knowledge on insect, pest and disease control	16 (80)	15 (75)	16 (80)	47 (78)	i
4	Lack of knowledge regarding improved practices	10 (50)	11 (55)	12 (60)	33 (55)	iii

(Figures in parentheses show percentage to total)

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An Economic Analysis of Raisin Production in Solapur District of Maharashtra.

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ABSTRACT

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 five raisin production units were selected, so total twenty 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.

Keywords: *Raisin, Total cost, B-C ratio, Economic analysis.*

INTRODUCTION

Agriculture was the first occupation of man, and as it embraces the whole earth, it is the foundation of all other industries. Agriculture, with its allied sectors, is indisputably the largest livelihood provider in India mostly in rural areas. During the current pandemic of Covid-19 the growth of the agriculture is positive in both the starting quarters of financial year 2020-21 whereas the other sectors shows the negative growth (The Hindu, 2020). According to the Economic survey 2121-22 Agriculture and allied sector proved to be the most resilient to the Covid-19 shock as it registered a growth of 3.6 percent in 2020-21 and improved to 3.9 percent in 2021-22, driving the overall Indian Economy's real GDP expansion of 9.2 percent in 2021-22.

Grape is one of the important fruit crops grown in tropical India. It is the third most widely cultivated fruit after citrus and banana. Grapes are widely consumed as fresh fruit in India. It is also used for producing raisins, wine, juice, juice concentrate, squash, beverages, jams and marmalades. Grapes are highly digestible and have a number of therapeutic properties. The world production of raisin is 1237160 metric tonnes during 2020-21(Statista 2022). Turkey and USA are the largest producer of in the world and together contribute 54.69 per cent. Turkey is called as 'mother land of grapes'. In India Raisins are mainly produced in Sangli, Solapur and Nashik district of Maharashtra and Vijaypura and Bagalkot Districts of Karnataka. Maharashtra ranks first in raisin production with near about 75% of total production in India.

There is ample scope for processing of grapes in the form of raisins in Solapur district, because of better opportunities in form the availability of quality raw material and access to new technology; credit and marketing support system have enabled to boost up the production and also usage of product, in view of good market.

METHODOLOY

For study multistage sampling technique was used, in which Solapur District was selected purposively because it was one of the top district in Grapes and Raisin production. The Pandharpur tehsil was selected as based on larger production of grape. 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 five raisin production units were selected, so total twenty raisin production units were selected for study purpose.

Tabular Analysis:

Tabular analysis was adopted for analyzing the general economic characteristics of the sample raisin processors, labour utilization, costs and returns and profits on per tonne basis. The fixed cost and variable cost concepts were used and data were compared and analyzed by averages, percentages, etc., to obtain meaningful results.

RESULT AND DISCUSSION

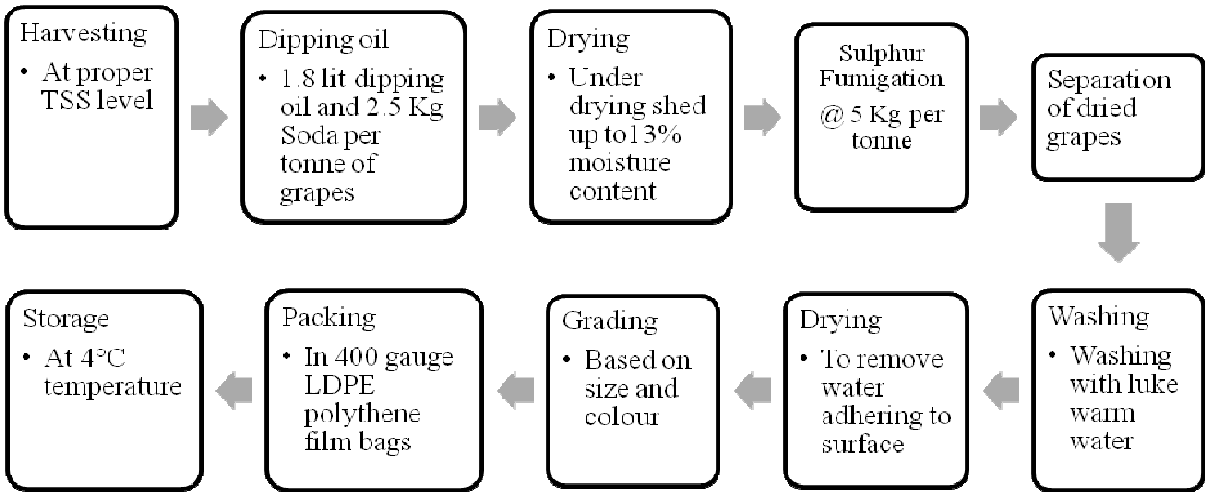
Varieties used for Raisin Preparation:

Major production of raisin (90 per cent) in the world is from Thompson Seedless. The Thompson Seedless is a white, thin skinned grape, which produces the best raisins available today. Besides the other varieties viz. Sonaka, Tas-A-Ganesh,Clone -2 Manik Chaman,Cardinal and other white and colored seeded varieties are also used for raisin production.

Methods of Raisin making:

There are two methods of Raisin making one is oil dipping method and another is sulphur fumigation method. The farmer in study area used combination of both i.e. oil dipping method sulphur fumigation method. In this method first step is harvesting of at proper TSS level (24%). Next step is to dip grapes in dipping oil (1.8 lit.) and Soda (2.5 Kg) for one tonne of grapes. After dipping keep the grapes in raisin shed for drying up to 13 % moisture level. Then sulphur fumigation is done @ 5 kg Sulphur for on tonne for enhancing colour for about 12 hours. Then separate the dried grapes with help of rubbing rings. After separation wash raisins in warm luck water and dried it for surface water. Then Grading is done on the basis of colour and size of Raisins in to different grades. After grading next step is packing is done in 400 gauge LDPE polythene film bags according required size. Store the packed Raisin boxes in cold storage at 4^0C up to marketing.

Fig- Flow chart of Raisin Preparation



Observations and analysis:

Table no - 1 shows the initial capital investment on raisin production, in which maximum investment was in on processing shed which is near about 94.72percent of total initial investment, followed by Equipments and tools. The total initial investment was about Rs. 9210825.

Table - 1 Initial capital Investment

Sr. No	Particulars	Quantity	Price per unit	Value (Rs)	Percentage
1.	Processing Shed Including covering net (No) (150x 5x 11 ft)	46	189673.91	8725000	94.72
2.	Crates(No)	605	325	196625	2.13
3.	HTP(No)	16	14437	231000	2.50
4.	Barrel(No)	31	700	21700	0.23
5.	Fumigation Tray(No)	360	15	5400	0.05
6.	Spade(No)	46	150	6900	0.07
7.	Rake(No)	16	500	8000	0.08
8.	Rubbing Rings(No)	324	50	16200	0.17
	Total Initial Capital Investment			**9210825**	**100**

In cost structure of raisin production fixed and variable costs concepts was used. Table 2 shows the cost structure of raisin production. The per tonne variable cost and fixed cost observed to be 127456.28 and17360.71 rupees respectively. The items included in variable were raw grapes, chemicals, labour charge, grading, and Packaging and storage charges, in which raw grapes accounts larger percentage (83.95) of working capital followed by Labour cost and chemical used. The total fixed cost was around Rs.1657948.5 and total variable cost was around Rs. 12172075.3.

Table -2 Cost structure of raisin production

Sr. No	Particulars	Quantity	Price per unit	Value (Rs)	Per tonne cost	Percentage
	A) Variable cost					
1.	Raw grapes (Tonnes)	382	25000	9550000	100000	83.95
2.	Chemicals					
	a) Dipping oil EthylOleate lye (lit.)	687.6	140	96264	1008	0.84
	b) Soda (Potassium carbonate) (kg)	916.8	168	154022.4	1612.79	1.35
	c) Sulphur	1104	48	52992	554.89	0.46
3.	Spraying					
	a) Dipping oil EthylOleate lye (lit.)	343.8	140	48132	504	0.42
	b) Soda (Potassium carbonate) (kg)	458.4	168	77011.2	806.4	0.67
4.	Labour cost	2171	400	868400	9093.19	7.63
5.	Netting charge (Grading)	95.5	2500	238750	2500	2.09
6.	Packaging box (no)	6500	30	195000	2041.88	1.71
7.	Storage Charge	95.5	1000	95500	1000	0.83
8.	**Total Amount**			**11375771.4**	**119118.02**	**100**

9.	Interest on working capital @7 %			796303.9	8338.26	
10.	**Total variable cost**			**12172075.3**	**127456.28**	
B) Fixed cost						
11	Depreciation on fixed capital @ 7 %			644757.75	6751.39	
12	Interest on fixed capital @ 11 %			1013190.75	10609.32	
13	**Total fixed cost (11+12)**			**1657948.5**	**17360.71**	

Table 3 showed the return structure of raisin production in selected area. Per tonne gross income received was about Rs.175000 and total cost was about Rs.144817. Net income received was around Rs. 2882476.2 and per tonne net return was about Rs. 30182. The per Kg costs were calculated in which fixed cost was Rs.17.36, variable cost was Rs.127.4 and total cost Rs.144.7 respectively. The benefit cost ratio was estimated is around 1.21. More or less similar results were also obtained by Nethravathi Ashok Patil and R.A. Yeladalli in 2015 and Kulkarni, 1984.

Table 3 Return structure of raisin production

Sr no.	Particular	Quantity(kg)	Rate per unit	Amount	Income per tonne
1.	Grade A	76400	200	15280000	160000
2.	Grade B	9550	150	1432500	15000
3.	Gross Income			16712500	175000
4.	Total cost			13830023.8	144817
5.	**Net Income**			**2882476.2**	**30182**
6.	**Fixed cost per kg**				**17.36**
7.	**Variable cost per kg**				**127.4**
8.	**Total Cost per kg**				**144.7**
9.	**B:C Ratio**				**1.21**

CONCLUSION

The study concluded that production of Raisin is economically viable in Pandharpur area of Solapur District. Due to suitable climatic condition in selected area raisin production was done without loss and with best quality, which increases the profit to the farmer. Also good quality raw grapes available nearby area at reasonable price which reduces the cost of raisin production.

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Resource Use Efficiency in BGII Cotton Production in Akola District

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ABSTRACT

Bt cotton is the India's first genetically modified crop. The present study was undertaken in Akola district of Vidarbha region purposively. The study was based on the primary data.The data of production was collected for the year 2020-21. Overall sample of 90 BG II cotton cultivators was selected randomly. The resource use efficiency in BG II cotton production was estimated by using the Cobb-Douglas production function. The results revealed that, at overall levelin case of per hectare input utilization, hired human labour had occupied the first position in terms of both physical unit (85.97 days/ha) and monetary unit (14945.77Rs./ha). 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 group and at overall level the ratio of MVP to MFC was less than one for all explanatory variables included in the function. This indicates over utilization of resources.

Keywords: *BG II cotton, resource use efficiency, coefficient of multiple determinations (R^2), MVP, MFC.*

INTRODUCTION

Cotton (*Gossypium spp.*) is one of the most important cash crops. Cotton is a natural fiber of vegetable origin and composed of cellulose. Bt cotton is the India's first genetically modified crop. Bt cotton carries the *Cry1Ac* gene derived from the common soil bacterium *Bacillus thuringiensis* var. *kurstaki*. Bt cotton was approved by the Genetic Engineering Approval Committee (GEAC) for commercial cultivation in India on march 26th 2002. BG I cotton carries *Cry1Ac* gene which exhibits excellent control of bollworms, whereas BG II cotton carries two Bt genes viz., *Cry1Ac* as well as *Cry2Ab* for insect resistance and herbicide tolerance. In the year 2019-20, 94% of the cotton area in India came under Bt cotton cultivation including Bt with herbicide tolerance. The area under Bt cotton cultivation in India has increased from 0.29 lakh ha in 2002-03 to 117.47 lakh ha in 2019-20. During the same period, productivity has also increased from 191 kg/ha to 436 kg/ha. BG II cotton exhibits excellent control of bollworms and created ecofriendly environment due to reduction in use of insecticides and pesticides. Also reduced production cost, increased profit, lowered farming risk, so that improved farmer's perspective in cultivating cotton crop.

METHODOLOGY

The present study was undertaken in Akola district of Vidarbha region purposively. Akot, Akola and Balapur tahasil from Akola district were selected purposively on the basis of potential area under BG II cotton cultivation. From each selected tahasil, three villages were selected randomly i.e. total 9 villages were selected.Random selection of ten cultivators from each selected village i.e. overall sample of 90 BG II cotton cultivators was selected. Selected BG II cotton cultivators were categorized into small (N=56), medium (N=23) and large group cultivators (N=11) on the basis of their average size of land holding. The present study was based on the primary data. The data of production was collected for the year 2020-21 through the personal interview method by using pretested schedule. The resource use efficiency in BG II cotton production was estimated by using the Cobb-Douglas production function.

Production function analysis

The Cobb-Douglas production function was estimated to study the resource use efficiency and influence of inputs on BG II cotton productivity. The Cobb-Douglas production function was estimated on per hectare basis and it is specified as follows,

$$Y = ax_1^{b_1} \times x_2^{b_2} \times x_3^{b_3} \times x_4^{b_4} \times x_5^{b_5} \times x_6^{b_6} \times x_7^{b_7}$$

Where,

Y = Gross returns (Rs./ha)
a = Intercept
b_1, b_2, b_3, b_4, b_5, b_6, b_7 = Regression coefficient of respective factor as follows,
X_1 = Expenditure on human labour (Rs./ha)
X_2 = Expenditure on bullock labour (Rs./ha)
X_3 = Expenditure on machinery (Rs./ha)
X_4 = Expenditure on seed (Rs./ha)
X_5 = Expenditure on manure (Rs./ha)
X_6 = Expenditure on fertilizer (Rs./ha)
X_7 = Expenditure on plant protection (Rs./ha)

Marginal value product of particular resource represents the 'expected addition of one unit of that resource while other inputs are held constant' to the marginal factor cost.

$$\text{MVP} = b_i \frac{GM\ (Y)}{GM\ (X_i)} \times P_Y$$

Where,

b_i= Elasticity of output Ywith respect to input X_i
GM (Y) = Geometric mean of output Y
GM (X_i) = Geometric mean of input X_i
P_Y = Price of produce/qtl.

RESULTS AND DISCUSSION

Per hectare input utilization for BG II cotton crop

Table 1 Per hectare input utilization pattern of selected BG II cotton cultivators (Rs./Ha)

Particular	Unit		Small		Medium		Large		Overall	
			Physical Unit	Monitory Unit	Physical Unit	Monitory Unit	Physical Unit	Monitory Unit	Physical Unit	Monitory Unit
Seed	Kg.		2.25	3606.64	2.26	3639.55	2.24	3599.23	2.25	3622.13
Manure	Tons.		1.33	1671.09	1.81	2265.60	2.79	3489.40	1.98	2480.01
Fertilizer	N	Kg.	97.03	2945.83	101.85	3332.53	106.25	3513.69	101.81	3287.31
	P	Kg.	55.45	1971.80	58.78	2213.07	60.35	2301.15	58.82	2179.93
	K	Kg.	51.86	1811.45	53.06	1918.12	52.23	1982.13	52.47	1920.48
Hired human labour	Days		80.03	13746.87	84.18	14631.36	92.87	16399.97	85.97	14945.77
Family labour	Days		26.68	5388.77	19.53	3933.93	10.35	2084.15	18.99	3836.46
Bullock labour	Days		4.51	2274.66	5.65	2870.60	5.79	2982.20	5.35	2739.75
Machine hrs.	Hrs.		8.86	4607.91	8.75	4528.30	9.65	5042.41	9.14	4737.99
Irrigation	Rs.		-	549.18	-	475.19	-	440.31	-	495.27
Plant protection	Rs.		-	5562.63	-	6182.96	-	6552.44	-	6112.05
Total	Rs.		-	44136.83	-	45991.21	-	48387.08	-	46357.15

The Table 1 indicated per hectare input utilization on the overall basis viz., seed (2.25 kg), manure (1.98 tons.), fertilizer i.e. N (101.81 kg), P (58.82 kg) and K (52.47 kg), respectively and hired human labour (85.97 days), family human labour (18.99 days), bullock labour (5.35 days), machinery (9.14 hrs.), irrigation (495.27 Rs.) and plant protection (6112.05 Rs.). It is also observed that, as regards family human labour utilized it was highest i.e. 26.68 days in small group cultivators. Highest seed (2.26 kg) and fertilizer K (53.06 kg) was used by medium group cultivators. Highest hired human labour utilization was found in large group cultivators i.e. 92.87 days. Also highest manure (2.79 tons), fertilizer N (106.25 kg) and fertilizer P (60.35 kg) was used by large group cultivators. Plant protection chemical was a major part of BG II cotton cultivation which worked out highest for large group cultivators.

Resource use efficiency in BG II cotton production

The Cobb-Douglas production function was estimated on per hectare basis for small, medium, large size groups and at overall level and presented in Table 2.

It is revealed from Table 2 that, at overall level the regression coefficient of expenditure on seed (0.1744) and expenditure on fertilizer (0.7531)was significant at 10 per cent and 5 per cent probability level, respectively. The regression coefficient of expenditure on manure (0.2341) was significant at 5 per cent probability level. The value of coefficient of multiple determination (R^2) of estimated production function was 0.94 which indicates about 94 per cent variation in per hectare gross returns of BG II cotton was explained by the explanatory variables included in the function. Decreasing returns to scale (0.95) was observed.

In small size group, the regression coefficient of expenditure on fertilizer (0.7331) and expenditure on manure (0.2814) was significant at 10 per cent and 5 per cent probability level, respectively. The value of coefficient of multiple determination (R^2) of estimated production function was 0.93 which indicates about 93 per cent variation in per hectare gross returns of BG II cotton was explained by the explanatory variables included in the function. Decreasing returns to scale (0.95) was observed. In medium size group, the regression coefficient of expenditure on seed (0.7178) and expenditure on manure (0.5014) was significant at 5 per cent probability level, respectively. The value of coefficient of multiple determination (R^2) of estimated production function was 0.96 which indicates about 96 per cent variation in per hectare gross returns of BG II cotton was explained by the explanatory variables included in the function. Increasing returns to scale (1.17) was observed. In large size group, the regression coefficient associated with expenditure on human labour, bullock labour, machinery, seed, manure, fertilizer and plant protection was found to be non-significant. The value of coefficient of multiple determination (R^2) of estimated production function was 0.95 and significant at 10 per cent probability level which indicates about 95 per cent variation in per hectare gross returns of BG II cotton was explained by the explanatory variables included in the function. Increasing returns to scale (1.27) was observed.

Table 2 Cobb-Douglas production function for BG II cotton

Sr. No.	Particulars	Size of land holding			
		Small	Medium	Large	Overall
1.	Constant (Intercept)	1.3042***	0.8879*	0.3190	1.3511
		(0.3304)	(0.4629)	(1.6536)	(0.2915)
2.	Regression coefficient (b_i)				
A	Expenditure on human labour (X_1)	0.0403	0.1146	0.3228	0.0057
		(0.3247)	(0.3793)	(0.4097)	(0.3026)
B	Expenditure on bullock labour (X_2)	-0.0063	0.0661	0.4570	0.0028
		(0.0529)	(0.0960)	(0.4606)	(0.0494)
C	Expenditure on machinery (X_3)	0.1181	-0.1189	-0.1609	0.1325
		(0.0853)	(0.1208)	(0.4131)	(0.0802)

D	Expenditure on seed (X_4)	0.1319 (0.1200)	0.7178** (0.2510)	0.5802 (0.4438)	0.1744* (0.1148)
E	Expenditure on manure (X_5)	-0.2814** (0.1133)	0.5014** (0.1852)	0.2424 (0.5612)	-0.2341** (0.1067)
F	Expenditure on fertilizer (X_6)	0.7331* (0.4106)	0.1579 (0.4801)	0.0788 (0.7225)	0.7531** (0.3675)
G	Expenditure on plant protection (X_7)	0.2159 (0.3517)	-0.2663 (0.3196)	-0.2477 (0.5655)	0.1190 (0.3194)
3.	Coefficient of multiple determination (R^2)	0.93 (0.0461)	0.96 (0.0238)	0.95* (0.0210)	0.94 (0.0451)
4.	Returns to scale ($\sum b_i$)	0.95	1.17	1.27	0.95

Note: * indicates values significant at P = 10% ** indicates values significant at P = 5%
*** indicates values significant at P = 1% (Figures in parenthesis indicates the standard error)

Marginal value of product to Marginal factor cost

The ratio of MVP to MFC was worked out for small, medium, large size groups and at overall level and presented in Table 3.

Table 3 Marginal value of product to Marginal factor cost

Sr. No.	Particulars	MVP to MFC			
		Small	Medium	Large	Overall
1.	Expenditure on human labour (X_1)	0.0472	0.1335	0.3734	0.0066
2.	Expenditure on bullock labour (X_2)	-0.0096	0.0958	0.6514	0.0043
3.	Expenditure on machinery (X_3)	0.1638	-0.1608	-0.2145	0.1837
4.	Expenditure on seed (X_4)	0.1882	0.9941	0.7909	0.2486
5.	Expenditure on manure (X_5)	-0.4248	0.7327	0.3474	-0.3533
6.	Expenditure on fertilizer (X_6)	0.9597	0.2025	0.0997	0.9856
7.	Expenditure on plant protection (X_7)	0.2883	-0.3476	-0.3195	0.1588

It is observed from Table 3 that, at overall level and in case of small, medium, large size group the ratio of MVP to MFC with respect to expenditure on human labour, bullock labour, machinery, seed, manure, fertilizer and plant protection was less than one. This indicates over utilization of these resources. Hence, there should be reduction in utilization of these resources to optimize BG II cotton returns.

CONCLUSIONS

From this study it is concluded that, per hectare input utilization on the overall basis viz., seed (2.25 kg), manure (1.98 tons.), fertilizer i.e. N (101.81 kg), P (58.82 kg) and K (52.47 kg), respectively and hired human labour (85.97 days), family human labour (18.99 days), bullock labour (5.35 days), machinery (9.14 hrs.), irrigation (495.27 Rs.) and plant protection (6112.05 Rs.). The value of coefficient of multiple determination (R^2) of estimated production function at overall level was 0.94 which indicates 0.94per cent variation in per hectare gross returns of BG II cottonwas explained by the explanatory variables included in the function. Decreasing returns to scale (0.95) was observed.At overall level the ratio of MVP to MFC with respect to expenditure on human labour, bullock labour, machinery, seed, manure, fertilizer and plant protection was less than one.Hence, there should be reduction in utilization of resources to optimize BG II cotton returns.

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Estimation of Marketable Surplus of Pigeonpea

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ABSTRACT

It is observed that, excluding small sized land holding group, the marketable surplusis rising with the size of land holding. Marketable surplus is dependent on production. It is also observed that, none of the farmers faced distressed sale of pigeonpea and therefore, the question of taking cognizance of distressed sale did not arise. . The quantity of marketable surplus is dependent upon consumption and requirement of farmers. The farmers are expected to adopt the package of practices and intensive farm management irrespective of area allotment under different crops. They should not retain the produce for making the payment of wages, baluta and old payment in lieu thereof.They should adopt the mode of payment in terms of cash. Farmers should purchase seeds of recommended high yielding varieties.

Keywords *: marketable surplus , marketed surplus, consumption, pigeonpea*

INTRODUCTION-

The country which is predominantly agricultural is to a great extent influenced by marketable surplus. India being such predominantly agricultural country, its economy is highly influenced by marketable surplus of the main agricultural produce. Two concepts viz, marketable surplus and marketed surplus are required to be critically understood with a view to analyze various aspects related to the study. Marketed surplus which has to play a vital role in setting upan equilibrium between supply and demand in the market. It is therefore, necessary to make critical appraisal of the marketed surplus which is brought for disposal in the market. Considering the importance of marketable surplus as it determines the volume of the marketed surplus in the particular area .Pigeonpeahas been selected as major crops predominantly grown by the farmers as the food crops. The area selected for the present study belongs to Amravati and Bhatkulitahsil of Amravati district has the objectives ;

1) To estimate the marketable surplus of pigeonpea
2) To estimate marketed surplus and distress sale if any in pigeonpea

METHODOLOGY

The details of methodology on different heads is given as under

A) Selection of villages –

The area selected for present study belongs to Amravati and Bhatkuli tahsils in Amravati District. Following ten villages were selected for the present study viz, Walgaon, Rewasa, Nya-akola, Kamunja,and Wazarkhed belong to Amravati tahsil and Waigaon, Ashti, Kamnapur, Khartelegaon , and Jaltapur belong to Bhatkulitahsil in Amravati District

Selection of Respondent

Fifteen farmers each has 10 villages belonging to different land holding groups who raised pigeonpea during the year 2018-2019 were selected and were arranged in ascending order on the basis of size of land holding and 20 farmers were selected on random sampling basis from the land holding groups. The study was based on the concept viz Domestic

consumption, marketable surplus, marketed surplus and distress sale.

