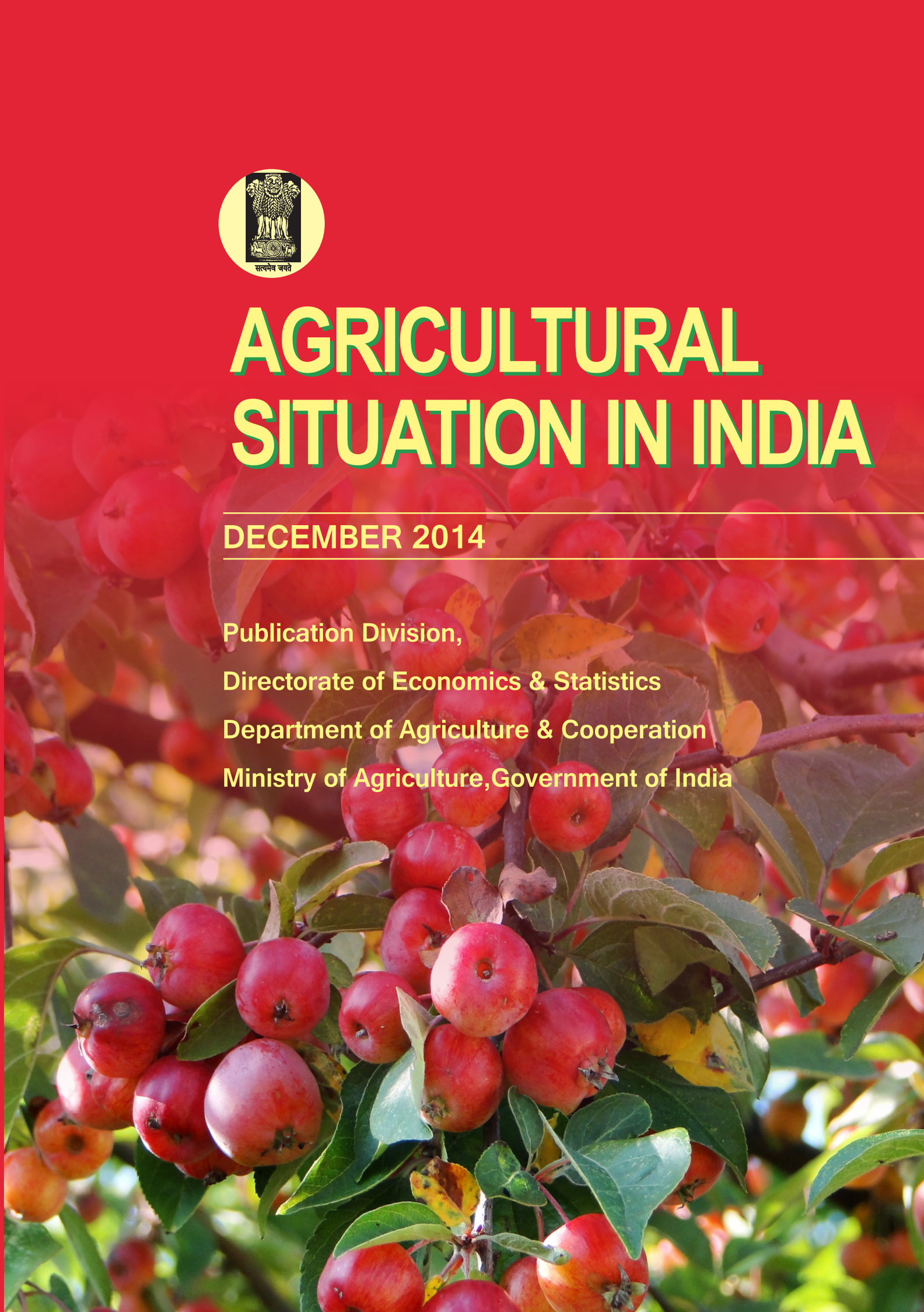

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The Journal is brought out by the Directorate of economics and statistics, ministry of agriculture, it aims at presenting a factual and integrated picture of the food and agricultural situation in india on month to month basis. The views expressed, if any, are not necessarily those of the Government of India.

NOTE TO CONTRIBUTORS

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STATISTICAL TABLES

Abbreviations used

N.A. —Not Available.
N.Q. —Not Quoted.
N.T. —No Transactions.
N.S. —No Supply/No Stock.
R. —Revised.
M.C. —Market Closed.
N.R. —Not Reported.
Neg. —Negligible.
Kg. —Kilogram.
Q. —Quintal.
(P) —Provisional.
Plus (+) indicates surplus or increase.
Minus (–) indicates deficit or decrease.

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GENERAL SURVEY

(i) Trends in Foodgrain Prices

During the month of October, 2014, the All India Index Number of Wholesale Price (2004-05=100) of Food grains declined by 0.46 percent from 237.3 in September, 2014 to 236.2 in October, 2014.

The Wholesale Price Index (WPI) Number of Cereals declined by 0.34 percent from 236.6 to 235.8 and WPI of Pulses declined by 1.12 percent from 240.9 to 238.2 during the same period.

The Wholesale Price Index Number of Wheat declined by 0.10 percent from 209.7 to 209.5 while that of Rice declined by 0.12 percent from 247.3 to 247 during the same period.

(ii) Weather, Rainfall and Reservoir Situation during November, 2014

Cumulative Post Monsoon (October to December) Rainfall for the country as a whole during the period 01st October to 26th November, 2014 is 32% lower than LPA. Rainfall in the four broad geographical divisions of the country during the above period was lower than LPA by (-) 31% in North West India, (-) 31% in Central India, -14% in South Peninsula and (-) 69% in East & North East India. Out of a total of 36 meteorological subdivisions, 11 subdivisions received excess/normal rainfall and 25 subdivisions received deficient/scanty rainfall.

Central Water Commission monitors 85 major reservoirs in the country which have a total live capacity of 155.05 BCM at Full Reservoir Level (FRL). Current live storage in these reservoirs as on 27th November, 2014 was 104.20 BCM as against 122.69 BCM on 27.11.2013 (last year) and 105.03 BCM of normal storage (average storage of the last 10 years). Current year's storage is 85% of the last year's and 99% of the normal storage.

As per latest information available on sowing of crops, around 57.8% of the normal area under Rabi crops have been sown upto 28.11.2014. Area sown under all Rabi crops taken together has been reported to be 360.94 lakh hectares at All India level as compared to 378.92 lakh hectares in the corresponding period of last year.

(iii) Price Movement of Onion, Potato and Tomato during November, 2014

The All India average wholesale price of onion during November 2014 was Rs. 2016/qtl compared to Rs. 2022/qtl in October, 2014, showing a marginal decline of 0.3% over the last month. The average wholesale price was in the range of Rs. 871/qtl in Jaipur to Rs. 3376/qtl in Kozhikode. The retail prices onions remained stable in November 2014 as compared to October 2014, which was Rs. 26/kg. The average retail price ranged from Rs. 14/kg in Dharwad to Rs. 42/kg in Eranakulam. Total arrivals of onion during November, (27/10/2014-26/11/2014) was 1100522 tonnes which was about 84.2% higher than the previous month's arrival and 37% higher than the previous year.

In case of potato, the All India average wholesale price during November, 2014 was Rs. 2452/qtl compared to Rs. 2389/qtl in October, 2014, showing an increase of 2.6% over the last month. The average wholesale price during November, 2014 was in the range of Rs. 1533/qtl in Kota to Rs. 3735/qtl in Thiruvananthapuram. At the retail level, All India average retail price of potato in November, 2014 was Rs. 30/kg as compared to Rs. 29/kg in October, 2014. The average retail price was in the range of Rs. 20/kg in Kota to Rs. 41/kg in Thiruvananthapuram. Total arrivals of potato during October, (27/10/2014-26/11/2014) was 712710 tonnes which was about 30.7% higher than the previous month's arrival and 23.6% lower than the previous year.

In respect of tomato, the All India average wholesale price during November, 2014 was Rs. 1825/qtl compared to Rs. 2348/qtl in October, 2014, registering a decline of 22.3% over the previous month. The average wholesale price during November, 2014 was in the range of Rs. 6571/qtl in Jaipur to Rs. 3028/qtl in Ahemdabad. At the retail level, All India average price of tomato in November, 2014 was Rs. 24/kg compared to Rs. 30/kg in October, 2014. The average retail price ranged between Rs. 12/kg in Indore and Jabalpur to Rs. 43/kg in Guwahati. Total arrivals of tomato during October, (27/10/2014-26/11/2014) was 551484 tonnes which was about 94.9% higher than the previous month's arrival and 150% higher than the previous year.

Table shows rabi area coverage as December 19, on 2014-15 and 2013-14. There has been a decline in the overall rabi coverage (-5.3%) in 2014-15 *vis-a-vis* the corresponding period of 2013-14.

All India Production of Foodgrains

As per the 1st advance estimates released by Ministry of Agriculture on 19.09.2014, production of total kharif foodgrains during 2014-15 is estimated at 120.3 million

tonnes compared to 129.3 million tonnes in 2013-14 and 117.2 million tonnes in 2012-13.

TABLE 1: Production of Major Agricultural Crops (First Adv. Est.)

Kharif Crops	Production (in Million Tonnes)		
	2012-13	2013-14	2014-15
Rice	85.6	92.3	88.0
Total Pulses	5.3	6.0	5.2
Pigeon Pea (Tur/Arhar)	2.8	3.0	2.7
Urdbean	1.1	1.3	1.2
Moongbean	0.7	0.9	0.7
Total Coarse Cereals	26.3	31.0	27.1
Jowar	2.6	2.6	1.6
Bajra	6.6	8.7	7.5
Maize	14.9	17.8	16.0
Total Oilseeds	18.8	24.0	19.7
Groundnut	3.8	5.6	5.0
Soyabean	12.6	15.7	11.8
Sugarcane	335.3	341.8	42.8
Cotton	33.4	35.3	34.6
Total Kharif Foodgrains	117.2	129.3	20.3

Procurement

Procurement of rice as on 19.12.2014 was 11.9 million tonnes during Kharif Marketing Season 2014-15 and procurement of wheat was 28.0 million tonnes during Rabi Marketing Season 2014-15.

TABLE 2: Procurement in Million Tonnes

Crop	2010-11	2011-12	2012-13	2013-14	2014-15
Rice	34.2	35.0	34.0	31.8	11.9*
Wheat	22.5	28.3	38.2	25.1	28.0
Total	56.7	63.4	72.2	56.9	39.9

*Position as on 19.12.2014

Off-take

Off-take of rice during the month of September, 2014 was 32.9 lakh tonnes. This comprises 26.0 lakh tonnes under TPDS and 6.9 lakh tonnes under other schemes. In respect of wheat, the total off-take was 24.2 lakh tonnes comprising of 19.9 lakh tonnes under TPDS and 4.3 lakh tonnes under other schemes.

Stocks

Stocks of food-grains (rice and wheat) held by FCI as on December 1, 2014 were 49.5 million tonnes, which is lower by 17.1 per cent compared to the level of 59.7 million tonnes as on December 1, 2013.

TABLE 3: Off-take and Stocks of Food Grain (Million Tonnes)

Crops	Off-take				Stocks	
	2011-12	2012-13	2013-14	2014-15 (Till Sep.)	Dec 1, 2013	Dec 1, 2014
Rice	32.1	32.6	29.2	15.9	14.2	10.6
Unmilled Paddy#					21.5	16.9
Converted Unmilled Paddy in terms of Rice					14.4	11.3
Wheat	24.3	33.2	30.6	12.1	31.1	27.6
Total (Rice & Wheat)	56.4	65.9	59.8	27.9	59.7	49.5

Note: Buffer Norms for Rice & Wheat are 7.2 Million Tonnes & 14.0 Million Tonnes as on 1.10.2014 respectively.
#Since September, 2013, FCI gives separate figures for rice and unmilled paddy lying with FCI & state agencies in terms of rice.

Economic Growth

As per the quarterly estimates of Gross Domestic Product (GDP) for the second quarter (July-September) of 2014-15, released by CSO (on November 28, 2014), GDP growth at factor cost at constant (2004-05) prices is estimated at 5.3 per cent as against 5.2 per cent in Q2 of 2013-14. Growth rate for the first quarter of 2014-15 was 5.7 per cent. The growth rate during the first half of 2014-15 stood at 5.5 per cent. At the sectoral level growth rates are 3.2 per cent for agriculture and allied sectors, 2.2 per cent for industry sector and 7.1 per cent for service sector in Q2 of 2014-15.

TABLE 4: Growth of GDP at Factor cost by Economic Activity (at 2004-05) Prices (per cent)

Sector	Growth			Share in GDP		
	2011-12	2012-13 (1R)	2013-14 (PE)	2011-12	2012-13 (1R)	2013-14 (PE)
Agriculture, forestry & fishing	5.0	1.4	4.7	14.4	13.9	13.9
Industry	7.8	1.0	0.4	28.2	27.3	26.1
Mining & quarrying	0.1	-2.2	-1.4	2.1	2.0	1.9
Manufacturing	7.4	1.1	-0.7	16.3	15.8	14.9
Electricity, gas & water supply	8.4	2.3	5.9	1.9	1.9	1.9
Construction	10.8	1.1	1.6	7.9	7.7	7.4
Services	6.6	7.0	6.8	57.4	58.8	59.9
Trade, hotels, transport & communication	4.3	5.1	3.0	26.7	26.9	26.4
Financing, insurance, real estate & business services	11.3	10.9	12.9	18.0	19.1	20.6
Community, social & personal services	4.9	5.3	5.6	12.7	12.8	12.9
GDP at factor cost	6.7	4.5	4.7	100.0	100.0	100.0

1R: 1st Revised Estimates; PE: Provisional Estimates. Source: CSO

TABLE 5: Quarterly Estimates of GDP Growth at Constant (2004-05) Prices (per cent)

Sectors	2012-13				2013-14				2014-15	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Agriculture, forestry & fishing	1.8	1.8	0.8	1.6	4.0	5.0	3.7	6.3	3.8	3.2
Industry	0.3	-0.4	1.7	2.1	-0.4	2.6	-0.4	-0.2	4.2	2.2
Mining & quarrying	-1.1	-0.1	-2.0	-4.8	-3.9	0.0	-1.2	-0.4	2.1	1.9
Manufacturing	-1.1	0.0	2.5	3.0	-1.2	1.3	-1.5	-1.4	3.5	0.1
Electricity, gas & water supply	4.2	1.3	2.6	0.9	3.8	7.8	5.0	7.2	10.2	8.7
Construction	2.8	-1.9	1.0	2.4	1.1	4.4	0.6	0.7	4.8	4.6
Services	7.2	7.6	6.9	6.3	7.2	6.3	7.2	6.4	6.8	7.1
Trade, hotels, transport & communication	4.0	5.6	5.9	4.8	1.6	3.6	2.9	3.9	2.8	3.8
Financing insurance, real estate and business services	11.7	10.6	10.2	11.2	12.9	12.1	14.1	12.4	10.4	9.5
Community, social & personal services	7.6	7.4	4.0	2.8	10.6	3.6	5.7	3.3	9.1	9.6
GDP at factor cost	4.5	4.4	4.6	4.4	4.7	5.2	4.6	4.6	5.7	5.3

Source: CSO.

