Publication Division

DIRECTORATE OF ECONOMICS AND STATISTICS
DEPARTMENT OF AGRICULTURE AND CO-OPERATION
MINISTRY OF AGRICULTURE
GOVERNMENT OF INDIA
C-1, HUTMENTS, DALHOUSIE ROAD,
NEW DELHI-110011
PHONE : 23012669

Subscription

	Inland	Foreign
Single Copy	**: Rs.40.00**	**£ 2.9 or $ 4.5**
Annual	**: Rs.400.00**	**£ 29 or $ 45**

Available from :

The Controller of Publications,
Ministry of Urban Development,
Deptt. of Publications,
Publications Complex (Behind Old Secretariat),
Civil Lines, Delhi-110 054.
Phone : 23817823, 23817640, 23819689

Agricultural Situation in India

LXXI **SEPTEMBER, 2014** **No. 6**

CONTENTS

PART I

Officials of the Publication Division, Directorate of Economics and Statistics, Department of Agriculture and Co-operation, New Delhi associated in preparation of this publication :

D. K. Gaur—*Technical Asstt.*

S. K. Kaushal-*Technical Asstt.(P)*

The Journal is brought out by the Directorate of Economics and Statistics, Ministry of Agriculture. It aspires to present 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

Articles on the State of Indian Agriculture and allied sectors are accepted for publication in the Directorate of Economics & Statistics, Department of Agriculture & Cooperation monthly Journal "Agricultural Situation in India". The Journal intends to provide a forum for scholarly work and also to promote technical competence for research in agricultural and allied subjects. The articles in Hard Copy as well as Soft Copy in MS Word, not exceeding five thousand words, may be sent in duplicate, typed in double space on one side of fullscape paper in Times New Roman font size 12, addressed to the Economic & Statistical Adviser, Room No.145, Krishi Bhawan, New Delhi-11 0001, alongwith a declaration by the author(s) that the article has neither been published nor submitted for publication elsewhere. The author(s) should furnish their e-mail address, Phone No. and their permanent address only on the forwarding letter so as to maintain anonymity of the author while seeking comments of the referees on the suitability of the article for publication.

Although authors are solely responsible for the factual accuracy and the opinion expressed in their articles, the Editorial Board of the Journal, reserves the right to edit, amend and delete any portion of the article with a view to making it more presentable or to reject any article, if not found suitable. Articles which are not found suitable will not be returned unless accompanied by a self-addressed and stamped envelope. No correspondence will be entertained on the articles rejected by the Editorial Board.

An honorarium of Rs. 2000 per article of atleast 2000 words for the regular issue and Rs. 2500 per article of at least 2500 words for the Special/Annual issue is paid by the Directorate of Economics & Statistics to the authors of the articles accepted for the Journal.

PART II

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.

GENERAL SURVEY

Agriculture

Rainfall: With respect to rainfall situation in India, the year is categorized into four seasons: winter season (January-February), pre monsoon (March-May), south west monsoon (June-September) and post monsoon (October-December). South west monsoon accounts for more than 75 per cent of annual rainfall. The actual rainfall received during the Monsoon period 01.06.2014 – 16.09.2014, has been 727.7 mm as against the normal at 819.1 mm.

Table 1 shows kharif area coverage as on September 19 of 2014-15 and 2013-14. Since kharif sowing goes on till September/October, the acreage under kharif area is expected to improve further in the coming weeks. There has been a decline in the overall kharif coverage vis-à-vis the corresponding period of last year over the last week as on September 19.

TABLE 1 : KHARIF AREA COVERAGE – AS ON 19.09.2014

S.No.	Crops	Area sown (In Lakh hectares		% change over
		2014-15	2013-14	2013-14
1.	Rice	373.60	373.15	0.12
2.	Total pulses	100.05	107.71	-7.11
a)	Pigeon Pea (Tur/Arhar)	35.44	38.46	-7.85
b)	Urdbean	24.73	23.79	3.95
c)	Moongbean	21.15	23.96	-11.73
3.	Total coarse Cereals	182.07	195.25	-6.75
a)	Jowar	18.48	21.68	-14.76
b)	Bajra	68.34	74.67	-8.48
c)	Maize	78.23	81.91	-8.14
4.	Total Oilseeds	176.82	192.49	-13.78
a)	Groundnut	37.04	42.96	-13.78
b)	Soyabean	110.31	122.19	-9.72
5.	Sugarcane	48.74	50.32	-3.14
6.	Cotton	125.75	113.60	10.70
	Total Kharif Area	1015.18	1040.85	-2.47

Source: DAC.

All India production of food grains:

As per the 4th advance estimates released by Ministry of Agriculture on 14.08.2014, production of total food grains during 2013-14 is estimated at 264.77 million tonnes compared to 257.13 million tonnes in 2012-13.

TABLE 2: PRODUCTION OF MAJOR AGRICULTURAL CROPS (IN MILLION TONNES)

Crop	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14 (4th advance estimates)
Rice	99.18	89.09	95.98	105.30	105.24	106.54
Wheat	80.68	80.80	86.87	94.88	93.51	95.91
Total Pulses	14.57	14.66	18.24	17.09	18.34	19.27
Total Food grains	234.47	218.11	244.49	259.29	257.13	264.77
Total Oilseeds	27.72	24.88	32.48	29.79	30.94	32.88
Sugarcane	285.03	292.30	342.38	361.04	341.20	350.02

Procurement:

During the Kharif Marketing Season 2013-14 (Which spans from October, 2013 to September, 2014), the procurement of rice stood at 31.57 million tones as on 19.09.2014. During Rabi Marketing Season 2014-15 (Which spans from April 2014 to March 2015), the procurement of wheat was 28.02 million tones as on 11.07.2014.

TABLE 3: PROCUREMENT IN MILLION TONNES

Crop	2010-11	2011-12	2012-13	2013-14	2014-15
Rice	34.20	35.04	34.04	31.57 *	
Wheat	22.51	28.34	38.15	25.09	28.02 **
Total	56.71	63.38	72.19	56.37	

- Position as on 19.09.2014 ** Position as on 11.07.2014

Off-take:

Off-take of rice during the month of July, 2014 was 25.36 lakh tones. This comprises 21.94 lakh tones under TPDS and 3.42 lakh tones under other schemes. In respect of wheat, the total off-take was 17.15 lakh tones comprising 15.26 lakh tones under TPDS and 1.89 lakh tones under other schemes.

Stocks:

Stocks of food grains (rice and wheat) held by FCI as on September 1, 2014 were 57.28 million tones that is lower by 12.08 per cent compared to the level of 65.15 million tones as on September 1, 2013.

TABLE 4: OFF-TAKE AND STOCKS OF FOOD GRAINS (MILLION TONNES)

Crop	Off-take				Stocks	
	2011-12	2012-13	2013-14	2014-15 (Till July)	Sept. 1, 2013	Sept. 1, 2014
Rice	32.12	32.64	29.20	2.54	20.57	17.33
Unmilled Paddy #					9.28	6.65
Converted Unmilled Paddy in terms of Rice					6.22	4.46
Wheat	24.26	33.21	30.62	1.71	38.36	35.49
Total (Rice & Wheat)	56.38	65.85	59.82	4.25	65.15	57.28

Note: Buffer Norms for Rice & Wheat are 11.80 Tonnes & 20.10 Million Tonnes as on 1.7.2014 respectively.

Since September, 2013, FCI gives separate figures for rice and unmilled paddy with FCI & state agencies in terms of rice.