B) Land Holding Groups of Farmers –

1) Marginal (Up to 1.00 ha)
2) Small (1.01 to 2.0 ha)
3) Semi-medium (2.01 to 4.00 ha)
4) Medium (4.01 to 10.00 ha)
5) Large (10.01ha & above)

C) Computation of Marketable surplus

It is computed by given formula

MS= P-C

Where MS = Marketable surplus , P= Total production of Pigeonpea

C= Total consumption -stands for following items in the same year;

1) Domestic needs 2) Seeds 3) Feeds 4) Wages in kind 5) Baluta payment 6) Old payment

Marketed surplus – It is a quantity of agricultural produce actually sold out of marketable surplus.

RESULTS AND DISCUSSION

After the analysis of collected data, it was tabulated as under

Table No-1 Consumption needs of pigeonpea per family

Groups	Consumption (g)						
	Domestic needs	Seeds	Feeds	Wages in kind	Baluta payment	Old payment	Total consumption
Marginal	30.5	6.8	--	--	-	--	37.3
Small	29.0	11.5	2.0	--	0.5	--	43.0
Semi-medium	32.5	9.1	0.5	0.5	1.9	---	44.5
Medium	29.0	11.3	4.5	3.5	--	--	48.3
Large	38.0	12.0	5.5	4.0	1.5	---	61.0
Total	159.0	50.7	12.5	8.0	3.9	-	234.1
Mean per family	1.59	0.51	0.13	0.8	0.04	--	

The highest quantity of pigeonpea (Table No-1) is required by farmers for domestic needs (dietic requirement) , which is followed by seeds, feeds , payment of wages in kind and baluta payment respectively. An average per family requirement in all land holding group taken together ranged as 1.59 quintals for domestic needs, 0.51 quintals for seeds (some farmers use their own produce) , 0.13 quintals for feeds , 0.08 quintals for payment of wages in kind and 0.04 quintals for baluta payment respectively .

Table No-2 Total production, consumption and marketable surplus of pigeonpea (Group wise and average for all groups)

Groups & size of holding	**Area (ha-1)**	**Production (g)**	**Consumption (g)**	**Marketable surplus**	**Marketed surplus**
Marginal (upto 1.00 ha)	8.5	126.5	37.3	89.2	10.49
Small (1.01 to 2.0ha)	12.5	162.0	43.0	119.0	9.52
Semi-medium (2.01 to 4.00 ha)	19.0	289.0	44.5	244.5	12.87
Medium (4.01 to 10.00 ha)	33.5	512.0	48.3	463.7	13.84
Large (10.01 ha &above)	50.0	823.0	61.0	762.0	15.24
Total	123.5	1912.5	234.1	1678.4	----
Average ha.		15.48	1.89	-----	13.61

The marketable surplus was seen rising as the size of land holding increased except small sized land holding group (Table No-2) . The average per hectare marketable surplus of pigeonpeawas in order of 10.49, 12.87, 13.84 and 15.24 quintals in respect of marginal, semi-medium, medium, and large sized land holding groups respectively. The marketable surplus in small sized group was of 9.52 quintals per hectare which was slightly lesser than the marketable surplus of marginal group. However this exception of marketable surplus appeared in small sized group which rule out the conclusion that the marketable surplus of pigeonpea increased as the size of land holding increase.

Table No-3Production, Marketable Surplus, Marketed Surplus and Distressed Sale Pigeonpea(Group wise and Average for all groups)

Groups	Production(g)	Marketable Surplus (g)	Marketed surplus (g)	Distressed sale (g)
Marginal (upto 1.00 ha)	126.50	89.20 (70.51)	78.00 (61.66)	Nil
Small (1.01 to 2.0ha)	162.00	119.00 (73.45)	102.00 (62.96)	Nil
Semi-medium (2.01 to 4.00 ha)	289.00	244.50 (84.60)	208.00 (54.68)	Nil
Medium (4.01 to 10.00 ha)	512.00	463.70 (90.56)	280.00 (54.68)	Nil
Large (10.01ha &above)	823.00	762.00 (92.58)	382.00 (46.41)	Nil
Total	1912.50	1678.40 (87.75)	1050.00 (54.90)	Nil
Mean	15.48	13.59	8.50	Nil

The marketable surplus was increased as the size of land holding increased (Table No-3) because, marketable siurplus of pigeonpea was in ascending order of 70.51, 73.45, 84.60,90.56 and 92.18 percent respectively , in respect of marginal, small, semi-medium, medium and large size land holding groups. However, the marketed surplus was seen rising from marginal to semi-medium group as 61.66 percent in marginal 62.96 percent in small and 71.97 percent of total production in semi-medium group. The marketed surplus of pigeonpea decreased from medium to large size land holding groups, which was 54.68 percent and 46.41 percent of total production medium and large size land holding groups respectively.When all land holding groups were taken together, it was observed that, out of total production 1912.50 quintals of pigeonpea the marketable surplus being 1050 quintals which was 54,90 percent of the total production . The average per hectare production was 15.48 quintals and of which marketed surplus was 87.75 percent (13.59 quintals) and per hectare, marketed surplus was 54.90 percent (8.50 quintals) of total produce.

Overall observations revealed that, the marketed surplus of pigeonpea was substantially higher 87.75 percent in the study area, although, it was the main food crop . Marketed surplus , however, was 54.90 percent of total produce which was relatively lower than expected. Further it was also reported by most of the farmers that, some additional portion of marketable surplus they sell during rainy season i e at the time of sowing, because they needs financial assistance at that time. The marketable surplus of pigeonpea is dependent upon the size of holding,in general ruling out, the findings that, the production of pigeonpea was lesser in small group than in marginal group, because decline in production in small group is not of considerable difference. The marketable surplus is dependent upon the production, because the higher the production, higher is its marketable surplus . Thus an average quantity of marketable marketable surplus per hectare indicated that, farmers in study area could get reasonable yield in quantity of marketable surplus for disposal.

CONCLUSIONS

Overall conclusions can be summarized as higher the size of land holding , higher is the marketable surplus in case of pigeonpea ,irrespective of size of land holding , the rate marketable surplus per hectare can

be increased through intensive farm management practices, the marketable surplus is directly dependent upon, because higher the volume of production, higher is the marketable surplus ,the marketable surplus is dependent upon consumption, requirement of farmers. If the consumption quantity is reduced, the marketable surplus can be substantially increased. The marketed surplus is dependent upon the quantityof marketable surplus and on the tendencyof producers-sellers to dispose of the quantity out of marketable surplusat the particular time. The farmers belonging to large size land holding group,hardly intend to dispose of the maximum quantity of marketable surplus, at the time of harvest, because they retain the marketable surplus for disposal at the time of their financial needs which , they mostly face during sowing season.

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Economic Production of BG II Cotton in Akola District

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ABSTRACT

Cotton is the largest kharif crop of the country. The present study was undertaken in Akola district of Vidarbha region purposively for the year 2020-21. The study was based on the primary data. Overall sample of 90 BG II cotton cultivators was selected randomly. The cost and returns of BG II cotton production was worked out by using the standard cost concepts and input-output ratio was also worked out. The study found that, per hectare total cost of cultivation of BG II cotton i.e. cost 'C_3' at overall level was Rs. 79734.96. At overall level average gross returns was worked out to Rs. 127160.99 at cost 'C_3'. The net returns obtain at overall level was Rs. 47426.03 at cost 'C_3'. The highest input-output ratio at cost 'C_3' was recorded in large size group i.e. 1:1.64 followed by medium size group i.e. 1:1.60 and small size group i.e. 1:1.50. Major constrains faced by BG II cotton cultivators during production were infestation of insects and pests (88.89 per cent), high wage rate (84.44 per cent) and high cost of fertilizers and pesticides (80.00 per cent).

Keywords: *BG II cotton, cost, input-output ratio, returns.*

INTRODUCTION

Cotton (*Gossypium spp*.) is one of the most important commercial crops. Cotton belongs to the genus *Gossypium* and family Malvaceae. Types of cotton are, long stapled cotton (27.50 to 32.00 mm), medium stapled cotton (20.50 to 27.00 mm) and short stapled cotton (20.00 mm and below). Cotton plays a key role in the national economy in terms of employment generation and foreign exchange earnings. Cotton occupies a place of pride being the prime supplier of raw material (85%) for textile industry. The global cotton area, production, productivity and consumption for the year 2019-20 was 34.31 million ha, 26.15 million tons, 762 kg/ha and 22.54 million tons, respectively. Cotton is the largest kharif crop of the country. The total cotton area, production, productivity and consumption of India for the year 2019-20 was 12.60 million ha, 6.12 million tons, 466 kg/ha and 5.63 million tons, respectively. Maharashtra is the leading cotton growing state in India. Cotton area, production and productivity of Maharashtra for the year 2019-20 was 43.69 lakh ha, 82.00 lakh bales and 319 kg/ha,respectively(Source: www.cotcorp.org.in)The study would help cultivators for earning money and increasing farm income from the cultivation of BG II cotton crop by maintaining climatic conditions, irrigation facilities and financial facilities. The cultivation of BG II cotton engages cultivator, his family and labours. It provides better utilization of land, labour and capital to earn the highest profit from the crop.

METHODOLOGY

The present study was undertaken in Akola district of Vidarbha region purposively. Akot, Akola and Balapurtahasil from Akola district were selected purposively on the basis of potential area under BG II cotton cultivation. From each selected tahasil, three villages were selected randomly i.e. total 9 villages were selected.Random selection of ten cultivators from each selected village i.e. overall sample of 90 BG II cotton cultivators was selected. Selected BG II cotton cultivators were categorized into small, medium and large group cultivators on the basis of their average size of land holding.The present study was based on the primary data. The data of production was collected for the year 2020-21 through the personal interview method by using pretested schedule. The cost and returns of BG II cotton production was worked out by using the standard cost concepts i.e. cost A_1, cost A_2, cost B_1,

cost B_2, cost C_1, cost C_2 and cost C_3 and input-output ratio was also worked out.

Cost concepts

The standard cost concepts i.e. cost 'A_1', cost 'A_2', cost 'B_1', cost 'B_2', cost 'C_1', cost 'C_2' and cost 'C_3'wasused in present analysis.

Cost 'A_1' = It includes all actual expenses in cash and kind incurred in production by cultivator.

Cost 'A_2' = Cost 'A_1' + Rent paid for leased-in land

Cost 'B_1' = Cost 'A_1' + Interest value of owned fixed capital assets (excluding land)

Cost 'B_2' = Cost 'B_1' + Rental value of owned land less of land revenue + Rent paid for leased-in land

Cost 'C_1' = Cost 'B_1 + Imputed value of family labour

Cost 'C_2'= Cost 'B_2' + Imputed value of family labour

Cost 'C_3' = Cost 'C_2' + 10 per cent of cost 'C_2' on account of managerial functions performed by cultivator

Cost of production per quintal

Cost of production per quintal of BG II cotton has been worked out by total cost (cost C_3) minus value of by produce dividing by quantity of main produce in quintal.

Gross returns

Gross returns was estimated from returns obtained by the sale of main produce.

Net returns

Net returns was computed at different costs i.e. cost 'A_1', cost 'A_2', cost 'B_1', cost 'B_2', cost 'C_1', cost 'C_2'and cost 'C_3' by deducting respective costs from the gross returns.

Input-Output ratio

This is the ratio which represents returns obtained per rupee of investment. Input-output ratio is calculated at cost 'A_1', cost 'A_2', cost 'B_1', cost 'B_2', cost 'C_1', cost 'C_2'and cost 'C_3' by dividing gross returns by the respective cost.

RESULTS AND DISCUSSION

Average size of holding of selectedBGIIcottoncultivators

It is noticed from Table 1 that, number of selected cultivators was 90, out of which 56 cultivators belongs to small size holding, 23 cultivators belongs to medium size holding and 11 cultivators belongs to large size holding with average size of holding was 1.72, 3.68 and 6.21 ha, respectively. The average size of holding of BG II cotton cultivators at overall level was 3.87 ha.

Table 1Average size of holding of selected BG II cotton cultivators

Sr. No.	Size of holding	No. of cultivators Selected	Average size of holdings
1.	Small (Up to 2 Ha.)	56 (62.22)	1.72
2.	Medium (2.01 to 4.00 Ha)	23 (25.56)	3.68
3.	Large (4.01 & above)	11 (12.22)	6.21
	Total/ Overall	90 (100.00)	3.87

(Figures in parentheses indicates percentage to the total cultivators)

Per hectare cost of cultivation of BG II cotton

Table 2 indicated that, in case of small size group per hectare cost of cultivation at cost 'C_3' was Rs. 76755.15,which indicates the 10 per cent as a managerial cost. Among the various components of expenditure, the share of cost of hired human labour had occupied the first position with 17.91 per cent followed by fertilizer (8.77 per cent), plant protection

(7.25 per cent), etc. The share of family labour was 7.02 per cent. Per hectare yield obtained by small cultivators was 21.32 quintal with gross returns of Rs. 114821.84. Per quintal cost of production was worked out to Rs. 3600.15.

Table 2 Per hectare cost of cultivation of BG II cotton for small group cultivators(Rs./ha)

Sr. No.	ITEM	Unit		Input/ Ha	Cost/ unit of input (Rs.)	Total cost/ha (Rs.)	Percent to total cost C_3
1.	Hired Human Labour	Male	Days	10.13	232.78	2358.06	3.07
		Female	Days	69.90	162.93	11388.81	14.84
	Subtotal		Days	80.03	395.71	13746.87	17.91
2.	Bullock Labour		Pair days	4.51	504.36	2274.66	2.96
3.	Machine Charges		Hours	8.86	520.08	4607.91	6.00
4.	Seed		Kg.	2.25	1602.95	3606.64	4.70
5.	Manure		Tons.	1.33	1256.46	1671.09	2.18
		N	Kg.	97.03	30.36	2945.83	3.84
		P	Kg.	55.45	35.56	1971.80	2.57
6.	Fertilizer	K	Kg.	51.86	34.93	1811.45	2.36
	Subtotal					6729.08	8.77
7.	Irrigation Charges	Rs.				549.18	0.72
8.	Insecticide (Plant Protection)	Rs.				5562.63	7.25
9.	Incidental Charges	Rs.				48.05	0.06
10.	Repairing Charges	Rs.				44.94	0.06
11.	Working Capital	Rs.				38841.05	50.60
12.	Int. on Wr.Cap. @ 6 % /annum	Rs.				1747.85	2.28
13.	Depreciation	Rs.				3024.32	3.94
14.	Land Rev. cess& other taxes	Rs.				58.46	0.08
15.	COST "A_1"	Rs.				43671.68	56.90
16.	Rental Value Leased in land	Rs.				-	-
17.	COST "A_2"	Rs.				43671.68	56.90
18.	Int. on Fix.Cap. @ 10 %/annum	Rs.				1638.45	2.13
19.	COST "B_1"	Rs.				45310.13	59.03
20.	Rental Value of Land	Rs.				19078.51	24.86
21.	COST "B_2"	Rs.				64388.64	83.89
		Male	Days	16.30	222.24	3622.51	4.72
22.	Family Human Labour	Female	Days	10.38	170.16	1766.26	2.30
	Subtotal		Days	26.68	392.40	5388.77	7.02
23.	Cost " C_1"	Rs.				50698.90	66.05
24.	Cost " C_2"	Rs.				69777.41	90.91
25.	Additional Value of Human Labour	Rs.				0.00	0.00
26.	Cost "C_2*"	Rs.				69777.41	90.91
27.	10 percent Cost C_2*	Rs.				6977.74	9.09
28.	Cost "C_3"	Rs.				76755.15	100.00
29.	Main produce	Rs.		21.32	5385.64	114821.84	
30.	Per qtl. cost of production at Cost "C_3"	Rs.				3600.15	

Table 3 Per hectare cost of cultivation of BG II cotton for medium group cultivators

(Rs./ha)

Sr. No.	ITEM	Unit		Input/ Ha	Cost/ unit of input (Rs.)	Total cost/ha (Rs.)	Percent to total cost C_3
		Male	Days	11.97	223.22	2671.94	3.40
1.	Hired Human Labour	Female	Days	72.21	165.62	11959.42	15.22
	Subtotal		Days	84.18	388.84	14631.36	18.62
2.	Bullock Labour		Pair days	5.65	508.07	2870.60	3.65
3.	Machine Charges		Hours	8.75	517.52	4528.30	5.76
4.	Seed		Kg.	2.26	1610.42	3639.55	4.63
5.	Manure		Tons.	1.81	1251.71	2265.60	2.88
		N	Kg.	101.85	32.72	3332.53	4.24
		P	Kg.	58.78	37.65	2213.07	2.82
6.	Fertilizer	K	Kg.	53.06	36.15	1918.12	2.44
	Subtotal					7463.72	9.50
7.	Irrigation Charges	Rs.				475.19	0.60
8.	Insecticide (Plant Protection)	Rs.				6182.96	7.87
9.	Incidental Charges	Rs.				54.80	0.07
10.	Repairing Charges	Rs.				47.85	0.06
11.	Working Capital	Rs.				42159.93	53.66
12.	Int. on Wor.Cap. @ 6 % /annum	Rs.				1897.20	2.42
13.	Depreciation	Rs.				1714.54	2.18
14.	Land Rev. Cess& Other Taxes	Rs.				74.93	0.10
15.	COST "A_1"	Rs.				45846.60	58.36
16.	Rental Value Leased in land	Rs.				-	-
17.	COST "A_2"	Rs.				45846.60	58.36
18.	Int. on Fix.Cap. @ 10 %/annum	Rs.				771.46	0.98
19.	COST "B_1"	Rs.				46618.06	59.34
20.	Rental Value of Land	Rs.				20863.39	26.56
21.	COST "B_2"	Rs.				67481.45	85.90
		Male	Days	13.02	215.80	2809.72	3.58
22.	Family Human Labour	Female	Days	6.51	172.69	1124.21	1.43
	Subtotal		Days	19.53	388.49	3933.93	5.01
23.	Cost " C_1"	Rs.				50551.99	64.35
24.	Cost " C_2"	Rs.				71415.38	90.91
25.	Additional Value of Human Labour	Rs.				0.00	0.00
26.	Cost "C_2*"	Rs.				71415.38	90.91
27.	10 percent Cost C_2*	Rs.				7141.54	9.09
28.	Cost "C_3"	Rs.				78556.92	100.00
29.	Main produce	Rs.		22.48	5588.52	125629.93	
30.	Per qtl. cost of production at Cost "C_3"	Rs.				3494.52	

It is observed from Table 3 that, in case of medium size group per hectare cost of cultivation at cost 'C_3' was Rs. 78556.92,which indicates the 10 per cent as a managerial cost. Among the various components of expenditure, the share of cost of hired human labour had occupied the first position with 18.62 per cent followed by fertilizer (9.50 per cent), plant protection (7.87 per cent), etc. The share of family labour was 5.01 per cent. Per hectare yield obtained by medium cultivators was 22.48 quintal with gross returns of Rs. 125629.93. Per quintal cost of production was worked out to Rs. 3494.52.

Table 4 Per hectare cost of cultivation of BG II cotton for large group cultivators

(Rs./ha)

Sr. No.	ITEM	Unit		Input/ Ha	Cost/ unit of input (Rs.)	Total cost/ha (Rs.)	Percent to total cost C_3
		Male	Days	14.82	216.04	3201.71	3.90
1.	Hired Human Labour	Female	Days	78.05	169.10	13198.26	16.09
	Subtotal		Days	92.87	385.14	16399.97	19.99
2.	Bullock Labour		Pair days	5.79	515.06	2982.20	3.63
3.	Machine Charges		Hours	9.65	522.53	5042.41	6.15
4.	Seed		Kg.	2.24	1606.80	3599.23	4.39
5.	Manure		Tons.	2.79	1250.68	3489.40	4.25
		N	Kg.	106.25	33.07	3513.69	4.28
		P	Kg.	60.35	38.13	2301.15	2.80
6.	Fertilizer	K	Kg.	52.23	37.95	1982.13	2.42
	Subtotal					7796.97	9.50
7.	Irrigation Charges	Rs.				440.31	0.54
8.	Insecticide (Plant Protection)	Rs.				6552.44	7.99
9.	Incidental Charges	Rs.				56.32	0.07
10.	Repairing Charges	Rs.				52.94	0.06
11.	Working Capital	Rs.				46412.19	56.57
12.	Int. on Wor.Cap. @ 6 % /annum	Rs.				2088.55	2.55
13.	Depreciation	Rs.				922.77	1.12
14.	Land Rev. Cess& Other Taxes	Rs.				98.87	0.12
15.	COST "A_1"	Rs.				49522.38	60.36
16.	Rental Value Leased in land	Rs.				-	-
17.	COST "A_2"	Rs.				49522.38	60.36
18.	Int. on Fix.Cap. @ 10 %/annum	Rs.				600.86	0.73
19.	COST "B_1"	Rs.				50123.24	61.09
20.	Rental Value of Land	Rs.				22379.79	27.28
21.	COST "B_2"	Rs.				72503.03	88.37
		Male	Days	7.41	211.17	1564.77	1.91
22.	Family Human Labour	Female	Days	2.94	176.66	519.38	0.63
	Subtotal		Days	10.35	387.83	2084.15	2.54
23.	Cost " C_1"	Rs.				52207.39	63.63
24.	Cost " C_2"	Rs.				74587.18	90.91
25.	Additional Value of Human Labour	Rs.				0.00	0.00
26.	Cost "C_2*"	Rs.				74587.18	90.91
27.	10 percent Cost C_2*	Rs.				7458.72	9.09
28.	Cost "C_3"	Rs.				82045.90	100.00
29.	Main produce	Rs.		23.75	5678.82	134871.98	
30.	Per qtl. cost of production at Cost "C_3"	Rs.				3454.56	

Data in Table 4 revealed that, in case of large size group per hectare cost of cultivation at cost 'C_3' was Rs. 82045.90,which indicates the 10 per cent as a managerial cost. Among the various components of expenditure, the share of cost of hired human labour had occupied the first position with 19.99 per cent followed by fertilizer (9.50 per cent), plant protection (7.99 per cent), etc. The share of family labour was 2.54 per cent. Per hectare yield obtained by largecultivators was 23.75 quintal with gross returns of Rs. 134871.98. Per quintal cost of production was worked out to Rs. 3454.56.