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ARTICLES

Impact of Irrigation on Resource Use Efficiency in Crop Production In Himachal Pradesh

MANU GAUTAM*, A.D.N. BAJPAI ** AND RANVEER SINGH***

Agriculture is the main occupation of the people of Himachal Pradesh. It has an important place in the economy and provides direct employment to about 70 percent of total workers, Nearly 20 percent of the total Gross State Domestic Product comes from agriculture and its allied sectors. The cultivated land is 5.40 lakh hectares which is about 12 per cent of the total geographical area of the State. The average land holding is 1.03 hectares and only 19 per cent of the cultivated land is under irrigation. About 81 per cent of the total cultivated area in the State is rainfed (GoHP, 2007). In order to strengthen the economical and financial position of the farmers, it is important to increase productivity of agriculture, Its significance has increased with the advent of New Technogy based on High Yielding Varieties of Seeds and fertilizers. The new agricultural technology requires an assured dependable supply of water (Reddy, 1995). The present situation warrants to find out how the farmers are using their resources at present. If resource use is in-efficient, production can be increased by making adjustments in the use of factors of production in the optimal direction. In case, the use is efficient, the production can be increased by using modern technology. This will certainly help not only in increasing the income of the farmers but also reduction in pressure on land. Keeping these factors in mind an attempt has been made in this paper to examine the resource use efficiency in cultivation of major crops grown under irrigated and un-irrigated conditions in the hilly state of Himachal Pradesh.

Methodology

In Himachal Pradesh, out of total irrigated area, 75 per cent was irrigated by flow irrigation (*kuhls),* 14 per cent by tube wells, 5 per cent by lift irrigation and rest by other schemes during the year 2007. Three irrigation schemes, *viz*. Lift Irrigation Schemes, Jukhala, Flow Irrigation Scheme, Rukmani Baroa and Tube Well Scheme, Takka have been selected for the present study. A samply of 30 farm households in comand area and 20 non-irrigated farm households from the periphery of command area of the selected schemes was drawn. Hence, the total sample was of 90 farm households of command area (irrigated farms) and 60 farm households of non-irrigated area. The required information has been gathered on well designed questionnaires/schedules through personal interview method. The study pertains to the agricultural year 2008-09

The Cobb-Douglas production function has been used to study the resource use efficiency by computing MVPs for maize and wheat, the important crops of the command area of the irrigation schemes under study. The Cobb-Douglas production function of the following type has been used (Acharya-Madnani, 1988).

$$Y = aX_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4}$$

The following variables have been considered for the analysis:

Y= Gross value of output of respective crop (in Rs./Ha.)

a = Intercept or constant

X_1= Human Labour (in man days /Ha.)

X_2= Bullock Labour + Machine Labour (in Rs./Ha.)

X_3= Quantity of seeds (in kg./Ha.)

X_4= Value of Manure + Fertilizers (in Rs./Ha.)

b_i = Elasticity coefficients of respective factor inputs.

In the present study , the output (main and by product) per hectare is the endogenous variable. The exogenous variables selected for the study are human labour, bullock and machine labour, seeds and cost of manure and fertilizers, However, the various other variable like varieties of crop grown, insecticides and pesticides used, managerial variables etc. have not been included in the model due to the facts that either these are used in very low quantum or sometimes these inputs may not be applied at all. Value of factors like bullock and machine labour,manure and fertilizer were added together because one of the two was missing in some cases and it would have not been possible to use Cobb-Douglas

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function for zero values. For all the regression co-efficient, the values of standard errors, "t" values and co-efficient of multiple determination (R^2) have been worked out. The marginal value products (MVP) of the inputs were derived by taking partial derivative of yield with respect to the input concerned at the geometric mean level of the inputs. Equality of MVP to factor cost ratio indicates the optimum resources use efficiency of a particular input. Thus, it indicates the ways of combining inputs for maximizing the productivity and hence the returns. This type of analysis has been carried out separately for two important crop, *viz.* Maize and wheat in irrigated and un-irrigated conditions.

The statistical significance level of regression co-efficients has been worked out in order to find out the goodness of fit (Koutsoyiannis, 1978). This has been done by calculating the "t" statistics using the following formula for regression coefficients:

$$t = \frac{b_i}{\sqrt{\text{var } b_i}} \text{ with (n-k-1) degrees of freeedom}$$

The denominator in the above expression respresents the standard error of the corresponding estimate.

F-test has been applied to see the significance level of co-efficient of multiple determination (R^2) by following formula (Gujarati, 1978):

Where:

k = Number of bis including intercept

n =No. of Observations

R^2 = Coefficient of multiple determination

The calculated values of t' and 'F' statistics have been compared with their respective table values of find out the particular level of significance.

Marginal Value of Productivity: The marginal value productivity (MVP) of any variable (X_1), is the incremental change in the total output expressed in monetary terms, brought about by the addition of one unit of X_1, keeping other factor levels static at geometric mean. The most reliable estimates of MVPs are obtained if the resources as well as the gross returns are at their geometric mean level. The MVPs have been computed as:

Where:

bi = The regression co efficient of 1th independent variable

= Geometric mean of gross return of the crop

= Geometric mean of the 1th independent variable.

The maximizing of the economic benefits calls for efficient allocation of the scarce resources and the perfectly efficient allocation of the resources is obtained when its marginal value productivity is just enought to offset its cost. So, the economic efficiency of resource use or the marginal value product of each input was compared with its acquisition cost (P_{xi}) in order to estimate the allocation efficiency *i.e.*

$$MVP_{x_i} = P_{x_i} \quad \text{or} \quad MVP_{x_i} = MFC_{x_i}$$

Where

MVP_{x_i} = Marginal value product of 1st input

P_{x_i} = price of 1th input

MFC_{x_i} = Marginal factor costg of i^{th} input

However, in reality farming entaiIs more than one activity and so; each resource has more than one use. The perfect efficieny condition of resource use in such a situation can be expressed in the following manner:

Returns to Scale: The sum of estimated elasticities (*i.e.* regression co-efficient) gives the value of returns to scale. This indicated the proportion by which the output would change if all the independent variables are increased simultaneously by one per cent. The sum of elasticities being less than one, one or more than one indicate decreasing, constant or increasing returns to scale. The returns to scale have been worked out as:

Returns to Scale (I)= Σb_i, $=b_1 + b_2 + ... + b_n$

Where,

b_i = regression co-efficients.

Results and Discussion

The study of land resource of sampled farm households reveals that per farm cultivated land was higher among irrigated farms in comparison to non irrigated farms. The average size of land holding was 1.78 hectares in case of irrigated farms and 0.91 hectare in non-irrigated farms. Maize and wheat are the major crops accounting for about 41 and 40 percent of gross cropped area on irrigated farms and 45 per cent and 43 per cent respectively on non-irrigated farms (Table 1).

TABLE 1: Cropping Pattern on Sampled Farms

(Percentage of G.C.A.)

Crops	Irrigated farms	Un-Irrigated farms
Maize	40.60	45.34
Wheat	40.36	43.47
Pulses	0.42	0.67
Vegetables	6.31	1.13
Oilseeds	2.03	4.08
Spices	1.59	0.07
Fodder	8.69	5.24
GCA	100.00	100.00
Land holding ha/farm	1.78	0.91

GCA=Gross Cropped Area

Variable Co-efficients in value productivity of Maize: Maize is an important cereal crop of Himachal Pradesh. The results of regression analysis for maize are presented in Table 2. It revealed that the value of co-efficient of multiple determinations (R^2) was 0.599 under irrigated condition and 0.595 under un-irrigated condition. The rest of the variations may be due to the factors not included in the model. All variables were significant under both irrigated and rainfed conditions. The production elasticity of human labour was the highest under irrigated conditions. It was 0.300 which was significant at 1 per cent level of probability. It indicates that keeping all other factors constant at their geometric mean level, one per cent increase in human labour will bring 0.30 per cent increase in value of maize output. The production elasticity of seed was 0.275 and significant at 1 per cent level. The production elasticity of bullock and machine labour was signification at 1 per cent level with a value 0.070; whereas, the co-efficient of manure the fertilizer was 0.071 and significant at 1 per cent level of probability.

As far as the production co-efficients of selected variable under un-irrigated conditions are concerned, they was signficant too. The regression co-efficient of human labour was 0.412 and significant at 1 per cent level of probability. It indicated that holding other factors constant one per cent increase in human labour would increase the production by 0.412 per cent. The co-efficient of bullock and machine labour was 0.146 and significant at 1 per cent level. The production elasticity of manure and fertilizer was 0.048 which was significant at 5 per cent level. A negative co-efficient was noticed for seed under un-irrigated condition. The co-efficient of it was - 0.425. High use of seeds had resulted in negative production elasticity. The co-efficient of multiple determination R^2 of the un-irrigated maize was 0.595 which indicated that about 59.5 per cent of the variations in value of production are explained by the explanatory variables included in the model. The co-efficient of human labour and bullock-machine labour were higher for rain-fed conditioin. Whereas, co-efficient of manure and fertilizer was higher under irrigated condition in comparison to rain-fed condition.

The F-values of the equation derived for irrigated and un-irrigated maize were 31.739 and 20.188 which were highly significant at 1 per cent level implying that all the explanatory variables were important for explaning the variations in value of production of maize.

TABLE-2: Cobb-Douglas Production Function Estimates for Irrigated and Un-irrigated Maize and Wheat Crops

Particulars	Maize		Wheat	
	Irrigated	Un-irrigated	Irrigated	Un-irrigated
Constant	3.135*	3.580*	1.026*	3.432*
	(0.138)	(0.278)	(0.266)	(0.481)
Human Labour (X_1)	0.300*	0.412*	0.402*	0.230**
	(0.067)	(0.119)	(0.086)	(0.105)
Bullock and Machine	0.070*	0.146*	0.351*	0.191*
Labour (X_2)	(0.025)	(0.036)	(0.051)	(0.069)
Seeds (X_3)	0.275*	(-)0.425*	0.454*	(-)0.275***
	(0.077)	(0.108)	(0.081)	(0.147)
Manure and Fertilizers	0.071*	0.048**	0.180*	0.134*
(X_4)	(0.024)	(0.021)	(0.095)	(0.038)
R^2	0.599	0.595	0.687	0.678
F-value	31.739	20.188	46.570	28.886
d.f.	85	55	85	55

Note : Figures in parentheses are standard errors for the respective regression co efficients.

* Significant at 1 per cent level of probability

** Significant at 5 per cent level of probability

*** Significant at 10 per cent level of probability

Variable Co-efficient in Value Productivity of Wheat: Wheat is the major rabi crop grown by all farmers of the selected schemes. It may be seen from the Table-2 that the co-efficients of all the selected variables were signficant under irrigated condition. Manure and fertilizer variable was significant at 10 per cent level whereas all other variables were significant at 1 per cent level of probability. Among all the co-efficients of variables, highest co-efficient was that of seed with a value of 0.454. It implies that 1 per cent increase in seed will bring 0.454 per cent increase in production of wheat at its geometric mean level. The production elasticity was relatively higher in case of human labour, followed by bullock and machine labour and manure-fertilizer. The seed had the maximum and manure-fertilizer the minimum impact on the value productivity of wheat under irrigated condition. The co-efficient of multiple R^2 of the irrigated wheat was 0.687 which indicates that about 69 per cent of the variations in value productivity are explained by the explannatory variables included in the model.

In case of un-irrigated wheat, except for seed, all other co-efficients were positive. It means that seed factor was negatively contributing towards production of wheat under rainfed conditions. In other words, farmers were using higher than optimum rate of seed. This higher rate of seed may be due to poor quality of seed and in-sufficient moisture in the soil. The co-efficient of the seed variable was 0.275 and significant at 10 per cent level of probability. Among other variables, human labour, bullock-machine labour and manure-fertilizer and production elasticities equal to 0.230, 0.191 and 0.134 respectively. It implies that humun labour has higher contribution in comparison to other factors in the production of wheat under rainfed conditions. The co-efficient of multiple determination R^2 of the un-irrigated wheat was 0.678 which indicates that 68 per cent of the variations in production have been explained by the selected variables in the model.

The F-values of the equation derived for irrigated and rainfed wheat were 46.570 and 28.886 which were highly significant at 1 per cent level implying that all the explanatory variables were important for explaining the variations in production of wheat.

Returns to Scale in Crop Production

The summation of all the variable co-efficients indicates the returns to scale. It may be seen from the Table-3 that return to scale for maize is 0.716 in case of irrigated condition and 0.181 in case of rainfed condition which is significantly different from unity indicating decreasing returns to scale. The returns to scale was 1.387 in case of irrigated wheat which indicates that if all the factors included in the function are simultaneously increased in equal proportion, the value of wheat output would increase at increasing rate. Whereas, the sum of regression co-efficients was 0.280 in case of un-irrigated wheat which means that the production function exhibited decreasing returns to scale.

TABLE-3: RETURNS TO SCALE ON MAIZE AND WHEAT CROPS

Particulars	Maize		Wheat	
	Irrigated	Un-Irrigated	Irrigated	Un-Irrigated
Sum of Elasticities (Σb_1)	0.716	0.181	1.387	0.280
Deviation from Unity	-0.284	-0.819	0.387	-0.720
Returns to Scale	Decreasing	Decreasing	Increasing	Decreasing

Allocative Efficiency

The objective of a rational farmer is to maximize his profit. It is imperative that he allocate his resources consistent with their respective marginal contributions in monetary terms. The degree to which it is accomplished is measured by allocative efficiency. So, allocative efficiency (AE) is determined by calculating the ratio of the marginal value product (MVP) to the marginal factor cost (MFC) or price of a particular resource (*i.e.* P_{xi}). If the marginal contribution of one unit of input is greater than the price of the input in question, then the farmer is said to be allocating the resource efficiently and there is further scope for allocating more unit of that particular input. If the marginal contribution is negative, then the farmers are said to be using the input excessively (Suresh, et. al. 2006).

Allocative Efficiency in Maize: The MVP/MFC ratio was maximum (16.58) in case of seeds in irrigated conditions (Table 4). It indicated that seeds contributed positively and significantly towards maize production in irrigated areas. It means that by the use of more seeds farmers can increase the production of maize. The MVP/MFC ratio was greater than one for human labour (2.45) indicating the scope for further increase in the usage of this input to increase the production. For other variables like bullock and machine labour, manure and fertilizers this ratio was 0.93 and 0.11 respectively. The ratios for these variables were less than one which clearly indicated their excessive use in the production process. In un-irrigated maize, the MVP to MFC ratio was greater than one for human labour (3.28). Increase in the use of this input would bring increased returns to the farmers. The MVP to MFC ratios for bullock and machine

labour, manure and fertilizers were 0.20 and 0.07 which were less than one. In case of seed the allocative efficiency ratio indicated that an additional expenditure of one rupee on this account would reduce the revenue by Rs. 24.56. Hence, to be economically efficient, the farmers had to reduce the amount of seed applied.

A comparison of irrigated and un-irrigated areas on the basis of allocative efficiency shows that in irrigated area human labour and seed were underutilized and by increased use of these factors, production could be increased. Whereas, in un-irrigated area, human labour had MVP/MFC ratio greater than one which suggested that more use of this factor could increase the production in this area. The MVP to MFC ratio was less than one in bullock-machine labour and manure-fertilizers under both conditions. However, the level of inefficiency was higher on un-irrigated farms. Seeds in un-irrigated farms had a negative ratio whereas it was positive and greater than one on irrigated areas.