ECONOMIC GROWTH

As per the Provisional Estimates of the Central Statistics Office (CSO), the growth in Gross Domestic Product (GDP) at factor cost at constant (2004-05 prices) is estimated at 4.7 per cent in 2013-14 with agriculture, industry and services registering growth rates of 4.7 per cent 0.4 per cent and 6.8 per cent respectively. The GDP growth rate is placed at 4.7 per cent, 5.2 per cent in the first, second quarters respectively and 4.6 per cent each in the third and fourth quarters of 2013-14. GDP growth in the first quarter of 2014-15 recorded at 5.7 per cent is the highest in nine quarters.

TABLE 5: GROWTH OF GDP AT FACTOR COST BY ECONOMIC ACTIVITY (AT 2004-05 PRICES)

Sector		Growth			Percentage Share in GDP		
		2011-12	2012-13 (1R)	2013-14 (PE)	2011-12	2012-13 (1R)	2013-14 (PE)
1	Agriculture, forestry & fishing	5.0	1.4	4.7	14.4	13.9	13.9
2	Industry	7.8	1.0	0.4	28.2	27.3	26.1
a	Mining & quarrying	0.1	-2.2	-1.4	2.1	2.0	1.9
b	Manufacturing	7.4	1.1	-0.7	16.3	15.8	14.9
c	Electricity, gas & water supply	8.4	2.3	5.9	1.9	1.9	1.9
d	Construction	10.8	1.1	1.6	7.9	7.7	7.4

TABLE 5: GROWTH OF GDP AT FACTOR COST BY ECONOMIC ACTIVITY (AT 2004-05 PRICES)-*Contd.*

Sector		Growth			Percentage Share in GDP		
		2011-12	2012-13 (1R)	2013-14 (PE)	2011-12	2012-13 (1R)	2013-14 (PE)
3	Services	6.6	7.0	6.8	57.4	58.8	59.9
a	Trade, hotels, transport & communication	4.3	5.1	3.0	26.7	26.9	26.4
b	Financing, insurance, real estate & business services	11.3	10.9	12.9	18.0	19.1	20.6
c	Community, social & personal services	4.9	5.3	5.6	12.7	12.8	12.9
4	GDP at factor cost	6.7	4.5	4.7	100	100	100

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

TABLE 6: GROWTH OF QUARTERLY ESTIMATES OF GDP AT CONSTANT (2004-05) PRICES

Sectors		2011-12				2012-13				2013-14				2014-15
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
1	Agriculture, forestry & fishing	6.5	4.0	5.9	3.4	1.8	1.8	0.8	1.6	4.0	5.0	3.7	6.3	3.8
2	Industry	10.1	8.2	6.9	6.3	0.3	-0.4	1.7	2.1	-0.4	2.6	-0.4	-0.2	4.2
a	Mining & quarrying	0.3	-4.6	-1.9	5.8	-1.1	-0.1	-2.0	-4.8	-3.9	0.0	-1.2	-0.4	2.1
b	Manufacturing	12.4	7.8	5.3	4.7	-1.1	0.0	2.5	3.0	-1.2	1.3	-1.5	-1.4	3.5
c	Electricity, gas & water supply	8.5	10.3	9.6	5.4	4.2	1.3	2.6	0.9	3.8	7.8	5.0	7.2	10.2
d	Construction	8.9	11.9	12.2	10.2	2.8	-1.9	1.0	2.4	1.1	4.4	0.6	0.7	4.8
3	Services	6.7	7.0	6.5	6.1	7.2	7.6	6.9	6.3	7.2	6.3	7.2	6.4	6.8
a	Trade, hotels, transport & communication	5.5	4.7	4.0	3.3	4.0	5.6	5.9	4.8	1.6	3.6	2.9	3.9	2.8
b	Financing, insurance, real estate & business services	11.3	12.0	11.1	11.0	11.7	10.6	10.2	11.2	12.9	12.1	14.1	12.4	10.4
c	Community, social & personal services	2.4	5.4	5.7	5.7	7.6	7.4	4.0	2.8	10.6	3.6	5.7	3.3	9.1
4	GDP at factor cost	7.6	7.0	6.5	5.8	4.5	4.6	4.4	4.4	4.7	5.2	4.6	4.6	5.7

Source : CSO

Future of Indian Agriculture: Prospects and Challenges

H. R. Prajapati* and Dr. Indira Dutta**

Abstract

This paper explores the past, present and future scenario of Indian agriculture, with the help of secondary data sources. What will be the nature of food demand and Supply in future? Is any change will occur in the demand of the Indian domestic food basket? Is technological progress and agriculture intensification will meet the future domestic demand of food grains? This paper searches the some of the probable answers to these questions. The nature of Indian agriculture is domestic demand driven and the direction is diversified according to demand of domestic market to a large extent. Technology will play a key role but need to operate it an affable atmosphere for more effectiveness.

Key Words: *Indian Agriculture, Prospects, Challenges*

Introduction

India has made tremendous progress in agricultural production after the green revolution and was possible due to adoption of new farming techniques, high yielding variety of seeds, use of fertilizers, increasing irrigation facility and availability of electricity. The success of this achievement goes to the millions of small and marginal farmers that had contributed their physical and mental efforts. The policy supports production strategies, public investment in infrastructure, technological progress, research and extension for crops, livestock and fisheries all have significantly contributed to increase food production and its availability. During the last 62 years, India's food grain production increased from 50.8 million tons (Mt) to 259.32Mtduring the period of 1950-51 to 2011-12. The above increase in production was not merely due to expansion of cultivated area, but it happened mainly due to increase in productivity of food grains from 522 kg/ha to 1757 kg/ha. The cropping intensity of 137 percent has registered an increase of only 26 percent since 1950-51. The net sown area was 118.55 Mha in 1951 and it has increased 141.36 in 2009. Presently, the total net irrigated area is 45.5 percent of the net sown area, the remaining 54.5 percent is rain fed. The Availability of net per capita food grains has increased from 454gm/ day to 476 gm/day during the period 1981 to 2011 even as the country's population almost doubled (MOA, 2011).

The nature of Indian agriculture is steadily domestic demand driven and it may accelerate in the coming future. The agricultural diversification in cropping pattern is basically driven by the commercialization of agriculture market since economic reform. The major impact of faster income growth was on domestic demand leading a process of demand diversification in a large scale (Alagh, 1989/1995). He again pointed out in his memorial lecture 2011 that the Expansion and diversification of the consumption

* Ph.D. Scholar, Center for Studies inEconomic and Planning, School of Social Sciences, Central University of Gujarat. Mob: 7838396513, Email: harry.cug@gmail.com ** Associate Professor, Center for Studies inEconomic and Planning, School of Social Sciences, Central University of Gujarat.Sector 30, Gandhinagar, Gujarat

basket were basically driven by a higher growth performance of the Indian economy since the 1980s. A minimum amount of agro-based items is essential in the consumption baskets of different income groups. These items are not for elite consumption alone. As people are better off, they drink more milk; eat more eggs, vegetables, fruits and cheese on a daily basis. This happened in the nineties and by now this diversification of food basket is well known. Demand will depend largely on income growth, taste preference and population growth.

The higher growth of the population projected at 1.4 billion in 2030[1] and income provide the base for domestic demand of food grains. The decadal growth of cereal demand has recorded 13 percent. On the other hand growth for demand of fruits and vegetables, eggs, chicken and milk are much higher. The decadal growth figures for potatoes are 24 percent, 30 percent of vegetables, 40 percent for milk, 200 percent for eggs and 250 percent for chicken. The Demand for beef, mutton and pork also goes up but it hicks in religious reasons and make absolute figures low. The low growth of cereal demand is compensated by the very high demand growth of non-cereal based and non-crop based agricultural goods (Alagh, 2011). There are, however, two perspectives on the relative importance of grains in India's agricultural future demand projections.