Table 5 Per hectare cost of cultivation of BG II cotton for overall group cultivators(Rs./ha)

Sr. No.	ITEM	Unit		Input/ Ha	Cost/ unit of input (Rs.)	Total cost/ha (Rs.)	Percent to total cost C_3
		Male	Days	12.45	220.86	2749.69	3.45
1.	Hired Human Labour	Female	Days	73.52	165.89	12196.08	15.30
	Subtotal		Days	85.97	386.75	14945.77	18.75
2.	Bullock Labour		Pair days	5.35	512.10	2739.75	3.44
3.	Machine Charges		Hours	9.14	518.38	4737.99	5.94
4.	Seed		Kg.	2.25	1609.84	3622.13	4.54
5.	Manure		Tons.	1.98	1252.53	2480.01	3.11
		N	Kg.	101.81	32.29	3287.31	4.12
		P	Kg.	58.82	37.06	2179.93	2.73
6.	Fertilizer	K	Kg.	52.47	36.60	1920.48	2.41
	Subtotal					7387.72	9.26
7.	Irrigation Charges	Rs.				495.27	0.62
8.	Insecticide (Plant Protection)	Rs.				6112.05	7.67
9.	Incidental Charges	Rs.				53.88	0.07
10.	Repairing Charges	Rs.				48.76	0.06
11.	Working Capital	Rs.				42623.33	53.46
12.	Int. on Wor.Cap. @ 6 % /annum	Rs.				1918.05	2.41
13.	Depreciation	Rs.				1894.13	2.38
14.	Land Rev. Cess& Other Taxes	Rs.				78.32	0.10
15.	COST "A_1"	Rs.				46513.83	58.34
16.	Rental Value Leased in land	Rs.				-	-
17.	COST "A_2"	Rs.				46513.83	58.34
18.	Int. on Fix.Cap. @ 10 %/annum	Rs.				1020.86	1.28
19.	COST "B_1"	Rs.				47534.69	59.62
20.	Rental Value of Land	Rs.				21115.18	26.48
21.	COST "B_2"	Rs.				68649.87	86.10
		Male	Days	12.32	217.53	2679.92	3.36
22.	Family Human Labour	Female	Days	6.67	173.39	1156.54	1.45
	Subtotal		Days	18.99	390.92	3836.46	4.81
23.	Cost " C_1"	Rs.				51371.15	64.43
24.	Cost " C_2"	Rs.				72486.33	90.91
25.	Additional Value of Human Labour	Rs.				0.00	0.00
26.	Cost "C_2*"	Rs.				72486.33	90.91
27.	10 percent Cost C_2*	Rs.				7248.63	9.09
28.	Cost "C_3"	Rs.				79734.96	100.00
29.	Main produce	Rs.		22.82	5572.35	127160.99	
30.	Per qtl. cost of production at Cost "C_3"	Rs.				3494.08	

Table 5 found that, in case of overall size group per hectare cost of cultivation at cost 'C_3' was Rs. 79734.96,which indicates the 10 per cent as a managerial cost. Among the various components of expenditure, the share of cost of hired human labour had occupied the first position with 18.75 per cent followed by fertilizer (9.26 per cent), plant protection (7.67 per cent), etc. The share of family labour was 4.81 per cent. Per hectare yield obtained by overall cultivators was 22.82 quintal with gross returns of Rs. 127160.99. Per quintal cost of production was worked out to Rs. 3494.08.

Table 6 Per hectare cost and returns from BG II cotton (Rs./qtl.)

Sr. No.	Particulars	Small	Medium	Large	Overall
1.	Main Produce (qtl./ha)	21.32	22.48	23.75	22.82
2.	Value of Main Produce	114821.84	125629.93	134871.98	127160.99
3.	Gross Returns	114821.84	125629.93	134871.98	127160.99
4.	Cost of Cultivation at				
	Cost 'A_1'	43671.68	45846.60	49522.38	46513.83
	Cost 'A_2'	43671.68	45846.60	49522.38	46513.83
	Cost 'B_1'	45310.13	46618.06	50123.24	47534.69
	Cost 'B_2	64388.64	67481.45	72503.03	68649.87
	Cost 'C_1'	50698.90	50551.99	52207.39	51371.15
	Cost 'C_2'	69777.41	71415.38	74587.18	72486.33
	Cost 'C_3'	76755.15	78556.92	82045.90	79734.96
5.	Net Returns at				
	Cost 'A_1'	71150.16	79783.33	85349.60	80647.16
	Cost 'A_2'	71150.16	79783.33	85349.60	80647.16
	Cost 'B_1'	69511.71	79011.87	84748.74	79626.30
	Cost 'B_2'	50433.20	58148.48	62368.95	58511.12
	Cost 'C_1'	64122.94	75077.94	82664.59	75789.84
	Cost 'C_2'	45044.43	54214.55	60284.80	54674.66
	Cost 'C_3'	38066.69	47073.01	52826.08	47426.03
6.	Input- Output ratio at				
	Cost 'A_1'	2.63	2.74	2.72	2.73
	Cost 'A_2'	2.63	2.74	2.72	2.73
	Cost 'B_1'	2.53	2.69	2.69	2.68
	Cost 'B_2'	1.78	1.86	1.86	1.85
	Cost 'C_1'	2.26	2.49	2.58	2.48
	Cost 'C_2'	1.65	1.76	1.81	1.75

Table 6 depicted that, the gross returns was highest in large size group i.e. Rs. 134871.98 followed by medium size group (Rs. 125629.93) and small size group (Rs. 114821.84) and at overall level it was Rs. 127160.99. Net returns at cost 'C_3' was highest in large size group i.e. Rs. 52826.08 followed by medium size group (Rs. 47073.01) and small size group (Rs. 38066.69) and at overall level it was Rs. 47426.03. This means BG II cotton crop appeared to be good for monitory benefits. The highest input-output ratio at cost 'C_3' was recorded in large size group i.e. 1:1.64 followed by medium size group i.e. 1:1.60 and small size group i.e. 1:1.50. At overall level the input-output ratio at cost 'C_3' was 1:1.59.

The input-output ratio which is an indicator of economic efficiency in crop production for the crop and other discussion indicated that, BG II cotton registered a good input-output ratio at cost 'C_3' i.e. 1:1.59 at overall level means this is a profitable crop.

Constraints faced by BG II cotton cultivators in production of BG II cotton

Table 7Constraints faced by BG II cotton cultivators during production

Sr. No.	Constraints	No. of cultivators (N=90)	Per cent to total cultivators	Rank
1.	Unfavorable climate	55	61.11	VII
2.	High cost of fertilizers and pesticides	72	80	III
3.	High wage rate	76	84.44	II
4.	Less availability of human labour	70	77.78	IV
5.	High cost of quality seed	65	72.22	V
6.	Irregular supply of electricity	47	52.22	IX
7.	Infestations of insect and pest (Heavy infestations of pink bollworm)	80	88.89	I
8.	Attack of wild animals on crop	62	68.89	VI
9.	Lack of financial facility	51	56.67	VIII
10.	Lack of technical knowledge about pest and diseases and its control	43	47.78	X

Data in Table 7 showed that, major constrains faced by BG II cotton cultivators during production were infestation of insects and pests which was expressed by 80 (88.89 per cent) cultivators followed by high wage rate (84.44 per cent) and high cost of fertilizers and pesticides (80.00 per cent). Other problems in production were less availability of human labour, high cost of quality seed, attack of wild animals on crop, unfavorable climate, lack of financial facility, irregular supply of electricity and lack of technical knowledge about pest and diseases and its control and overall percentages of these were 77.78, 72.22, 68.89, 61.11, 56.67, 52.22 and 47.78 per cent, respectively.

CONCLUSIONS

From this study it is concluded that, per hectare total cost of cultivation of BG II cotton i.e. cost 'C_3' was highest in large size group i.e. Rs. 82045.90 followed by medium size group (Rs. 78556.92) and small size group (Rs. 76755.15) and at overall level it was Rs. 79734.96. At overall level average gross returns was worked out to Rs. 127160.99. The net returns obtain at overall level at cost 'C_3' was Rs. 47426.03. 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) and small size group (1.50) and at overall level it was 1.59.The study results have indicated that BG II cotton is a profitable crop. Hence, the study suggested that area under BG II cotton should increase.Major constrains faced by BG II cotton cultivators during production were infestation of insects and pests, high wage rate and high cost of fertilizers and pesticides and overall percentages of these were88.89 per cent, 84.44 per cent and 80.00 per cent, respectively.

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Constraints Faced by Dairy Businessmen during Production and Marketing of Milk

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ABSTRACT

The study was undertakenin four tahsils of Amravati district of Maharashtra with objective to examine the constraints faced by dairy businessmen during production and marketing of milk. We collected data from 60 cows milk producers and 60buffaloes milk producers in four tahasils of Amravati district in Maharashtra. These constraints are then listed from one to nineteen and studied in their frequencies, percentage and ranking. It is revealed that ,cows and buffalo milk producers had faced the low purchased price by private dairy shop and non-availability of labour as major problems. High cost of feeds, fodder and concentrate feeds was also observed. Lack of artificial insemination facilities, delay in the marketing of milk, delay in the payment from dairy shops and lack of grazing land were also major problem faced by milkproducers.In the other problems, non- availability of veterinary doctors, lack of cold storage facilities, lack of animal health awareness program of Government and non-identification of animal diseases were found as minor problems to both cows and buffaloes milk producers.The milk producers were mostly unknown about the different management practices of cow and buffaloes .
Keywords- feed , fodder , constraints, milk producers

INTRODUCTION

In India, agriculture and allied sectors provide livelihood to about 70 percent of the population and contribute nearly one fifth of national income, with the land available for cultivation remaining unchanged that is 142.6 million hector. The per capita available land in the context of existing population comes to about 0.30hec. (ICAR Booklet- 2011).The pressure exerted by over increasing occupancy on the land by the increasing strength of population has been further reducing the per capita available land. It is insufficient for maintaining minimum standard of living hence, it is utmost necessary that, subsidiary agro-based industries or occupation must be tried by rural people to seek over the means for their survival.

As a subsidiary agro-based industry, dairy provide drought power and manures which augment the crop production. Our country is rich in genetic diversity of cattle. Milch animals are one of the solutions to solve the problem of uncertainty associated in family business. Dairy industry is one of the profitable agro-based industries which can effectively tackle the problem of unemployment and underemployment in the rural as well as in urban area.

Milk, being the most perishable commodity; require quick & efficient marketing system which minimizes the cost of marketing services so as to ensure the largest share of consumer's price to the producers. Milk production in the country is marked by high seasonal fluctuation. In the flush season, the middle men of milk marketing infrastructure collect large production of milk at low price & distribute to consumers at higher price. By this way, these functionaries exploit both the milk producers & consumers.

Thus it is clearly say that,milk production from buffaloes is profitable but milk producers are facing some problemswhich created difficulties in their dairy business. These constraints disappointed

milk producers, hence this research is undertaken to study the different constraints being faced by milk producers with fallowing objective-

To justify the constraints faced by buffaloes milk producers and cow milk producers during production and marketing of milk and milk products.

METHODOLOGY

The present study was conducted in eight villages in four tahasils (two villages in each tahasil) in Amravati district in Maharashtra . Total 120 dairymen (60 cow milk producers and 60 buffalo milk producers) were selected randomly from eight villages . 15 milk producers from each village are respondent. The interview was conducted personally and Data were collected by using pre-prepared comprehensive questionnaire related to constraints of dairy farmers at the time of production and marketing of milk and milk products. All together of 19 constraints were identified and responses were scored as yes =1 and no=0.

The constraints are then listed from one to nineteen and studied as per their frequencies, percentage and ranking.

The details about its calculation concerning to frequencies, percentage and its ranking given as under

a) Frequencies – It is calculated by noting the repetition of the same problem faced by milk producers

b) Percentage- It is calculated by

$$\frac{\text{number of milk producers facing a problem}}{\text{total surveyed milk producers}} \times 100$$

c) Ranking –It is calculated using dataof the frequencies and percentage

RESULTS AND DISCUSSION

Table1 Constraints faced by cow and buffalo milk producers during production and marketing of milk .

Sr. No.	Constraints	Frequency	Percentage	Rank
1	Lack of sufficient grazing facility in rural area	58	96.66	I
2	Low - purchased price by dairy society.	54	90.00	II
3	High per unit price of concentrates feed.	52	86.66	III
4	Non-availability & high cost of concentrates feed	42	70.00	IV
5	Delay in the getting payment of milk from dairy society.	41	68.33	V
6	Non-availability of labour.	40	66.66	VI
7	Lack of animals' health awareness Govt.program.	40	66.66	VI
8	Non-availability of veterinary aids in the village.	40	66.66	VI
9	High price fluctuation in the dry fodder.	32	53.33	VII
10	Lack of cold storage facilities for keeping unsold milk.	32	53.33	VII
11	Problem of spoilage milk in the summer.	31	51.66	VIII
12	Non-identification of animals' diseases.	29	48.33	IX
13	Delay in the marketing of milk.	28	46.66	X
14	Lack of artificial insemination facilities in the village.	24	40.00	XI
15	Drinking water problem of animals in the summer.	17	28.33	XII
16	Difficulties in quick transport of milk to the cities/towns.	14	23.33	XIII
17	Fearof natural calamity such as snake bite	13	21.66	XIV
18	Lack of pukka approach roads.	13	21.66	XIV
19	Fat content variation.	12	20	XV

Above table shows that,cow and buffalo milk producers had also faced to much problems during production and marketing of milk .These problems are discussed here as under.

It was reveals that, 96.66% (58 milk producers) milk producers had faced the problem of lack of sufficient grazing facility at the same time low purchased price by dairy co-operatives was the problem found in 86.66% (52) of milk producers. It was also noted that, lack of sufficient grazing facility and low- purchased price by dairy co-operatives was as ranked first and second respectively. High per unit price of concentrate feeds was faced to 71.66% (41) milk producers & it was ranked was as third and all were severe problems to milk producers. It was observed that, non-availability of concentrate feed and & veterinary medicines in rural area was faced by 6833% (41) milk producers whereas 66.66% (40) milk producers had faced the problem of delay in the getting payment from dairy crop society.

Near about 6.33% of total milk producers were facing another problem i.e. lack of animal health awareness Govt. program. Non- availability of veterinary aids in the village, high price fluctuations in the dry fodder price, lack of cold storage facility for keeping unsold milk & problem of spoilage of milk in the summer was faced by 61.66% (37), 58.33% (35), 56.66% (34), and 56.66% (34) milk producers respectively. It is further recorded that, non-identification of animal diseases, delay in the marketing of milk and milk products and lack of artificial inseminations facilities in the village etc was the problems created to 53.33% (32), 51.66% (1), 46.66% (28) of milk producers respectively.

In the minor constraint , drinking water problem of animals in the summer season, difficulties in quick transport of milk to cities, fairness of natural calamity (snake bites) , lack pakka approach road & fat content variations were also found as 38.33% (23), 36.66% (22), 33.33% (20), 30.00% (18) & 26.68% (16) to milk producers respectively.

The overall observation denoted that, as compared to cows milk producer's problems, buffalo milk producers had faced some different constraints such as, delay in the getting payment & high price fluctuation in dry fodder price etc.In the ranking of seriousness about the problem, lack of sufficient grazing land which ranked first, low purchased price to milk which ranked as second and high per unit price of concentrate feeds which ranked as third were the major problems to the buffalo milk producers.

Non-availability of labour lack of storage facilities for unsold milk, delay in marketing of milk and fat content variation were the same problems found in cows && buffaloes milk producers.

According to the finding of Thorat & Kulkarni (1994), high cost of feeds and non – availability of credit were the major problems.

Fat content in the milk decided level of price at time of selling the milk at private dairy shops, therefore ,fat content variation was also disturbing factor to milk producers. Natural calamity such as, snake bite in rainy season in cattle shed as well as during grazing created serious loss because, it cause death of animals. It was understood that, spoilage of milk in summer season was some time create great loss. Non-identification of animal's disease properly to milk producers and created animaldeath was also countable constraints. Sometimes milk producers used traditional methods of care of disease of animals therefore, animals taken long period to care. It affected milk yield.

CONCLUSIONS

During the collection of data, we had discussed with the milk producers about different constraints faced by them. Whatever the constraints found, are summarized that, cows and buffalo milk producers had faced the low purchased price by private dairy shop and non- availability of labour as major problems. High cost of feeds, fodder and concentrate feeds was also observed. Lack of artificial insemination facilities, delay in the marketing of milk, delay in the payment from dairy shops and lack of grazing land were also major problem faced by milk producers.

In the other problems, non- availability of veterinary doctors, lack of cold storage facilities , lack of animals health awareness program of Government and non- identification of animal diseases were found as minor problems to both cows and buffaloes milk producers.The milk producers were mostly unknown about the different management practices of cow and buffalo.Non - availability labour, high cost of feeds/concentrate feeds and non- availability of veterinary doctor in the

rural area were faced as major constraints to milk producers.

POLICY IMPLICATIONS

As the constraints studied, private registered breeder and state government agency should make available good pedigree milk animals for sale to farmers. As it is seen that, purchasing cost of milch animals is very much therefore, department of animal husbandry of state government should start special scheme to finance or subsidy at the time of purchasing of animals.It is necessary to suggest that, State Agricultural Universities & Animal Science Universities should adopt special campaign program for the farmers to start the dairy business & better dairy management technology.Farmers should raise fodder crops such as maize and other forage crops so as to make available for their animals as feeds and can be minimized the cost on feeds and fodder.

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Economic analysis of Production and Marketing of Banana in Kadapa district of Andhra Pradesh

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ABSTRACT

To accomplish the stated objectives 90 farmers were selected from three tehsils namely Vemula, Pulivendula and Lingala of Kadapa district. The study was based on primary dataduring the year 2021-2022. Per hectare yield for overall average was 734.97 quintals. The average gross returns were obtained was Rs.804955.81. The average per hectare net return received at overall was Rs. 377582.66. The overall input-output ratio was 1.88.The input output ratio which is an indicator of economic efficiency in crop production for the crop and it indicated that the banana registered a good input output ratio i.e.1.88 means hypothesis is acceptable and proved.The constraints faced by banana farmers in production of banana was the problem of incidence of disease was ranked first with mean score of 71.74, destruction due to wind (mean score: 66.48), High fertilizer cost (mean score: 56.03) was ranked as second and third followed by High labour charges (mean score: 38.24).

INTRODUCTION

Banana varieties originated from the two well-known species *Musa acuminata* and *Musa balbisiana*. The banana is currently the most popular tropical fruit on the global market, due to an extremely developed and prepared business. The second most important fruit crop in India, after mango, is the banana (*Musa sp*.). The banana is a favourite fruit of all age groups due to its year-round availability, affordability, variety, flavour, nutritional value, and medicinal price. High-tech crop farming is a financially viable business that leads to an increase in production, improvement in product quality, and early crop adulthood with the products attracting top money prices.In terms of area under cultivation, output, and export of bananas in the nation, Andhra Pradesh takes the top spot. The state government has selected banana as one of the growth engine crops. The districts of Rayalaseema have become the top producing regions and also in the amount of farmers that are reportedly working in agriculture. The majority of banana growers in the state cultivate the Karpura Chakkerakeli, Tella Chakkerakeli, Budida Chakkerakeli, Amruthapani, Red-Banana, Sugandhalu (Karpura), Karpuravali (Budida Arti) and Rasthalu types of bananas. The United Arab Emirates, Bahrain, Egypt, and Saudi Arabia included under Primary destinations for export of banana. 2.315 million tonnes production in the state's Kadapa district. In the district, the fruit is grown on 25,000 acres, 10,000 of which are in the Pulivendula constituency. Rajampeta and Railway Kodur are two further significant areas.Andhra Pradesh ranks first in production of Banana with 6209.44 thousand tonnes and the total area under banana was 100.16 thousand ha. Andhra Pradesh was contributing close to 18 percent of the total production in the country. Banana is cultivated in over 25,000 acres of land in Kadapa district with Pulivendula town accounting for 10,000 acres.

METHODOLOGY

The present investigation was undertaken to study the production and marketing aspects of Banana. Economic analysis was made by using different cost concepts and estimating marketing cost, price spread. The methodology used

and analytical procedure have been explained in the present chapter.

Sampling Technique

The present study was undertaken in Rayalaseema region of Kadapa district of Andhra Pradesh. The region was selected purposively for the study as it has highest concentration of banana in the district.The sampling technique adopted for this study was multistage random sampling. Selection of district, selection of tahsil, selection of villages and selection of farmers were considered.A sample of 90 farmers were selected randomly from the chosen area. From each village 10 farmers were selected randomly.

Collection of data

The present investigation was based on the primary data. The selected farmers were personally interviewed and required data collected from them for the year 2021-2022, by the survey method through a specially designed pre-tested schedule. It includes information related to following aspects was collected.The banana farmers were further classified in to three size groups on the basis of land holding as small (up to 2 ha), medium (2.01-4 ha) and large (4.01 ha and above).The data on purchase price, expenses and margins obtained in the marketing of banana were collected from 10 Pre harvest contractors, 10 wholesalers, 10 retailers. This data were used for estimating market cost as well as price spread in marketing.

Analytical procedure

Simple tabular analysis was carried out to work out the level of input utilized, cost of cultivation and returns from banana crop. The expenditure incurred by the selected farmers on growing crop was worked out by using the standard cost concept.

RESULT AND DISSCUSSION

Farm product is the results of different input factors utilized in the process of production. A study of input utilization helps to determine the profitability of crop enterprises.

The degree of management of the resources can be judged for the utilization of resources, the choice and the decision making. Beside this, it also indicates the level of technology adopted by the farmers. The farmers required to spend on various inputs like tissue culture plants, manure, fertilizer, human labour. Therefore, it was necessary to know the pattern of expenditure on various inputs on per hectare basis. The Per hectare inputs used in banana crop was estimated and presented in table 1.

It was observed from table 1, that use of hired human labour was observed highest in large farmers i.e. 356.27 days. The per hectare utilization of machine labour was highest in large farmers i.e. 11.93 hrs. The fertilizer use was highest in large farmers followed by medium and small farmers. Use of family labour was observed highest in case of small farmers i.e. 32.06 days followed by medium and large farmers.

Table 1 Per hectare input utilization of selected banana growers

Sr. No.	Particulars	Unit	Small	Medium	Large	Overall
1	Hired Human Labour					
	Male	Days	241.59	250.32	261.12	252.89
	Female	Days	81.50	88.94	95.16	89.79
	Sub total		323.09	339.26	356.27	342.68
2	Family Labour					
	Male	Days	21.40	19.40	18.56	19.54
	Female	Days	10.66	9.04	8.48	9.21
	Sub total		32.06	28.45	27.04	28.75
3	Total labour					
	Male	Days	262.99	269.72	279.67	272.42
	Female	Days	92.16	97.98	103.64	99.00

	Sub total		355.15	367.70	383.31	371.43
4	Machine labour					
	Owned labour	Hrs.	1.94	0.00	0.00	0.50
	Hired labour	Hrs.	8.60	11.53	11.93	10.95
	Sub total		10.54	11.53	11.93	11.45
5	Manure	Qt.	286.52	240.43	293.91	276.14
6	Fertilizer					
	N	Kg.	439.83	451.28	455.38	450.16
	p	Kg.	302.33	340.40	336.08	328.67
	K	Kg.	245.22	247.53	264.90	254.68

Table 2. Per hectare cost of cultivation of banana (Value in Rs)

Sr. No.	Items	Unit		Quantity	Price/unit	Total cost	Percentages
1	Hired Human Labour	Male	Days	252.89	287.68	72749.99	17.02
		Female	Days	89.79	224.27	20137.58	4.71
	Sub total					92887.56	21.73
2	Machine labour		Hours	11.45	700.00	8016.41	1.88
3	Planting material		No.	3202.65	12.25	39232.42	9.18
4	Manures		qtl.	276.14	71.83	19835.69	4.64
5	Fertilizer	N	Kg	450.16	23.81	10717.57	2.51
		P	Kg	328.67	43.28	14224.24	3.33
		K	Kg	254.68	25.30	6443.70	1.51
	Sub total					31385.51	7.34
6	Irrigation charges	(Rs.)				6994.63	1.64
7	Plant Protection	(Rs.)				9502.12	2.22
8	Propping	(Rs.)				14364.43	3.36
9	Incidental charges	(Rs.)				1261.32	0.30
10	Repairing Charges	(Rs.)				860.20	0.20
11	**Working Capital (1 to 10)**	(Rs.)				**224340.30**	52.49
12	Interest on working capital					13460.42	3.15
13	Depreciation	(Rs.)				800.22	0.19
14	Land Revenue	(Rs.)				25.00	0.01
15	**Cost A_1 (Items 11 to 14)**	(Rs.)				**238625.93**	55.84
16	Rental value leased in land					0.00	0.00
17	**Cost A_2 (Items 15 to 16)**	(Rs.)				**238625.93**	55.84
18	Int. on Fix. Cap.@10%					8069.57	1.89
19	**Cost B_1 (Items 15 and 18)**	(Rs.)				**246695.51**	57.72
20	Rental value of owned land	(Rs.)				134134.30	31.39
21	**Cost B_2 (Items 19 and 20)**	(Rs.)				**380829.81**	89.11
22	Family Labour	Male	Days	19.54	287.83	5623.95	1.32
		Female	Days	9.21	224.44	2067.29	0.48
	Sub total					7691.24	1.80
23	**Cost C_1 (Items 19+22)**	(Rs.)				**254386.74**	59.52
24	**Cost C_2 (Items 21+22)**	(Rs.)				**388521.04**	90.91

25	10% cost of C_2 (Managerial cost)	(Rs.)				38852.10	9.09
26	**Cost C_3**	(Rs.)				**427373.15**	100.00
27	Yield	qtl.		734.97	1095.22	804955.81	
28	Cost of production per qtl.	Rs.				581.48	

It is seen from the Table 2, that at overall level the cost of cultivation was Rs. 427373.15/- The major item contributed to total cost C_3 were Rental value of land (31.39 %), followed by hired human labour (21.73 %) Planting material (tissue culture) (9.18 %), Fertilizer (7.34 %), Manures (4.64 %) and propping (3.36 %). The average main production at overall level was 734.97 q/ha and per quintal cost of production was worked out to Rs. 581.48.