Allocative Efficiency in Wheat: The analysis revealed that the MVP to MFC ratio was greater than one for human labour (3.96) for irrigated wheat. It indicates that labour use should be enhanced for wheat cultivation in the command area to reap higher benefits. The MVP/MFC ratio for seed was also greater than one (40.06) and was the maximum indicating that there is a scope to increase expenditure in this resource to increase returns from wheat production. The MVP/MFC ratio for bullock-machine labour and manure-fertilizers were less than one, indicating that these resources were being over utilized and returns could be increased by less use of these variables. In case of un-irrigated wheat, human labour had a MVP/MFC ratio greater than one which indicated under use of this factor. It suggested that to increase returns, use of human labour should be increased; whereas, bullock-machine labour and manure-fertilizers factors had MVP/MFC ratios less than one. It means that these reosurces were being over utilized and returns could be increased by reduction in the use of these variables. The seed variable (X_3) in un-irrigated wheat had negative MVP/MFC ratio which indicated overuse of this resource. So the returns could be increased by reducing the use of this variable.

TABLE-4: ALLOCATIVE EFFICIENCY IN IRRIGATED AND UN-IRRIGATED MAIZE AND WHEAT CROPS

(*In Rs*.)

Particulars	Irrigated			Un-irrigated		
	MVP	MFC	MVP/MFC	MVP	MFC	MVP/MFC
Maize crop						
Human Labour (X_1)	367	150	2.450	492	150	3.280
Bullock and Machine Labour (X_2)	0.929	1.000	0.930	0.196	1.000	0.200
Seeds (X_3)	426.550	25.720	16.580	-631.750	25.720	-24.560
Manure and Fertilizers (X_4)	0.107	1.000	0.110	0.069	1.000	0.070
Wheat crop						
Human Labour (X_1)	594	150	3.960	338	150	2.250
Bullock and Machine Labour (X_2)	0.442	1.000	0.440	0.242	1.000	0.240
Seeds (X_3)	498	12.430	40.060	-290	12.430	-23.330
Manure and Fertilizers (X_4)	0.240	1.00	0.240	0.150	1.000	0.150

A comparison of resource use efficiency in irrigated and un-irrigated areas shows that there was higher scope of increasing human labour in irrigated area to increase returns from wheat crop. The bullock-machine labour and manure-fertilizers factors were being utilized with higher inefficiently on un-irrigated farms. In case of seed, this resource was being underutilized on irrigated farms and over utilized on un-irrigated farms. This is because on un-irrigated farms higher seed rate is used due to its poor germination.

Conclusion

The above analysis indicates that the production elasticity of human labour was maximum among all variables under irrigated and un-irrigated conditions in maize crop. Production elasticity of seed was negative and significant in un-irrigated maize and wheat crops. Production elasticity was higher in bullock and machine labour under irrigated condition and human labour under un-irrigated condition among all the variables under consideration. All the variables in the function were found significant in maize

and wheat crop. The returns to scale was increasing only in irrigated wheat and decreasing in un-irrigated wheat, irrigated maize and un-irrigated maize. The allocative efficiency was greater than one in case of human labour under irrigated and un-irrigated maize and wheat. It suggested an increase in this factor could increase returns in the crops under study. Same trend was observed in case of seed of maize and wheat under irrigated condition. Whereas under un-irrigated condition; seed variable in maize and wheat crops had negative MVP/MFC ratio. It indicated miss-utilization of this resource. The other two variables, viz. bullock and machine labour, manure and fertilizer had MVP/MFC ratio less than one in maize and wheat crops under irrigated as well as un-irrigated conditions. But these variables were more over utilized in un-irrigated conditions than irrigated conditions. Over utilization or under utilization of resources was observed in the analysis of resource use in cultivation of maize and wheat crops. It is therefore, suggested that the farmers should be educated by the extension workers about the optimum doses of the resources to get maximum production and returns.

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Economics and Marketing of High Density viz-a-viz Standard Variety of Apples in Himachal Pradesh

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Introduction

The Hilly areas of Himachal Pradesh have high agro-climate suitable for production of high value crops like apple fruits. In such areas, self sufficiency of food grains had not been the goal of development policy as it would amount to under-utilization of resources. Under such a situation, maximizing the income from scare land resource has been the prime objective. Switching over to commercial agriculture has been an effective strategy to save farmers from the vicious circle of less income from low investment in case of traditional agriculture. This has to be achieved by laying emphasis on cultivation of compatible fruit crops, in particular apples, rather than traditional field crops, promoting the policy of spatial specialization.

Historically, an apple orchard was initially planted in Mashobra by Mr. Couts in 1887, popularized by Mr. Satyanand Stokes in 1918 who brought root stock from USA for the farmers of the state, around Kiari (Kotkhai) in 1930, which (apple cultivation later spread to other parts of District Shimla, and to Manali and Kullu area. The High Density plantation of apple (dwarf variety) was developed only during the last two decades in Himachal Pradesh.

Over the period, these apple orchards, having standard variety, have been able to bring in spectacular transformation in income level of orchardists. However, these have passed into another phase of declining productivity. A strong need is being felt to switch over to high density plantations (HDP) of apples. The high density apple plantations have an advantage of having low gestation period, significantly higher productivity and thus yielding higher income, with an additional benefit of ease in management requirements, World over these HD plantations are being preferred because of the obvious benefits for the small agriculture holdings.

The HD plantations is in consonance with the trend of optimum utilization of available space, both horizontal and vertical to achieve maximum level of production per unit of area by way of accommodating maximum number of plants in the given area as also harvesting maximum solar energy for photosynthesis. With the existing extensive system of plantation, not only the yield per unit area is low but the gestation period of the plantation is also comparatively long and plants being vigorous pose problem in management. For overcoming these problems, HD plantation as followed in Europe and United States, is being gradually taken up in Himachal Pradesh. The idea in HD plantation is to raise only such fruits varieties which have high yield potential on high density rootstock to have high productivity and to maintain size of the trees convenient in handling besides reducing cost of cultivation. It is possible to accommodate 2000-3000 trees per hectare under this system as against 250-300 per hectare under the extensive system presently being followed in Himachal Pradesh. The HD plantation system not only ensures precocity in production but also increases yield substantially with better quality and the produce.

The orchards in Himachal Pradesh are located generally on steep lands, the high and ultra HDP being followed in other countries involving very high capital investment may not be suitable here. As such for very high density plantation the rootstock require fertile soil, flat lands, assured irrigation and provision of support in the form of stakes will not be suitable except in valley areas. In steep areas the root stock should be able to provide support to the main area. In case of apples semi-intensive plantation density involving plantation of 600 to 1000 trees per hectare with free standing trees may be suitable in Himachal Pradesh. In case of apple, 99 percent plants are presently being raised on seedling rootstocks. Himachal Pradesh has been one of the few states to have imported clonal rootstock on a large scale and the apple trees grafted on them are being made available to orchardists of the state in form of complete series of Malling and Malling Marten. Keeping these factors into account, some of the promising rootstocks like M9, M26, MM106, MM111 etc. are being cultivated in the state. The best indigenous rootstock available, so far, in North-Western Himalayan region is the Crab apple. (Malusbaccata).

The present scenario of HDP of apple trees is not very encouraging in the state due to non-availability of complete information concerning the benefits of HDP and of desired rootstock and the technical knowhow which is crucial for popularizing these plantations. Thus it has become more pertinent to study the economic benefits and superiority of HDP particularly for apples. The objectives of the present study are as follows:

* To study the trends in area and production of apple in Himachal Pradesh.

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* To study the conomics of Standard (traditional) *viz-a-viz* HD apple orchard.

* To study the marketing systems and analyze the problems related to HD Plantation in orchards.

Methodolog

Presently, there are small number or orchardists who are progressive and large growers, have adopted the HDP in lower heights in the state. The **data** was procured from the Directorate of Horticulture, Himachal Pradesh and from survey undertaken by the Agro-Economics Research Centre, Himachal Pradesh, during 2012, in Rohru, Jubbal and Kotkhai area of District Shimla, in Himachal Pradesh.

There are two important steps to take the apples to the consumer, namely, produce of fruits in orchards and its marketing through various channels. The distribution comprises movement of apples from producer to ultimate consumer. In this process, the fruit has to pass through more than one hand except when it is directly sold to the consumer by the producer which is a rare phenomena. In this chain, various agencies like growers, pre-harvest contractors, commission agents, wholesaler, retailers etc. are engaged. This chain of intermediaries is called marketing channel. Various channels may be described as follows:

1. Producer-consumer
2. Producer-Forwarding agent-Commission agent-Wholesaler-Retailer-Consumer
3. Producer-Pre-harvest contractor-Commission agent-Wholesaler-Retailer-Consumer
4. Producer-Commission agent-Wholesaler (self of FA)-Retailer-Consumer
5. Producer-H.P.M.C.-Wholesaler-Retailer-Consumer
6. Producer-Retailer-Consumer
7. Producer-Processing Unit-Consumer

The most popular channel followed by villagers of this area, in case of Table apples, is channel No. 2 while in case of Culled apples they follow the H.P.M.C. Channel.

Results and Discussion

Socio Economic Status of the Sample Household is depicted in **Table 1,** the average family size of apple orchardist is 4.53 person per family in which 1.85 person are male, 1.70 are female and 0.98 are children per family. Male and female are equally responsible for the orchard work which are 1.16 male and 1.04 female workers. Overall literacy percentage is 81.87 during the study period. The dependency ratio is 2.05 per person. The average size of holding is 2.13 Hect., in which cultivated land is 2.09 Hect., mono-horticulture is practiced in the area where whole of the area is covered by the apple crop.

TABLE 1: General Scoio-Economic Condition of Apple Orchardists

Sl.No.	Particulars	Number
1.	Sample size	74
2.	Family size (persons)	4.53
3.	Per farm adult male population	1.85
4.	Per farm adult female population	1.70
5.	Per farm children population	0.98
6.	Workers per family	1.16
	Male	1.04
	Female	0.00
	Children	
7.	Literacy	
	Male	84.03
	Female	66.98
	Children	100.00
	Total (av)	81.87
8.	Dependency rate	2.05
9.	Average size of holding (hect)	2.13
10.	Average cultivated land (hect)	2.09
11.	Average orchard size (hect)	2.09
12.	Average area under apple (hect)	2.09
13.	Per farm field crop	Nil

The District wise Area and Production of Apples in Himachal Pradesh: During 1973-76 trinnium to 2007-10 trinnium, district wise Area and production of Apples in Himachal Pradesh alongwith compound growth rate (CGR) during this period are presented in **Table 2.**

It may be seen from **Table 2** that the maximum area under apples is in Shimla district *i.e.* 47.18 percent and 33.28 percent during the first and the last trinnium respectively. But the highest growth was observed in Lahaul & Spiti district (75.11 percent) followed by Chamba (33.85), Kinnaur (23.33), Mandi (5.63) and Kullu (5.15). It is important to see that Solan district shows a negative growth rate—1.15 percent per trinnium because area of apple is used for off-season vegetables. Overall in Himachal Pradesh the area of apple has CGR of 5.11 percent. On the other hand the production is found to have the highest CGR in Kinnaur followed by Shimla, Kullu and Chamba. The overall production in the state has CGR 7.24.

TABLE 2: District-wise Area and Production of Apple in Himachal Pradesh 1974-76 to 2008-10.

District	Area (Hect)-in trinnium			Production (Tonnes) in trinnium		
	1973-76	2007-10	CGR	1973-76	2007-10	CGR
Shimla	15868 (47.18)	32365 (33.28)	2.80	56984 (45.50)	285986 (62.04)	10.86
Kullu	8070 (23.59)	23570 (24.24)	5.19	34553 (27.60)	97306 (21.12)	4.90
Mandi	4972 (14.78)	15339 (15.77)	5.63	17410 (13.90)	23747 (5.16)	0.98
Chamba	870 (2.85)	11768 (12.10)	33.85	2872 (2.30)	6782 (1.48)	3.67
Kinnaur	960 (2.58)	9461 (9.74)	23.93	3346 (2.67)	45669 (9.91)	34.18
L & Spiti	29 (Neg)	835 (0.85)	75.11	NA	414 (0.08)	NA
Kangra	340(1.01)	452 (0.46)	0.89	1250 (0.99)	443 (0.09)	-1.74
Solan	176 (0.52)	101 (0.10)	-1.15	605 (0.48)	30 (Neg)	-2.56
Sirmaur	2243 (6.96)	3345 (3.45)	1.15	8214 (6.56)	569 (0.12)	-2.51
Total	33628 (100)	97236 (100)	5.11	125234 (100)	460946 (100)	7.24

Note : Figures in parenthesis represent percentage to total.

Variety-wise and Age wise Area Under Apple: The reasons that permit the cultivation of particular fruit and variety in a particular are dependent on climate, soil type, availability of water and topography etc. In the study area, both standard variety as well as HD variety of apples are grown. The major standard varieties are Royal delicious, Red delicious, Rich- a red, Golden delicious, and Red golden; and the major high density varieties are Red chief, Vance, Organ spur, Super Chief and Golden spur, The details of age-wise and variety-wise area of standard apples are given in **Table 3**, and that of HD variety of apples are given in **Table 4.** Their summary is presented in **Table 5.**

As far as area is concerned, traditional variety occupied 12 percent as against HD variety which occupied 88 percent in total orchard area in non-bearing stage. In traditional category Royal delicious is the major variety which occupies all the area of non- bearing trees, whereas among the HD category Red Chief has highest area as compared to other variety. It can be seeen from Table 5 that area under traditional category is 55 percent and rest 45 percent is under the HD variety of bearing orchard area. Regarding the total area under standard category is 48 percent against 52 percent in HD Dwarf variety. Orchardists are already aware of the HD variety of plantation.

TABLE 3: Age-wise and Variety-wise Area (Hect) under Standard Variety of Apple on Sample Farms.

Age in years	Royal	Red	Rich-a-red	Golden	Red golden	Total
			Non-bearing			
1.	-	-	-	-	-	-
2.	-	-	-	-	-	-
3.	-	-	-	-	-	-
4.	-	-	-	-	-	-
5.	1.16	-	-	-	-	1.16
6.	1.16	-	-	-	-	1.16
7.	0.72	-	-	-	-	0.72
Total Non-bearing	3.04	-	-	-	-	3.04
Per farm	0.04	-	-	-	-	0.04

TABLE 3: AGE-WISE AND VARIETY-WISE AREA (HECT) UNDER STANDARD VARIETY OF APPLE ON SAMPLE FARMS. (*Contd.*)

Age in years	Royal	Red	Rich-a-red	Golden	Red golden	Total
			Bearing			
8.	2.01	-	-	-	-	2.01
9.	2.79	-	0.05	0.05	0.05	2.94
10.	3.68	0.04	0.05	0.10	0.10	3.97
11-12.	6.39	0.44	0.05	0.26	0.10	7.24
13-15.	10.75	0.36	0.30	0.41	0.21	12.03
16-20.	14.62	0.44	0.48	0.47	0.41	16.42
21-30.	14.80	0.50	0.47	0.50	0.42	16.69
31. and above	7.99	0.48	0.38	0.49	0.37	9.63
Total bearing	63.03	2.26	1.78	2.28	1.66	71.01
Per farm	0.85	0.03	0.02	0.03	0.02	0.96

TABLE 4: AGE-WISE AND VARIETY-WISE AREA (HECT) UNDER HIGH DENSITY DWARF VARIETY OF APPLE ON SAMPLE FARMS.