The fluctuation in agriculture prices of agriculture commodities is seen in the current decade. It was happened due to deficit of supply food items and holding of big traders. In future composition has been shifted towards fruits, vegetables, pulses, milk, eggs, chicken and meat. Therefore require acceleration of growth of allied sector along with the agricultural growth beyond the current 4 percent target rate, or a rise in imports. With limited land and water resources, the acceleration of agricultural growth requires. It will be possible through adopting the organic farming methods along with conventional farming method that will sustainable growth in agriculture and full fill the current demand with considering the health of soil and quality of produce.

The Consumption Pattern of Food Items

Keynes has long back propounded that as soon as income increases the consumption also increase, but not in the same proportion. The various studies have analyzed the consumption pattern of Indian rural and urban consumers. For instance Bansil (1998) stated that the per capita cereal consumption had stabilized at about 135 kg per year in urban areas, while it had actually declined from 185 kg to 175 kg per year during the last two decades (1972-73- 1993-94) in rural areas. Joshi (1998) had been used a 30 days reference period for food consumption and found that the average monthly per capita cereal consumption in urban area of India appears to have fallen from 11.24 kg in 1972-73 to 10.63 kg in 1993-94 and the corresponding rural figure are 15.26 kg to 13.40 kg. Kumar et al., (2007) and Mittal, (2007) pointed out that sustained economic growth, increasing population and changing lifestyles is causing significant changes in the Indian food basket, away from staple food grains towards high-value horticultural and animal products. Kumar et al., (2009) again found that per

[1] Source: F.A.O., 2006 as quoted in F.A.O., 2008, p.24.

capita consumption of food grains has declined; their total consumption has increased due to increasing population. Also, changes in the dietary pattern towards animal products have led to an increased demand of food grains as feed for livestock. Nonetheless, food grains, particularly rice and wheat, continue to be the main pillars of India's food security.

Table 1 shows a declining trend in the annual per capita consumption of food grains. The Consumption of per capita cereals declined from 140.3 kg per annum in 1983 to 131.39 kg per annum in 2009-10. The tastes preference and income have attributed to diversification in food consumption, easy access to supply of other high value agricultural commodities, changed tastes and preferences, as well as change in relative prices of food items. Higher economic growth and per capita incomes have contributed to reduction in per capita demand for cereals. While the annual per capita consumption of rice, wheat and pulses changed marginally between 1983 and 2009-10, the per capita consumption of edible oil has almost doubled. Sugar consumption also increased significantly from 9.7 kg per annum in 1983 to 12.1 kg per annum in 1999-2000, again remains same with marginal falls 9.46 kg per annum in 2009-10.

Table 1 Per capita consumption pattern of food grains in India (Kg/Annum)

Food Items	*Annual Per Capita Consumption*					
	1983	*1987-88*	*1993-94*	*1999-2000*	*2004-05*	*2009-10*
Rice	68.1	73.1	67.3	66.8	72.9	69.97
Wheat	47.9	49.1	43.8	45.6	52.7	52.97
Total Cereals	140.3	138.7	123.0	120.7	138.2	131.39
Pulses	10.1	10.3	8.1	10.6	8.5	8.39
Edible oil	4.1	4.7	4.7	8.7	6.45	8.35
Sugar	9.7	10.0	8.9	12.1	9.49	9.46

Source: *S. Mittal (2008), based on consumer expenditure survey of National Sample Survey, Rounds 38, 43, 50, 55,61 and 66 pertaining to the periods 1983, 1987-88, 1993-94, 1999-2000, 2004-05 and 2009-10.*

Table 2 illustrates average annual rate of growth of per capita consumption during the different NSS rounds 1983-1988, 1988-1994, 1994-2000, 2000-2005 and 2005-10. Total consumption of cereals shows a negative growth rate in three rounds period but during 2000-05 shows positive trend and then again negative for the year of 2009-10. Annual per capita consumption of edible oil has shown a significant increase 2.93 (1983 to 88) to 17.02 (1994 to 2000) between two NSS rounds, but during 1988 to 1994 growth was 0.00 and the next period was negative then for 2005 to 2010 was 5.89 percent annually. Sugar also witnessed a higher rate of growth in per capita consumption in the 1994-2000. This is followed by a significant increase in the consumption of pulses, followed by rice. According to Engel's law, a rise in income brings about a fall in per capita consumption of staple food and this is indicative of improvement in the welfare of people.

TABLE 2 ANNUAL AVERAGE GROWTH RATE[1] OF PER CAPITAL CONSUMPTION

Food Items	1983-88	1988-94	1994-2000	2000-05	2005-10
Rice	1.47	-1.59	-0.15	1.83	-0.80
Wheat	0.50	-2.16	0.82	3.11	0.10
Total Cereals	-0.23	-2.26	-0.37	2.90	-0.99
Pulses	0.40	-4.27	6.17	-3.96	-0.26
Edible oil	2.93	0.00	17.02	-5.17	5.89
Sugar	0.62	-2.20	7.19	-4.32	-0.06

Source: Computed from Table 1

Future Projection of food Demand

The future demand of food items is based on the past behaviour of consumers' tastes preferences and expenditure elasticity on food. Bhalla and Hazell (1997) had made an attempt to project food demand for India in 2020 under alternative income growth scenarios at 3.5 and 5.5 percent growth in per capita income. Their results showed that whether India will have a manageable cereal demand in 2020 depends critically on what happens to the livestock sector. Rapid economic growth, particularly if it is accompanied by significant reductions in poverty, will lead to escalating demand for milk, eggs and meats. These in turn will likely require changes in livestock production methods, with much greater use of cereals for livestock feed. This type of projection is called 'Baseline Scenarios'. Other, two scenarios called 'Poverty Removed' and 'Well-Fed India' are also attempted.

India has made enormous progress in providing food security for its people. The growth of food production has exceeded the growth of population. The availability of per capita food increased from 167 kg per year during 1980-1990 to 174 kg per year during 1990-2000. Indian policy makers have shifted their focus from self-sufficiency to generating additional income in rural area (Ahluwalia 2004). According to Directorate of Economics and Statistics, Department of Agriculture and Cooperation Data (2011), per capita net availability of food grains had increased from 144.1 kg per annum in 1951 to 186.2 kg per annum in 1991 and again fell to 165.9 kg per annum in 2000 and 160.1 kg per annum in the year of 2010.

India is continuing to be self-sufficient in food grain in the years ahead with declining net cropped area. Food grain production was driving the agricultural sector growth a natural consequence of high priority food policy regime pursued since independence to till 1990. After economic reform, the non food grain sector appeared and taken over the traditional food gain sector. Table 3 shows that the production of major food grains over the last 60 years. The higher growth has taken place in rice and wheat production while coarse cereals and particularly pulses are lagging behind. The table 3 also illustrates a decelerating growth of food grain production during 1990-2000. But during the period of 2000-01 to 2010-11 the growth rate again marginally increased from 1.1 percent to 2.19 percent.

[1] Average annual growth rates computed in this paper is compound annual average growth rates across the all NSS round and the base year is summed the previous round.

TABLE 3 PRODUCTION OF FOOD GRAINS IN INDIA (MILLION TONS)

Period	*Rice*	*Wheat*	*Coarse Cereals*	*Pulses*	*Total food grains*	*Growth Rate*[1]
1950-51	20.58	6.46	15.38	8.41	50.82	-
1960-61	34.58	11.00	23.74	12.70	82.02	4.90
1970-71	42.22	23.83	30.55	11.82	108.43	2.83
1980-81	53.63	36.31	29.02	10.63	129.59	1.80
1990-91	74.29	55.14	32.70	14.26	176.39	3.13
2000-01	84.98	69.68	31.08	11.07	196.81	1.10
2010-11	95.98	86.87	43.40	18.24	244.49	2.19

Source: Ministry of Agriculture, Government of India

The projection of demand in general is estimated on the basis of assumptions about the base year demand, population, expenditure elasticity and economic growth. The domestic demand projections[1] for rice, wheat and total cereals are arrived at by adding up the Direct Demand by consumers and Indirect Demand for input and industrial use. It is observed that household food demand has been primarily driven by growth in population and income. For the calculation of projected demand expenditure elasticity are compiled from Mittal (2006)[2].