Table 3. Economics of banana cultivation (Value in Rs./ha)

Sr. No.	Particulars	Small	Medium	Large	Overall
1	Main Produce(q/ha.)	700.37	715.96	767.63	734.97
2	Value of main produce	757267.16	778563.83	850084.99	804955.81
3	Gross Returns	757267.16	778563.83	850084.99	804955.81
4	**Cost of Cultivation at**				
	Cost "A_1"	229820.22	233269.21	243577.75	238625.93
	Cost "A_2"	229820.22	233269.21	243577.75	238625.93
	Cost "B_1"	236891.25	240744.59	252619.96	246695.51
	Cost "B_2"	363077.45	370480.23	394275.79	380829.81
	Cost "C_1"	245439.90	248373.96	259853.79	254386.74
	Cost "C_2"	371626.09	378109.59	401509.63	388521.04
	Cost "C_3"	408788.70	415920.55	441660.59	427373.15
5	**Net return at**				
	Cost " A_1"	527446.94	545294.62	606507.23	566329.87
	Cost " A_2"	527446.94	545294.62	606507.23	566329.87
	Cost " B_1"	520375.90	537819.24	597465.02	558260.30
	Cost " B_2"	394189.71	408083.60	455809.19	424126.00
	Cost " C_1"	511827.26	530189.87	590231.19	550569.07
	Cost " C_2"	385641.07	400454.24	448575.36	416434.77
	Cost " C_3"	348478.46	362643.28	408424.40	377582.66
6	**Output input ratio at**				
	Cost " A_1"	3.30	3.34	3.49	3.37
	Cost " A_2"	3.30	3.34	3.49	3.37
	Cost " B_1"	3.20	3.23	3.37	3.26
	Cost " B_2"	2.09	2.10	2.16	2.11
	Cost " C_1"	3.09	3.13	3.27	3.16
	Cost " C_2"	2.04	2.06	2.12	2.07
	Cost " C_3"	**1.85**	**1.87**	**1.92**	**1.88**

The Table 3 indicates that the per hectare production of banana for small, medium and large farmer was 700.37,715.96 and 767.63 quintal respectively. At overall level it was 734.97 q/ha. The average per hectare net return received by the small, medium and large cultivator was Rs. 348478.46/- Rs. 362643.28/- and Rs. 408424.40/-. At an overall the net returns was Rs.377582.66/-. The input-output ratio at cost C3 was 1.85,1.87 and 1.92 for small, medium and large farmer respectively. The overall input-output ratio was 1.88. It indicates that the banana cultivation was profitable, which means hypothesis is acceptable and proved.

Constraints in Production of Banana

Table 4 Constraints in production of banana

Sr.No.	Particulars	Mean score	Rank
	Constraints in Production		
1	High labour charges	38.24	4
2	Incidence of disease	71.74	1
3	Destruction due to wind	66.48	2
4	High fertilizer cost	56.03	3

The identified constraints were ranked by Garrett scoring technique. It could be observed from the above Table 4 that the problem of incidence of disease was ranked first with mean score of 71.74, destruction due to wind (mean score: 66.48), High fertilizer cost (mean score: 56.03) was ranked as second and third followed by High labour charges (mean score: 38.24).

CONCLUSIONS

Per hectare yield for overall average was 734.97 quintals. The average gross returns were obtained was Rs.804955.81. The average per hectare net return received at overall was Rs. 377582.66. The overall input-output ratio was 1.88.The input output ratio which is an indicator of economic efficiency in crop production for the crop and it indicated that the banana registered a good input output ratio i.e.1.88 means hypothesis is acceptable and proved. The constraints faced by banana farmers in production of banana was the problem of incidence of disease was ranked first with mean score of 71.74, destruction due to wind (mean score: 66.48), High fertilizer cost (mean score: 56.03) was ranked as second and third followed by High labour charges (mean score: 38.24).

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Shifting of Irrigated Area, Sources and Crop-wise Irrigation in Chhattisgarh State: An Empirical Analysis

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ABSTRACT

Chhattisgarh government is working to increase the state's irrigation potential by various schemes specially Narwa programme so that farmers don't have to rely so much on rain.due to climatic infuences sources and irrigated area has change over time. The study reveals there have been significant changes in irrigated area, source and crop-wise irrigation.The majority of the state's irrigated land is irrigated by canals (57 percent), followed by tube wells (37 percent). Demonstrates changes in the area of net irrigated land. 2 percent of irrigation comes from wells and 1 percent from tanks. Source-by-source percentage change in net irrigated area is depicted in figure 4.1.10 From 2000 to 2020, the area irrigated by wells increased by approximately 257 percent, followed by the area irrigated by canals, which increased by 34%. The area of the tank and other irrigation sources was reduced by 52 percent and 35 percent, respectively. The total net irrigated area increased by 62 percent. Analysis revealed that sharing of source of wells and tubewells have increased by 257% over the past 21 years, which can cause ground water depression and other types of hydrological issues.Maize had the maximum increase in irrigated area, at 4,691 percent, followed by gram and sesamum at 3,892 percent and 1,333 percent, respectively. In addition, there has been a decline in the irrigated area of several crops, primarily Sorghum, total pulses, and peanuts, by 83, 24, and 82 percent, respectively. There has been a growth of approximately 81,222 and 90 percent in paddy, wheat, and total cereals, respectively.

Keywords:Irrigation, Chhattisgarh, IrrigatedArea, Shift in Irrigated area

INTRODUCTION

In order to state's agriculture sector to reach its full potential, the government is putting a lot of effort into making better use of its water resources.The state has also started an integrated strategy to increase the number of double-cropped areas, change the way crops are grown, and increase income from small-scale agro-based businesses.The state has recognized irrigation as the prime need for overall development, prioritizingdeveloping irrigation potential. It is estimated that about 75% of the gross sown area of the state can be irrigated with the proper use and management of available water resources. However, the total irrigated area under all crops for Chhattisgarh is 31.2%,which is lower than the national average of 48 percent. further area under irrigation for pulses is only 15%. The net sown area of the state is 4.683 Million hectares and the gross sown area is 5.561 Million hectares. The total area covered under micro-irrigation is 21.98 Hectares for drip, 2.75 lakh Hectares for sprinkler, 2.97 lakh hectares of total micro-irrigation, which is less than the national average of 3.41 lakh hectares per state.About 73% of the Chhattisgarh Plains, 97% of the Bastar Plateau, 95% of the northern hills are rainfed. Moreover, the irrigated area available for double cropping is only 87,000 ha in the plains and 2300 ha in Bastar and the northern region. The state government has launched various schemes to increase irrigation facilities and thereby tried to increase the area under double crop.

METHODOLOGY

This study used secondary sources of data.The time series data used for district level data. while the number of cross section data is used in the state level data set.The statistics are categorised as secondary data because they were derived from the Directorate of Economics and Statistics, Government of India. And other publications the data is gathered from 2000 to 2020.To analyze, the impact of climate change on

the agriculture , it was assumed that more than 90 percent gross cropped area was assumed to represent agriculture sector . it is assumed that all the factors dependent upon climatic factors two types of data viz., irrigated area, source, crop-wise irrigated area etc.

RESULTS AND DISCUSSION

Changes in irrigated area and sources in Chhattisgarh

The total sown area of Chhattisgarh is 5561 million hectares, of which the net sown area is 4683 million hectares. According to estimates, around 75% of the state's total planted area can be irrigated with effective use and management of available water resources. At the time of the state's establishment (1 November 2000), the irrigation potential was 1.328 million hectares or 23 percent of the total sown area. The irrigation potential was expanded to 1.84 million hectares, or 33.15 percent of the total sown area, at the end of March 2012 (Water Resource Department, Chhattisgarh).The area of the state that is irrigated by various sources is depicted in Figure 1 The majority of the state's irrigated land is irrigated by canals (57 percent), followed by tube wells (37 percent). Demonstrates changes in the area of net irrigated land. 2 percent of irrigation comes from wells and 1 percent from tanks. Source-by-source percentage change in net irrigated area is depicted in figure 2 From 2000 to 2020, the area irrigated by wells increased by approximately 257 percent, followed by the area irrigated by canals, which increased by 34%. The area of the tank and other irrigation sources was reduced by 52 percent and 35 percent, respectively. The total net irrigated area increased by 62 percent between 2000 and 2020.

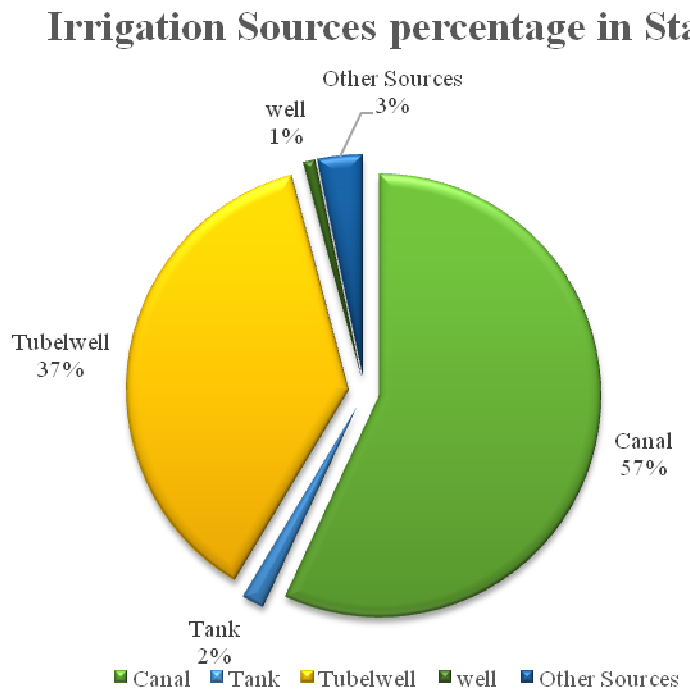

Figure 1.Sharing of irrigated area source-wise

Net Irrigated *A*rea in Chhattisgarh

According to the analysis, canal irrigation accounts for a greater proportion of Chhattisgarh's irrigation sources, but wells and tubewells have increased by 257% over the past 21 years, which can cause gro9undwater depression and other types of hydrological issues.

Table 1: Net irrigated area and share in irrigation by various sources

Year	Net Irrigated Area								
	Canal			Tank	Well			Other Source	Total
	Government	Private	Total		Tubewell	Other Well	Total		
2000	677569	361	677930	54663	131154	39308	170462	81107	984162
2001	834551	186	834737	54944	138541	38955	177496	84104	1151281
2002	733945	223	734168	51820	158078	38871	196949	85183	1068120
2003	768281	478	768759	49707	159468	35611	195079	76942	1090487
2004	829682	305	829987	58032	197270	38952	236222	83829	1208070
2005	875462	577	876039	52611	206124	34728	240852	78788	1248290
2006	887171	406	887577	52089	223370	34853	258223	84396	1282285
2007	913436	389	913825	55770	251474	30666	282140	82219	1333954
2008	887793	569	888362	53744	319429	150881	470310	95905	1508321
2009	869527	174	869701	50398	296536	26790	323326	79367	1322792
2010	895896	229	896125	45605	299892	26102	325994	88548	1356272
2011	872946	143	873089	-	383319	19686	403005	84765	1360859
2012	876576	94	876670	49226	419147	20413	439560	83581	1449037
2013	873932	103	874035	49612	439102	19164	458266	80307	1462220
2014	903801	-	903801	42622	427766	20180	447946	73341	1467710
2015	889001	344	889345	42906	444197	20607	464804	78843	1475898
2016	900551	344	900895	41322	445399	21081	466480	77066	1485763
2017	870842	-	870842	39890	507373	18556	525929	69057	1505718
2018	898500	-	898500	29910	559327	15556	574883	62060	1565353
2019	878471	-	878471	28061	552119	15958	568077	53745	1528354
2020	910514	355	910869	26074	595803	14041	609844	52158	1598945
Share in Irrigation in %			56.9668	1.6307	37.2622	0.8781	38.1403	3.2620	100.00
Year Difference			232939	(28589)	464649	(25267)	439382	(28949)	614783
Change in %			34.3603	-52.3004	354.2774	-64.2795	257.7595	-35.6923	62.4676

Source: Directorate of Economics and Statistics,GOI

The government of Chhattisgarh should implement such a policy. There is a need to prohibit the unnecessary digging of tube wells. In areas with tubewells, there is an immediate need to work on groundwater recharge and borewell recharge policies.

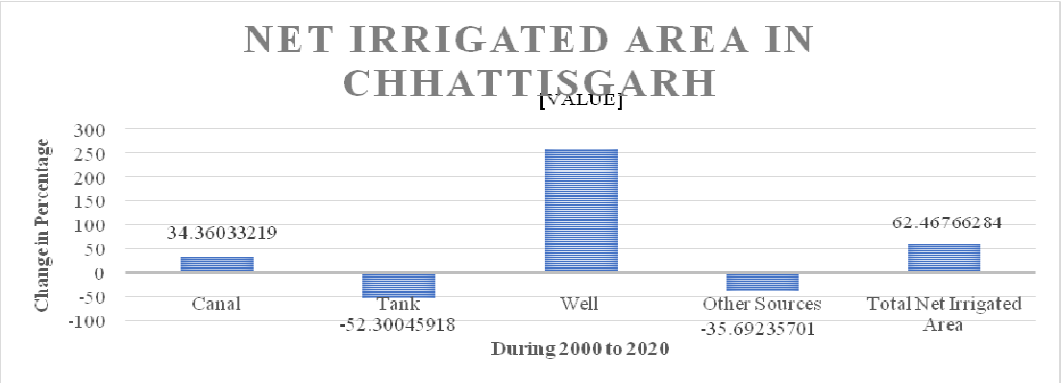

Figure 2.Net Irrigated Area in Chhattisgarh

There is a positive relationship between irrigation and crop yield;therefore,theirrigated area can assist in adapting to a climate change scenario. Over 21 years, the irrigation percentage for various crops shifted inboth positive and negative ways, influencing the yield of the most important crop. Area irrigated by crop presented in the Figure 3 Maize had the maximum increase in irrigated area, at 4,691 percent, followed by gram and sesamum at 3,892 percent and 1,333 percent, respectively. In addition, there has been a decline in the irrigated area of several crops, primarily Sorghum, total pulses, and peanuts, by 83, 24, and 82 percent, respectively. There has been a growth of approximately 81,222 and 90 percent in paddy, wheat, and total cereals, respectively. There has been a 479 percent growth in the sugarcane irrigated area. The mustard crop has increased by 247 percent, and the overall oilseeds crop has increased by 29 percent, resulting in a 105 percent rise in the total irrigated area.

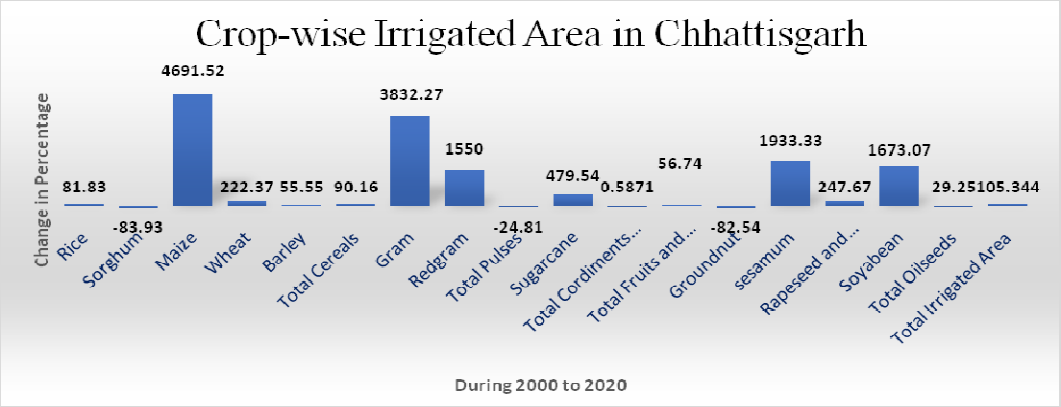

Figure 3. Crop-wise irrigated area change in Chhattisgarh

CONCLUSIONS

Analysis revealed that sharing of source of wells and tubewells have increased by 257% over the past 21 years, which can cause ground water depression and other types of hydrological issues. The government of Chhattisgarh should implement such a policy. There is a need to prohibit the unnecessary digging of tube wells. In areas with tubewells, there is an immediate need to work on groundwater recharge and borewell recharge policies.There has been a decrease in the irrigated area of Sorghum total pulses and groundnut, indicating that either their gross cropped area has decreased or this crop is produced in the rainfed area. It needs to be increased the area of pulses and irrigated area, particularly for these crops. To increase irrigated area, MSP policy and this programme must be promoted, along with irrigation infrastructure repair and maintenance of farm pond, reservoir and check dam and groundwater recharge.

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Marketing of BG II Cotton in Akola District

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ABSTRACT

Cotton occupies a predominant place among cash crops. The present study was undertaken in Akola district of Vidarbha region purposively for the year 2019-20. The study was based on the primary data. Overall sample of 90 BG II cotton cultivators was selected randomly and 10 village traders and 10 wholesalers from APMC Akola were selected randomly.The marketing of BG II cotton was studied by taking marketing cost, market margin, price spread and producer's share in consumer's rupee into consideration. Results revealed that, in per quintal marketing of BG II cotton highest total marketing cost was observed in channel III i.e. Rs. 346.26. 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. In regards to marketing, major constraints faced by BG II cotton cultivators were uncertainty of prices (82.22 per cent) and high cost of transportation (75.56 per cent).

Keywords:BG II cotton, marketing cost, producer's share in consumer's rupee.

INTRODUCTION

Cotton is known as 'King of Fibers' as well as 'White Gold' because of its higher commercial value. India is the country to grow all four species of cultivated cotton viz., *Gossypium arboreum, Gossypium herbaceum, Gossypium barbadense*and*Gossypium hirsutum.* In India 9 major cotton growing states are grouped into 3 diverse agro-ecological zones viz., northern zone, central zone and southern zone. Cotton occupies a predominant place among cash crops. Cotton accounts for around 25% of the total global fiber production and its proportion is around 59% in the raw material consumption basket of the Indian textile industry. It plays a major role in sustaining the livelihood of an estimated 5.8 million cotton farmers and 40-50 million people are engaged in related activities such as cotton processing and trade (Source: www.ministryoftextiles .gov.in).Vidarbha agricultural economy is based on cotton production. Akola is the major cotton growing district in Vidarbha region. 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).

METHODOLOGY

The present study was undertaken in Akola district of Vidarbha region purposively. Akot, Akola and Balapurtahasil from Akola district were selected purposively on the basis of potential area under BG II cotton cultivation. From each selected tahsil, three villages were selected randomly i.e. total 9 villages were selected.Random selection of ten cultivators from each selected village i.e. overall sample of 90 BG II cotton cultivators was selected. In BG II cotton marketing chain, 10 village traders and 10 wholesalers from APMC Akola were selected randomly for collecting the information of marketing. The present study was based on the primary data. The data of marketing was collected for the year 2019-20 through the personal interview method by using pretested schedule. The marketing of BG II cotton was studied by taking marketing cost, market margin, price spread and producer's share in consumer's rupee into consideration.

Marketing channels

Marketing channels are the route through which produce moves from producer to the ultimate consumer. In respect of BG II cotton, four important marketing channels were found in the study area viz.,

Channel I: Producer →Ginning Mill

Channel II: Producer → Village Trader →Ginning Mill

Channel III: Producer → Village Trader →Wholesaler →Ginning Mill

Channel IV: Producer → Wholesaler → Ginning Mill

Ginning mill was treated as the ultimate consumer in the present study.

Marketing cost

Marketing cost includes all actual expenses incurred by producer and various intermediaries involved in sale and purchase of the produce till it reaches to the ultimate consumer.

Market margin

It refers to difference between the prices prevailing as successive stages of marketing at given period of time. The absolute value of the market margin varies from channel to channel, market to market and time to time.

Price spread

Price spread indicates shares of various agencies involved in the marketing along with the cost incurred by them. The price spread of the produce shows the difference between net price received by producer in the assembling market and price paid by the ultimate consumer.

Producer's share in consumer's rupee

It is the ratio of net price received by producer expressed as a percentage of the price paid by consumer. Producer's share in the consumer's rupee (P_S) is expressed as follow**,**

$$P_S = \frac{P_P}{P_C} \times 100$$

Where,

Ps = Producer's share in consumer's rupee

P_P = Net price received by producer

P_C = Price paid by consumer

The different terms used in price spread are defined as follows,

Gross price of producer

This is equal to wholesale price at the primary assembling center or the price at the time of the first sale received by producer.

Net price of producer

It is equal togross price received by producer minus all expenses incurred by them on marketing the produce.

Results and discussion

Distribution of BG II cotton producersaccording to marketing channels

Table 1 Distribution of BG II cotton producersaccording to marketing channels

Sr. No.	Channel	No. of Producers N=90	Production (qtl.)
1.	Channel I (Direct selling of BG II cotton to ginning mill)	22 (24.44)	1699.50
2.	Channel II (Selling of BG II cotton to ginning mill via village trader)	16 (17.78)	469.12
3.	Channel III (Selling of BG II cotton to ginning mill via village trader and wholesaler)	32 (35.56)	587.41
4.	Channel IV (Selling of BG II cotton to ginning mill via wholesaler)	20 (22.22)	824.27
	Total	90 (100.00)	3580.30

Table 1 indicated that, channel Iwas the major channel of distribution. In this channel maximum quantity of BG II cotton was sold i.e. 1699.50 qtl. In channel IV quantity sold was 824.27 qtl. followed by 587.41 qtl. in channel IIIand 469.12 qtl. in channel II.

Marketing cost of BG II cotton

Table 2 Marketing cost of BG II cotton(Rs./qtl.)

Sr. No.	Particulars	Total Price			
		Channel I	Channel II	Channel III	Channel IV
A	**Marketing cost of producer**				
1.	Loading	51.05	0.00	0.00	50.10
2.	Transportation	80.22	0.00	0.00	75.15
3.	Market entry fee	1.38	0.00	0.00	2.43
4.	Weighing	1.38	0.00	0.00	2.43
5.	Commission	9.15	0.00	0.00	7.41
6.	Unloading	15.15	0.00	0.00	15.21
	Marketing cost	158.33	0.00	0.00	152.73
	Selling Price	5484.28	5236.84	5195.23	5398.69
B	**Marketing cost of village trader**				
1.	Loading	0.00	52.22	51.05	0.00
2.	Transportation	0.00	84.20	79.64	0.00
3.	Market entry fee	0.00	1.70	2.72	0.00
4.	Weighing	0.00	1.70	2.72	0.00
5.	Commission	0.00	11.30	8.85	0.00
6.	Unloading	0.00	15.88	15.18	0.00
	Marketing cost	0.00	167.00	160.16	0.00
	Selling price	0.00	5604.15	5536.48	0.00
	Market margin	0.00	200.31	181.09	0.00
C	**Marketing cost of wholesaler**				
1.	Loading	0.00	0.00	51.13	50.50
2.	Transportation	0.00	0.00	85.81	82.16
3.	Market entry fee	0.00	0.00	2.72	2.43
4.	Weighing	0.00	0.00	2.72	2.43
5.	Cess fund	0.00	0.00	17.00	17.00
6.	Commission	0.00	0.00	10.48	12.21
7.	Unloading	0.00	0.00	16.24	15.34
	Marketing cost	0.00	0.00	186.10	182.07
	Selling Price	0.00	0.00	6048.50	5952.77
	Market margin	0.00	0.00	325.92	372.01

It is observed from Table 2 that, per quintal maximum marketing cost of Rs. 158.33 was incurred by producer, as they directly sold BG II cotton to ginning mill (consumer) in channel I. In channel IV, it was Rs. 152.73. Producer incurred zero marketing cost in channel II and channel III. Among the different items of expenditure, the highest charges paid by producer for transportation i.e. Rs. 80.22 followed by loading i.e. Rs. 51.05, etc. in channel I. Highest gross price was received by producer in channel I i.e. Rs. 5484.28 followed by channel IV (Rs. 5398.69), channel II (Rs. 5236.84) and channel III (Rs. 5195.23). Highest total marketing cost was incurred by village trader in channel II i.e. Rs. 167.00. Among the different items of expenditure, the highest charges paid by village trader for transportation i.e. Rs. 84.20 followed by loading i.e. Rs. 52.22, etc. in channel II. Highest selling price of village trader was noticed in channel II i.e. Rs. 5604.15. Highest market margin was earned by village trader in channel II i.e. Rs. 200.31. Highest total marketing cost was incurred by wholesaler in channel III i.e. Rs. 186.10. Among the different items of expenditure, the highest charges paid by wholesaler for transportation i.e. Rs. 85.81 followed by loading i.e. Rs. 51.13, etc. in channel III. Highest

selling price of wholesaler was observed in channel III i.e. Rs. 6048.50. Highest market margin was earned by wholesaler in channel IV i.e. Rs. 372.01.