Age in yrs	Red Chief	Vance	Organ spur	Super Chief	Golden Spur	Total
			Non-bearing			
Initial year	2.00	0.88	0.64	0.32	0.32	4.16
1-2	1.84	1.44	1.68	0.88	0.88	6.72
2-3	1.68	1.36	1.28	0.88	0.88	6.08
3-4	1.68	1.12	1.04	0.56	0.56	4.96
Total	7.20	4.80	4.64	2.64	2.64	21.92
Per farm	0.09	0.06	0.06	0.04	0.04	0.29
			Bearing			
5-6	8.09	3.79	3.48	1.95	0.81	18.12
7-10	7.00	2.48	3.10	1.69	0.71	14.98
10-15	6.44	1.72	1.84	0.83	0.71	11.54
16 and above	6.97	2.65	1.88	1.32	0.73	13.55
Total	28.50	10.64	10.30	5.79	2.96	58.19
Per farm	0.38	0.14	0.13	0.08	0.04	0.79

TABLE 5: SUMMARY OF AREA

Variety	Non-bearing (hect)	Bearing (hect)	Total (hect)
	Total Per farm	Total Per farm	Total Per farm
Standard	3.040.04 (12.17)	71.010.96 (54.96)	74.051.00 (48.03)
High density Dwarf.	21.920.29 (87.82)	58.190.79 (45.04)	80.111.08 (51.97)
Total	24.960.33 (100)	129.201.75 (100)	154.162.08 (100)

NOTE: Figures in parenthesis depicts the percentage to the total

Variety-wise and age-wise Number of Apple Trees: The proportion of bearing and non-bearing tree in the orchard determines the quantum of present and future production. The proportion of non-bearing standard apple trees is very small and most of the potential area was brought under orchard long back and now not much scope is left for fresh plantation.

TABLE 6: Variety-wise and Age-wise Number of Plants of Standard Variety Apple on Sample Farms

Age in years	Royal	Red	Rich-a-red	Golden	Red golden	Total
			Non-bearing			
1.	-	-	-	-	-	-
2.	-	-	-	-	-	-
3.	-	-	-	-	-	-
4.	-	-	-	-	-	-
5.	340	-	-	-	-	340
6.	334	-	-	-	-	334
7.	202	-	-	-	-	202
Total Plants	876	-	-	-	-	876
% of plants	100	-	-	-	-	100
Per hectare plants	288	-	-	-	-	288
Per farm	11.84	-	-	-	-	11.84
			Bearing			
8.	583	-	-	-	-	583
9.	795	-	15	15	14	839
10.	1030	11	14	30	29	1114
11-12.	1885	126	14	74	28	2127
13-15.	3285	101	81	118	57	3642
16-20.	3968	121	127	129	112	4457
21-30	3700	137	121	135	113	4206
31 and above	1918	125	84	127	97	2351
Total plants	17164	621	456	628	450	19319
% of plants	88.85	3.21	2.36	3.25	2.33	100
Per hectare	272	274	256	275	271	272
Per farm	231.94	8.39	6.16	8.48	6.08	261.06

Owners of old plantations also plan to replace the old trees having low productivity by semi-HD varieties. The variety wise and age wise number of standard apple are presented in **Table 6.** and that of semi-dwarf variety is presented in **Table 7.**

Table 6 reveals that number of non-bearing and bearing standard variety of apple trees were 12 and 261 respectively. In case of HD variety apple per farm number of non-bearing and bearing trees were 172 and 458 respectively, Table 7. These Tables further show that Royal delicious in standard category and Red Chief in HD Dwarf category apples are the most popular varieties from among all the apples variety of trees.

TABLE 7 : VARIETY-WISE AND AGE-WISE NUMBER OF PLANTS UNDER HIGH DENSITY (DWARF) APPLE ON SAMPLE FARMS.

Age in years	Red chief	Vance	Organ spur	Super chief	Golden Spur	Total
			Non-bearing			
Initial year	1194	509	355	174	183	2415
1-2	1097	843	958	486	515	3899
2-3	1006	796	731	486	516	3535
3-4	1005	648	593	299	326	2871
Total plants	4302	2796	2637	1445	1540	12720
% of plants	33.82	21.98	20.73	11.36	12.10	100
Per hectare	597.5	582.5	568.31	547.34	583.33	580.29
Per farm	58.13	37.78	35.63	19.52	20.81	171.89
			Bearing			
5-6	4872	1832	1145	443	10440	
7-10	4210	1397	1664	90	393	8673
10-15	3911	962	1008	477	393	6751
16 and above	4303	1470	1084	750	405	8012
Total	17305	5977	5598	3362	1634	33876
% of plants	51.08	17.64	16.52	9.92	4.83	100
Per hectare	607.19	561.75	543.49	580.65	552.02	582.16
Per farm	233.85	80.77	75.65	45.43	22.08	457.78

Cost and Returns from H.D. Apple *viz-a-viz* Standard Varieties Apple

Apple is the most important fruit crop of the state and it takes about 4 years to reach bearing stage. Since early seventies, the farmers have been shifting to apple growing because it gives more returns than the field crops. At that time standard varieties were grown and these varieties takes longer time in coming to bearing stage. Now about from two decades high density apple varieties imported and cultivation is started. Presently semi high density spur types of varieties are very popular and growth in low height very successfully. Age wise maintenance cost, gross returns, return over maintenance cost, marketing cost and net returns of different age of standard as well as high density apple was worked out and presented in Table 8. The standard variety started economic bearing at the age of 8 years while the high density is five years. The bearing age has been classified into 8, 9, 10, 11-12, 13-15, 16-20, 21-30 and 31 and above for standard variety and same for high density is 5-6, 7-10 11-15 and above 16 years.

TABLE 8 reveals that, on an average HD apple grower per hectare received Rs. 50349 to Rs. 618364 from apple crop from the age 5-6 to 10-15 yrs, while for the standard apple gets Rs. 59561 to Rs. 418025 for the corresponding age 8 to 16-20 yrs. However, overall Rs. 470017 for HD dwarf apple and Rs. 226865 for the standard apples. The maintenance cost for the HD Dwarf is Rs. 108938 and for standard apples is Rs. 150891. It may be concluded that the production cost is found to be lower in HD apples than the Standard apples. At the same time per hectare return of the dwarf apple is more than double than the standard apple.

TABLE 8: Age-wise Cost and Returns from Standard Apple and HD Dwarf Apples on Sample Farms (Rs/Hect)

Age in Yrs.	Maintenance	Gross returns	Returns over maintenance	Marketing	Net returns
		Standard Apples			
8	105940	69611	-36329	23232	-59561
9	125640	114149	-11491	38097	-49588
10	130740	224483	93743	74921	18822
11-12	135850	352541	216891	117680	99211
13-15	145780	605486	459706	202080	257626
16-20	160680	868599	707919	289894	418025
21-30	161790	604816	443026	201857	241169
31 & above	159750	488265	328515	162958	165530
All	150891	566988	416079	189232	226865
Per farm	144794	544679	399285	181586	217699
		Dwarf Apples			
5-6	96984	207503	110519	60125	50394
7-10	106146	744427	638281	215713	422568
10-15	114687	1032131	917444	299080	618364
16 & above	122960	1114485	991525	442106	549419
All	108938	815152	706214	236197	470017
Per farm	85589	640996	555407	185733	369674

Marketing of Standard Apple *viz-a-viz* Dwarf Apple: Any single activity performed in carrying a product from the point of production to the ultimate point of consumption may be termed as market function and provides time, space and form utility. The preparation of apple for market involves grading packing, transportation etc. As all these functions are important to determine the returns to the farmers, therefore, great care has to be ensured at each and every stage. Thus, may carelessness at any stage in the marketing channel will result in lower price returns.

TABLE 9: Various Size of Apple Grades in Himachal Pradesh

Grade	Diameter (mm)	Number of fingers placed between left hand thumb and middle finger
Super large	85	4 fingres and thumb
Extra large	80	4 fingers and some extra space
Large	75	3-4 fingers
Medium	70	2-3 fingers
Small	65	2-3 fingers
Extra small	60	1 finger
Pittoo*	55 and below	None

*Mixed with C grade and sold as culled for fruit processing.

Picking: In the study area, the fruit is harvested during July to September depending on the elevation of the area. The picking operation is done by hand to both type of apples. After the fruit has been picked up, it is carefully placed in a picking basket and later on shifted to bigger baskets called Kalta, which can be strapped to shoulders and carried on the back to a place where packing is to be done. It is observed, Table 10, that the orchardists on an average incurred Rs. 14.00 and Rs. 13.27 per picking for the standard and HD apples, Rs. 4.66 for assembling both the types of apples.

TABLE 10: Charges paid by Orchardists for Picking, Assembling and Grading of Standard and High Density Dwarf Apples on Sample Farms (Rs/box)

Operation	Standard	Dwarf
Picking	14.00	13.27
Assembling	4.66	4.66
Grading	22.07	22.07
Total	40.73	40.00

Grading: Grading of apple, a crucial operation, determines the price of the produce in study area. Mechanical grading is totally absent. The orchardist follow the same standard

in grading for both types of apples. In particular, apples are graded according to their size and quality. Generally, there are two quality and six size grades. Thus each lot of a particular variety of apple is divided in to 12 different grades. Factors determining the quality of apples includes shape, stage of maturity, color, free from injury, blemishes, disease spot bruises etc., there are three recognized quality grades of apples known as A, B and C. The first two grades are marketable while the C grade apples are not considered fit for table purpose and classified as Culled apple to be sold for processing purpose only. Each fruit has been individually graded for quality and size, and grading is done manually. The operation consists of holding each fruit in left hand. The size grade is then determined on the basis of number of fingers to cover the gap used between left hand thumb and middle finger, Table 9. The charges for grading both types of apples are Rs. 22.07, Table 10.

Packing: Packing means arranging fruits in suitable containers in such a way that the produce is not damaged en route on its journey and the consumers get good quality fruit intact at his place. Packing is therefore, deserved to be done meticulously. It has to be compact so that fruits do not shake inside the box and thus bruises are avoided. On the other hand, too tightly packed fruits have equal chances of getting damaged. The farmers used corrugated fiber board carton for packing apples and four layers of trays for super—large and extra large grades whereas five layers of trays for other grades are used in the box and one tray is used a stopper to cover the fruits. On an average, farmers incur Rs. 88.10 and Rs. 87.02 respectively for the standard and HD dwarf apples on packing material including boxes, as showed in Table 11.

TABLE 11: Packing Cost Incurred by Orchardists: Standard and High Density Apples on Sample Farms (Rs/box)

Operation	Standard	Dwarf
Cost of box	40.00	40.00
Cost of tray	30.00	30.00
Assembling, closing	6.70	6.12
Leveling, stapling etc.	11.40	10.90
Total	88.10	87.02

Transportation: Transportation is the means of providing place utility to the producer. Generally the apple fruit is not consumed in the area where they are produced because of their very high marketable surplus nature. In such a situation adding place utility to the produce is essential to ensure better returns to growers. Apples fruit is highly perishable calling for efficient transportation for quick disposal, so that the consumer gets fresh fruit in good condition. The farmers reported that they take the produce to the nearest road head on human back. Most of the farmers have small quantity of produce. They do not produce enough to justify a full truck load in a single lot. Such producers join together so that a truck load becomes viable, then a truck is hired for transportation. But most of the orchardists reported that they sell their produce through forwarding agent who arrange for the transport. Most of the apple is dispatched to Delhi, Being the largest market in the country. The details of transportation cost of standard and dwarf apples is given in Table 12.

TABLE 12: Average Transportation Cost in Marketing of Apples on Sample Farms (Rs/box)

Operation	Standard	Dwarf
Orchard to road head	15.70	13.02
Forwarding charges (producing area)	5.00	5.00
Road head to Delhi	60.00	57.60
State tax	5.00	5.00
Loading, counting, unloading at destination	5.00	5.00
Total	90.70	85.62

Price Spread and Marketing Margins: Marketing margins include all costs of assembling, grading, packing transportation handling processing, storage wholesale and retail in the entire process of marketing. The study of marketing margin is very essential in the formulation of an appropriate marketing policy on the one hand, producers deserve a legitimate share in the consumer's Rupee, and on the other consumers have to be safeguarded against excessive price. These twin objectives can best be met by ensuring the service of intermediaries and functionaries at reasonable costs.

The price spread/margins were worked out for Delhi market because most of the marketed surplus of apple was sold through Azaadpur market. The details of the cost and margins of both type of apples are presented in **Table 13.**

The Table shows that the producer's share in consumer's rupee was 46.56 for standard apple and 52.23 percent for Dwarf apple. The marketing margins of mashakhor was 4.51 percent for standard quality and 3.67 percent for dwarf variety of apples. The retailer's margin was higher than the mashakhor's margin. This is because that the retailer has to bear the major burden of losses and deterioration of quality of fruits.

The Table 13 further reveals that marketing cost borne by producer account for 25.85 percent of standard apple and 21.41 percent of dwarf apple in consumer rupee. Since apple fruits are fragile and need proper packing, packing cost of apple is high *i.e.* 8.19 percent for standard and 6.35 percent for dwarf apples of the consumer price.

The carriage and transportation cost account for 7.29 percent for standard apple and 5.51 for the dwarf apple in consumer Rupee. Though Delhi market is officially regulated but still the commission and fees are charged at higher rate by intermediaries. The commission fee and tax account for 7.24 percent for standard apple and 7.35 percent for dwarf apple in consumer Rupee. All the intermediaries provide some service, bear cost and make profit.

Finally, it may be noted that the Dwarf variety fetched higher price than the Standard apple *i.e.* wholesale prices are respectively Rs. 1007 and Rs. 802 per box and the consumer prices are respectively 1369 and Rs. 1107 per box. Whereas other expenses are almost the same for both the varieties.