Mittal (2008) was chosen two scenarios and assume that the gross domestic product (GDP) growth rates to be 8 percent and 9 percent. In that period the growth rate of Indian economy ranged between 8 to 9 percent and thus he has chosen this range. Table 4 shows the future predictions food demand under two scenarios-I when economy grow at 8 percent and Scenario-II at9 percent. The growth in per capita income, under alternative scenarios, for computing demand projections is calculated by subtracting the population growth from income growth. Food demand forecasts for the years 2021 and 2026 at constant price of 1999-2000. Increase in the demand for total cereals and pulses are accounted on the basis of population growth and increase in demand for seed, animal feed and industrial use.

The demand for total cereal projected under scenario-I, 242.8 million tons (Mt) for 2021 and 273.5 Mt in 2026 if the economy grows at the rate of 8 percent per annum. The demand for rice, wheat and pulses is expected to be 96.9 Mt, 66.8 Mt and 38.7. Mt, for the year, 2021 and 102.2 Mt, 69.1 Mt and 51 Mt, for the year, 2026 respectively. Under scenario-II the demand of cereal will be 245.1Mt and 277.2 Mt for the year of 2021 and 2026, respectively. The demand for rice,

[1] Constant Annual Growth Rate (CAGR) calculated from the formula;

CAGR = ((End value/start value) ^ (1/(Period-1))-1

[2] The demand projections for the commodities are obtained through

$$D_t = d_0 * N_t (1+y* e)^t$$

Where, D_t is household demand of a commodity in year t; d_0 is per capita demand of the commodities in the base year; y is growth in per capita income; e is the expenditure elasticity of demand for the commodity; N_t is the projected population in year t.

wheat and pulses will be 96.8 Mt, 64.3 Mt and 42.5 Mt for the year, 2021 and 102.1 Mt, 65.9 Mt and 57.9 Mt, for the year, 2026 respectively. Increase in demand for pulses is quite evident as this is the major source of protein for the vegetarian population. Demand for edible oil is projected to be 40.9 Mt by2026 and sugar demand is expected to increase almost nine times (100.7 Mt) in 2026 from base year demand of 11.9 Mt.

TABLE 4 PROJECTION OF DOMESTIC DEMAND OF FOOD ITEMS IN INDIA (MILLIONS TONS)

Food Items	*Base year*	*Scenario I*		*Scenario II*	
	1999-2000	*2021*	*2026*	*2021*	*2026*
Rice	66.0	96.9	102.2	96.8	102.1
Wheat	44.9	66.8	69.1	64.3	65.9
Total Cereals	119.0	242.8	273.5	245.1	277.2
Pulses	10.4	38.7	51.0	42.5	57.9
Edible oil	8.6	26.7	35.3	30.2	40.9
Sugar	11.9	55.0	81.1	65.7	100.7

Source: S. Mittal (2008)

Note: Scenario I: GDP is 8 percent; Scenario II: GDP is percent. Domestic demand takes account of the demand for seed, feed, industrial use and wastage projected by Kumar (1998).

Table 5 shows annual per capita domestic demand projection for selected food items. The highest increment shows for oilseeds and sugar vis-à-vis total cereals in next two decades. The consumption of projected food items rice will marginally increase in both the scenarios and increased from 69.77 kg/annum to 72 kg per annum, but the consumption of wheat will reduce in the scenario I from 52.97 kg/annum to 49.6 kg/annum in 2021 and 48.9 kg/annum in 2026. But consumption of pulses, edible oils and sugar increase multiple times from the present level of 2009-10 NSS round.

TABLE 5 PROJECTED ANNUAL PER CAPITA DOMESTIC DEMAND FOR SELECTED FOOD ITEMS (KG/ANNUM)

Food Items	*NNS 66*	*Scenario I*		*Scenario II*	
	2009-10	*2021*	*2026*	*2021*	*2026*
Rice	69.97	72.0	72.3	71.9	72.2
Wheat	52.97	49.6	48.9	47.8	46.6
Total Cereals	131.39	180.4	193.4	182.2	196.0
Pulses	8.39	28.8	36.1	31.6	40.8
Edible oil	8.35	19.8	25.0	22.4	28.9
Sugar	9.46	40.9	57.4	48.8	71.2

Source: S. Mittal (2008) and NSSO 66 Round

The future projections of food demand have been made by different scholars under different assumptions related to population growth rates, expenditure elasticity's, at different base year, etc. Most of these made projections for rice, wheat, total cereals and pulses based on NSS consumer expenditure data. Table 6 presented comparisons of these studies predictions. Rosegrant et al. (1995) provided food projections for IFPRI's (International Food Policy Research Institute) 2020 vision based on the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT). They used demand elasticity and the technical coefficients synthesized from other sources, primarily from past studies.

TABLE 6 FUTURE PROJECTION OF FOOD DEMAND IN INDIA, BY DIFFERENT STUDIES (MILLION TONS)

Sources	Year	Rice	Wheat	Total Cereals	Pulses	Edible oil	Sugar
Ganesh et al.(2012)	2020	101.4	82.6	-	13.1	-	-
	2025	104.7	91.5	-	14.5	-	-
Chand (2007)	2020	-	-	261.5	19.1	-	-
Mittal (2008) Scenario-I (8 % GDP)	2021	96.9	66.8	242.8	38.7	26.7	55.0
	2026	102.2	69.1	273.5	51.0	35.3	81.1
Hanchate&Dyson (2004)	2026	-	-	217.6	16.0	-	-
Bhalla (2001)	2020	-	-	374.7	-	-	-
Thamarajakshi (2001)	2020	-	-	274.0	-	-	-
Rosegrant et al. (1995)	2020	-	-	237.3	-	-	-
Kumar (1998)	2020	122.1	102.8	265.7	30.9	-	-

Source: Ganesh et al. (2012),Mittal (2008), Chand (2007),Hanchate&Dyson (2004), Bhalla (2001), Thamarajakshi (2001), Rosegrant et al. (1995) and Kumar (1998)

Demand for total cereals projected by this paper in 2020 is 237.3 Mt. The study by Kumar (1998) used the Food Characteristic Demand System (FCDS). The total demand for cereals is projected to be 265.7 Mt in 2020. Bhalla (2001) computed demand for total cereals in 2020 as 374.7 Mt. By using new estimates on livestock growth. His estimates are based on the IMPACT model and based on the assumptions of GDP growth of 7.5-7.7 percent. Thamarajakshi (2001) estimated the total demand for cereals to be 274 Mt in 2020 under different assumptions of population and growth in urbanization.

Future Projection of food Supply

The future projection is based on the past experience of the medium and long-term supply of food items by using a straightforward approach. Supply projections have been calculated assuming the yield growths to be same as in the past decade. It is also assumed that the further area expansion will take place.

Supply prospects have been presented in Table 7 for selected food items rice, wheat, total cereals, pulses, oilseeds and sugarcane. Supply projections have been computed for the years, 2021 and 2026, using the yield growth for the period of 1993-2003 and taking 2003-04 as the base year for area and production. The projected yield figures for different crops, used in computation of future supply (see Mittal, 2008). He assumes that there is no area expansion and future supply is only dependent on yield growth, then the total supply of cereals will be 242.2 Mt in 2021 and 260.2 Mt in 2026. Rice and wheat production is also estimated to increase to 111.2 Mt and 97.9 Mt, respectively, by 2026. The diversification has been seen in the cropping pattern towards high-value commodities in major rice producing regions.