Channel wise price spread of BG II cotton

Table 3 Channel wise price spread of BG II cotton(Rs./qtl.)

Sr. No.	Particulars	Total Price			
		Channel I	Channel II	Channel III	Channel IV
1.	Net Price received by producer	5325.95 (97.11)	5236.84 (93.45)	5195.23 (85.89)	5245.96 (88.13)
2.	Total marketing cost incurred by producer, village trader and wholesaler	158.33 (2.89)	167.00 (2.98)	346.26 (5.72)	334.80 (5.62)
3.	Total market margin	0.00 (0.00)	200.31 (3.57)	507.01 (8.38)	372.01 (6.25)
4.	Purchase price of ginning mill	5484.28 (100.00)	5604.15 (100.00)	6048.50 (100.00)	5952.77 (100.00)
5.	Producer's share in consumer’s rupee	97.11	93.45	85.89	88.13

Data in Table 3 found that, in per quintal marketing of BG II cotton highest net price received by producer was recorded in channel I i.e. Rs. 5325.95 followed by channel IV (Rs. 5245.96), channel II (Rs. 5236.84) and channel III (Rs. 5195.23).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).Highest total market margin was noticed in channel III i.e. Rs. 507.01 followed by channel IV (Rs. 372.01) and channel II (Rs. 200.31).Highest purchase price of ginning mill was noticed in channel III i.e. Rs. 6048.50 followed by channel IV (Rs. 5952.77), channel II (Rs. 5604.15) and channel I (Rs. 5484.28). 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 intermediates decreases, the producer’s share in consumer’s rupee increases.

Constraints faced by BG II cotton cultivators in marketing of BG II cotton

Table 4 Constraints faced by BG II cotton cultivators during marketing

Sr. No.	Constraints	No. of cultivators (N=90)	Per cent to total cultivators	Rank
1.	Inadequate storage facilities	56	62.22	V
2.	Uncertainty of prices	74	82.22	I
3.	High cost of transportation	68	75.56	II
4.	High commission charges	66	73.33	III
5.	Lack of market intelligence	42	46.67	VI
6.	Irregular payment by intermediary	64	71.11	IV

Table 4 revealed that, in regards to marketing major constraints faced by BG II cotton cultivators wereuncertainty of prices and high cost of transportation which were expressed by 74 (82.22 per cent) and 68 (75.56 per cent) cultivators. Other constrains in marketing were high commission charges, irregular payments by intermediary, inadequate storage facilities and lack of market intelligence and overall percentages of these were 73.33, 71.11, 62.22 and 46.67 per cent, respectively.

CONCLUSIONS

It is concluded that, channel I i.e. producer →ginning mill was the important channel through which maximum quantity of BG II cotton (1699.50 qtl.) was sold by producer.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). Highest net price received by producer recorded in channel I i.e. Rs. 5325.95 followed by channel IV (Rs. 5245.96), channel II (Rs. 5236.84) and channel III (Rs. 5195.23). 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 intermediates decreases, the producer's share in consumer's rupee increases. Major constraints faced by cultivators during marketing were uncertainty of prices (82.22 per cent) and high cost of transportation (75.56 per cent).

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Economic analysis of Value addition in Cashew processing in Konkan region of Maharashtra State.

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ABSTRACT

A study was undertaken to assess economics of value addition in capital requirement, value addition, cost and returns of processed products of cashew. The south Konkan region was selected purposively.Three tahsils from each district and thirty cashew processing units from each district were selected. Thus final sample consisted 60 cashew processing units. Majority of the processing entrepreneurs are well experienced as indicated by existence of 90.00 percent units of cashew processing were established before year 2010. Per unit capital investment in cashew processing was Rs. 28lakh.Hence, the enterprises require a large amount of capital. Per Kg total cost, gross returns, and net returns in Cashewnutkernel production were Rs. 713.15, Rs 781.92 and Rs.68.77, respectively and input output ratio was worked out Rs.1:1.09, which indicated profitability of cashew processing enterprise .Maximum quantity of cashew kernel was produced W-320, SW-320, and W-240 grade which isattributed to introduction of Vengurla -4 and Vengurla-7 varieties by theuniversity. The average working period of Cashewnut processing is 254days. Per factory per day labours employed in cashew processing was 13.36 and employment created was 3540 days / year.Cashewnut processing units in study areaare operating above the breakeven point. Per quintal gross added valuein Cashewnut processing was 503.67 per cent.

Key Word: Cashew, value addition, cost, return, processing

INTRODUCTION

India is one of the leading producers, processors and exporters of cashews in the world. India is the Second largest cashew-producing country in the world and it is largest exporter with more than 15 per cent of the world's export share. The cashew nut industry generates employment for more than 10 lakh people on farms and factories in rural areas.. In India it covers a total of 1.15 million hectares of land, and produces 0.80 million tonnes (MT) of Cashewnut annually. Maharashtra is one of the leading states in fruit production. The total fruit crop area in Maharashtra was 7.53 lakh hectares and fruit production was 11.72mt .Konkan regions is mostly famous for horticultural fruits like mango, Cashewnut ,kokum, jackfruit, etc. The farmers in thergion have maintained the quality of the produce and goodwill in the minds of consumer. The reputation beingcarried over the years have awarded and recognized as a geographicalindication as.Hence an attempt is made to study value addition to cashew processing and its economic analysis with specific objective to study

economics of processing of cashew, capital investment its break-even analysis and value addition.

Methodology

South Konkan region is having maximum processing units for cashew. In view of this situation, to fulfill the objectives of the study the South Konkan region was selected purposively, which consist two districts. *viz:* 1) Ratnagiri and 2) Sindhudurg.Three tahsils from each district (Ratnagiri and Sindhudurg) having maximum number of processing units were selected purposively. The number of sample units interviewed from each selected tahsils was decided on proportionate basis so that larger representation by a tahsils having number of units could be achieved. Thirty cashew processing units from each district were finally selected. Thus final sample consisted of 60 cashew processing units. The primary data required for study were collected by "Survey Method" with the help of specially designed pre tested schedules.

Value addition Processes

The activities like sorting, grading, standardizing, cleaning, packing, storing, processing, advertising, transporting etc. which adds value to the produce at each stage are called value addition processes. Gross value addition is the difference between the value of end product and the value of raw material. Whereas net value addition is value of end product minus processing cost as well as cost of raw material. To assess the financial feasibility the analytical tools such as Break-even point, margin of safety were utilized for this study.

RESULT AND DISCUSSION

Capital investment in cashew nut processing

The information regarding capital investment made in Cashewnut processing is presented in Table .1.

Table 1. Capital investment in cashew nut processing.(Value Rs/lakh)

Sr. No	Particulars	Group		
		Medium	Large	overall
1	Land	1.51 (4.27)	2.75 (2.89)	2.05 (3.34)
2	Building	23.50 (66.54)	54.00 (56.71)	36.72 (59.92)
3	Machinery	5.53 (15.67)	27.70 (29.09)	15.14 (24.70)
4	Vehicle	4.50 (12.75)	9.50 (9.98)	6.67 (10.88)
5	Furniture	0.03 (0.07)	0.04 (0.04)	0.03 (0.05)
6	other fixed capital	0.25 (0.71)	1.24 (1.30)	0.68 (1.11)
	Total	**35.32 (100.00)**	**95.22 (100.00)**	**61.28 (100.00)**

(Figures in parentheses indicate percentages)

At overall level total capital investment in cashew processing was Rs.61.28 lakhs ,out of which maximum 59.9 per cent (Rs. 36.72 lakh) was incurred in building followed by machinery, which was about 15.14 lakh (24.70%). Amongs the groups it was observed that, in case of medium group per unit capital investment was Rs.35.32 lakh consisting 66.54 per cent (Rs. 25.50 lakh) on building and 15.67 per cent (Rs. 5.53 lakh) for machinery. As regards to large group total capital investment was Rs.95.22 crores. It was concluded that cashew processing business requires large amount of capital.

Per unit raw material used for cashew processing

The information regarding per unit raw material used in cashew nut processing is presented in Table 2

Table 2 Per unit raw material used for cashew processing (Value Rs.)

Sr. No.	Particulars	Unit	Group					
			Medium		Large		Overall	
			Qty.	Value (Rs.)	Qty.	Value (Rs.)	Qty.	Value (Rs.)
1	Raw cashew nut	MT	22.46	2908570	115.24	14837150	62.66	8077621

It is observed from table that quantity of raw Cashewnut utilized atoverall level was worked out to 62.66 MT, and cost was Rs. 80.78 lakh (Rs. 8077621).The raw material quantity in medium group was 22.46MT. Where as in case of large group it was to the extent of 115.24 MT. The expenditure for raw

material in medium and large group was Rs.29.08 lakh and Rs. 148.37 lakh, respectively. It is concluded that the cost of Cashew nut seed as a raw materials very high investment as compared to processed products prepared from other fruits.

Per unit production and returns in Cashewnut processing

The information regarding per unit production and returns in Cashewnut processing is presented in Table 3.

Table. 3. Per unit production and returns in Cashewnut processing.

Sr. No.	Particulars	Group					
		Medium		Large		Overall	
		Qty	Value	Qty	Value	Qty	Value
1	Cashew kernels	53.579	41.595 (99.72)	280.15	219.72 (99.73)	151.76	118.78 (99.73)
2	Cashewnut Shells	16.65	0.070 (0.17)	84.92	0.36 (0.16)	46.24	0.20 (0.16)
3	Cashewnut husk (Test)	5.36	0.045 (0.11)	28.02	0.24 (0.11)	15.18	0.13 (0.11)
	Gross returns (Rs.)		41.710 (100.00)		220.32 (100.00)		119.11 (100.00)

(Figures in parentheses indicate percentages)

At overall level gross returns received from Cashewnut processing were Rs.119.11lakh, out of which returns from cashew kernels were 99.73percent (Rs.118.78lakh). The other items of supplementary income were Cashewnut shells and Cashew nut husk (testa) contributed to the extent of 0.16 percent (Rs. 0.20 lakh) and 0.11 per cent (Rs. 0.13 lakh), respectively.

Per unit cost and returns in processing of Cashewnut

Theinformationregardingperunitcostandreturnsin Cashewnutprocessingispresentedin Table4

Table 4 Per unit cost and returns in processing of Cashewnut

Sr. No.	Particulars	Groups		
		Medium	Large	Overall
A)	**Variable cost**			
1	Raw Cashewnut	2908570 (73.90)	14837150 (77.30)	8077621 (76.58)
2	Fuel,Diesel,Hcl,oil etc.	13531 (0.34)	28315 (0.15)	19937 (0.19)
3	Electricity	25243 (0.64)	105319 (0.55)	59943 (0.57)
4	Wages paid to casual labours	274385 (6.97)	630512 (3.29)	428707 (4.06)
5	Repairs and renewals	4781 (0.12)	120320 (0.63)	54848 (0.52)
6	Packaging material	19005 (0.48)	131012 (0.68)	67541 (0.64)
7	Interest on working capital	324552 (8.25)	1585263 (8.26)	870860 (8.26)
	Total (A)	**3570067 (**90.70**)**	**17437891 (**90.85**)**	**9579457 (**90.82**)**

B)	**Fixed Cost**			
9	License fee	2000 (0.05)	2000 (0.01)	2000 (0.02)
10	Salary to permanent labours	53750 (1.37)	114375 (0.60)	80021 (0.76)
11	Rental value of land	11350 (0.29)	25200 (0.13)	17352 (0.16)
12	Depreciation	33468 (0.85)	307680 (1.60)	152293 (1.44)
13	Interest on fixed capital	35324 (0.90)	95223 (0.50)	61280 (0.58)
	Total (B)	**135892 (**3.45**)**	**544479 (**2.84**)**	**312946 (**2.97**)**
14	Total processing cost	**3705959 (**94.16**)**	**17982369 (**93.69**)**	9892403 (93.79)
C)	**Marketing Cost**			
15	Transport cost	21432 (0.54)	109258 (0.57)	59490 (0.56)
16	GST 5 %	208551 (5.30)	1101590 (5.74)	595535 (5.65)
	Total (C)	**229982 (**5.84**)**	**1210848 (**6.31**)**	655024 (6.21)
D)	**Paid out cost**	**3536028 (**89.84**)**	**17300171 (**90.14**)**	9500490 (90.07)
E)	**Returns (Rs.)**			
19	a)Main product	4159510	21971647	11878103
20	b) by product	11508	60158	32590
21	Gross Returns (RS)	**4171018**	**22031806**	**11910693**
22	Net returns (Rs.)	235077	2838588	1363265
F)	**Input output Ratio**			
23	a) At total cost	1.06	1.14	1.09
24	b) At paid out cost	1.18	1.27	1.22
25	**Total Cost Per Kg. (Rs.)**	735	685	713.15
26	**Gross returns per kg**	778.47	786.43	781.92
27	**Net Returns per kg kernel (Rs.)**	43.87	101.32	68.77
28	**Net Returns per kg raw Cashewnut (Rs.)**	10.47	24.63	16.60

At overall level per unit total cost of processing was Rs.105.47 lakh out of which variable cost was maximum 90.82 per cent (Rs.95.79 lakh) followed by marketing cost 6.21 per cent (Rs. 6.55 lakh) and fixed cost was 2.97 percent (Rs.3.12Lakh).It was also observed that amongst the various items of cost theshare of raw material that is Cashewnut seed was maximum 76.58 percent

followed by interest on working capital 8.26 percent and GST expenses 5.65 percent.Total variable cost in medium group was to the tune of Rs. 35.70lakh and in large group, it was Rs.174.38 lakhs. The total paid out cost which consisted cost on raw material, fuel, electricity wages paid to casual labour, license fee, repairs and renewals, salary to permanent labours, transport cost and GST. At overall level amount of paid out costwas Rs. 95.00 lakh (90.07 %). Similar trend was also observed in groupwiseresults. The gross returns at overall level were Rs.119.91lakh.The net returns per unit at overalllevel were Rs. 13.63 lakh (Rs. 1363265). However ,at overall level net returns were to the tune of was Rs.68.77.The net returns per Kg of raw Cashewnut processed at overall llevel were Rs.16.60. It is concluded that the share of raw material in Cashewnut processing was found to be higher (76.58%). However, in Cashewnut processing it is quite high (76.58%) indicating huge investment in purchase of raw Cashewnut.

Table .5 Per quintal cost and returns in Processing of Cashewnut

Sr. No.	Particulars	Group		
		Medium	Large	Overall
1	Variable cost	66632	62245	63122
2	Raw Cashewnut	54286	52961	53226
3	Fixed Cost	2536	1944	2062
4	Total processing cost	69168	64188	65185
5	Transport cost	400	390	392
6	Marketing Cost	4292	4322	4316
7	Total Cost	73461	68511	69501
8	Paid out cost	65997	61753	62602
9	Gross Returns (RS)	77848	78643	78484
10	Net returns (Rs.)	4387	10132	8983
11	**Input output Ratio**			
12	a) At total cost	1.06	1.14	1.09
13	b) At paid out cost	1.18	1.27	1.22
14	Total Cost Per Kg. (Rs.)	734.59	685.11	713.15
15	Gross returns per kg	778.47	786.43	781.92
16	Net Returns per kg kernel (Rs.)	43.87	101.32	68.77
17	Net Returns per kg raw Cashewnut (Rs.)	10.47	24.63	21.75

It was also revealed that when a processing of one kg Cashew nut seed (cost Rs. 128.92) is made processor get Rs. 21.75 as net returns. It was also noticed that a large difference in net returns per kg of raw material exist because in medium group per kg net returns was just Rs.10.47; where as in large group it was Rs.24.63.The input output ratio at overall level at total cost was 1:1.09 and in case of medium group it was 1:1.06 and in large group it was about 1:1.14. On the basis of per quintal cost and returns in Cashewnut processing It was concluded that Cashewnut processing is remunerative enterprise and it is even more profitable at large scale than a medium scale as indicated by the input output ratio ,at paid out cost was Rs.1:1.27 in large group and Rs.1:1.18 in medium group.

It was observed from table that the per unit output at overall level was 15176Kg. At overall level, the average per Kg selling price estimated from gross returns for all the grades together was worked out to

Rs. 779. Thebreakeven point is the quantity at which all costs allocated to a cashew processing are equal to total revenue received from sale. At overall levelbreakeven point was 2162 Kg. The figures of break even point for medium and large unit were1239 Kg and 3370 Kg ,respectively .It was observed that the cashew processing units are operating above the breakeven point. The margin of safety was 4119 Kg, 24645Kg and 13014 in medium group ,large group and at overall level, respectively. The percent age of margin of safety at overall level was18.26. The percentage of margin of safety in medium and large group was 23.09 percent and 11.99 percent ,respectively. It is concluded that the scale of production chosen by the Cashewnut processors is appropriate because in all groups the Cashewnut factories are operating above breakeven point; which underlines that the Cashewnut processors have enough knowledge about deciding the scale of production.

Per quintal value addition in Cashewnut processing

The information regarding per quintal value addition in Cashewnut processing is presented in Table.6.

Table 6 Per quintal value addition in Cashewnut processing

Sr. No	Particulars	Group		
		Medium	Large	Overall
1	Sale value of final product Rs./q	77632	78428	77977
2	Purchase value of Raw Cashewnut	12950	12875	12918
3	Gross Value Added	64682	65553	65059
4	Per quintal processing cost	69167	64188	67009
5	Net added value	8465	14240	10967
6	Added value (%)			
7	a) Gross	499.47	509.15	503.67
8	b) Net	65.37	110.60	84.97

The per quintal purchase value of raw Cashewnut at overall level was Rs. 12918. There was little difference in purchase value amongst the two groups which may be attributed to volume of purchase Per quintal gross returns received from sale of cashew kernel to overall level were Rs. 77977. The gross returns ranged from Rs. 77632 in medium group to Rs78428 in large units. The per quintal gross added value was worked out to Rs. 64682 and Rs. 65553 in medium group and large group, respectively. At overall level per quintal gross added value was Rs.65059. At overall llevelper quintal processing cost was worked out to Rs.67009 resulting into per quintal net added value Rs. 10967. Per quintal processing cost in medium group and large group wasRs.69167and Rs.64188,respectively.

Break-even point in Cashewnut processing unit

The information regarding break even point in Cashewnut processing is presented in Table 7

Table 7 Break-even point in Cashewnut processing unit

Sr. No.	Particulars	Unit	Group		
			Medium	Large	Overall
1	Fixed Cost	RS	135892	544479	312946
2	Total revenue	RS	4171018	22031806	11910693
3	Output	kg	5358	28015	15176
4	Per kg selling price	RS	776	784	779
5	Per kg Variable cost	RS	666	622	647
6	Break -even point	kg	1239	3370	2162

7	Total revenue at BEP	RS	961329	2642321	1689759
8	Margin of safety	kg	4119	24645	13014
9	Margin of safety	RS	3209689	19389485	10220934
10	Margin of safety	%	23.05	11.99	18.26

At overall level, percentage of gross added value was 503.67,indicating five times appreciation in value of Cashewnut seed due to processing in to Cashewnut kernel. Similar trend was also observed in allthe groups. In case of medium group and large group, percentage of netadded value was 65.37 per cent,and110.60 per cent, respectively. Thepercentage of net added value at overall level was 84.97 per cent.It isconcluded that due to processing net addition in value of Cashewnut isto the extent of84.97 per cent underlines the importance of processing.

CONCLUSION

It was concluded that the capital investment is relatively higher in Cashewnut processing. The Cashewnut production is profitable venture in Konkan region of Maharashtra. The Cashewnut production is profitable venture in Konkan region of Maharashtra. The per quintal net returns were Rs 8983 and benefit cost ratio was Rs. 1.09. It was also revealed that, the Cashewnut processing units are operating at scale 15176 Kg and break-even point was 2162 Kg indicated sufficiently higher quantity of margin of safety (13014 Kg).Per quintal gross and net value addition was 503.67 and 84.97 per cent, respectively which underlined the importance of processing. Thus Cashewnut processing is economically remunerative enterprise, in south Konkan region of Maharashtra.

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Financial Feasibility Analysis of Rose Cultivation in Pune District of Maharashtra

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ABSTRACT

The rose, also recognized as Rosa spp. in botany, rose, acclaimed as the queen of flowers, is undoubtedly one of the utmost beautiful of nature's creations. The study was conduct in the Pune district of western Maharashtra. A total of 30 polyhouses were selected, and their operation was taken into consideration for the years 2021- 2022. In the case of a non-subsidy farm, the net present value (NPV) of cultivating high-tech roses was Rs. 11061688 and Rs. 7710199 at discount rates of 10 and 12 per cent, respectively. The benefit cost ratio too was 1.13 and 1.10, and the internal rate of return (IRR) was 19.31%. The overall payback period was 5.06 years. In case of subsidized farms, the per-hectare investment analysis for hi-tech roses revealed that the net present value (NPV) of hi-tech rose cultivation at overall level was Rs. 22298437 and Rs. 18143789 at a 10 and 12 per cent discounting factor, respectively. With a benefit-cost ratio (BCR) of 1.30 to 1.27 and an internal rate of return (IRR) was 30.52 per cent which indicate that hi-tech rose venture was financially viable. A payback period was 2.90 years found at the overall level.

Key words: Rose, NPV, IRR, BCR, payback period.

Introduction

India's economy is based primarily on agriculture. About 58 per cent population is engaged in the agriculture sector. Agriculture and horticulture are a rapidly emerging and lucrative sector for changing age-old subsistence farming practices, particularly in rainfed, dry lands, hills, arid, and coastal agro-ecosystems. Floriculture crops are considered high-value cash crops and provide a good income to farmers The important floricultural crops in the international cut flower trade are Rose, Carnation, Chrysanthemum, Gladiolus, Orchids, Anthurium, Tulip and Lilies. The rose, also recognized as *Rosa* spp. in botany, rose, acclaimed as the queen of flowers, is undoubtedly one of the utmost beautiful of nature's creations. There is a sizable demand for roses in the form of cut and loose flowers, dry petals, long stemmed flowers and its derivatives like Rose water, Gulkand, perfumes, etc. on both the domestic and international markets. In India, where cut roses make up close to 60 per cent of the cut flower trade on the world market, it is approximated that one lakh hectares of land are used for crop production. Maharashtra ranks among the top states in India in terms of protected cultivation area.

The polyhouse technology now a day has become very popular in and around Pune city. In the State, Pune city is home to more than 60 per cent of the polyhouses. There are 190 ha of polyhouse cultivation in the state. 120 ha (63.16 %) of this area, which is concentrated in the Pune district's Maval, Haveli, Shirur, Mulashi, Rajgurunagar and Ambegaon tahsils. (Waghmare and Shendge, 2019). In Maharashtra, greenhouses are mainly used to cultivate the flowers like rose, gerbera and carnation. The cultivation of flowers is well known in areas like Pune, Satara, Nasik, Ahmednagar, Sangli, Kolhapur and Nagpur. (Patil *et.al.* 2020) in Maharashtra.

Methodology

The study was conduct in the Pune district of western Maharashtra because flower cultivation in polyhouses is becoming a new venture there. Pune district has the highest concentration of polyhouses out of the six districts in western Maharashtra. A total of 30 polyhouses were selected, and their operation was taken into consideration for the years 2021-

2022. With the aid of a schedule specifically created for rose flowers grown in polyhouses, information was gathered from the selected polyhouse owners on different aspects. The data was analysed to determine financial feasibility.

Selection of grower

A sample of 30 polyhouse rose growers was selected randomly from three selected tahsils on the basis of area under hi-tech rose production in polyhouses. The rose growers were grouped into three categories, namely small, medium, and large growers on the basis of area under hi-tech rose cultivation.