TABLE 13: MARKETING COST AT DIFFERENT STAGES FROM PRODUCER TO CONSUMER FOR STANDARD AND HIGH DENSITY APPLES

(Rs/box)

Particulars	Standard	% of Standard	Dwarf	% of Dwarf
Net price received by producer	515.71	46.56	715.20	52.23
Expenses incurred by orchardist				
Picking, assembling and grading	40.73	3.68	40.00	2.92
Packing and assembling	90.70	8.19	85.62	6.35
Carriage upto roadhead	15.70	1.42	13.02	0.95
Loading & unloading	5.00	0.45	5.00	0.36
Transportation upto market	60.00	5.42	57.60	4.20
Commission to forwarding agent	5.00	0.45	5.00	0.36
Commission to Commission agent	64.16	5.79	80.56	5.88
State tax	5.00	0.45	5.00	0.36
Sub-total	286.29	25.85	291.80	21.41
Wholesale price	802.00	72.41	1007.00	73.54
Expenses incurred by Mashakhor				
Carriage & handling	10.00	0.90	10.00	0.73
Market fee	16.04	1.45	20.14	1.47
Sub-total	26.04	2.35	30.14	2.20
Mashakhor's margin	50.00	4.51	50.35	3.67
Mashakor's sale price	878.04	79.27	1087.49	79.42
Retailer's expenses				
Carriage & handling	10.00	0.90	10.00	0.73
Retailer's losses @ 15%	131.71	11.89	163.12	11.91
Retailer's margin	87.80	7.92	108.74	7.94
Sub-total	229.51	2072	281.81	20.58
Consumer price	1107.55	100.00	1369.35	100.00

Problems of High Density Plantation/Apples

The area and production of apple has increased manifold during the last three decades for the traditional apple and during the last two decades for the HD Dwarf variety apples. This increase has also brought in many with regard to the production and marketing of fruits. Profit from apple cultivation depends on many factors *i.e.* productivity, time of picking, care in grading and packing, time taken in transportation, type of storage etc. Keeping all these factors in view, the problems asked from all the sample orchardists are gathered and presented in **Table 14.** The Major problems of HD apples orchardists of study area in Himachal Pradesh are observed in respect of the following:

1. **Root Stock:** It was observed during the course of investigation that most of the orchardists of lower elevation are not in good condition because of the poor variety and of low productivity. Majority of farmers have planned to uproot these orchards of standard variety and plan to establish the HD/semihigh density apple orchards. In this process they face the main problem of non-availability of root stock and lack of timely supply of root stock, poor quality of root stock, high cost and high incidents of diseases. The **Table 14** shows that 47% farmers most often remain worried about the non-availability of rootstock, 35% farmers express that root stock is not available some time and 18% farmers reported that they never feel the problem in root stock availability. Further, 50% farmers reported that rootstock was not available on time, and about 72% orchardists reported that root stock is not of good quality. Most of the farmers told that root stock is costly, 73% reported that it is resistant to diseases.

2. **Irrigation:** Due to lack of irrigation the fruit setting and growth are badly damaged and this affects both quality and quantity of fruit. Irrigation is the major problem of large farmers. Which is aggravated with the increase of farm size? The response in this respect is given in Table 14.

3. **Fertilizers:** Fertilizers play a very important role in both quality and quantity of production of fruit. Lack of fertilizers badly affects the plant growth as well as quality and quantity of the fruit. Lack of availability, high cost and lack of availability of micro-nutrients are also the major problems faced by all farmers in the state, **Table 14.**

4. **Plant Protecting Chemicals:** Plants of fruit are delicate and so many types of diseases affect them from root to leaves. The production of fruit particularly apple is not possible without plant protection chemical whose high cost, timely availability and its poor quality are the main problems faced by all the orchardists, **Table 14.**

5. **Picking Grading and Packing:** In the study area, the fruit is harvested during July to September depending upon the elevation of area. The picking, packing and grading operation is done by hand so the shortage of skilled labor, higher wages and non-availability of labor are the main problems faced by cultivators. This process also decides about the quality of the fruits at the consumer's end.

6. **Packing Material:** Another important function in the process of marketing is that of packing. Once the commodity reaches the market in well packed form, it fetches better price as compared to those not well packed. Apple being delicate in nature needs proper packing which may ensure least damage during transportation from apple producing area to distant markets. This may in turn fetch better price and high returns to the orchardists. In the study are apple is generally packed in CFB cartons with a capacity of about 20 Kg. The apple orchardists were asked about the problems faced by them regarding package boxes, packing material. The problems revealed by them were shortage of CFB cartons, high prices, non-availability at the proper time and the desired place, Table 14.

7. **Transportation:** Transportation is one of the important part in marketing the apple. Apples are carried from the orchards to road head/ forwarding point and from there transported to consuming market. Thus for efficient marketing mode of transportation is very important. The main problems identified by the growers were lack of timely availability of vehicles, village not connected with roads, high transportation charges an lack of all-weather road. More can be seen from the Table 14.

8. **Support/Procurement Price:** Apples which are fit for table purpose are sold to the processors. In Himachal Pradesh HPMC and HIMFED generally procure such fruits. About 100 percent farmers reported that HPMC do not pay value of procured apples in time. Thus they were of the view that the Government policy is not proper in this respect.

9. **Technical Knowhow:** Package of practice of HD apple is different from that of the standard variety. The density of apples is more than double semi HD variety are more suitable than

that of HD because of the uneven topography of the region. The main problem identified by the growers with regard to establishment of HD apple are the lack of knowledge about pollinizers, proper training, pruning of plants, spray schedule, fertilizers and micronutrients and identification of diseases, insect and pest, Table 14.

TABLE 14: Problems Faced by Overall Sampled Orchardists (sample size 74, Number Below in Percentage)

Particulars	Problems	Responses (%)		
		Most often	Sometimes	Never
1. Root Stock	Non-availability	47	35	18
	Lack of timely availability	50	24	26
	Poor quality	11	18	71
	High cost	66	19	18
	High incidents of diseases	15	12	73
2. Irrigation	Inadequate facilities	76	15	9
3. Fertilizers	Lack of timely availability	53	22	19
	Poor quality	28	51	21
	High cost	58	18	23
	Non-availability of micronutrient fertilizers	20	41	39
4. Chemical protecting plant	Lack of timely availability	20	73	7
	Poor quality	55	27	18
	High cost	77	11	12
5. Picking/grading/ packing	Shortage of skilled labor	73	19	9
	Higher wages	82	9	9
	Non-availability of labor	42	45	14
6. Packing material	Shortage of CFB cartons	54	20	26
	Shortage of other material	18	71	51
	High prices	74	12	14
	Non availability in time	14	19	67
	Non availability in desired place	10	12	78
7. Transportation	Lack of timely availability	34	19	47
	High transport charges	77	13	10
	Shortage of vehicles	9	9	82
	Village of unlinked roads	19	18	63
	Lack of all weather roads	50	24	26
8. Support/ procurement price (culled apple)	Low prices	100	00	00
	Price not announce in time	95	3	2
	Price not paid in time	100	00	00
9. Technical know how	Orchard establishment	30	47	23
	Variety of pollinizer	78	15	7
	Training of plants	59	22	19
	Pruning	31	50	19
	Spray schedule	42	32	26
	Fertilizer/micronutrients	51	26	23
	Identification of disease	59	15	26
	Identifying insects/pests	68	21	11

Conclusions:

From the above discussion, it may be concluded that maintenance cost is lower and productivity is higher in case of HD apples in comparison to standard apple. HD apples also fetch higher prices than its counterpart namely the standard variety. Having recognized that the cultivation of HD variety of apple is more remunerative the main findings in respect of improving socio-economic conditions of the apple growers are as follows:

1. The HD Dwarf variety of apple should be encouraged at different levels in the state by the Government as it is found to be much more remunerative.
2. 'The State of the Art' technical knowhow to the apple growers/orchardists, should be provided along with the financial support.
3. Better prices for the culled fruits which are used in fruit processing and in preparing fruit beverages, should be suitably fixed.
4. More and better storage facility in producing areas, so as to regulate the fast and timely supply as per the demand of the market, be managed.
5. Marketing facilities for sending the produce to different markets of the country namely Delhi, Bombay, Chennai, Calcutta and other capitals of the bigger states, should be made available.
6. Minimizing the number of 'agencies' in the channel of apples reaching from producer-to-consumers, be devised.
7. The role of the Government in this direction is solicited as a matter of policy.

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AGRO-ECONOMIC RESEARCH

Effect of Mechanization of Agricultural Growth and Comparative Economics of Labour and Machinery in Bihar*

Introduction

Traditionally, Indian farmers relied on equipments, which were simple and could be easily fabricated by village craftsmen. Since introduction of mechical power, agricultural engineering started gaining importance and thus; organized professional activities started. Though farm mechanization is increasing in India, it is mostly region specific. Besides the region specificity, the growth of agricultural mechanization is mainly hindered by the impediment of decreasing trend in operational land holdings. One of the major factors for poor response of farmers towards mechanization may be that mechanization of small and contiguous groups of land is found to be against economics of scale. Having understood the conformity of farm mechanization with increased production level at lower costs of production; in course of time policy efforts have been made by the Government of India. In addition to two Central Sector Schemes (namely; (i) Promotion and Strengthening of Agricultural Mechanization through Training, Testing and Demonstration, and; (ii) Post-harvest Technology and Management during the 11th Plan Period programmes like; MMA, RKVY, NHM and NFSM are also being implemented for promotion of mechanization. In the above backdrop and based on the primary survey of 100 farmers randomly chosen (50 each from high and low mechanized villages/strata), this study seeks to study the effects of mechanization on agricultural growth and comparative economics of labour and mechinery in Bihar.

While the secondary data sources and information provide the breadth of effects of mechanization in agricultural sector as a whole, the primary data based inputs provide the depth. We are sure that the Policy Makers; Agricultural Scientists, scholars, practitioners and officers of Agriculture and allied departments will find this study useful for their purposes.

Reference Period

Reference period of secondary data used in this study is 2001-02 to 2009-10. For primary data, it was 2008-2009 to 2010-2011.

Mechanization Programmes and Trends of Mechanization in Bihar

In Bihar, agricultural sector is faced with mainly four key challenges: (i) nano size of land holdings, (ii) low yields and high risks, (iii) biotic and abiotic constraints in raising crop yields, and; (iv) weak institutions accompanied by poor infrastructure. As far as efforts of the Government to promote and strengthen mechanization in agricultural sector are concerned since the year 2009-10 during the 11th Five Year Plan, *i.e.*, agricultural mechines, tools and equipments are being made available to farmers on subsidy basis mainly under the six schemes/programmes, *viz.*, (i) MMA, (ii) ISOPOM, (iii) Jute Technology Mini Mission-II, (iv) NFSM, (v) RKVY, and; (vi) State Plan on Power Tiller Promotion Scheme. Range of subsidy on agricultural mechineries/implements being very wide (from Rs. 3,000/- only on conoweeder to Rs. 30,000/- only meant for rotavator). As small implements were distributed largely, which had led in exceeding of physical targets in some years, so big machines could be distributed in less than targeted numbers.

Share of cost of human labour as percentage of operational cost was found higher in case of paddy. Cost of bullock labour as percentage of operational cost and mechine labour as percentage of the same were found higher in case of lentil and wheat respectively.

Further, higher shares of the cost of human labour and cost of bullock labour to total cost were found for paddy respectively. Cost of mechine labour to total cost could be seen the higher in case of wheat and lower for paddy.

It is interesting to have the determinate observation that the share of mechinery cost in regard to value of production was higher in case of paddy for human labour, the same for bullock labour and machine labour in case of wheat. Data reveals higher share of cost of human labour for maize, cost of bullock labour for lentil and cost of mechine labour for paddy' as percentage of value of production. The most interesting and substantial facts revealed here, are that shares of cost of (i) human, (ii) bullock, and; (iii) machine labour as percentage of value of production were minimum or the lowest for pulse crops only.

As far growth of costs in human labour, bullock labour and machine labour in the year 2008-09 as compared to 1996-97 is concerned maximum increase in human labour was observed in case of wheat, higher decline in bullock labour was seen in case of gram and higher increase in machine labour was found in paddy. The growth of

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production during the period (in percentage terms) was quite higher in value of production terms for wheat. Like the growth of costs scenario quite higher increase in machinery cost was observed in case of paddy again.

Demographic Profile and Cropping Pattern

It can be circumstantiated that surveyed farmers belonging to medium farm size class had higher average number of adult family members, whereas in regard to male members, small farmers' class was ahead. In regard to illiteracy, education levels up to primary and secondary and above sample marginal farm households were ahead. This could be due to their larger number in the sample. In percentage terms, on the parameter of education of the head of the family large sample households were at top having secondary and above qualification. On average (total) of educational front, medium farmers were ahead. As far percentage distribution of adult educated sample farmers is concerned, small farm size class was to top. Marginal size class had maximum number of SCs & OBCs households. There were no ST farm households in the sample. Percentage distribution of caste composition shows small farm households dominated by OBC, marginal by SC and large by the members of other castes. Higher average areas haivng irrigation facility were found in case of large and medium farms. In regard to unirrigated areas also, these two farm size classes were ahead. As far percentage distribution of irrigated area is concerned, in regard to total irrigated and total unirrigated areas medium & small and marginal & large respectively were ahead. No canal and tank irrigation was found in the area of study. There was a little fall in Crop Duration Index (CDI) in the year 2010-11 as compared to 2008-09. However, as a result of scanty rainfall in the year 2009-10, there was a clearly revealed decline in CDI. Paddy wheat and maize were the main cereals grown by the sample households, whereas under pulse crops, lentil, moong and gram got good shares of areas in cropping pattern during the three years.

Costs of Mechanization

The analysis causes to lead the finding that wheat incurred maximum input costs on seed and irrigation. In regard to organic manure and fertilizer maize was ahead. Wheat also cornered maximum amount as cost on pesticides/ weedicides. It is revealed that level of mechanization in the forms of tractor and harvest combine/carriage cost was higher in wheat than paddy and other crops. In percentage terms, distribution of input costs, in regard to hired labour (bullock and manual taken together), and hired machinery costs (including tractor and harvest combine) paddy and wheat respectively were ahead. As the harvest combine machine was made available for service/use of farmers in mechanized villages after the establishment of Farm Mechanization Bank in Mohanpur village of Shahkund block in the year 2010, so we have actually considered expenditure incurred on carriage of large quantum of harvested grains by tractors under the above noted head.

Here it could be noted that maximum and minimum percentages of machinery costs to value of output and same to marketed surplus were meant for wheat and gram. But, in percentage terms of marketed surplus to value of output paddy was at top and wheat at the bottom suggesting that retention of wheat was higher in this region of the state. Percentage of mechanization costs to value of output were also lower in case of lentil and paddy as compared to maize and wheat.

Data in tables demonstrate that in quantitative terms, the operation of ploughing cornered higher per hectare costs. In context of manually and power operated costs of mechanization, sowing were ahead. In case of power and tractor operated costs of mechanization irrigation and transportation and marketing shared maximum expenditures.

In quantitative terms (on aggregate level) higher cost of mechanization was computed for the operation of ploughing and lower being for threshing. Minimum percentages of the costs of mechanization were found in animal operated activities for threshing, manually operated activities of sowing and the lower in case of ploughing by tractor operated machines.

Pattern of Mechanization

Before jumping to conclusions it is envisaged that most of the sample households owned manual and animal operated machines. Ownership of machinery operation wise also revealed larger percentages of manually operated machines/ tools used in the activities like: sowing weeding, plant protection and harvesting. For irrigation, cent-per-cent of the farm households used pump sets mostly diesel run, either owned by them or on custom hiring basis. Animal and manually operated machines/devices were used by most of the farmers for (i) threshing, (ii) weeding, and; (iii) harvesting respectively, whereas tractor was operated prominently for ploughing purposes. While ploughing and harvesting were the main operations, where animal and manually operated machiens were employed for larger hours of time usage, there, on the other hand, irrigation and ploughing were ahead by power and tractor operated machines respectively. In percentage terms, operations like: (i) weeding, (ii) plant protection, and; (iii) harvesting shared longer hours of usage by manually operated devices. Longer time and larger total costs (in absolute number and percentage both) could be seen in ploughing and seed-bed preparation by animal operated machines. There is sufficient data to believe that adoption of mechanized practices in operations like sowing and planting were very low in case of surveyed farmers. It was seen that cent-per-cent irrigation operation was performed by diesel pump sets. However, weeding and inter-culturing activities were undertaken cent-per-cent by manually operated devices.