TABLE 7 PROJECTED DOMESTIC SUPPLY OF SELECTED FOOD ITEMS IN INDIA (MILLION TONS)

Food Items	Base Year 2003-04	Supply Projection	
		2021	2026
Rice	88.3	105.8	111.2
Wheat	72.1	91.6	97.9
Total Cereals	186.9	242.2	260.2
Pulses	14.9	17.6	18.4
Edible oil	8.6	12.5	13.9
Sugar	24.2	26.0	26.6

Source: Mittal (2008)

Note: Area and yield growth rates for the period 1994/95 to 2004-05 on the base period triennium ending 1993-94 are used from Agricultural Statistics at a Glance, 2007, Directorate of Economics and Statistics, GOI.

The Supplies of pulses are estimated to be 17.6 Mt in 2021 and 18.4 Mt in 2026 under the certain assumptions. Oilseed production is projected to go up to36.9 Mt in 2021 and 41.1 Mt in 2026 over the base year production of 25.3 Mt in 2003-04. Sugarcane has very low yield growth, thus the sugarcane production is estimated to be around, 255.2 Mt in 2021 and 260.5 Mt in 2026. The edible oil production is estimated to be 12.5 Mt in 2021 and 13.19 Mt in 2026. The sugar production is likely to be 26.0 Mt in 2021 and 26.6 Mt in 2026.

TABLE 8 FUTURE PROJECTION OF FOOD SUPPLY FOR INDIA, BY DIFFERENT STUDIES (MILLION TONS)

Sources	Year	Rice	Wheat	Total Cereals	Pulses	Edible oil	Sugar
Ganesh et al.(2012)	2020	135.9	96.3	-	-	-	-
	2025	153.1	102.0	-	-	-	-
Mittal (2008)	2021	105.8	91.6	242.2	17.6	36.9	255.2
	2026	111.2	97.9	260.2	18.4	41.1	260.5
Hanchate & Dyson (2004)	2026	-	-	265.8	23.7	-	-
Kumar & Mittal (2003)	2020	127.0	111.5	274.0	15.2	-	-

TABLE 8 FUTURE PROJECTION OF FOOD SUPPLY FOR INDIA, BY DIFFERENT STUDIES (MILLION TONS)-*Contd*

Sources	Year	Rice	Wheat	Total Cereals	Pulses	Edible oil	Sugar
Mittal (2000)	2020	149.3	128.5	-	-	-	198.1
Kumar (1998)	2020	134.0	127.3	309.0	-	-	-

Source: Gunesh et al. (2012), Mittal (2008),Hanchate & Dyson (2004), Kumar & Mittal (2003), Mittal (2000) and Kumar (1998)

The supply projections presented here were borrowed from different studies that used different assumptions of yield growth, cropping pattern shift, technological change, impact of input and output prices, etc. Table 8 present the supply projection of food items that were estimated by different scholars. Hanchante and Dyson (2004) computed supply projections for rice, wheat, total cereals, pulses, edible oil and sugars assuming constant area and yield productivity. According to their finding domestic production in 2026 will be 265.8 Mt for total cereals and 23.7 Mt for pulses with 1996-98 as the base year. Total estimates for cereals are quite close to the projected by Mittal 2008 as 260.2 Mt for the year of 2026, with 2003-04 as the base.

Kumar (1998) and Kumar & Mittal (2003) study had presented their estimation on future supply under assumptions of input and output prices, total factor productivity (TFP) growth and supply elasticity. Both projects a supply of 309.0Mt and 274.0Mt of total cereals, respectively, in 2020. The estimated supply of pulses in 2020 by Kumar & Mittal (2003) study is 15.2 Mt that was very close to the 17.6 Mt estimate of pulses production by Mittal (2008) to 2021. The Future supply of oilseeds and sugarcane has not been considered by other studies except for Mittal (2000). The estimates presented by Mittal (2008) for sugarcane is lower than that of Mittal (2000) himself because sugarcane yields are showing a declining trend in present years. All these studies are predicting that the future problem is related to scarcity of supply of the diversified demand basket of agriculture, food item, but not presented any solution that how can eliminate the future problem of supply constraints.

Future Projection of Supply-Demand Gap

The supply and demand gap is calculated on the basis of future supply minus demand. That can act as indicators to policy makers to formulate their medium and long-term agricultural policies. The increase in total demand for food items is mainly due to growth in population and per capita income. As far as supply in concerned, production is constrained by low yield growth.

Table 9 present that the demand for some food items is more than its supply and in other cases less than supply; it implies a deficit of the commodity in future for the total cereals, pulses, edible oils and sugar. The gap between supply and demand is widening over in coming future. The supply-demand gap for total cereals is expected to be -0.6 Mt in 2021 whereas it is projected at -13.3 Mt in 2026.The supply-demand gap for pulses, edible

oils and sugar present deficit supply -21.1 Mt, -14.2 Mt and -29.0 Mt respectively, for the year of 2021 and -32.6 Mt, -21.4 Mt and -54.5 Mt respectively for the year of 2026 that have serious concerns for policy makers. It will happen due to changes in taste preference for food baskets by the present generation.

TABLE 9 FUTURE SUPPLY-DEMAND GAP FOR SELECTED FOOD ITEMS (MT)

Food Items	2021			2026		
	Demand	Supply	(S-D)Gap	Demand	Supply	(S-D)Gap
Rice	96.9	105.8	8.9	102.2	111.2	9.0
Wheat	66.8	91.6	24.8	69.1	97.9	28.8
Total Cereals	242.8	242.2	-0.6	273.5	260.2	-13.3
Pulses	38.7	17.6	-21.1	51.0	18.4	-32.6
Edible oil	26.7	12.5	-14.2	35.3	13.9	-21.4
Sugar	55.0	26.0	-29.0	81.1	26.6	-54.5

Source: Calculated from table 3 and 6

The percentage average annual growth is presented in table 10 for the year of 2021 and 2026 but the base year is different for calculation of supply (1999-2000) and demand (2003-04). So the more differences can be seen in growth. The growth of demand is more than the growth of the supply of food items when the cultivated area being constant because the growth of population is more than the growth of food grains. The Rate of the growth of projected demand for the selected food items is much more than projected supply growths for these food items. For cereals the demand grows at a much higher rate than the domestic supply as 4.73 percent of demand and 1.64 percent for supply in the year of 2021, 4.81 and 1.71 for the year of 2026. This difference in growth rates is much higher for pulses, edible oil and sugar.

TABLE 10 ANNUAL GROWTH RATE OF PROJECTED SUPPLY AND DEMAND (PERCENT)

Food Items	2021		2026	
	Demand	Supply	Demand	Supply
Rice	2.13	1.10	2.03	1.13
Wheat	2.22	1.50	2.00	1.56
Total Cereals	4.73	1.64	4.81	1.71
Pulses	12.37	1.01	14.46	1.02
Edible oil	9.57	2.52	11.50	2.68
Sugar	16.46	0.41	21.54	0.43

Source: Calculated from Table 3 and 6 the base year, 1999-2000 for Demand (Scenario I) and 2003-04 for Supply projection

Prospects and Challenges

The Indian agriculture is conquered by the small and marginal farmers. Most of them do not have the capacity to adopt high cost conventional farming, so there is an urgent need alternative low cost farming system that increases productivity. Organic farming is labour-animal intensive farming techniques that will support the farmers. It has multiple gains first is animal provided organic compose for using in the fields at the place of chemical fertilizers. Second, livestock support the animal husbandry occupation that can increase the supply of milk and its related products. Third, it provides the employment opportunity of family members in their own villages. Fourth the use of organic fertilizer maintain the soil nutrients and prevent the degradation of soil quality. Fifth the uses of organic compose increase the guilty of products that have huge demand in the national and international market. Finally the organic farming is eco-friendly, labour intensive cost farming system that is appropriate for sustainable growth of Indian agriculture.