Table 1 Distribution of sample of rose cultivators

Category	Area (Ha)	Number of sample selected
Small	0-0.10	10
Medium	0.10-0.20	10
Large	>0.20	10

Analytical tools

Financial feasibility analysis

The economic evaluation of investment in rose garden was carried out by developing year wise cash outflows and cash inflows for rose garden. The financial feasibility of investment in rose garden is calculated with the help of following financial feasibility tests.

1. Internal rate of returns (IRR):

Internal rate of return (IRR) is the rate at which a project's net present value equals zero. The internal rate of return is arrived at, through interpolation technique by using different discount rates so as to see that net present value is equal to zero. It is calculated by using following formula,

$$\mathbf{IRR = \sum Rt\ (1 + r)\text{-}n - \sum Ct\ (1 + r)\text{-}n = 0}$$

IRR= [Lower discounting rate] + [Difference between two discounting rates] × [NPV at lower discounting rate ÷ Absolute difference between NPV at lower and higher discounting rate]

Internal rate of return is a comparative index. If IRR is greater than prevailing rate of interest than investment is feasible.

2. Net present value (NPV):

The discounted value of the net cash inflows for the project is represented by the present value. The net cash inflows, which represent the opportunity cost of capital, were discounted in the present study, which used a discount factor of 12 per cent. It can be presented by,

$$\boldsymbol{NPV} = \frac{\sum_{t=1}^{n} P_t}{(1+i)^t} - C$$

Where,

Rt = Returns in period 't'

Ct = Cost in period 't'

r = Discount rate t = Project life

For viability of investment NPV should be positive at prevailing rate of interest.

3. Benefit Cost Ratio (BCR):

It is the ratio of value of all cash inflow to the values of cost out flows during the life of project. It is calculated as,

$$\mathbf{BCR} = \frac{\sum_{t=1}^{n} Bt(1+r)^{-1}}{\sum_{t=1}^{n} Ct(1+r)^{-1}}$$

If BCR is greater than one, the investment is considered feasible.

4. Payback period:

The payback period, also referred as the project's payback period, is the amount of time required for the project to create a stream of cash proceeds equivalent to the initial cash outlay.

$$\mathbf{P} = \frac{I}{E}$$

Where,

P = Payback Period

I = Initial investment

E= Cash flow per year

RESULTS AND DISCUSSION

Financial feasibility of investment in hi-tech rose cultivation.

The polyhouse unit requires more fixed capital, so it is important to consider the income stream over the course of the polyhouse unit's entire life. We must, however, make a few assumptions in order to estimate both the cash inflows and cash outflows for investment because it is difficult to generate the cash flows for the entire life span of polyhouse unit investment in the absence of observed temporal information on benefits and cost. These assumptions are, the life span of the polyhouse is considered to be 20 years, the income stream of the polyhouse unit is even and constant over its next crop, economic life of rose was considered as 5 years. Financial feasibility in hi-tech rose cultivation (without subsidy) is given in table 2.

Table 2 Financial feasibility in hi-tech rose cultivation (without subsidy)

Groups	Parameters					
	NPV		Payback period (Years)	B:C Ratio		IRR (%)
	10 %	12 %		10 %	12%	
Small	8522189	5467277	5.60	1.1	1.08	17.36
Medium	9924737	6704027	5.30	1.125	1.09	15.40
Large	11246149	7844168	5.06	1.12	1.09	12.92
Overall	**11061688**	**7710199**	**5.06**	**1.13**	**1.10**	**19.31**

A cost-benefit analysis was carried out to evaluate the new technology, i.e., polyhouse. For studying the economic viability of the project, net present worth (NPV), benefit-cost ratio (BCR), payback period, and internal rate of return (IRR) were worked out and presented in table 2 because the net present value (NPV) and benefit cost ratio (B-C ratio) are functions of the discount rate, these measures were calculated at 10 and 12 per cent. These were, by and large, the interest rates charged by the various financial institutions providing loans.

The results indicate that the net present value of hi-tech rose cultivation at overall level was Rs. 11061688 and Rs. 7710199 at 10 and 12 per cent discounting factors, respectively. At a 10 and a 12 per cent discounting factor, at the overall level benefit-cost ratio was 1.13 and 1.10, respectively. Whereas payback was 5.06 years and the IRR observed was 19.31 per cent.

The net present value of small, medium, and large groups of hi-tech rose farms at 10 per cent discounting rate was Rs. 8522189, Rs. 9924737, and Rs. 11246149, respectively, whereas the net present value of small, medium, and large groups of rose farms at a 12 per cent discounting factor was Rs. 5467277, Rs. 6704027, and Rs. 7844168, respectively. The benefit- cost ratios of small, medium, and large groups of hi-tech rose farms were at 10 per cent discount rate of 1.10, 1.125, and 1.12, respectively. whereas the benefit-cost ratios of small, medium, and large groups of rose farms were 12 per discount rate was, 1.08, 1.09, and 1.09, respectively. The internal rate of return, which is the most accepted method of investment appraisal, also shows that investments in hi-tech rose cultivation yielded a better rate. The internal rate of return of small, medium, and large groups of hi-tech rose farms was 17.36, 15.40, and 19.31, respectively. The payback period ranges from 5.06 to 5.60 years.

All financial feasibility test in all groups i.e., small, medium and large were positive and indicating profitability of rose cultivation. On the basis of all these economic parameters, it can conclude that, the rose cultivation is commercially more profitable venture in Pune district. Financial feasibility in hi-tech rose cultivation (with subsidy) is given in table 3.

The results of table 3 indicate that the net present value of hi-tech rose cultivation at overall level was Rs. 22298437 and Rs. 18143789 at 10 and 12 per cent discounting factors, respectively. At a 10 and a 12 per cent discounting factor, at the overall level benefit-cost ratio was 1.30 and 1.27, respectively. Whereas payback was 2.90 years and the IRR observed was 30.52 per cent.

The net present value of small, medium, and large groups of hi-tech rose farms at 10 per cent discounting rate was Rs. 18043530, Rs. 20212572, and Rs. 20430822, respectively, whereas the net present value of small, medium, and large groups of rose farms at a 12 per cent discounting factor was Rs. 14419579, Rs. 16318853, and Rs. 16466569, respectively. The benefit-cost ratios of small, medium, and large groups of hi-tech rose farms were at 10 per cent discount rate of 1.27, 1.29, and 1.23, respectively. whereas the benefit-cost ratios of small, medium, and large groups of rose farms were 12 per discount rate was, 1.24, 1.26, and 1.21, respectively. The internal rate of return, which is the most accepted method of investment appraisal, also shows that investments in hi-tech rose cultivation yielded a better rate. The internal rate of return of small, medium, and large groups of hi-tech rose farms was 30.01, 32.39, and 31.96, respectively. The payback period ranges from 2.90 to 3.31 years.

Table 3 Financial feasibility in hi-tech rose cultivation (with subsidy)

Groups	Parameters					
	NPV		Payback period (Years)	B:C Ratio		IRR (%)
	10 %	12%		10%	12%	
Small	18043530	14419579	3.31	1.27	1.24	30.01
Medium	20212572	16318853	3.09	1.29	1.26	32.39
Large	20430822	16466569	3.13	1.23	1.21	31.96
Overall	**22298437**	**18143789**	**2.90**	**1.30**	**1.27**	**30.52**

Conclusions

According to a study of per-hectare investment analysis for high-tech roses in the case of a non-subsidy farm, the net present value (NPV) of cultivating high-tech roses was Rs. 11061688 and Rs. 7710199 at discount rates of 10 and 12 per cent, respectively. The benefit cost ratio too was 1.13 and 1.10, and the internal rate of return (IRR) was 19.31%. The overall payback period was 5.06 years. In case of subsidized farms, the per-hectare investment analysis for hi-tech roses revealed that the net present value (NPV) of hi-tech rose cultivation at overall level was Rs. 22298437 and Rs. 18143789 at a 10 and 12 per cent discounting factor, respectively. With a benefit-cost ratio (BCR) of 1.30 to 1.27 and an internal rate of return (IRR) was 30.52 per cent which indicate that hi-tech rose venture was financially viable. A payback period was 2.90 years found at the overall level. All financial indicators indicate an increase over subsidised cultivation and hi-tech cultivation rose was more profitable in subsidized farm than non-subsidized farm

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Female Labour Participation in Agriculture and Allied Sectors of Northern Hills in Chhattisgarh

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ABSTRACT

Thepresent studyseeks to examine the role of women labour and their participation in different farm operations. To achieve the objectives of study, the primarycross-sectional data were collected from 150 randomly selected farmers of Surajpur and Korea district of Northern Hills of the state for the year 2016-17. The empirical findings of this study reveal thatwomen labour participation in different farm enterprises was comparatively more than that of male labourwhich was noticed to be 53.32%, 69.65%, 56.86%, 58.09%, 57.86%, 29.94% and 12.05% in agriculture, vegetable, dairy, goatry, poultry, NAREGA and others, respectively. However, women labour participation was lowest in other non-farm related activities likeartisan, carpenters etc. Overall, female labours participation increases with farm size due to higher utilization of female laboures in agriculture activities especially in own field. In agriculturaland vegetable production operations women labour participation washighest in intercultural operationsi.e.,99.49% and 82.28%, respectively and lowest in fertilizer spray/ Manuring/ pesticidei.e., 1.53% and 11.93%, respectively as compared to men labours. In dairy and goatryactivity women labour participation was highest in disposal of dung i.e., 99.85% and 100%, respectively. No women labour was involved in milk disposal and grazing of cattles.In goatry no women labour was involved in milking and marketing of goats.In poultry operations, women labour participation was maximum in spreading bedding material on floor i.e., 73.20%. Whereas, no women labourers were involved in marketing of poultry. Source wise female labour participation was highest in on farm activitiesi.e., 57.09% followed by off farm i.e., 53.18% as compared to men labours. The empirical findings of study itself shows that women play a significant role in production and management activities of crop and livestock. It is a major concern to planners and policy makers forstrengthening farm women and overcome their problems by implementation of programmes that will address women's strategic and practical needs.

Keyword: Participation, operations, women labourers, onfarm, off farm.

Introduction

Women play a pivotal role in agricultural and rural economies in all developing countries. Aggregate data show that women comprise around 43 per cent of the agricultural labour force both globally and in developing countries (FAO, 2011). Moreover, according to the data fromthe World Bank (2013), global female labour force participation is around 50 per cent. But less value is given to their contributions, and rural women are less likely to realize their capacity to make life better for themselves, their families and communities (Akinsanmi, 2005). In overall farm production, women's average contribution is estimated at 55- 66per cent of the total labour with percentages, much higher in certain regions (Moktan *et al.,*2012).

As per Census 2011, workers constituted 39.79 per cent of the total population whereas the ratio of female workers was 25.51 per cent. At the All-India level, the percentage share of females as cultivators is 24.92 and as an agricultural labourer it was 18.56. The women of Chhattisgarh enjoy a unique position within the country. The proportion of women in the population (the sex ratio or the number of women per 1000 men) stands at 991 according to the 2011 census. Female agricultural workers constitute a majority of the women'sworkforce in Chhattisgarh. The main agricultural operations performed by women are transplanting, harvesting, weeding and threshing. Almost all the agricultural work is carried out by women labour except ploughing.

There is an increase in total agricultural labour in Chhattisgarh from the 2001 to 2011 census year. It was 31.94per cent (Percentage of total workers) in 2001 which increased to 41.8per cent (Percentageof total workers) in the 2011 primary census abstract (Census of India 2001-2011). In Chhattisgarh female total workers was 40.04per cent in 2001 and 39.70per cent in 2011 which shows that the female total workers are slowly decreasing. In 2001 female agriculture labourers which was 44.09per cent increased to 54.44per cent in 2011. In 2001 male agriculture labourwas 22.80per cent and it is increased to 32.90per cent in 2011. In all female agricultural labours are not very behind in number than the male labour force as the facts and figures speak (Office of the Registrar General, India.).The present study attempts to throw light on the contribution of women in agriculture.

Methodology

Selection of Study Area

Keeping thegiven objectives, the study has adopted a multistage sampling procedure for the selection of the district, talukas, blocks, villages and women agricultural labourers.Chhattisgarh state consists of 27 districts and is subdivided into three agro-climatic zones. Korea and Surajpur district from North Hill of Chhattisgarh were selected for study. Seventy-fivehouseholds from each selecteddistrict were selectedrandomly. Thereafter 15were selected randomly from sampled blocks.It was difficult to find women working as agricultural labour in large-size farm households. Snowball sampling method was used forthe selection of150 households and then categorized intomarginal (below 1 ha.), small (1 to 2 ha.) and medium (2 to 4 ha.).Only those households having (at least one) woman worker and were engaged in agriculture as well as at least one of the allied sectors i.e. Dairy, Poultry, Goatry etc. were chosen for listing and their basic details were collected.

Primary data from the sampled farmers were collected through the personal interview method with the help of a pretested questionnaire schedule. The simple averages and percentages method were used to represent the results of the study.

Result and Discussion

The study yields many useful results, which are presented inthe following heads.

Employment details of Agriculture

Table 1 depicts that women labourers were involved for 53.32 per cent on an overall basis whereas it accounts for 48.97 per cent, 52.58 per cent and 56.19 per cent for marginal, small and medium farmers, respectively. Yadav (2017) revealed that 69.33 per cent of the farm women were involved in agriculture. Ghosh (2014) analysed that 45.3 per cent of the agricultural labour force consists of women but most of them have remained as invisible workers. The highest involvement of women labourers was observed in interculturaloperations accounting for 99.02 per cent, 99.81 per cent and 99.46per cent followed by harvesting 97.82per cent, 98.31 per cent and 97.92 per cent for marginal, small and medium farmers, respectively. This result is supported by Das (2015) investigated that weeding is one of the most participated works of women agricultural labourers, 29.5 per centand 43per cent of the respondents are involved in weeding on a regular and occasional basis respectively. The least involvement of women labourers was found in Fertilizer Spray/Manuring/Pesticide 1.53 per cent on an overall basis as well as for marginal (2.79 per cent) and small (0.69 per cent) farmers. Pal (2016) also found that the level of participation of women labourers was limited in ploughing farmland and spreading fertilizers and pesticides which were traditionally considered only implemented by men. Saikia (2000) records that women perform 80 per cent of transplanting and harvesting, they do not participate at all in spraying insecticides and other pesticides, using tractors and power tillers, or purchasing inputs.Whereas for medium farmers no women labourers were involved for transportation and marketing.

Employmentdetails of Vegetable Production

Table 2shows that the involvement of women labourers was observed at 69.65per cent on an overall basis, whereas 68.01 per cent, 71.18 per cent and 69.45 per centof women labourers were involved in vegetable cultivation for marginal, small and medium farmers, respectively. The highest involvement of women labourers was observed in intercultural operations on an overall basis (82.28 per cent) as well as for marginal (87.59 per cent) and small (86.58 per cent) farmers. Whereas for medium farmers, other cultural practices involved the highest number of women labourers *i.e.,* 77.38 per cent followed by intercultural operations (76.61 per cent). Women labourers were least involved in Fertilizer Spray/Manuring/Pesticide on an overall basis (11.93 per cent) also for marginal (6.99 per cent), small (11.65 per cent) and medium (14.41 per cent) farmers.

Employmentdetails of Dairy

Table 3depicts that women labourers contribute 56.86 per centof manpower on an overall basis, whereas 53.75 per cent, 57.79 per cent and 58.66 per cent among marginal, small and medium farmers, respectively. Yadav (2017) found that 16.33 per cent of farm women were engaged in animal husbandry. Women labourers were mostly involved (99.85 per cent) in the disposal of dung followed by the cleaning of animals and sheds (87.81 per cent). Marginal, small and medium farmers householdsinvolve 99.45 per cent, 100 per cent and 100 per cent of women labourers for disposal of dung. No women labourers were involved in the grazing of cattle in the study area similar to the findings of Behera, et al. (2013) and Das (2015).

Employmentdetails of Goatry

Yadav (2017) found that 17per cent of the farm women possessed goats because this fetches them little economic support for their families. Table 4 revealed that in goatry women were involved in about 58.09per cent of man-days on average whereas for marginal, small and medium farmers women'slabourer's involvement is 60.53per cent, 59.59per cent and 54.28per cent, respectively. Disposal of dung in all categories was exclusively carried out by women labourers in all three categories of farmers. Marginal and small farmers carry out cleaning of animals and sheds only by women labourers. No women labourers were involved in the milking and marketing of goats.

Employmentdetails of Poultry

The rate of women in poultry farming at the household level is central in the poultry industry. Even though rural women are not using modern management techniques, such as vaccination and improved feed, their poultry enterprise is impressive. Every year, income from poultry farming has been rising (Mondal 2013). Table 5 revealed that women were involved in 57.86per cent of manpower on an average basis. While individually it was 71.55per cent, 45.39per cent and 47.17per cent for marginal, small and medium farmers, respectively. Women were mainly involved in Spreading bedding material on the floor which accounts for about 73.20per cent on an average basis. While individually for marginal farmers maximum womenlabourer involvement of 81.28per cent was observed in supplying feed and water, whereas for small (71.79per cent) and medium (81.82per cent) farmers women labourers were involved in the cleaning of bedding and Spreading bedding material on floor respectively. Whereas no women labourers were involved in the marketing of poultry in any individual category. Yadav (2017) found that 3.67 per cent of farm women had bird-rearingoccupations.

Sector-wiseemploymentdetails

A perusal of Table6 revealed that overall, 47.00 per cent contribution of female labourers is there in the total number of employment days. The highest percentage participation of females is in the vegetable sector *i.e.,* 69.65 per cent followed by goatry with 58.09 per cent. Overall, female labourers' participation increases with farm size due to the higher utilization of female labourers in agriculture activities especially in their field. These results are in a similar line to Devaki *et al*.(2015),who reported that the majority 61 per cent of the farm women were involved in agriculture and dairy activities.

Source-wiseemploymentdetails

Table7 reveals that female labour participation is highest on-farm*i.e.,* 57.09 per cent followed by off-farmsource of employment *i.e.,* 53.18 per cent. In nonfarm sources of employment female labour participation is relatively low *i.e.,* 25.90 per cent. In all categories of farm size highest percentage contribution of female labourers is in on-farmsources of employment.

Table 1: Contribution of female laboursin agricultural operations (in %)

Operations	Marginal	Small	Medium	Overall
Field preparation	5.46	10.17	11.63	9.80
Sowing	3.36	4.32	1.08	2.87
Transplanting	89.20	92.00	91.21	91.00
Irrigation	19.10	18.51	13.51	16.06
Intercultural operations	99.02	99.81	99.46	99.49
Fertilizer Spray/ Manuring / Pesticide	2.79	0.67	1.48	1.53
Harvesting	97.82	98.31	97.92	98.03
Carrying harvested paddy to threshing field	9.44	13.50	19.46	14.38
Threshing	16.15	13.71	30.19	19.84
Winnowing	34.12	41.43	42.78	39.65
Grading & Packaging	36.92	41.96	46.37	42.56
Transportation & Marketing	13.43	15.35	0.00	10.02
Others	26.97	27.37	23.02	25.07
Total	**48.97**	**52.58**	**56.19**	**53.32**

Table 2: Contribution of female labours in vegetable production operations (in %)

Operations	Marginal	Small	Medium	Overall
Nursery bed prepration	55.17	63.64	71.43	63.68
Field prepration	62.48	66.86	64.79	64.85
Sowing	43.17	44.92	69.33	52.87
Transplanting	64.63	72.28	75.24	72.04
Irrigation	83.09	77.86	72.45	76.07
Intercultural operations	87.59	86.58	76.61	82.28
Fertilizer Spray/ Pesticide Manuring	6.99	11.65	14.41	11.93
Harvesting	83.13	75.36	71.99	75.14
Grading & Packaging	72.21	67.30	50.00	60.02
Transportation & Marketing	30.09	32.19	22.62	27.92
Others	86.11	83.65	77.38	80.96
Total	**68.01**	**71.18**	**69.45**	**69.65**

Table 3: Contribution of female labours in dairy (in %)

Operations	Marginal	Small	Medium	Overall
Cleaning of Animals and Sheds	85.01	91.12	86.49	87.81
Harvesting green fodder & Transportation of fodder	86.89	88.94	86.93	87.54
Offering feed & Drinking water arrangement	75.77	83.94	79.77	80.07
Disposal of dung	99.45	100.00	100.00	99.85
Grazing	0.00	0.00	0.00	0.00
Milking	24.87	20.69	22.05	22.47
Milk Disposal	0.00	0.00	0.00	0.00
Total	**53.75**	**57.79**	**58.66**	**56.86**

Table 4: Contribution of female labours in goatry (in %)

Operations	Marginal	Small	Medium	Overall
Cleaning of Animals and Sheds	100.00	100.00	90.00	97.68
Harvesting green fodder & Transportation of fodder	80.00	84.38	89.47	84.37
Offering feed & Drinking water arrangement	87.71	84.95	90.63	87.67
Disposal of dung	100.00	100.00	100.00	100.00
Grazing	6.90	8.08	9.62	8.34
Milking	0.00	0.00	0.00	0.00
Marketing	0.00	0.00	0.00	0.00
Total	**60.53**	**59.59**	**54.28**	**58.09**

Table 5: Contribution of female labours in poultry (in %)

Operations	Marginal	Small	Medium	Overall
Spreading bedding material on floor	76.38	54.17	81.82	73.20
Supplying feed and water	81.28	63.64	56.25	71.19
Cleaning of bedding	80.99	71.79	58.33	72.86
Marketing	0.00	0.00	0.00	0.00
Total	**71.55**	**45.39**	**47.17**	**57.86**

Table 6: Sector wise contribution of female labours (in %)

Sectors	Marginal	Small	Medium	Overall
Agriculture	48.97	52.58	56.19	53.32
Vegetable	68.01	71.18	69.45	69.65
Dairy	53.75	57.79	58.66	56.86
Goatry	60.53	59.59	54.28	58.09
Poultry	71.55	45.39	47.17	57.86
NREGA	28.43	33.33	26.67	29.94
Others*	8.19	12.63	19.89	12.05
Total	**42.27**	**45.95**	**51.64**	**47.00**

* Artisan, Carpenters etc.

Table. 7: Sources wise contribution of female labours (in %)

	Marginal	Small	Medium	Overall
On farm	56.91	55.68	58.08	57.09
Off farm	48.67	55.47	57.96	53.18
Nonfarm	23.31	28.07	25.87	25.90
Total	**42.27**	**45.95**	**51.64**	**47.00**

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Constraints faced by farmer in sapota production in Palghar district of Maharashtra

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ABSTRACT

The present study was conducted during 2020-21 in Palghar district of Maharshtra. The cultivation of sapota in Dahanu tehsil is concentrated near and away from sea the shore, therefore, the villages in the Dahanu tehsil were divided in two categories Group I and Group II and from each group three villages were selected randomly. From each selected village 15 farmers were randomly selected. Thus, total sample consisted of 90 sapota farmers. The results revealed that, the important constraints faced by sapota farmers at the overall level was non availability of harvesting labour in time (88.89%), followed by non-availability of labour in general (77.78%), non-availability of fertilizers in time (72.22%), non-availability of manures in time (66.67%), fluctuation in electricity (61.11%), price received was not remunerative (44.44%), non-availability of plant protection chemicals in time (38.89%), lack of knowledge (31.11%), non-availability of credit in time (27.78%) and problems of pest and diseases (20.00%).

Key words:*Constraints, fluctuation, remunerative, credit etc.*

1. Introduction

Sapota (*Manilkara achras*) is one of the most important tropical fruits belonging to the family sapotaceae. It is popularly known as chiku and is one of the delicious fruits of humid tropical and subtropical regions. The origin of sapota is Tropical America and South-East Mexico. India ranks first in sapota production in the world. In India total area under sapota cultivation was 107.16 thousand ha with a production of 1284.60 thousand MT and productivity 11.99 MT/ha in 2020-21. Sapota was cultivated first time in Maharashtra in 1898 in a village named Gholwad in Dahanu tehsil of Palghar district. The area under sapota production in Maharashtra was 17.91 thousand ha with production of 156.42 thousand MT and productivity 8.73 MT/ha in 2020-21. In Maharashtra area under sapota cultivation is more in Palghar district. Area of Palghar district under sapota cultivation was 3.04 thousand ha with production of 34.05 thousand MT and productivity 11.20 MT/ha in 2020-21. The area under sapota cultivation in Dahanu tehsil was 2.32 thousand ha. In the Palghar district 76 per cent of total area under sapota is in Dahanu tehsil.