Both of these operations took equally large hours of time usages. Cent-per-cent of the plant protection equipments were used, which were manually operated and it took (all in total) 16 hours of time per hectare of cropped area. Operation of harvesting needed quite longer hours of time than plant protection, irrigation, sowing and planting and ploughing & seed-bed preparation. it was wholly performed by manual sickle. Even having used paddy thresher by cent-per-cent of the sample households, it had to be given maximum number of hours. General observation is also revealed here that more time was devoted containing quite higher percentage of the total usage in transporting the agricultural produces for marketing by animal operated means of conveyance. Per hour cost incurred in machine driven device was higher than that of animal operated device.

Farmers' Perceptions

The analysis related to farmers' perceptions has been made in absolute and percentage terms. The factors for which farmers' perception have been obtained contained: (i) economical, (ii) quicker operations, (iii) reduction in drudgery, and; (iv) any other. For measuring the intensity of perception, ranking (*viz.,* Rank-I, Rank-II and Rank-III) has been taken into consideration.

Quicker operation, economical and quicker operations again were considered main reasons by the farmers for the use of machinery revealed in the form of getting Rank-I, II & III respectively. In percentage terms also, the scenario was similar. Irrigation and ploughing related operations were the main for which machines were widely used. For all the three ranks, these operations were prominent. In the study area, tractor operated plough and then animal operated plough were reported as most appropriate machines/devices for this purpose. It was observed that manually and animal operated seed drills were the most appropriate sowing and planting machines by the sample households. Cent-per-cent surveyed farm households pronounced diesel pump set to be the most appropriate machine for irrigation. Farmer's perception towards manually operated weeding and inter-culture machines to be highly suitable was in consonant with earlier data showing number of farmers using machineries. Among plant protection equipments, manually operated machine was considered as appropriate one by larger proportion of farmers. No other machine except self propelled reaper was described as appropriate as sickle for harvesting by the sample farmers.

Power operated thresher was perceived as most appropriate machine for threshing. Though quite large number of sample households used manual and animal operated devices for this purpose. For marketing and transportation tractor trolley like: device/machine was perceived as the most appropriate means. Main revealed problem in case of animal operated plough and tractor plough were expensive to hire and expensive to purchase respectively. Hire facility not available and expensive to hire in case of tractor driven seed-cum-fertilizer drill respectively were noted as major problems by surveyed farmers. While expensive to hire and hire facility not available in case of manually operated weeding and inter-culture machines respectively were the major problems as perceived by the farmers. In regard to irrigation related problems; (i) expensive to purchase, (ii) expensive to hire, (iii) repair and service facilities expensive, and; (iv) high maintenance cost were experienced as low and middle ranking major problems. In case of plant protection machineries used problems of hiring facility not available and expensive to hire were major but low ranking problems. Hire facility not available (in case of manual sickle), particularly when labourers were not available in desired number, non-availability of paddy thresher on time and expensive to hire bullock driven cart marketing means of transportation have been reported as major problems. Better land utilization and reduced drudgery were the two prominently reported answers in response to usefulness of machineries. It was interesting to note that majority of the total farmers surveyed were though not aware of all the government programmes and types of assistance being provided, however, some of them did recieve assistance of one kind or the other under some of programmes/schemes. Quite lower percentage of total farmers surveyed didn't find the programme useful, as they were not even aware about most of the farm mechanization initiatives. However, a little less than half of the total farm households surveyed found the programmes/schemes useful. It is clearly revealed that whatever increases in production were observed in regard to paddy, wheat and gram had caused as a result of mechanization. Conclusively, positive effects of mechanization on agricultural growth, and comparative economics of labour and machinery are there. Its adjacency to actual contribution needs to be examined separately.

Action Points

On the basis of analytical discussions, and secondary and primary data based observations made through the preceding six chapters, the following Action Points can be appropriately suggested:

1. Higher costs of mechanized farming, particularly in wheat, are due to good number of irrigation and threshing operations. it could be reduced to some extent by exploring and developing low cost irrigation infrastructure. *(Attn: Department of Water Resources, Government of Bihar, Director-Cum-Dean, Research, "Bihar Agricultural University, Sabour, (Bhagalpur)" RAU, PUSA (Samastipur) and WALMI (Patna).*
2. Zero tillage (particularly in wheat), saves about 1 and half hour of time required for preparing one hectare of land. It also helps in reducing the

consumption of diesel by about 20 litres required in sowing wheat/hectare of land. So, 'zeo tillage method' needs to to be popularized and promoted. *(Attn: Directorate of Agricultural Extension, Government of Bihar).*

3. In the areas/regions of low agricultural mechanization, emphasis should be given on establishing Farm Machinery Banks on district/ commissionery level. *(Attn: Ministry of Agriculture, Government of India & Department of Agriculture, Government of Bihar).*

4. In view of increasing number of farmers willing to adopt mechanization in their agricultural operations, the areas/regions where 'Farm Mechanization Banks' are already in existence, the number of particular type of machines/ implements should be increased. *(Attn: Director, Agriculture, Government of Bihar & Ministry of Agriculture, Government of India).*

5. As 'Power tillers or 2WTs (two-whell tractors)' perform the same tasks as' '4WTs,' and these are more effective and desirable for marginal and small holdings, so use of 'Power Tillers (PTs)' needs to be assisted and promoted. *(Attn: Department of Agricultural Extension, Directorate of Agriculture, Government of Bihar, NABARD & Other Public Sector Banks).*

6. Even farmers with small holdsing wish to use selected improved farm equipments through custom hiring to increase productivity and to reduce 'cost of production.' So, demonstration and on the field training should be given/ arranged on regular intervals in regard to uses of machine and animal drawn steel plough, disc harrow/cultivators, seed drill, row planter, etc. *(Attn: Directorate of Extension, Government of Bihar).*

7. With a view to overcome the problems of scarcity of capital and/resource to hire machines/ tools, Users group or Farmers Co-operative Societies should be formed under mechanization schemes. Further, it should be linked with banks through Micro finance lending. *(Attn: Ministry of Agriculture, Government of India, NABARD, Department of Institutional Finance, Government of Bihar).*

8. In comparatively low mechanized villages/areas, some of the prominent impediments were non-availability of assured sources of irrigation and very poor power supply position, particularly for agricultural operations. To remove these constraints, separate electricity feeders for rural areas be given on priority basis. *(Attn: Department of Water Resources, Government of Bihar, and Bihar State Power Holding Company Ltd. (BSPHCL), Patna.*

9. Mechanized practices in agricultural operations (particularly sowing, planting, etc.) have crept in. But, its level is very low. So, there is need to make farmers more responsive towards mechanization of agriculture by suitably explaining and properly training them about the comparative advantages and usage of agricultural tools, machineries and equipments. *(Attn: Directorate of Agriculture Extension, Government of Bihar).*

10. No use or limited uses of Harvester combine, thresher and other machines/implements were the result of non-familiarity of farmers with these machines and lack of technical knowledge about how to operate them. So, on regular intervals, trainings to operate those machines/implements need to be urgently given. *(Attn: Directorate of Agricultural Extension, Government of Bihar).*

11. To expand the purview of Agricultural mechanization, "Rice-rubber Houlier Sail-arm Machine and facility of laser leveler (on hiring basis) should be made available. *(Attn: Directorate/Division of extension, Agricultural Engineering, Directorate of Agriculture, Government of Bihar).*

12. Tractor for "Farm Machineries Bank" should be made available on permanent basis. *(Attn: Directorate of Agriculture, Government of Bihar.*

13. With a view to promote mechanization in agriculture in less mechanized areas of Bhagalpur, Banka and Munger districts, unchecked excavation of sand, particularly from the bed of river Chandan and construction of check dams at some points in this river, need to be strictly stopped and constructed respectively, so that adequate irrigation is ensured during all seasons. *(Attn: Departments of Mines & Water Resources, Government of Bihar).*

14. In view of the lower share of machine labour costs of incurred in pulse crops as percentage of values of their production, greater emphasis needs to be given for promoting mechanized practices in cultivation of pulses. *(Attn: Ministry of Agriculture, Government of India, Department of Agriculture, Government of Bihar).*

Foodgrains

During the months of November, 2014 the Wholesale Price Index (Base 2004-2005=100) of pulses increased by 0.97%, Cereals declined by 0.42% and foodgrains declined by 0.17% respectively over the previous month.

ALL INDIA INDEX NUMBER OF WHOLE SALE PRICES

(Base : 2004-2005 = 100)

Commodity	Weight (%)	WPI for the Month of November 2014	WPI for the Month of October 2014	WPI A year ago	Percentage change during	
					A month	A year
Rice	1.793	245.4	247.0	232.5	-0.65	5.55
Wheat	1.116	211.7	209.5	216.7	1.05	-2.31
Jowar	0.096	290.7	293.3	247.1	-0.89	17.64
Bajra	0.115	242.8	252.4	251.0	-3.80	-3.27
Maize	0.217	230.6	235.7	251.1	-2.16	-8.16
Barley	0.117	230.0	232.7	216.2	-1.16	6.38
Ragi	0.019	319.1	330.0	336.2	-3.30	-5.09
Cereals	3.373	234.8	235.8	230.0	-0.42	2.09
Pulses	0.717	240.5	238.2	230.3	0.97	4.43
Foodgrains	4.09	235.8	236.2	230.1	-0.17	2.48

Source: Office of the Economic Adviser, M/O Commerce and Industry.

Behaviour of Wholesale Prices

The following Table indicates the State wise trend of Wholesale Prices of Cereals during the month of November, 2014.

Commodity	Main Trend	Rising	Falling	Mixed	Steady
Rice	Falling	A.P.	Haryana Jharkhand	U.P.	Assam Kerala
Wheat	Falling	U.P.	Gujarat Haryana Jharkhand		Karnataka
Jower	Rising	Karnataka Rajasthan	Gujarat	A.P.	
Bajra	Rising & Falling	A.P.	Haryana	Gujarat	Karnataka
		Rajasthan	Maharashtra		
Maize	Falling	Haryana	Jharkhand Karnataka U.P.	Rajasthan	

Procurement of Rice

3.66 million tonnes of Rice (including paddy converted into rice) was procured during November 2014 as against 3.02 million tonnes of rice (including paddy converted into rice) procured during November 2013. The Total procurement of Rice in the current marketing season *i.e.* 2014-2015, up to 28.12.2014 stood at 10.59 million tones, as against 11.02 million tonnes of rice procured, during the corresponding period of last year. The details are given in the following table:

PROCUREMENT OF RICE

State	Marketing Season 2014-15 (upto 28.11.2014)		Corresponding Period of last Year 2013-14		Marketing Year (October-September) 2013-14		2012-13	
	Procurement	%age to Total	Procurement	%age to Total	Procurement	%age to Total	Procurement	%age to Total
Andhra Pradesh	2	0.02	317	2.87	3722	11.76	6464	19.00
Chhatisgarh	0	0.00	0	0.00	4290	13.56	4804	14.12
Haryana	1988	18.77	2394	21.71	2406	7.60	2609	7.67
Maharashtra	11	0.10	5	0.04	161	0.51	192	0.56
Punjab	7738	73.06	8083	73.29	8106	25.62	8558	25.16
Tamil Nadu	3	0.03	51	0.46	684	2.16	481	1.41
Uttar Pradesh	111	1.05	89	0.81	1127	3.56	2286	6.72
Uttarakhand	64	0.60	18	0.16	463	1.46	497	1.46
Others	675	6.37	72	0.65	10678	33.75	8129	23.89
Total	10592	100.00	11029	100.00	31637	100.00	34020	100.00

Source: Department of Food & Public Distribution.

Procurement of Wheat

The total procurement of wheat in the current marketing season *i.e.* 2014-2015 up to June, 2014 is 27.99 million tones against a total of 25.04 million tones of wheat procured during last year. The details are given in the following table:

PROCUREMENT OF WHEAT

(*In Thousand Tonnes*)

State	Marketing Season 2014-15 (upto 30.06.2014)		Corresponding Period of last Year 2013-14		Marketing Year (October-September) 2013-14		2012-13	
	Procurement	%age to Total	Procurement	%age to Total	Procurement	%age to Total	Procurement	%age to Total
Haryana	6495	23.20	5873	23.45	5873	23.41	8665	22.71
Madhya Pradesh	7094	25.34	6325	25.26	6355	25.33	8493	22.26
Punjab	11641	41.58	10878	43.44	10897	43.43	12834	33.64
Rajasthan	2159	7.71	1268	5.06	1268	5.06	1964	5.15
Uttar Pradesh	599	2.14	683	2.73	683	2.72	5063	13.27
Others	6	0.02	13	0.05	16	0.06	1129	2.96
Total	27994	100.00	25040	100.00	25092	100.00	38148	100.00

Source: Department of Food & Public Distribution.

Commercial Crops

Oilseeds and Edible Oils

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 203.7 in November, 2014 Showing a decrease of 0.9 per cent over the previous month. However, it increased by 0.2 per cent over the previous year. The WPI of Niger Seed (5.8 percent), Sunflower Seed (4.7 per cent), Copra (4.4 per cent), Cotton Seed (3.0 per cent), Safflower seed (2.9 per cent), Groundnut seed (2.2 per cent) and Gingelly seed (1.5 per cent) decreased over the previous month. However, the WPI of Soyabean (3.8 per cent) and Rape & Mustard Seed (0.4 per cent) increased over the previous month. The Wholesale Price Index (WPI) of Edible Oils as a group stood at 143.9 in November, 2014 a decrease of 0.1 per cent and 3.2 per cent over the previous month and over the previous year, respectively. The WPI of Copra oil (3.2 per cent), Mustard Oil (1.4 per cent), Groundnut Oil (1.0 per cent) and Sunflower Oil (0.9 per cent) increased over the previous month. However, the WPI of Soyabean Oil (3.6 percent), Cotton seed oil (2.4 per cent) and Gingelly Oil (1.4 per cent) decreased over the previous month.

Fruits & Vegetable

The Wholesale Price Index (WPI) of Fruits & Vegetable as a group stood at 264.8 in November, 2014 showing a decrease of 2.9 per cent and 9.2 per cent over the previous month and over the previous year, respectively.

Potato

The Wholesale Price Index (WPI) of Potato Stood at 426.3 in November, 2014 showing an increase of 1.2 per cent and 32.6 per cent over the previous month and over the previous year, respectively.

Onion

The Wholesale Price Index (WPI) of Onion stood 342.1 in November, 2014 showing an increase of 2.9 per cent over the previous months. However, it decreased by 57.5 percent over the previous year.

Condiments & Spices

The Wholesale Price Index (WPI) of Condiments & Spice (Group) stood at 305.5 in November, 2014 showing an increase of 0.9 per cent and 18.2 per cent over the previous months and over the previous year, respectively. The WPI of Chillies (Dry), Turmeric and Black Pepper increased by 3.8 per cent, 1.7 per cent and 1.5 per cent over the previous months.