Various studies have found that the cost of organic farming is less than the conventional farming and productively lower in some crops and equal in other crops, but the net returns of organic growers are greater than the conventional growers, because the prices of organic producers are 25 to 50 percent more than the conventional produce. The yield enhancement is necessary by using less energy and water saving technologies. There are two major options for India to explore. One is promote the organic farming with multiple cropping patterns that can increase productivity without damaging soil nutrients. Another is conventional farming capital extensive high cost farming that has been made formers debater and resultant they force to suicide. The conventional farming needs more money for cultivation as compare to organic farming. In my opinion conventional foaming becomes for the solutions of future problems, but a consistent affords is necessity by the academic, policy makers, governments in this direction.

Another challenge is related to rain-fed areas, which constitute 55 percent of the net sown area of the country and are home to two-thirds of livestock and 40 percent of human population. Even after realizing the full irrigation potential, about 50 percent of the cultivated area will remain rain-fed. The business as usual approach of taking all the major interventions uniformly across all the regions of the country has not paid much dividend. Therefore, regionally differentiated interventions befitting natural resource endowment and livelihood status are the need of the hour. The approach adopted for prioritization of rain-fed areas of the country integrates the natural resources and livelihood indices and addresses the above issue (NRAA, 2012). The rain-fed area is the great challenge for enhancing the productivity, but the diversified orgasmic farming system may be solution for future challenges.

The real challenge on Indian agriculture is to meet the future diversified domestic demand for food items for the growing population. For meeting future domestic food requirement, the country either needs to increase agricultural production or depend on imports. When agricultural growth is limited, imports can help improve the country's supply situation in the short term. But for the long term, the

country will need to focus on productivity enhancement, through public investment in irrigation, research and efficient use of water, plant nutrition and other inputs (Kumar 1998, Fan et al 1999, Evenson et al 1999, Singh 2001). These policies will induce efficiency that can help in maintaining balance between domestic production and demand. These are the future challenges for policy makers that will be needed for inclusive development that increase the welfare of its rural poor;

First to increase the per unit agricultural productivity of land that can boost the agricultural growth as virtually all cultivable land is farmed. For increase yield productivity will need to diversification of higher value crops, and developing value chains to reduce marketing costs. By applying water efficient technology for irrigation must compete with increasing industrial and urban needs. *Second* the growth of agriculture must also benefit the small and marginal farmers, landless poor's, and all social groups through providing appropriate price of their crops and minimum wages for rural workers. There is a need to prevent the hoarding of food items and selling in off sessions. *Third* to ensure appropriate agricultural growth responds to future food security needs, by diversifying the cropping pattern according to change of taste preference of Indians.

The policy maker shifts their purity to develop a research system that will concentrate on self-service restaurant of crops and support for non-crop agriculture, including animal husbandry, aquaculture, fisheries, etc. these sectors will support to increase the production of fruits, vegetables, pulses edible oils, milk and eggs that can support to reduce future supply-demand gap. The main dangers, apart from anti-agricultural policy are management of natural resource domains. Agricultural research can fill in the gaps by using strategies for land and water management. In the Eleventh Plan was not covering the Perspective of the Economy, but in twelfth plan draft uses the word sustainable and inclusive that will sign for the focus on environmental and distributional concerned on India's future.

Conclusion

Overall the future prospects of Indian agriculture may be well. It has been predicted by the different studies that demand will grow faster than the supply in case of non cereal food items. So if the policy maker able to provide the proper incentive to farmers will meet the future demand as they had responded well in the past when Government policies were supportive. The paper concludes that supply-demand gap for total cereals is expected to be -0.6 Mt in 2021 whereas it is projected at -13.3 M t in 2026. The supply-demand gap for pulses, edible oils and sugar present deficit supply -21.1 Mt, -14.2 Mt and -29.0 Mt respectively, for the year of 2021 and -32.6 Mt, -21.4 Mt and -54.5 Mt respectively for the year of 2026 that have serious concerns for policy makers. The consumption of food, water and air are necessary but not a sufficient condition for overcoming the problem of malnutrition in India. For the better future, there is a need to focus on the quality of these items that can be chive through caring nature.

References

G S Bhalla (2001): Demand and supply of food and feed grains by 2020 in the book Towards Hunger Free

India edited by M.D, Asthana and Pedro Medrano. New Delhi, Manohar.

GS Bhalla and P. Hazell (1997): Foodgrains Demand in India to 2020: A Preliminary Exercise, *Economic and Political Weekly* December 27, pp-A150-A154.

Hanchante and T Dyson (2004): Prospects for food demand and supply in the book twenty first century India, edited by Tim Dyson, Robert Cassen and L. Visaria, Oxford University Press.

Joshi (1998): Changing Pattern of Consumption Expenditure in India and Some Selected States, Sarvekshana Analytical Report No.2. New Delhi, India: Ministry of Planning and Programme Implementation.

M S Ahluwalia (2004): Reducing Poverty and Hunger in India: The role of Agriculture, IFPRI Annual Report Essay 2004-05.

M W Rosegrant, M Agcaoili-Sombilla, and N D Perez, (1995): Global Food Projections to 2020: Implications for Investment, 2020 Discussion Paper No. 5. Washington, D.C.: IFPRI.

P Kumar and V C Mathur (1996): 'Structural Changes in the Demand for Foodgrains in India', *Indian Journal of Agricultural Economics*, Vol 51, No 4, pp 664-73.

P Kumar, Mruthyunjaya and D M, Madan (2007) Long-term changes in food basket and nutrition in India, *Economic and Political Weekly*, (September 1): 3567- 3572.

P C Bansil (1998): Demand for Foodgrains by 2020, *Economic and Political Weekly,* March 7, pp 546-48

P Kumar (1998): Food Demand and Supply Projections for India, Agricultural Economics Policy Paper 98-01, Indian Agricultural Research Institute, New Delhi.

P Kumar and S Mittal (2003): Productivity and Supply of Food grains in India in book Towards a Food Secure India: Issues & Policy, edited by S Mahendra Dev et al., Manohar Publishers and Distributors, pp: 33-58.

P Kumar, P K Joshi and P S Birthal (2009): Demand Projections for Foodgrains in India, *Agricultural Economics Research Review Vol. 22*, pp 237-243

R E Evenson, C Pray and M W Rosegrant (1999) Agricultural Research and Productivity Growth in India, IFPRI Research Report No. 109, Washington, D.C.: International Food Policy Research Institute

R Thamarajakshi (2001): Demand and Supply of food grains in 2020 in the book Towards Hunger Free India edited by M.D, Asthana and Pedro Medrano. New Delhi, Manohar.

S Mittal (2006): Structural Shift in Demand for Food: India's prospects in 2020. ICRIER Working Paper No. 184

S Mittal (2008): Demand-Supply Trends and Projections of Food in India ICRIER Working Paper No. 209

S Mittal (2000): Productivity and Sources of Growth for Major Cereal and Non-Cereal Crops

in India: Implications for Food Security and Self Reliance, PhD Dissertation. Dr. Bhimrao Ambedkar University, Agra.

S Mittal (2007): what effect changes in cereal consumption? *Economic and Political Weekly,* (February): 444-447.

Y K Alagh (1989/1995): Planning and Policies for Indian Agricultural Research, Shastri Memorial Lecture, Reprinted in ICAR, Landmarks in Indian Agriculture.

Y K Alagh (2011): The Future of Indian Agriculture, in the memorial lecture by Dr. B.P. Pal, the memory of Dr. B.P. Pal, 21/06/2011.