2. Materials and methods

In the Konkan region the Palghar district was selected purposively for this study due to maximum area under sapota cultivation.Dahanu tehsil from Palghar district having maximum area under sapota cultivation which constituted 76 per cent area to the Palghar district. Hence, Dahanu tehsil was selected purposively for the present study. The cultivation of sapota in Dahanu tehsil is concentrated near and away from sea shore, therefore, the villages in the Dahanu tehsil were divided in two categories

i.e. near the sea shore (Group I) and away from sea shore (Group II) and from each group separate list of villages was prepared and from each group three villages were selected randomly.From each selected village 15 farmers were randomly selected. Thus, total sample consisted of 90 sapota farmers. The selected farmers were interviewed personally with the help of schedule specially designed for research purpose.

3. Results and Discussion

3.1 Constraints faced by farmers in sapota production

The information regarding the constraints faced by sapota farmers in study are presented in Table 3.1.

The important constraints faced by sapota farmers at the overall level was non availability of harvesting labour in time (88.89%), followed by non-availability of labour in general (77.78%), non-availability of fertilizers in time (72.22%), non-availability of manures in time (66.67%), fluctuation in electricity (61.11%), price received was not remunerative (44.44%), non-availability of plant protection chemicals in time (38.89%), lack of knowledge (31.11%), non-availability of credit in time (27.78%), problems of pest and diseases (20.00%).

The important constraints faced by sapota farmers in group I were non availability of harvesting labour in time (91.11%), followed by non-availability of labour in general (86.67%), non-availability of fertilizers in time (71.11%), non-availability of manures in time (64.44%), fluctuation in electricity (57.78%), price received was not remunerative (44.44%), non-availability of plant protection chemicals in time (35.56%), lack of knowledge (33.33%), non- availability of credit in time (31.11%) problems of pest and diseases (17.78%).

The important constraints faced by sapota farmers in group II were non availability of harvesting labour in time (86.67%), followed by non-availability of labour in general (68.89%), non-availability of fertilizers in time (73.33%), non-availability of manures in time (68.89%), fluctuation in electricity (64.44%), price received was not remunerative (44.44%), non-availability of plant protection chemicals in time (42.22%), lack of knowledge (28.89%), non- availability of credit in time (24.44%), problems of pest and diseases (22.22%).

Table 3.1: Constraints faced by farmers in Sapota production

Sr. No.	Constraint faced	Group I (N = 45)	Group II (N = 45)	Overall (N = 90)
1.	Non-availability of harvesting labour in time	41 (91.11)	39 (86.67)	80 (88.89)
2.	Non-availability of labour in general	39 (86.67)	31 (68.89)	70 (77.78)
3.	Non-availability of fertilizers in time	32 (71.11)	33 (73.33)	65 (72.22)
4.	Non-availability of manures in time	29 (64.44)	31 (68.89)	60 (66.67)
5.	Fluctuation in electricity	26 (57.78)	29 (64.44)	55 (61.11)
6.	Price received was not remunerative	20 (44.44)	20 (44.44)	40 (44.44)
7.	Non-availability of plant protection chemicals in time	16 (35.56)	19 (42.22)	35 (38.89)
8.	Lack of knowledge	15 (33.33)	13 (28.89)	28 (31.11)
9.	Non-availability of credit in time	14 (31.11)	11 (24.44)	25 (27.78)
10.	Problems of pest and diseases	8 (17.78)	10 (22.22)	18 (20.00)

(Figures in the parentheses indicates percentage to total)

4. Conclusion

The important constraints as reported by sapota growers at overall level were non availability of harvesting labour in time (88.89%), followed by non-availability of labour in general (77.78%), non-availability of fertilizers in time (72.22%).

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Growth Rate in Area, Production and Productivity of Different Crops in Tamil Nadu State

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ABSTRACT

The present study examines the growth action of area, production and productivity pattern in the Tamil Nadu State. Using data from 1990-91 to 2009-10, linear and compound growth rate of area, production and productivity in Tamil Nadu state was estimated for each period to study the growth performance. In the State, gross cropped area occupies major portion in total geographical area of the state followed by net sown area and forest area. Despite of this, area under current fallow, other fallow occupies prominent portion in total area. Area under the fallow is increasing. Hence importance is given to prevent converting cropped area to waste land. The study suggests farmers to make use of available resource efficiently to convert cultivable waste land and fallow land into farm land.

Key words- growth rate, gross cropped area, net sown area, resource efficiency

INTRODUCTION

Land and water are the crucial natural resources for any development activity. Consequently, access to land and control over its uses were the prime sources of conflict within and between communities throughout human history. Like any other resource land has two dimensions, viz, quality and quantity, and both of these crucial aspects are under serious threat. Though technological progress in agriculture and agricultural intensification have mitigated the demand for land for non-agricultural purposes are posing a serious challenge to both researchers and policy makers. Intensive agriculture coupled with large-scale irrigation projects without utilized or unutilized. For sustainable utilization of the land ecosystems, it is essential to know the natural characteristics, extent and location, its quality, productivity, suitability and limitations of various land uses. The growth of population is greater than the rate of growth of food production. It is usually achieved through proper use of land resources with the application of bio-fertilizers, double cropping, modern methods of irrigation and manpower.

In Tamil Nadu, area under cultivable waste land, fallow land, land under misc trees, grooves not included in area sown, land under non-agricultural use shows increase in percentage change with positive sign. Area under forest, permanent pastures, net sown area, area sown more than once gross cropped shows decrease in percentage change. It clearly shows that fallow land, land under non-agricultural use should be used properly to improve land utilization pattern of the state.

In present study a comparison is done to analyze percentage change in area under Land utilization pattern for two different periods and growth rates were identified for the same period.

METHODOLOGY

In the present study, Linear Growth Rate (LGR) and Compound Growth Rate (CGR) were estimated for each period to study the growth LUP.

For studying the growth rate in area, production and productivity, linear growth rate was estimated by using following linear functions.

$$Y= a+bx+e$$

Where

Y = Dependent variable for which growth rate is estimated

a= Intercept/Constant

b= Regression/trend coefficient

x= Period in years

e= Error term with zero mean and constant variance.

Compound Growth Rate was then estimated by using the following equation:

$$Y= a.b^x$$

Y= Dependent variable for which growth rate is estimated

a= Intercept or constant

b= Trend / Regression coefficient

x= Period in years

b= (1+r)

where, r = is compound growth rate

C.G.R. = (antilog of b-1) x 100

The necessary data for the selected cereals crops was purely based on secondary sources and it was collected from various issues of Statistical Hand Book of Tamil Nadu, Season and Crop report of Tamil Nadu. To work out triennium averages for base period i.e., 1990-91, period considered were 1988-89, 1989-90,1990-91 and for end period i.e., 2009-10, period for triennium considered were 2007-08, 2008-09, 2009-10 simple arithmetic averages, percentages of selected parameters of development were used for the comparison of situation in Tamil Nadu over three period of time.

Time period I, II and III represents time series data for 1990-91 to 1999-2000, 2000-01 to 2009-10 and 1990-91 to 2009-10 respectively. The present study examines the growth performance of Land Utilization Pattern in Tamil Nadu State. Table-1 reports the Land utilization pattern for the period of 1990-91 to 2009-10. It reveals that area under current fallow is constantly increasing throughout the period and area sown more than once is decreasing. Gross cropped area of the state is also declining. Area under forest is decreasing but change is minute when compared to other particulars.

Growth rate of area under different crops

The trend in area of different crops were studied and depicted in Table 4.The growth rate of area under paddy cultivation had been significant at 5 per cent for period II and III. Area under cultivation of sugarcane, Sesame, green gram, black gram, red gram, total pulses were non-significant for overall period. The growth rate area under maize cultivation had increased from 0.02 to 0.23 per cent in linear growth rate and 0.02 to 0.37 per cent in compound growth rate.

Table 1. Growth rate of area under different crops in Tamil Nadu

S.No.	Particulars	LGR			CGR		
		I	II	III	I	II	III
1	Paddy	1.00	0.04*	-1.00*	1.06	0.22*	-1.02*
2	Sorghum	-5.06	-3.49	-3.52	-4.92	-3.62	-3.47
3	Pearl millet	-6.51	-10.79**	-7.31	-6.13	-10.78**	-7.83
4	Finger millet	-4.76	-4.55**	-3.14	-4.60	-4.46**	-3.08
5	Maize	10.05*	12.24	11.50	10.35*	15.11	13.25
6	Total cereals	-0.85	-0.28**	-1.43	-8.49	-0.22**	-1.42
7	Red gram	-6.14	-10.43	-7.50	-6.12	-9.81	-7.90
8	Bengal gram	0.70*	1.38**	-1.37	1.26	1.38*	-1.12**
9	Green gram	-1.44	1.78	1.13	-1.33	1.83	1.15
10	Black gram	-3.02	1.43	-0.21	-2.78	1.51	-0.18
11	Horse gram	-5.69	-9.77	-5.30	-5.51	-9.17	-5.46
12	Total pulses	-3.13	-2.34	-1.89	-2.97	-2.21	-1.82
13	Groundnut	-3.73	-4.16**	-5.02	-3.77	-4.14**	-5.04
14	Sesame	-4.89	-4.70	-4.80	-4.75	-4.31	-4.73
15	Sugarcane	3.50	1.79	1.24	3.70	1.91	1.24
16	Cotton	-2.40	-4.33	-5.92	-2.57	-3.36*	-6.11
17	Total food grains	-1.27	-0.66**	-1.52	-1.25	-0.59**	-1.50

*Significant at 5 per cent, **Significant at 1 per cent

Growth rate of production of different crops

Growth rate of production of different crops in Tamil Nadu has been depicted in Table 5. Paddy, pearl millet, finger millet, maize, Sesame, ground nut production remains non-significant during overall period. Production of green gram remains significant at 1 % for overall time period. The average production of maize has increased significantly in

overall time period. It had increased from 0.06 to 0.18 per cent in linear growth rate and 0.05 to 0.19 per cent in compound growth rate.

Table 3. Growth rate of productivity of different crops in Tamil Nadu

Sr. No.	Particulars	LGR			CGR		
		I	II	III	I	II	III
1	Paddy	0.92*	-0.49**	-0.57	0.83*	-0.30**	-0.61
2	Sorghum (cholam)	-0.74	1.55	-1.48	-0.73	1.64	-1.51
3	Pearl millet (cumbu)	3.18	3.59	1.33	3.09	3.72	1.27
4	Finger millet (ragi)	0.24**	0.72	-0.97	0.23**	0.82	-1.03
5	Maize	0.05**	14.71	5.71	0.05**	14.61	4.37
6	Total cereals	1.94	1.51**	0.23**	1.86	1.68**	0.16**
7	Red gram	1.33*	1.08	0.59	1.40*	1.05	0.66
8	Bengal gram	0.26	-0.25	-0.83	0.28	-0.26	-1.40
9	Green gram	0.02	-4.39	-1.37	-0.12	-4.98	-1.68
10	Black gram	-1.00	-2.62	-1.55	-1.06	-2.92	-1.70
11	Horse gram	1.23	3.43	-0.32	1.12	3.72	-0.46
12	Total pulses	-0.30	-1.64	-1.20	-0.31	-1.81	-1.31
13	Groundnut	3.22	2.26	1.80	3.39	2.30	1.83
14	Sesame	4.81	-1.51*	0.70	5.10	-1.20*	0.82
15	Sugarcane	-0.85	1.30	-1.08	-0.84	2.03	-1.92
16	Cotton	0.34	4.35	-0.00	0.21	4.48	0.00
17	Total food grains	2.16	1.72	0.25	2.11	1.87	0.17

*Significant at 5 per cent, **Significant at 1 per cent

CONCLUSION

Research activities should focus more on increasing the productivity and profitability of less water-intensive crops so as to reduce the stress on water resources as well as to increase the area that could be cultivated with a given quantum of water. Institutional arrangements need to focus on the prevention of idling of fertile agricultural lands located close to urban areas for speculative purposes.

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Trend Analysis of Coffee in India

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ABSTRACT:

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.

Key words Trend analysis, Price competitiveness

INTRODUCTION

Coffee is a unique commercial crop of importance both at the national and international levels. At the national level it is the only crop with a well establishedcentralised marketing system working for over forty years. At the international level, International coffee organisation a unique organisation with producing as well as consuming countries as members, is functioning for the smooth running of trade. Coffee in India is more than an agricultural export product. It is also social, institutional and cultural fabric of southern states of India. This is the heart of rural societies in the traditional coffee growing area. Two importance species of coffee grown in India. India ranks 7th in area, 6th in production 3rdin productivity and 6th in export with respect to coffee.

METHODOLOGY

Trends Analysis

The trend in area, production, productivity and prices of coffee was computed for the series data of 2000-2019. To trace the path of process different parametric trend models were used. Among the competitive trend models, the best models were selected based in their goodness of fit (measured in terms of R^2) value and significance of the coefficients.

List of different parametric models with their equations

Sr. No.	Function	Equation
1	Linear	$Y_{t=} a + b_t$
2	Logarithmic	Log $Y_{t=}$ Log a + Log b_t
3	Inverse	$Y = f(x)$; $Y = f^{-1}(f(x))$
4	Quadratic	$Y_t = a + b_1 + c_t^2$
5	Cubic	$Y_t = a + b_t + c_t^2 + d_t^3$
6	Compound	$Y = b_0^* (x^{b}_1)$
7	Power	$Y = b_0^* (b_1^x)$
8	Growth	$Y_t = a + bc$
9	Exponential	Log $Y = b_0 + b_1 x$

Nominal Protection Coefficient (NPC)

The fourth objective of the present study was to study the export competitiveness of Coffee. The competitiveness of coffee in India was measured by Nominal Protection Coefficient (NPC). NPC is a straight forward measure of competitiveness. It is calculated as the ratio between the domestic price to the international prices of a comparable grade of commodity, adjusted for all the transfer costs such as insurance, leaving cost, margins, losses, etc. under exportable hypothesis. A decision criterion is if NPC is less than one, than the commodity is competitive

that is worth exporting the commodity. If NPC is greater than one, the commodity is not competitive that is not worth exporting.

It was estimated by using following formula.

$$NPC = \frac{P_d}{P_r}$$

Where,

NPC = Nominal Protection Coefficient.

Pd = Domestic prices of the coffee.

Pr = World reference price of coffee.

If NPC> 1 are protected, compared to the situation that would prevail under free trade and if NPC< 1, are disprotected.

RESULTS AND DISCUSSION

Trend analysis of area, production, productivity, domestic prices and international prices of coffee in India for the overall period showed that, a wide range of models has been explored, among the competitive models the best fitted models were selected based on the R^2 significance. Among the competitive parametric models, in all cases cubic models are found to be best fitted; thereby indicating that the movement of all the series was uniform throughout India.

The NPC value of coffee showed that, the value in period I was 0.96 and in period II was 0.49 and for overall it was 0.73 which indicates coffee are competitive in international market

Among the competitive parametric models, in the cases cubic models are found best fitted for area, production, productivity, domestic price and International price.

Production and productivity were significant at one per cent level and for area, domestic prices and international prices is at five per cent level.

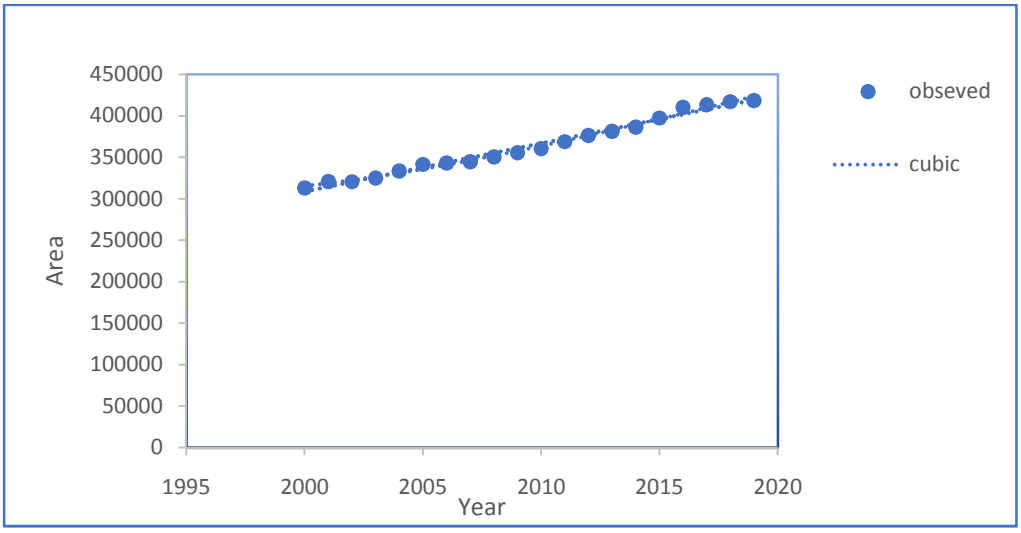
Table:1 Trend in Area, production, productivity, domestic and international prices of coffee.

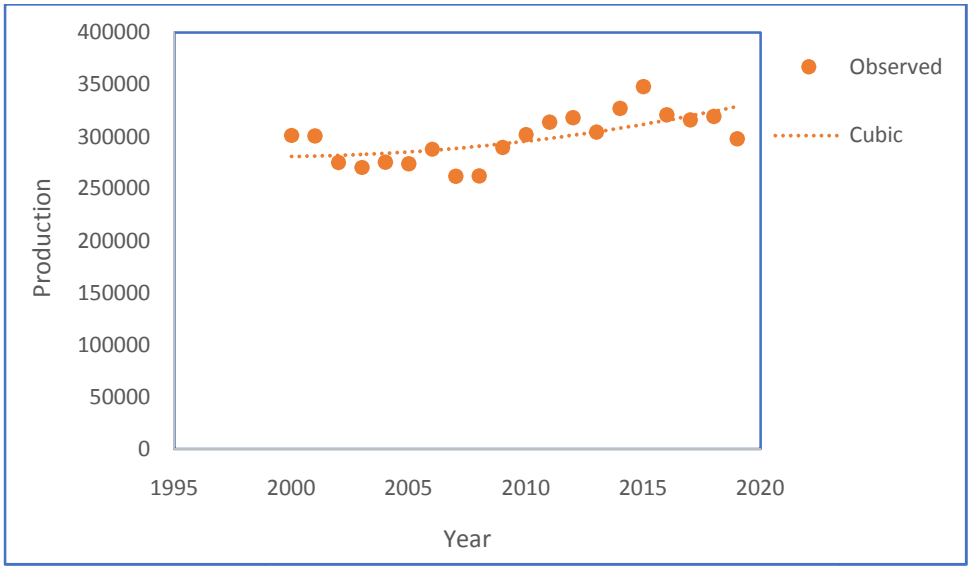
(2000-01 to 2019-20)

Sr. No	Particulars	Function	R^2	Coefficients		
				b_1	b_2	b_3
1.	Area	Cubic	0.992*	2516.3	237.343	-4.3967
2.	Production	Cubic	0.808**	-25661	3104.94	-94.805
3.	Productivity	Cubic	0.431**	-96.555	9.2876	-0.2680
4.	Domestic price	Cubic	0.561*	14594.09	-2100.8	67.156
5.	International price	Cubic	0.523*	9529.15	-2233.2	80.746

Note: * = significant at 5 per cent level.

** = significant at 1 per cent level.

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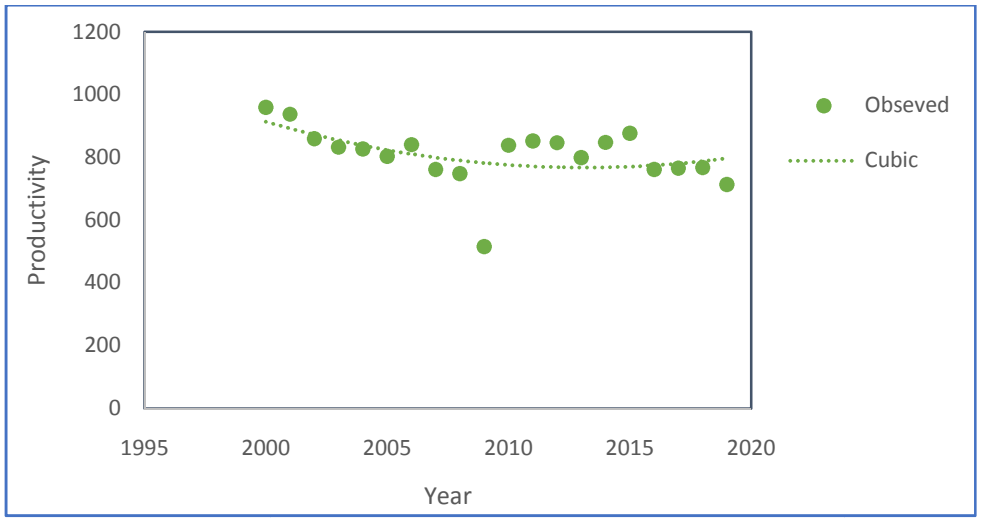
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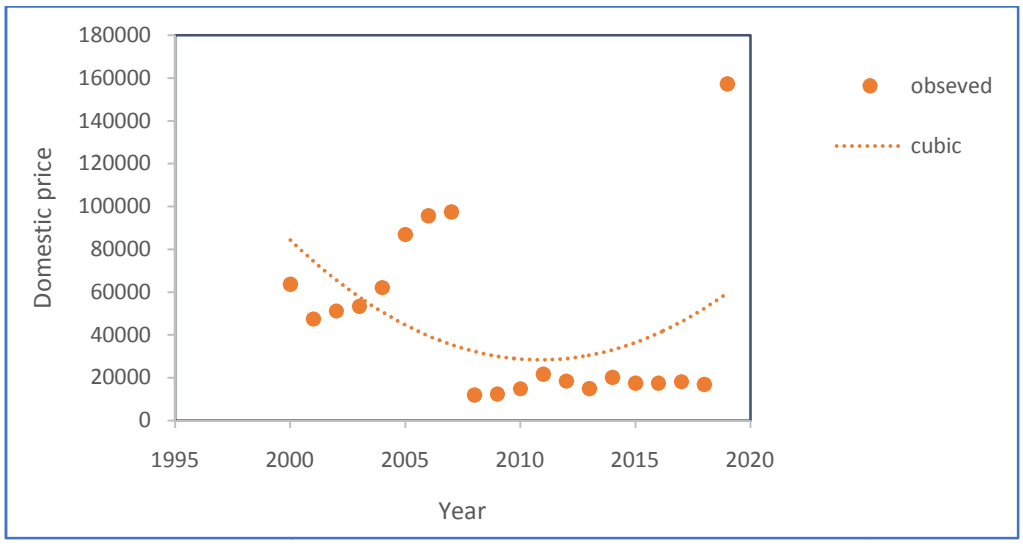
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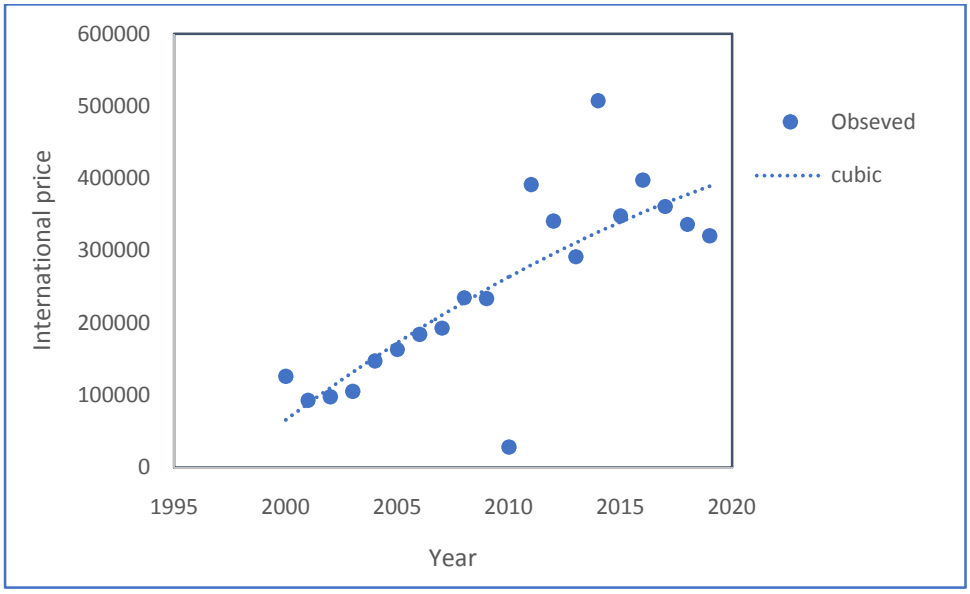

Table2. Nominal Protection Coefficient (NPC) of Indian coffee

Sr. No	Period	Year	Domestic Prices(Pd) (Rs./Tonne)	International Prices(Pr) (Rs./Tonne)	NPC
1	Period I (2000-01 to 2009-10)	2000-01	63655	126032	0.50
		2001-02	47439	92840	0.51
		2002-03	51160	97798	0.52
		2003-04	53306	105206	0.50
		2004-05	62095	147230	0.42
		2005-06	86888	163013	0.53
		2006-07	95644	184028	0.51
		2007-08	97431	19272	5.05
		2008-09	11916	23465	0.50
		2009-10	12344	23352	0.52
Average Period I (2000-01 to 2009-10)					**0.96**
2	Period II (2010-11 to 2019-20)	2010-11	14844	28076	0.52
		2011-12	21646	39126	0.55
		2012-13	18419	34082	0.54
		2013-14	14904	29144	0.51
		2014-15	20160	50735	0.39
		2015-16	17483	34776	0.50
		2016-17	18580	39753	0.46
		2017-18	18162	36087	0.50
		2018-19	16847	33609	0.50
		2019-20	157251	320495	0.49
Average Period II (2010-11 to 2019-20)					**0.49**
Average Overall period (2000-01 to 2019-20)					**0.73**

CONCLUSIONS

- There was an increase in trend in area, production, productivity, domestic prices and international prices of coffee during overall period and it values were positive and among the competitive parametric models, in all cases cubic models are found to be best fitted based on R^2 and significance.