Raw Cotton

The Wholesale Price Index (WPI) of Raw Cotton stood at 191.5 in November, 2014 showing a fall of 1.9 per cent and 19.1 per cent over the previous months and over the previous year, respectively.

Raw Jute

The Wholesale Price Index (WPI) of Raw Jute stood at 2897.7 in November, 2014 showing an increase of 4.5 per cent and 14.1 per cent over the previous month and over the previous year, respectively.

WHOLESALE PRICE INDEX OF COMMERCIAL CROPS

Commodity	Latest November, 14	Month October, 14	Year November, 13	% Variation over Months	% Variation over Year
Oil Seeds	203.7	205.5	205.1	-0.9	0.2
Groundnut Seed	212.3	217.1	203.5	-2.2	6.7
Rape & Mustard Seed	194.6	193.9	194.7	0.4	-0.4
Cotton Seed	175.7	181.1	185.3	-3.0	-2.3
Copra (Coconut)	184.5	192.9	132.1 -4.4	46.0	
Gingelly Seed (Sesamum)	428.9	435.6	457.2	-1.5	-4.7
Niger Seed	192.1	203.9	177.1	-5.8	15.1
Safflower (Kardi Seed)	121.8	125.4	156.1	-2.9	-19.7
Sunflower	175.6	184.2	193.6	-4.7	-4.9

WHOLESALE PRINCE INDEX OF COMMERCIAL CROPS (*Contd.*)

Commodity	Latest November, 14	Month October, 14	Year November, 13	% Variation over Months	% Variation over Year
Soyabean	187.8	181.0	228.4	3.8	-20.8
Edible Oils	143.9	144.1	148.8	-0.1	-3.2
Groundnut Oil	164.7	163.0	180.4	1.0	-9.6
Cotton Oil	175.5	179.9	181.2	-2.4	-0.7
Mustard & Rapeseed Oil	157.4	155.2	154.3	1.4	0.6
Soyabean Oil	148.2	153.7	161.7	-3.6	-4.9
Copra Oil	140.8	136.5	125.4	3.2	8.9
Sunflower Oil	123.7	122.6	132.8	0.9	-7.7
Gingelly Oil	174.9	177.4	191.4	-1.4	-7.3
Fruit Vegetables	264.8	272.8	300.3	-2.9	-9.2
Potato	426.3	421.4	317.9	1.2	32.6
Onion	342.1	332.6	782.4	2.9	-57.5
Condiments & Spices	305.5	302.8	256.2	0.9	18.2
Black Pepper	770.6	759.1	582.7	1.5	30.3
Chillies (Dry)	310.1	298.7	273.4	3.8	9.3
Turmeric	229.0	225.2	212.0	1.7	6.2
Raw Cotton	191.5	195.3	241.4	-1.9	-19.1
Raw Jute	289.7	277.1	254.0	4.5	14.1

STATISTICAL TABLES

Wages

1. Average Daily Agricultural Wages in Some States (Category-Wise)

(in Rs.)

State	District	Centre	Moth & Year	Daily Normal Working Hours	Field Labour		Other Agri. Labour		Herdsman		Skilled Labour		
											Carpenter	Blcak Smith	Cobbler
					M	W	M	W	M	W	M	M	M
Andhra Pradesh	Krishna	Ghantasala	June, 14	8	290	237.5	350	NA	250	NA	300	NA	NA
	Guntur	Tadikonda	June, 14	8	275	NA	NA	NA	250	NA	NA	NA	NA
	Ranga Reddy	Arutala	June, 14	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Karnataka	Bangalore	Harisandra	Sep., 13	8	250	200	200	175	200	180	300	250	NA
	Tumkur	Gidlahali	Dec., 13	8	175	165	180	170	180	170	200	180	NA
Maharashtra	Nagpur	Mauda	Feb., 12	8	100	100	NA	NA	NA	NA	NA	NA	NA
	Ahmednagar	Akole	Feb., 12	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jharkhand	Ranchi	Gaitalsood	April, 12	8	100	100	NA	90	90	NA	58	58	NA

1.1. AVERAGE DAILY AGRICULTURAL WAGES IN SOME STATES (OPERATION-WISE)

(in Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working (Hours)	Ploughing	Sowing	Weeding	Harvesting	Othere Agri. Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Assam	Barpeta	Loharapara	June, 14	M	8	250	250	250	250	250	250	200	250	250
				W	8	NA	NA	200	200	200	NA	NA	NA	NA
Bihar	Muzffarpur	Bhalui Rasul	June, 12	M	8	130	120	80	130	150	120	200	180	250
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Shekhpura	Kutaut	June, 12	M	8	NA	NA	185	NA	185	NA	245	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chhattisgarh	Dhamtari	Sihaba	Sep., 14	M	8	NA	NA	100	NA	80	80	250	100	80
				W	8	NA	NA	100	NA	70	80	150	100	80
Gujarat	Rajkot	Rajkot	Jan., 13	M	8	209	225	150	170	147	150	360	360	240
				W	8	NA	169	150	179	145	142	NA	NA	NA
	Dahod	Dahod	Jan., 13	M	8	100	100	100	100	100	NA	200	144	150
				W	8	NA	100	100	100	100	NA	NA	NA	NA
Haryana	Panipat	Ugarakheri	Aug., 14	M	8	350	300	350	300	300	NA	NA	NA	NA
				W	8	NA	250	250	NA	250	NA	NA	NA	NA
Himachal Pradesh	Mandi	Mandi	Dec., 13	M	8	NA	162	162	162	162	NA	260	240	240
				W	8	NA	162	162	162	162	NA	650	NA	NA
Kerala	Kozhikode	Koduvally	July, 14	M	4-8	920	550	NA	550	760	NA	NA	NA	NA
				W	4-8	NA	NA	450	450	500	NA	NA	NA	NA
	Palakkad	Elappally	July, 14	M	4-8	450	400	NA	NA	433	NA	600	NA	NA
				W	4-8	NA	NA	300	NA	300	NA	NA	NA	NA
Madhya Pradesh	Hosangabad	Sangarkhera	Sep., 14	M	8	200	200	200	200	150	150	350	350	NA
				W	8	NA	200	200	200	150	150	NA	NA	NA
	Satna	Kotar	Sep., 14	M	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Shyopurkala	Vijaypur	Sep., 14	M	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA

1.1. Average Daily Agricultural Wages in Some States (Operation-Wise)

(in Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working (Hours)	Ploughing	Sowing	Weeding	Harvesting	Othere Agri. Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Odisha	Bhadrak	Chandbali	June, 14	M	8	250	250	NA	250	262.5	250	300	250	250
				W	8	NA	NA	NA	200	212.5	200	NA	NA	NA
	Ganjam	Aska	June, 14	M	8	250	200	NA	250	270	200	400	300	200
				W	8	NA	100	100	150	110	100	NA	NA	NA
Punjab	Ludhiyana	Pakhowal	June, 20 13	M	8	265	270	270	270	260	NA	325	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rajasthan	Barner	Vishala	Feb., 14	M	8	310	310	NA	NA	NA	100	400	300	300
				W	8	310	310	NA	NA	NA	NA	NA	300	NA
	Jalore	Panwa	Feb., 14	M	8	NA	NA	NA	NA	NA	200	350	300	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tamil Nadu*	Thanjavur	Pulvarnathm	June, 14	M	8	NA	312.5	NA	325	322.73	NA	NA	NA	NA
				W	8	NA	NA	133.75	141.67	135	NA	NA	NA	NA
	Tirunelveli	Malayakulam	June, 14	M	8	NA	300	NA	NA	397.37	NA	NA	NA	NA
				W	8	NA	150	132	135	300	NA	NA	NA	NA
Tripura	State	Average	March, 20	M	8	238	201	203	209	207	199	253	235	240
				W	8	NA	154	152	154	154	149	NA	NA	NA
Uttar Pradesh*	Meerut	Ganeshpur	Apr., 14	M	8	250	231	231	NA	234	NA	365	NA	NA
				W	8	NA	181	196	181	191	NA	NA	NA	NA
	Arraiya	Aurraiya	Apr., 14	W	8	NA	NA	NA	NA	150	NA	250	NA	NA
				M	8	NA	NA	NA	150	150	NA	NA	NA	NA
	Chandaul	Chandauli	Apr., 14	W	8	NA	NA	200	200	200	NA	350	NA	NA
				M	8	NA	NA	200	200	200	NA	NA	NA	NA

M-Man W-Woman NA-Not Available
NR-Not Reported *States reported district average daily wages

PRICES

2. WHOLESALE PRICES OF CERTAIN AGRICULTURAL COMMODITIES AND ANIMAL HUSBANDRY PRODUCTS AT SELECTED CENTRES IN INDIA

(Month end Prices in Rs.)

Commodity	Variety	Unit	State	Centre	Nov.-14	Oct.-14	Nov.-13
Wheat	PBW 343	Quintal	Punjab	Amritsar	1500	1500	-
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	1520	1480	1550
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	1548	1650	1727
Jowar	-	Quintal	Maharashtra	Mumbai	2250	2400	2450
Gram	No III	Quintal	Madhya Pradesh	Sehore	2550	2400	3651
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1310	1230	1275
Gram Split	-	Quintal	Bihar	Patna	4440	4445	4675
Gram Split	-	Quintal	Maharashtra	Mumbai	3800	3800	5100
Arhar Split	-	Quintal	Bihar	Patna	6885	6890	6800
Arhar Split	-	Quintal	Maharashtra	Mumbai	6750	6750	6600
Arhar Split	-	Quintal	NCT of Delhi	Delhi	6065	6060	6350
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	7700	7800	6600
Gur	-	Quintal	Maharashtra	Mumbai	3600	4600	3400
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4650	4300	4000
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2100	2500	2150
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	3275	3300	3270
Mustard Seed	Black	Quintal	West Bengal	Raniganj	3650	3600	3850
Mustard Seed	-	Quintal	West Bengal	Kolkata	4000	3900	4200
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	4150	4150	4110
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	-	-	3680
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	1500	1400	1900
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	2000	2000	1550
Castor Seed	-	Quintal	Andhra Pradesh	Hyderabad	3750	3900	3300
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	13550	13400	6560
Copra	FAQ	Quintal	Kerala	Alleppey	8800	9900	7900
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	4500	4500	3800
Groundnut	-	Quintal	Maharashtra	Mumbai	5200	5300	7000
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1174	1173	1166
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1305	1230	1230
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	1275	1320	1275
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	1275	1260	1350
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1476	1425	1262
Castor Oil	-	15 Kg.	Andhra Pradesh	Hyderabad	1260	1268	1170
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	1880	1870	1380
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2775	2700	3000
Coconut Oil	-	15 Kg.	Kerala	Cochin	1875	2175	1650
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	1600	1810	1800
Groundnut Cake	-	Quintal	Andhra Pradesh	Hyderabad	3143	3243	2857
Cotton/Kapas	NH 44	Quintal	Andhra Pradesh	Nandyal	3650	3750	4000
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	-	-	-

2. WHOLESALE PRICES OF CERTAIN AGRICULTURAL COMMODITIES AND ANIMAL HUSBANDRY PRODUCTS AT SELECTED CENTRES IN INDIA—*Contd.*

Commodity	Variety	Unit	State	Centre	Nov.-14	Oct.-14	Nov.-13
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	3095	2955	2740
Jute Raw	W 5	Quintal	West Bengal	Kolkata	3045	2905	2690
Oranges	-	100 No	NCT of Delhi	Delhi	458	667	-
Oranges	Big	100 No	Tamil Nadu	Chennai	365	580	520
Oranges	Nagpuri	100 No	West Bengal	Kolkata	-	-	-
Banana	-	100 No	NCT of Delhi	Delhi	292	333	250
Banana	Medium	100 No	Tamil Nadu	Kodaikkanal	483	483	432
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	59000	59000	58000
Almonds	-	Quintal	Maharashtra	Mumbai	67000	67000	58000
Walnuts	-	Quintal	Maharashtra	Mumbai	67000	66000	66000
Kishmish	-	Quintal	Maharashtra	Mumbai	21000	20000	14000
Peas Green	-	Quintal	Maharashtra	Mumbai	4600	4600	4600
Tomatoes	Ripe	Quintal	Uttar Pradesh	Kanpur	775	1400	3350
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	2500	2300	2400
Cauliflower	-	100 No	Tamil Nadu	Chennai	1700	2200	2000
Potatoes	Red	Quintal	Bihar	Patna	2100	2030	1425
Potatoes	Desi	Quintal	West Bengal	Kolkata	2060	1800	1280
Potatoes	Sort I	Quintal	Tamil Nadu	Mettuppalaya	2752	2778	2574
Onions	Pole	Quintal	Maharashtra	Nashik	1100	1100	2400
Turmeric	Nadan	Quintal	Kerala	Cochin	11000	11000	10000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	8500	8800	9400
Chillies	-	Quintal	Bihar	Patna	9200	9170	7800
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	66000	65500	47000
Ginger	Dry	Quintal	Kerala	Cochin	22000	24000	19000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	140000	140000	120000
Cardamom	Small	Quintal	West Bengal	Kolkata	115000	120000	95000
Milk	Cow	100 Liters	NCT of Delhi	Delhi	-	-	-
Milk	Buffalo	100 Liters	West Bengal	Kolkata	3600	3600	3600
Ghee Deshi	Deshi No. 1	Quintal	NCT of Delhi	Delhi	30682	30682	28681
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	40000	39000	30500
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	36640	33440	30650
Fish	Rohu	Quintal	NCT of Delhi	Delhi	10000	11000	10000
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	28200	29200	30000
Eggs	Madras	1000 No.	West Bengal	Kolkata	4500	4200	4500
Tea	-	Quintal	Bihar	Patna	21000	21150	20000
Tea	Atti Kunna	Quintal	TamilNadu	Coimbatore	34000	-	9000
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	30000	30000	260000
Coffee	Rubusta	Quintal	Tamil Nadu	Combatore	15500	15500	14000
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	4600	4600	2875
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	3600	3600	2775
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	3900	3900	3700
Rubber	-	Quintal	Kerala	Kottayam	10300	11400	14000
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	29800	29800	29000