NRAA Report (2012) Prioritization of Rain-fed Areas in India, National Rain-fed Area Authority Planning Commission, Government of India, New Delhi, Study Report 4.

Extent of Technological Gap in Adoption of Paddy Cultivation Technology by the Paddy Grower Farmers of Uttar Pradesh: The Role of Technology in Modern Agriculture

PUSHPA[*], KAVITA PAL[**] & S.K.SRIVASTAVA[***]

Abstract

History shows that farmers and their supporting institutions have been successful in introducing technological innovations to respond and adapt to environmental and socioeconomic challenges. Innovation itself is a mechanism by which society adapts to changing resource endowments, and which is in turn driven by social and cultural values. And adoption of technological innovation in agriculture has attracted considerable attention in India because the majority of the population in India derives its livelihood from agricultural production and because new technology seems to offer an opportunity to increase production and income substantially. But the introduction of many new technologies has met with only partial success, as measured by observed rates of adoption. Using Eastern Region of Uttar Pradesh as a case, this paper illustrates how farmers and their supporting institutions are evolving and co-producing technologies. The study was conducted in Deoria district of Uttar Pradesh use of multi stage stratified random sampling technique was made in the present investigation. Rudrapur and Gauribazar blocks from Deoria district were randomly selected. Thus the study was based on 80 farmers sample size, which shows that higher technological gap was observed in seed treatment, disease management, improved verities, recommended dates of sowing, adoption of plant nutrients and insect pest management. The average technological gap of the respondent paddy growers was 69.5 per cent. The major suggestions made by the respondent paddy growers for minimizing technological gap were developing the irrigation network with government aid, provision of quality seeds and fertilizers at required time and place. Developing technical know- how and training on major practices to needy farmer.

Introduction

Whenever agriculture as well as the food grains of India is talked about, rice comes first. It is primarily staple food for more than 2.5 billion people. Rice cultivated in an area of 155 million hectare of land with production of 596 million tonnes in world (FAO Stat 2006).

Among major rice growing countries India ranks first in area (43.8 million ha.) followed by China (28.67 million ha.). But in terms of productivity India is far behind from other major rice growing countries like China, Japan, U.S.A. and Egypt. This low level of productivity can be tackled substantially by growing high yielding varieties/hybrids and by

[*] Division of Dairy Economics Statistics & Management (NDRI), Karnal – 132 001, Haryana
[**] National Centre for Agricultural Economics and Policy Research, New Delhi-110012
[***] G.B. Pant University of Agriculture & Technology, Pantnagar – 263 145, Uttarakhand

increasing both the area under balanced fertilizer use and application rates. West Bengal, Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Punjab, Madhya Pradesh and Karnataka, contributes more than 85 per cent of rice production.

Uttar Pradesh is one of the most important states of the country in terms of agricultural production and most populous province in India which occupies 7.3 percent of the country's area and feed 21.1 per cent of its population. The state is well known for its success in the green revolution and is a major higher producer of food grains, sugarcane and potato in the country. The agriculture sector of Uttar Pradesh is the most significant sector, which not only contributes around one third of state's gross domestic product, but also provides employment to about seventy percent of its population. This state plays an important role in agricultural production of the country and contributes 21 percent in cereals, 18.5 percent of pulses and 6.0 percent in oilseeds, while it occupies only 12 percent net agricultural area of the country. The agricultural growth performance of Uttar Pradesh over the thirty years period from mid 1960s to mid 1990s undoubtedly speaks of the successful implementation of new technology package in the various crops. The statistical data of area and production for the year 2008-09 shows that the average yield of paddy per hectare in Deoria district was observed 17.33 quintals per hectares as against 40.07 quintals per hectare in Uttar Pradesh. This indicates that the average per hectares yield of paddy crop in Deoria district is much less than the average yields of paddy in Uttar Pradesh and India. At present the, the efforts are also being made for transfer of technology to potential users as quickly as possible. But there exist gap between scientific information involved and its utilization by ultimate users and this may one of the reasons for low productivity in paddy. In view of the study the specific objectives of the present study is so below;

To examines the level of technology adoption of respondent's paddy growers from Deoria district of Uttar Pradesh.

To obtain the constraints faced by the paddy growers in full adoption of optimum dates of sowing and optimum plant nutrients.

Methodology

The Study Area

The study was conducted in Deoria district of Uttar Pradesh. Keeping in mind the objectives of the study, multi stage stratified random sampling technique was used. Out of 16 development block, two blocks namely *Gauri bazaar* and *Rudrapur* were selected randomly then one village from each selected block i.e. Pananha village from Gauri bazaar and Dharauli from Rudrapur block were selected randomly. Then two adjoining villages of *Pananha* and Dharauli namley Surajpur, Khairabanwa and Gahila, Tarasara were selected respectively. Thus in this way cluster of three villages ware formed in each selected block. In third stage farmers were classified into different categories of marginal (less than 1 ha of land), small (1-2 ha) medium (2-4 ha) and large (more than 4 ha). Then 20 farmers from each category were selected on the basis of probability proportion to their size from both the clusters of villages, respectively. Thus the study was based on 80 farmers sample size.

Analytical Tools

In order to attain the first objective the technology adoption level; will be examined in two parts, one at individual component level and another at aggregate technology level. So in this study adoption level of individual technology and deviation from recommended level was examined separately for each selected crop. And to examine the overall technology adoption level, an aggregative index will be prepared as given by ***Dhondiyal.***

$$L = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{X_i}{R_i}\right]\times 100$$

Where,

L= Level of technology adoption (%)

n= Number of technological factors

X_i = Actual level of i^{th} technology

R_i = Recommended level of i^{th} technology

i = 1, 2, ----------, n

The technology adoption index thus prepared varies from 0 to 100. Farmers were categorized depending upon their technology adoption level as per the criteria given below.

TABLE 1: TECHNOLOGY ADOPTION INDEX

Extent of technology adoption (%)	Adoption category
0-25	Low
25-50	Medium
50-75	High
75-100	Very high

Source: Dhondhiyal, 1991

To achieve the second objective i.e. constraints in technology adoption, the sample farmers were asked to rank the problems faced by them in adoption of new farm technology. Then the ranks given to a constraint by the farmers were changed into percent position by using the following formula:

Percent position = 100(Rij-0.50)/Nj

R_{ij} =Rank given for i^{th} item by j^{th} individual, Nj = Number of items ranked by j^{th} individual. Then the per cent of rank, for a single constraint was added for total farmers to give the overall percent position which was calculated by dividing sum of per cent of rank for total sample for a constraint by number of respondents. The average per cent position was then converted to scores by referring to the transmutation table, given by Garret's. The ranks were finally assigned by arranging the scores in descending order.

Results and Discussion

Adoption of high yielding varieties

TABLE 2: ADOPTION OF HIGH YIELDING VARIETIES ON DIFFERENT SIZE GROUP OF FARMS

(Per cent)

Farm size group		Paddy
Marginal	F	100
	A	100
Small	F	100
	A	100
Medium	F	100
	A	100
Large	F	100
	A	100

Note: Where, F denotes per cent of farmers and A denotes per cent of area under HYV

Table reveals that there is no Gap in adoption of High Yielding Varieties of Paddy and all the farmers across the size group adopted HYV of paddy. In case of coverage of area it was found that cent percent farmers in the study area had sown HYV of seeds on their paddy field.