- 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.

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Performance of Coffee in India

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ABSTRACT

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 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: Compound growth rate, coefficient of variation, coppock's instability index.

INTRODUCTION

Coffee is one of the world's most widely traded commodities, after crude oil, and is the most sought commodity in the world. This puts coffee ahead of commodities like Natural Gas, Gold, Brent, Oil, Sugar and Corn. Coffee is grown in over 60 countries across Asia, Africa, South America, Central America and the Caribbean. Many of those countries are heavily dependent on coffee, which account for over 50 per cent of their total export earning. It provides a livelihood for over 125 million people around the world and it is particularly important for smallholder farmers who produce most of the world's coffee.

Depending on agro - ecological variables existed in the coffee growing countries there are different flavours and varieties of coffee in the world. However, despite the different flavours and varieties of coffee, only Arabica and Robusta are the two main varieties which are commercially grown and sold as a coffee beans. Globally, Arabica is the mora common type of bean grown accounting for 70 per cent of coffee production, and it is considered as more flavourful. Robusta is hardier and cheaper and most commonly seen in instant coffee jars. Arabica is grown in higher altitude than robusta. Arabica required adequate temperature, ranging between 15 degree Celsius and 25 degree Celsius to 30 degree Celsius is suitable. Coffee occupies a place of pride

among plantation crops grown in India. It is the most important cash crop that is grown in the tropics. Coffee is grown in the tropical belt of the world where there is good sunshine, heavy rains and rich organic soil. It cannot be grown in places where there is frost or snow. Coffee trees are evergreen and grow to a height of 20 feet. But to simplify harvesting the trees are pruned to around eight feet. The tree takes 4-5 years to produce the first crop.

Cultivation of this stimulating beverage crop is mainly confined to the southern states of Karnataka, Kerala, Tamil Nadu and Andhra Pradesh, Assam, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Sikkim, Tripura and West Bengal forming the non- traditional belt. It is also grown in area which receive predominant north-east monsoon as in Tamil Nadu, Andhra Pradesh and Orissa. Summer showers are important for flowering in coffee and are received during March- April. which is mainly cultivated in the southern states of Karnataka 67.7 per cent, Kerala 22.3 per cent and Tamil Nadu 6.2 per cent and to a lesser extent, in non- traditional areas like Andhra Pradesh, Orissa 3.7 per cent and North Eastern States 0.1 per cent.

METHODOLOGY

The present investigation was undertaken to study the "Performance of Coffee in India"

The data was collected from secondary sources subjected to appropriate analytical techniques in order to arrive at a meaningful conclusion. To fulfil the specific objective of the study based on the nature and extent of availability of data, the following analytical tools and techniques were adopted.

1) Growth rate analysis
2) Instability Index

1) Growth rate analysis

The first objective of the present study was to estimate the growth in area, production productivity of coffee. import and export of coffee in India. The growth rates in production, import and export of coffee in India was studied by using compound growth rates. The growth rate was estimated using following model

$Y = a.bt$ ..... (1)

Where,

Y = Depended variable for which growth rate is to be estimate(Quantity imported / import value/ Quantity exported / export value/ Area/ Production /Productivity)

a = Intercept

b = Regression Coefficient

t = Time variable

This equation was estimated after transforming (1) as follows,

$\text{Log } Y = \log a + t (\text{Log } b)$ ..... (2)

Then the percent compound growth rate (g) was computed using the relationship.

$CGR\ (g) = (\text{Antilog } (\log b) - 1) \times 100$ ..... (3)

The significance of the regression coefficient was tested using the 't' test.

2) Degree of instability in performance of coffee.

In order to study the instability in the performance of coffee Coefficient of variation, were used. Coefficient of variation (CV)

Coefficient of variation (CV) = $\frac{\delta}{\bar{X}} X100$

σ = Standard deviation

S.D. = $\sqrt{\frac{\Sigma(x-\bar{x})^2}{n}}$

$\bar{x}$ = Arithmetic mean

X = Variable

n = Number of observation

Coppock's Instability Index (CII)

Coefficient of instability is another measure of instability besides coefficient of variation measure the variation around the trend. Coppock's instability index (CII) Coefficient of instability was worked using Coppock's Instability Index (CII).

The instability index= = [Antilog ($\sqrt{}$V log)-1]×100

Vlog=$\frac{\sum\left(\log\frac{x_{t+1}}{x_t}-m\right)}{N}$

Where,

xt= Area/ production /productivity/ import / export in year t

N = Number of year minus one

m = Arithmetic mean of the difference between the log of xt and $xt-1$, $xt-2$ etc.

V log = Logarithmic variance of the series.

RESULT AND DISCUSSION

Area and production of coffee in India was increasing considerably during the study period in 2000-01. It was 313934 Ha and increased to 418167 Ha 2019-20 and production in 2000-01 was 301200 tonnes and it decrease to 298000 tonnes 2019-20. The analysis of growth rate of area, production, productivity, import quantity and value, export quantity and value of coffee in India. for period I, period II and overall period displayed that there was positive and highly significant increase in

area. production of coffee was positive and significant only in overall period, but in productivity was negative and non- significant in all growth rate period. In case of import quantity and value, it was seen that period II and overall period were positive and significant but period I seems to have negative growth of import quantity. In case of export quantity, it was positive period I and overall period were significant. And export value, positive and significant for entire period.

In case of area, production of coffee the instability was found to be high in the overall period and productivity of coffee the instability was found high in the period I, instability low in area in period I, production and productivity low in period II. In case of import quantity and value the instability was found to be high in the overall period. and import quantity instability was found low in period II. Import value low in period I. In case of export quantity and export value the instability found to be high in overall period and export quantity the instability was low in period I. Export value the instability was low in period II.

In case of area, production and productivity of coffee the coppock's instability index was found to be high in overall period. And low in area in the period I. coppock's instability index low in production and productivity in the period II. In case import quantity and value of coffee the coppock's instability index was found to be high in overall period and low in period I. In case export quantity of coffee the coppock's instability index was found to be high in period II and low in period I. export value of coffee the coppock's instability index was found to be high in overall period and low in period I.

Table 1: Period-wise Compound growth rates of area, production and productivity of Coffee.

Particulars	CGR	SE	t-value
Area			
Period I(2000-01 to 2009-10)	1.39**	0.03	17.72
Period II (2010-11 to 2019-20)	1.78**	0.03	17.70
Overall Period (2000-01 to 2019-20)	1.60**	0.04	42.53
Production of Coffee			
Period I (2000-01to 2009-10)	-0.82	0.02	-1.61
Period II (2010-11 to 2019-20)	0.11	0.02	0.21
Overall Period (2000-01 to 2019-20)	0.84**	0.02	3.47
Productivity of Coffee			
Period I (2000-01 to 2009-10)	-4.60	0.44	-4.14
Period II (2010-11 to 2019-20)	-1.68	0.01	-3.44
Overall Period (2000-01 to 2019-20)	-0.73	0.05	-1.53

Note: ** = significant at 1 per cent level.

Table 2 : Compound growth rates of coffee import

Particulars	CGR	SE	t-value
Import Quantity			
Period I (2000-01 to 2009-10)	-0.59	0.28	-0.08
Period II (2010-11to 2019-20)	33.15**	0.14	7.58
Overall Period (2000-01 to 2019-20)	14.76**	0.28	5.32

Import Value			
Period I (2000-01 to 2009-10)	7.76	0.25	1.15
Period II (2010-11 to 2019-20)	33.06**	0.13	8.19
Overall Period (2000-01 to 2019-20)	18.29**	0.31	5.99

Note: ** = significant at 1 per cent level.

Table 3 :Compound growth rates of Coffee export

Particulars	CGR	SE	t-value
Export Quantity			
Period I (2000-01 to 2009-10)	7.44**	0.09	4.11
Period II (2010-11to 2019-20)	11.08	0.30	1.34
Overall Period (2000-01 to 2019-20)	7.81**	0.21	3.87
Export Value			
Period I (2000-01to 2009-10)	19.35**	0.09	3.69
Period II (2010-11to 2019-20)	10.03**	0.06	5.67
Overall Period (2000-01 to 2019-20)	12.79**	0.08	15.27

Note: ** = significant at 1 per cent level.

Table 4 : Instability index of area, production and productivity of Coffee

	Particular		
	Area	**Production**	**Productivity**
Period I (to 2000-01 to 2009-10)			
Mean	334864.9	279897.5	808
SD	14182.2	14282.74	122.769
CV	4.23	5.10	15.19
Period II (2010-11 to 2019-20)			
Mean	39279.5	315920	806.4
SD	21111.34	14276.15	52.96162
CV	5.37	4.51	6.56
Overall Period (2000-01 to 2019-20)			
Mean	363831.2	297908.7	807.2
SD	34490.53	23122.49	92.0260
CV	9.47	7.76	11.40

Note: SD- Standard Deviation and CV-Coefficient of Variation(per cent)

Table 5 : Instability index forimport quantity and import value of coffee

	Particular	
	Import Quantity	**Import Value**
Period I (2000-01 to 2009-10)		
Mean	267.7	61338.6
SD	245.29	39220.15
CV	91.62	63.94

Period II (2010-11 to 2019-20)		
Mean	1143.6	541975.8
SD	757.12	362255.5
CV	66.20	66.83
Overall Period (2000-01 to 2019-20)		
Mean	705.65	301657.2
SD	708.46	351685.1
CV	100.39	116.58

Note: SD- Standard Deviation and CV- Coefficient of Variation

Table 6 : Instability index forexport quantity and export value of coffee

	Particular	
	Export Quantity	**Export Value**
Period I (2000-01 to 2009-10)		
Mean	25226.4	4737638
SD	7082.79	1631968
CV	28.07	34.44
Period II (2010-11 to 2019-20)		
Mean	50918.6	17179830
SD	17215.15	4661156
CV	33.80	27.13
Overall Period (2000-01 to 2019-20)		
Mean	38072.5	10958734.35
SD	18380.75	7231320.5
CV	48.27	65.98

Note: SD- Standard Deviation and CV- Coefficient of Variation

Table 7 : Coppock's Instability index in area, production, productivity ofcoffee

	Particular		
	Area	**Production**	**Productivity**
Period I (to 2000-01 to 2009-10)			
CII	10.43	10.52	11.88
Period II (2010-11 to 2019-20)			
CII	10.55	10.45	10.68
Overall Period (2000-01 to 2019-20)			
CII	10.98	17.14	11.36

CII- Coppock's instability index(per cent)

Table 8 : Coppock's Instability index forimport quantity and import value of coffee

	Particular	
	Import Quantity	**Import Value**
Period I (2000-01 to 2009-10)		
CII	18.74	18.22

Period II (2010-11 to 2019-20)		
CII	25.22	24.96
Overall Period (2000-01 to 2019-20)		
CII	28.35	36.32

CII-Coppock's instability index(per cent)

Table 9 : Coppock's Instability index forexport quantity and export value of coffee

	Particular	
	Export Quantity	**Export Value**
Period I (2000-01 to 2009-10)		
CII	13.01	14.00
Period II (2010-11 to 2019-20)		
CII	20.97	19.77
Overall Period (2000-01 to 2019-20)		
CII	18.59	20.94

Note: CII- Coppock's instability index(per

CONCLUSION

1. The compound growth rate of coffee area (1.60 per cent per annum), production (0.84 per cent per annum) in India was found to be positive and highly significant during the overall period of the study except productivity (-0.73 per cent per annum) which was negative and non-significant.
2. The compound growth rate for import quantity (14.76 per cent per annum) and import value (18.29 per cent per annum) was found to be positive and significant for overall period of coffee. Export quantity (7.81 per cent per annum) and export value (12.79 per cent per annum) was found to be positive and significant for overall period of coffee.
3. The study of instability index showed that there was stability in area, production, productivity, import quantity and value, export quantity and value of period II as compared with period I. The highest instability was found in overall period of import value (116.58 per cent) and lowest in period I of area (4.23 per cent).
4. The study of coppock's instability index showed that there was more variability in area, production, productivity, import quantity and value, export quantity and value of period I compared with overall period. The highest coppock's instability was found in overall period of import value (36.32 per cent) and lowest in period I of area (10.43 per cent).

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Marketing Pattern of Milk Produced by Small and Marginal Milk Producer in Maharashtra

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ABSTRACT

The study focused on analyzing the profitability of milk production and the marketing channels utilized by milk producers in the Vidarbha and Marathwada regions of Maharashtra State. This area was deliberately selected due to its lower milk production and productivity in comparison to the rest of the state. In 2021 and 2022, 410 milk producers were randomly divided into three groups based on the number of milch animals they owned: small (1-3 animals), medium (4 to 5 animals), and large (6 animals or more). Data was mostly acquired from these producers and analyzed using tabular data analysis. The study found that under an unorganized marketing Channel, 3.36 percent of milk was used for own consumption and offered for sale at the door, 25.12 percent was sold to vendors, and 16.49 percent was sold to sweet makers and tea stalls, respectively. Organized marketing is an effective milk procurement system as milk producers trusted more on dairy cooperative societies which cover a milk procurement market of 44.56 percent as compared to private dairies which procure 10.46 percent of the milk.

Keywords: milch animals , marketing channels

INTRODUCTION

Dairy farming has played an essential part in the national economy, especially in rural regions, as 85 percent of India's milk production comes from small unorganized milk farmers. Over seventy million rural families depend on dairy products made by small-scale producers. A gradual shift of the milk marketing channel from the unorganized to the organized sector is essential to promote inclusive growth for all types of milk producers and to guarantee the availability of high-quality raw milk and processed dairy products for consumers. The study utilized primary supplies obtained from individual milk producers in the Vidarbha and Marathwada regions of Maharashtra. The divisions appropriately represent the diverse range of organizations participating in the milk industry. Both areas of the State have had a significant rise in the quantity of contemporary milk marketing networks.However, the traditional market that dominates the dairy industry continues to play a significant role in the states. At the farm level, the traditional market is comprised of private milk traders or vendors that purchase milk directly from producers and sell it directly to urban consumers, or to informal institutional buyers such as restaurants, tea stalls, etc., or wholesalers and other retailers. Typically, they operate on a small scale, processing 30 to 50 litres of milk each day.

Modern marketing of milk and milk products involves dairy cooperatives and private formal processors collecting milk at designated points in villages. The price paid to farmers is typically determined on the quality of the milk, which gets evaluated based on its fat and solid-not-fat (SNF) present in milk. The total milk market was mostly contributed by the marginal and small herd size category of milk producers, accounting for around 69% (Birthal, 2008). Small and marginal milk producers are forced to sell their milk to informal buyers who often exploit them by paying below the market price due to their dominance. Milk production in Vidarbha and Marathwada regions of Maharashtra state varies substantially in structure.

METHODOLOGY

The Vidarbha and Marathwada regions of Maharashtra State were chosen purposely as they have lower milk output and productivity compared to other regions in the state. Data was mostly obtained from milk producers in Bhandara, Yavatmal, Nanded, and Latur districts of the Vidarbha and Marathwada regions. A total of 410 samples were acquired through random selection. Approximately 52.20% of milk producers have a small herd size, 30.98% have a medium herd size, and 16.83% have a high herd size. Two districts were selected from each region and two blocks were randomly chosen from each district. Furthermore, three villages were chosen randomly from each block. Every household that produced milk was classified based on the number of milch animals they had into three categories: small (1-3 animals), medium (4-5 animals), or large (above 6 animals).

The study obtained primary data by conducting personal interviews with dairy farmers, cooperative employees, and other stakeholders to assess the status of dairy farmers' milk production, consumption patterns, challenges, opportunities, milk procurement practices by commercial dairies, procurement frequency, and pricing. The information extracted was organized and analyzed to determine the milk marketing patterns in Maharashtra.

RESULT AND DISCUSSION

Table:1.1 depicts the marketing pattern of milk among different herd size categories of households in the study area. A close perusal of table revealed that out of total quantity of milk disposed off per day by the households for the Overall herd size category, 44.56 per cent was disposed to dairy cooperatives followed by 25.12 per cent to milk vendors, 16.49 per cent to tea shops and Sweet makers and 10.46 percent to private dairy industry. Only 3.36 per cent to utilized for home consumption and selling directly to consumers.

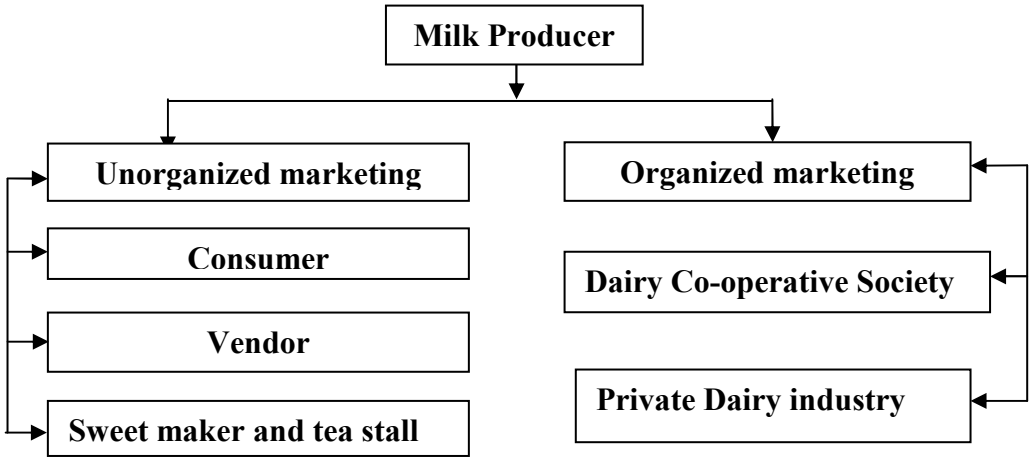

Fig:1.1 Diagrammatic representation of marketing channel identified in study area.

As far as herd size category wise marketing of milk is concerned, small farmers disposed off 37.21 per cent to milk vendors, 27.76 per cent to dairy cooperatives, 24.41 per cent to sweet makers and tea shops, 6.71 per cent to private dairy industry and 3.91 per cent to home consumption and direct selling to consumers .

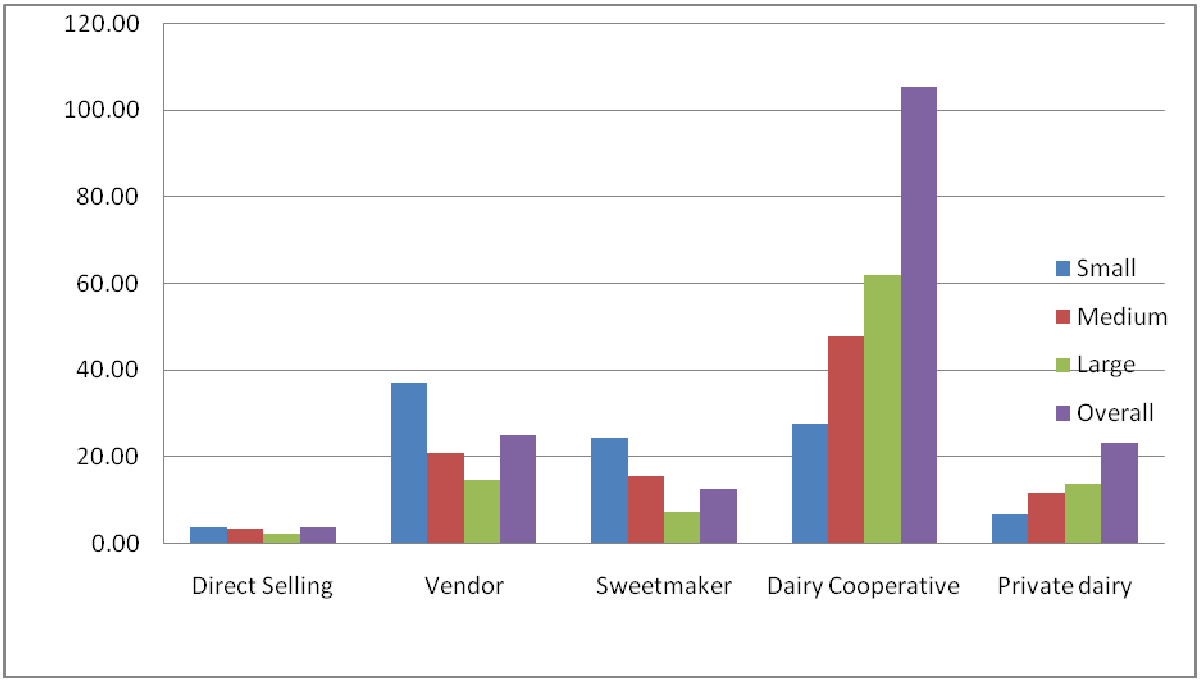

Figure: 1.1 Herd Size Category wise milk marketing Pattern of household

Table:1.1 Marketing Pattern of milk at producer level under different herd size category

(Liter/day/household)

Particulars of marketing milk sale	Herd Size Category			
	Small	Medium	Large	Over all
A) Unorganized marketing Channel				
1) wn consumption and door selling	0.434 (03.91)	0.659 (03.66)	0.611 (02.26)	0.534 (03.36)
2) endor	4.100 (37.21)	3.787 (21.04)	4.000 (14.81)	3.987 (25.12)
3) weet maker and tea stall	2.685 (24.41)	2.839 (15.77)	2.000 (07.41)	2.617 (16.49)
B) Organized marketing Channel				
1) airy Co-operative Society	3.054 (27.76)	8.618 (47.87)	16.681 (61.78)	7.071 (44.56)
2) rivate dairy industry	0.739 (06.71)	2.098 (11.66)	3.710 (13.74)	1.660 (10.46)
Total milk per household	11.012 (100.00)	18.001 (100.00)	27.002 (100.00)	15.868 (100.00)

(Figure in parenthesis indicate percentage of sale)

Similarly, the medium herd size category farmers marketing 47.87 per cent to dairy cooperatives followed by 21.04 per cent to milk vendors, 15.77 per cent to sweet makers and tea shops, 11.66 per cent to private dairy industry and 3.66 per cent to home consumption and direct selling to consumers .

Whereas large herd size category farmers marketing 61.78 per cent to dairy cooperatives followed by 14.81 per cent to milk vendors, 13.74 per cent to private dairy industry ,7.41 per cent to tea shops, and 2.26 per cent to home consumption and direct selling to consumers . These finding supported by Patibandla Lakshmipriya etal (2019) All category of milk producer were marketing their milk mainly to dairy cooperative societies and to vendor to sale milk in door to door delivery in nearest town. This is due to better remunerative prices offered by the dairy cooperatives in the study area.

CONCLUSIONS

Most milk producers in the study area trust the dairy cooperatives and its fair pricing policy for all seasons for procurement of milk based on FAT and SNF present in the milk. The milk producers with large herds primarily sold their milk to dairy cooperatives, then to milk dealers, individual dairy businesses, tea shops, and finally to customers for home consumption and direct sales.

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