3. Month-end Wholesale Prices of Some Important Agricultural Commodities in International Markets during year 2014

Commodity	Variety	Country	Centre	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
CARDAMOM	Guatmala Bold.Green	U.K.	-	Dollar/M.T.	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00	9000.00
				Rs./Qt1	56079.00	55818.00	54216.00	55008.00	53010.00	54072.00	54054.00	54549.00	54729.00	55287.00	55665.00
CASHEW KERNELS	Spot U.K. 320s	U.K.	-	Dollar/lbs	3.46	3.44	3.46	3.40	3.48	3.55	3.55	3.52	3.60	3.68	3.60
				Rs./Qtl	47516.61	47022.08	45938.06	45800.88	45175.83	47007.79	46992.15	47021.72	48249.09	49824.15	49074.26
	Spot U.K. 320s	U.K.	-	Dollar/M.T.	7648.65	7614.88	7623.07	7497.06	7673.14	7837.34	7802.62	7763.90	7876.39	8114.12	7918.99
				Rs./Qt1	47658.74	47227.49	45921.37	45422.03	45194.79	47086.74	46862.54	47057.00	47896.33	49845.04	48978.95
CASTOR OIL,	Any Origin ex tank Rotterdam	Netherlands	-	Dollar/M.T.	1600.00		1700.00	1675.00	1650.00	1655.00	1675.00	1775.00	1703.00	1753.00	1752.00
				Rs./Qtl	9969.60		10240.80	10237.60	9718.50	9943.24	10060.05	10152.18	10355.94	10768.68	10836.12
CELERY SEED	ASTA cif	India	-	Dollar/M.T.	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00					
				Rs./Qtl	9346.50	9303.00	9036.00	9168.00	8835.00	9012.00					
CHILLIES	Birds eye 2005 crop	Africa	-	Dollar/M.T.	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00	4100.00
				Rs./Qtl	25547.10	25428.20	24698.40	25059.20	24149.00	24632.80	24624.60	24850.10	24932.10	25186.30	25358.50
CINNAMON BARK		Madagascar	-	Dollar/M.T.	1100.00	1100.00	1100.00	1276.00	1276.00	1276.00	1276.00	1276.00	1276.00		
				Rs./Qtl	6854.10	6822.20	6626.40	7798.91	7515.64	7666.21	7663.66	7733.84	7759.36		
CLOVES	Singapore	Madagascar	-	Dollar/M.T.	13250.00	13250.00	12600.00	12600.00	12600.00	12800.00	12800.00	12800.00	9900.00	9900.00	10500.00
				Rs./Qt1	82560.75	82176.50	75902.40	77011.20	74214.00	76902.40	76876.80	77880.80	60201.90	60815.70	64942.50
COCONUT OIL	Crude Phillipine/ Indonesia,	Netherlands	-	Dollar/M.T.	1280.00	1420.00	1355.00	1375.00	1385.00	1360.00	1285.00	1075.00	1210.00	1250.00	1220.00
				Rs./Qt1	7975.68	8806.84	8162.52	8404.00	8157.65	8170.88	7717.71	6515.58	7358.01	7678.75	7445.70
COPRA	Phillipines cif Rotterdam	Phillipine	-	Dollar/M.T.	806.50	895.50	851.00	867.00	873.00	854.00	806.50	692.00	762.00	759.00	768.50
				Rs./Qtl	5025.30	5553.89	5126.42	599.10	5141.97	5130.83	4843.84	4194.21	4633.72	4662.54	4753.17
CORRIANDER		India	-	Dollar/M.T.	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	2000.00	2000.00	2000.00
				Rs./Qtl	9346.50	9303.00	9036.00	9168.00	8835.00	9012.00	9009.00	9091.50	12162.00	12286.00	12370.00
CUMMIN SEED		India	-	Dollar/M.T.	2250.00	2250.00	2250.00	2250.00	2250.00	2250.00	2250.00	2250.00	2250.00	2250.00	2250.00
				Rs./Qtl	14019.75	13954.50	13554.00	13752.00	13252.50	13518.00	13513.50	13637.25	13682.25	13821.75	13916.25
Fennel seed		India	-	Dollar/M.T.	2600.00	2600.00	2600.00	2600.00	2600.00	2600.00	2600.00	2600.00	2600.00		
				Rs./Qt1	16200.60	16125.20	15662.40	15891.20	15314.00	15620.80	15615.60	15758.60	15810.60		
GINGER	Split	Nigeria	-	Dollar/M.T.	1800.00	1800.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00	2300.00
				Rs./Qtl	11215.80	11163.60	13855.20	14057.60	13547.00	13818.40	13813.80	13940.30	13986.30	14128.90	14225.50
GROUNDNUT kernels	US 2005, 40/50	European Ports	-	Dollar/M.T.	1250.00	1250.00	1220.00	1200.00	1180.00	1180.00	1180.00	1200.00	1230.00	1370.00	1450.00
				Rs./Qtl	7788.75	7752.50	7349.28	7334.40	6950.20	7089.44	7087.08	7273.20	7479.63	8415.91	8968.25

Commodity	Variety	Country	Centre	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oc	Nov.t
GROUNDNUT Oil	Crude Any Origin cif Rotterdam	U.K.	-	Dollar/M.T.	1500.00	1500.00	1500.00	1180.00	1180.00	1180.00	1180.00	1180.00	1180.00	1200.00	1200.00
				Rs./Qtl	9346.50	9303.00	9036.00	7212.16	6950.20	7089.44	7087.08	7151.98	7175.58	7371.60	7422.00
LENTILS	Turkish Red Split Crop 1+1 water	U.K.	-	Pound/M.T.	606.12	599.00	602.12	594.90	597.93	588.72	-	-	-	-	-
				Rs./Qtl	6230.91	6201.78	6023.61	6112.00	5890.21	6022.02	-	-	-	-	-
MAIZE		U.S.A.	Chicago	C/56 lbs	427.50	455.50	484.50	503.50	472.50	441.00	362.50	359.50	329.50	375.25	378.25
				Rs./Qtl	1046.85	1110.23	1147.02	1209.42	1093.73	1041.26	855.63	856.32	787.45	905.93	919.41
OATS		CANADA	Winnipeg	Dollar/M.T.	465.48	569.22	445.04	446.35	368.48	362.40	355.63	400.28	367.97	397.39	339.04
				Rs./Qt1	2900.41	3530.30	2680.92	2728.09	2170.35	2177.30	2135.91	2426.10	2237.63	2441.17	2096.96
PALM KERNAL OIL	Crude Malaysia/ Indonesia,	Netherlands	-	Dollar/M.T.	1170.00	1375.00	1350.00	1300.00	1245.00	1235.00	1120.00	845.00	935.00	965.00	980.00
				Rs./Qtl	7290.27	8527.75	8132.40	7945.60	7333.05	7419.88	6726.72	5121.55	5685.74	5928.00	6061.30
PALM Oil.	Crude Malaysian/ Sumatra,	Netherlands	-	Dollar/M.T.	855.00	950.00	923.00	903.00	875.00	873.00	820.00	723.00	710.00	740.00	715.00
				Rs./Qt1	5327.51	5891.90	5560.15	5519.14	5153.75	5244.98	4924.92	4322.10	4317.51	4545.82	4422.28
PEPPER (Black)	Sarawak Black lable	Malaysia	-	Dollar/M.T.	-	-	-	-	-	-	9600.00	10000.00	10000.00	10000.00	10000.00
				Rs./Qtl	-	-	-	-	-	-	57657.60	60610.00	60810.00	61430.00	61850.00
RAPESEED	Canola	CANADA	Winnipeg	Can	423.80	415.50	458.20	445.80	466.50	483.30	438.00	424.20	400.10	444.40	429.90
				Dollar/M.T.	2366.92	2316.83	2502.23	2472.41	2535.43	2715.66	2448.42	2368.73	2196.95	2438.87	2345.10
RAPESEED	UK delivered rapeseed delivered	U.K.	-	Pound/M.T.	278.00	304.00	325.00	330.00	273.00	269.00	258.00	240.00	232.00	225.00	242.00
				Rs./Qtl	2857.84	3147.01	3251.30	3390.42	2689.32	2751.60	2632.89	2413.20	2303.06	2211.75	2353.69
RAPESEED OIL	Refined bleached and deodorised	U.K.	-	Pound/M.T.	668.00	681.00	706.00	711.00	675.00	657.00	607.00	590.00	578.00	636.00	627.00
				Rs./Qt1	6867.04	7049.71	7062.82	7304.81	6649.43	6720.45	6194.44	5932.45	5737.81	6251.88	6098.20
SOYABEAN Meal	UK produced 49% Oil & protein	U.K.	-	Pound/M.T.	366.00	410.00	412.00	384.00	371.00	343.00	311.00	338.00	342.00	354.00	345.00
				Rs./Qtl	3762.40	4244.32	4121.65	394.22	3654.72	3508.55	3173.76	3398.59	3395.03	3479.82	3355.47
SOYABEAN OIL	Refined bleached and deodorised	U.S.A.	-	Rs./Qtl	37.10	41.20	40.73	4250.00	3963.00	40.65	36.20	32.86	32.62	34.18	33.48
		U.K.		Pound/M.T	5094.90	5631.71	5407.68	5725.11	5144.59	5382.72	4791.88	4389.58	4371.90	4627.69	4563.91
					652.00	695.00	683.00	686.00	645.00	646.00	614.00	578.00	693.00	572.00	617.00
				Rs./Qtl	6702.50	7194.64	6832.73	7047.96	6353.90	6607.93	6265.87	5811.79	6879.41	5622.76	6000.94
SOYABEANS	US NO.2 yellow	Netherlands	Chicago	Dollar/M.T.	563.90	492.20	504.70	517.30	523.00	512.30	463.60	453.10	415.90	453.90	454.60
				Rs./Qt1	3513.66	3052.62	3040.31	3161.74	3080.47	3077.90	2784.38	2746.24	2529.09	2788.31	2811.70
		U.S.A.	-	C/60 Ibs	1269.25	1407.25	1440.00	1468.50	1497.75	1415.75	1201.00	1119.75	936.75	1043.00	1047.00
				Rs./Qtl	2902.49	3203.09	3183.56	3294.00	3237.58	3121.64	2647.25	2490.76	2090.57	2351.42	2376.58
SUNFLOWER SEED OIL	Refined bleached and deodorised	U.K.	-	Pound/M.T.	710.0C	732.00	696.00	720.00	693.00	680.00	683.00	637.00	654.00	665.00	712.00
				Rs./Qtl	7298.80	7577.66	6962.78	7397.28	6826.74	6955.72	6970.02	6405.04	6492.26	6536.95	6924.91

Commodity	Variety	Country	Centre	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oc	Nov.t
TALLOW	High grade delivered	U.K.	London	Pound/M.T.	465.00	445.00	445.00	445.00	420.00	405.00	400.00	350.00	350.00	350.00	350.00
				Rs./Qtl	4780.20	4606.64	4451.78	4571.93	4137.42	4142.75	4082.00	3519.25	3474.45	3440.50	3404.10
TURMERIC	Madras finger	India spot/cif		Dollar/M.T.	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	850.00	—	—
				Rs./Qtl	5296.35	5271.70	5120.40	5195.20	5006.50	5106.80	5105.10	5151.85	5168.85		
WALNUTS	Indian light halves	U.K.		Pound/M.T.	8130.00	8130.00	8130.00	8130.00	8130.00	8130.00	—	—	—	—	—
				Rs./Qtl	83576.40	84161.76	81332.52	83527.62	80088.63	83161.77	—	—	—	—	—
Wheat		U.S.A.	Chicago	C601bs	551.50	600.00	696.75	676.50	638.75	575.50	530.75	539.50	480.25	538.25	562.00
				Rs./QtI	1261.16	1365.68	1540.38	1517.46	1380.74	1268.94	1169.88	1200.06	1071.79	1213.47	1275.68

	Exchange Rate	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	US Dollar	62.31	62.02	60.24	61.12	58.90	60.08	60.06	60.61	60.81	61.43	61.85
	Can Dollar	55.85	55.76	54.61	55.46	54.35	56.19	55.90	55.84	54.91	54.88	54.55
	UK Pound	102.80	103.52	100.04	102.74	98.51	102/29	102.05	100.55	99.27	98.30	97.46

Source: Public ledger

4. Sowing and Harvesting Operations Normally in Progress During January, 2015

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Summer Rice, Ragi, (R), Small Millets (R) other Rabi, Pulses, Sugarcane, Onion	Winter Rice, Jowar (K), Maize (R), Ragi, (K), Tur (K), Urad (K), Mung (K), Winter Potato (Plains), Sugar cane, Groundnut, Castorseed, Cotton, Mesta, Sweet Potato, Garlic.
Assam Bihar		Winter Rice, Winter Potato, Sugarcane, Sesamum, Cotton.
Bihar	Summer Rice, Winter Potato (Plains), Sugarcane	Winter Potato (Plains), Sugarcane, Groundnut, Rapeseed & Mustard, Linsed.
Gujarat	Sugarcane	Small Millets (R), Tur (K), Sugarcane Ginger, Chillies, Tobacco, Castorseed, Cotton, Turmeric
Himachal Pradesh	Winter Potato (Hills), Onion	—
Jammu & Kashmir	Onion	Winter Potato, Chillies (Dry).
Karnataka	Summer Rice, Ragi (R), Urad, Mung (R) Potato (Plains) Sugarcane	Winter Rice, Jowar (R), Bajra (K), Ragi (K), Wheat, Barley, Small Millets (K), Gram, Tur (K), Mung (K), Other Kharif Pulses Potats (Plains) Sugarcane Black Pepper, Chillies (Dry) Tobacco Castorseed, Rapeseed & Mustard, Linseed, Cotton, Mesta, Sweet Potato, Turmeric, Kardiseed, Tapioca.
Kerala	Summer Rice, Sugarcane, Sesamun (3rd Crop)	Winter Rice, Ragi, Tur, (K) Other Kharif Pulses, (Kulthi), Urad (R) Other Rabi Pulses, Sugarcans, Ginger, Black Pepper, Seamum (2nd Crops) Sweet, Potato, Turmeric, Tapioca.
Madhya Pradesh	Sugarcane, Onion	Jowar (K), Small Millets (R), Tur (K), Urad (R) Mung (R), Other Rabi, Pulses, Sugarcane, Ginger, Chillies (Dry), Tabacco, Castorseed, Rapeseed & Mustard, Cotton, Mesta, Sweet Potato, Turmeric, Sannhemp.
Maharashtra	Sugarcane	Winter Rice, Jowar Gram, Urad (R) Mung (R), Sugarcane, Chillies (Dry), Tobacco, Cotton Turmeric, Sannhemp.
Orissa	Summer Rice, Chillies (Dry).	Winter Rice, Winter Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Castorseed, Nigerseed.
Punjab and Haryana	Potato, Tabacco, Onion.	Potato, Sugarcane, Sweet Potato.
Rajasthan	Sugarcane, Tobacco	Tur (K), Winter Potato (Plains), Sugarcane, Chillies (Dry).
Tamil Nadu	Winter Rice, Jowar (R), Sugarcane, Tur (R), Tobacco, Groundnut, Sesamum, Onion, Bajra (R)	Rice, Jowar (K), Bajra (K), Ragi, Small Millets (K) Gram, Tur (K) Urad (K) Mung (K), Other Kharif Pulses Winter Potato (Hills), Sugarcane, Black Pepper, Groundnut, Castorseed, Sesamum, Cotton, Turmeric, Onion.
Tripura	Summer Rice	Winter Rice Gram, Winter Potato (Plains), Sugarcane, Rapeseed & Mustard, Sweet Potato.
Uttar Pradesh	Summer Rice, Sugarcane, Jute Onion Tobacco (Late).	Tur (K), Winter Potato (Plains), Sugarcane, Tobacco (Early), Castorseed Rapeseed & Mustard, Cotton, Sweet, Potato, Turmeric, Tapioca.
West Bengal	Summer Rice, Sugarcane.	Tur (K), Urad (R), Mung (R) Other Rabi Pulses, Winter Potato (Plains), Sugarcane, Ginger, Chillies (Dry), Sesamum, Rapeseed & Mustard.
Delhi	Winter Potato (Plains) Onion	Summer Potato (Plains), Sugarcane, Chillies (Dry), Onion.
Andaman & Nicobar Inlands	—	Winter Rice.

(K)—Kharif (R)—Rabi

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