Adoption of recommended dates of sowing

TABLE 3: ADOPTION OF RECOMMENDED DATES OF SOWING ON DIFFERENT SIZE GROUP OF FARMS

(Per cent)

Farm size group		Paddy
Marginal	F	45
	A	50
Small	F	75
	A	65
Medium	F	55
	A	50
Large	F	65
	A	60

Note: Where, F denotes per cent of farmers and A denotes per cent of area under HYV

Table revealed that about 45 per cent of marginal farmers and 75 per cent of small farmers have planted their paddy crop at optimum sowing time. The technological gap vary from 40 to 55 per cent i.e. among all the categories of farmers marginal farmers are having 55 percent Gap in full adoption of this particular technology. Only 45 percent of farmers had shown paddy crops on recommended dates and time. Whereas 75 percent of small farmers which is more than medium and large farmers had shown paddy crops on recommended time and date. Being poor in agricultural resources, still the highest area was planted at optimum time by the small farmers, which is quite surprising that more than half of the area on small farms had shown on recommended date and time.

Adoption of recommended seed rate

Table reveals that though, on all farms size groups under paddy crop the seed quantity was used more than that of recommended seed rate, maximum deviation was observed on medium farms wherein 119.37 per cent of optimum quantity of seed was used. In adoption of this particular technology there is no Gap in rate of adoption.

TABLE 4: QUANTITY OF SEED USED AND DEVIATION FROM RECOMMENDED LEVEL

(Kilogram per hectare)

Particulars		Paddy
Recommended doses		40
Marginal	A	40.5
	D	0.5
	P	101.25
Small	A	42.75
	D	2.75
	P	106.87
Medium	A	47.75
	D	7.75
	P	119.37
Large	A	46
	D	6
	P	115

Where; A= Average use, D= Deviation from recommended level, P=Percentage use of recommended level.

Adoption of treated seed

Figures indicate that there is positive association between the percentage of farmers using the treated seed and the farm size. The table reveals that only 20 per cent of large farmers had sown treated seed as against about zero per cent of marginal farmers. The adoption of treated seed under medium farms was found almost at par with adoption level under large farms. Quite a similar picture was emerged with respect to adoption of treated seed by medium and small farmers.

TABLE 5: ADOPTION OF TREATED SEED ON DIFFERENT SIZE GROUP OF FARMS

(percent)

Farm size group	Paddy
Marginal	0
Small	10
Medium	16
Large	20

In next section, the research had discussed about the constraints of adoption of all these technologies and sown that poor knowledge regarding importance of seed treatment and chemical use majority of the farmers under different categories of farms felt that appropriate chemical is not known for different insects and diseases.

Adoption of Plant Protection Chemicals

The adoption of plant protection chemicals was nil on marginal farms in all the three crops. About 15, 30 and 60 per cent of small, medium and large farmers had adopted plant protection measures and made an average expenditure of Rs. 240.25, 375 and 591.5 per hectare, respectively in paddy crop.

Table 6: Adoption of plant protection chemicals and expenditure therein

Farm size group/ Crop		Paddy
Marginal	F	-0-
	A	-0-
	R	-0-
Small	F	15
	A	293.25
	R	250-350
Medium	F	30
	A	375
	R	200-500
Large	F	60
	A	591.5
	R	350-700

Where, F denotes per cent of farmers', F denotes Average expenditure incurred (Rs/ha) and R denotes range of expenditure (Rs/ha)

Adoption of fertilizers

Figures indicate that though there is positive correlation between amount of nitrogen use and in farm size. However, the picture with respect to comparison of recommended dose of nitrogen and actual use is not the same in all the crops. Nitrogen use per hectare is quite in excess as compared to recommended level across the different size of farms.

It is revealed from the table that in paddy crop marginal farmers had applied about 89 per cent of recommended dose whereas, on other size group of farms nitrogen was used in excess amount to the extent of about 11.5 percent on small farms to 21.5 percent on large farms.

TABLE 7: QUANTITY OF NITROGEN USED AND DEVIATION FROM RECOMMENDED LEVEL

Particulars		Paddy
Recommended doses		120
Marginal	A	107.2
	D	-12.8
	P	89.33
Small	A	131.5
	D	11.5
	P	109.58
Medium	A	136
	D	16
	P	113.3
Large	A	145.82
	D	25.82
	P	121.58

Where, A= Average use, D= Deviation from recommended level and P= Percentage use of recommended level

TABLE 8: QUANTITY OF PHOSPHORUS USED AND DEVIATION FROM RECOMMENDED LEVEL

(Kilogram per hectare)

Particulars		Paddy
Recommended doses		40
Marginal	A	18.5
	D	-21.5
	P	46.25
Small	A	20.25
	D	-19.25
	P	50.62
Medium	A	22.55
	D	-17.45
	P	56.37
Large	A	28.82
	D	-11.18
	P	72.05

Where, A= Average use, D= Deviation from recommended level and P= Percentage use of recommended level

Table reveals that against the recommended level of 40 kilo grams per hectare in paddy crop, phosphorus use has ranged from 18.5 kilo gram on marginal farms to about 27 kilo grams per hectare on large farms. Thus it is concluded marginal differences was observed in use of phosphorus on all farm size groups while this difference was quite high between marginal and large farms. Marginal farmers were found to be applying lowest quantity of phosphorus as compared to its use on other farm size groups. It emerged that there is ample scope for use of phosphorus in different crops in Deoria district of Uttar Pradesh.

Level of Potash Use

TABLE 9: QUANTITY OF PHOSPHORUS USED AND DEVIATION FROM RECOMMENDED LEVEL

(Kilogram per hectare)

Particulars		Paddy	Wheat	Sugarcane
Recommended doses		40	40	60
Marginal	A	-0-	-0-	-0-
	D	-40	-40	-60
	P	-0-	-0-	-0-
Small	A	-0-	-0-	-0-
	D	-40	-40	-60
	P	-0-	-0-	-0-
Medium	A	-0-	5.75	3.12
	D	-40	-34.22	-56.88
	P	-0-	14.37	5.2
Large	A	-0-	8.39	18.31
	D	-40	-31.61	-41.69
	P	-0-	20.97	30.51

Where, A= Average use, D= Deviation from recommended level and P= Percentage use of recommended level

The table reveals that none of the farmers in paddy crop had applied potash. It is, therefore, concluded that despite of being an important plant nutrient, K was used in almost negligible quantity in all the crops. No use of K was found on marginal farms.

Nutrient use ratio

It is depicted from the table that generally all the farmers across the farm size groups were using inappropriate nutrient ratio, and none of the marginal farmers were applying potash fertilizer in their field. The table also reveals that Nitrogen was in higher proportion compared to other nutrients and the highest ratio for all the crops were used by large farmers.

TABLE 10: NUTRIENT USE RATIO

Crops/ Particular	Paddy
Recommended ratio	3:1:1
Marginal	5.7:1:0
Small	6.4:1:0
Medium	6.03:1:0
Large	5.05:1:0

TABLE 11: USE OF GREEN MANURE AND FYM (Percent)

Use of green manure and FYM	Farm size group			
	Marginal	Small	Medium	Large
Farmers practicing green manure	-0-	-0-	15	25
Farmers willing to use more green manure	-0-	35	35	40
Farmers practicing FYM	100	100	100	100
Farmers willing to use more FYM	30	35	45	55

Table reveals that only medium and large farmers were practicing green manuring but their proportions were very low. Marginal and small farmers though, impressed by green manuring were handicapped to spare land for the purpose in view of their small holdings. The proportion of farmers willing to adopt green manure ranges between 35 per cent on small farms to about 40 per cent on large farms. All the farmers across the farm size were practicing use of FYM in the crops. However, they were interested to use FYM at higher level.

Level of Irrigation

Irrigation water has a key role in enhancing the crop productivity. An adequate moisture supply to plants is a pre-requisite for an efficient use of farming inputs. Therefore, the application of irrigation water in major crops grown in the study area on different size of farms was analyzed in terms of number of irrigations, and percentage of farmers applying different number of irrigations. Crop wise results are presented in the table.

TABLE 12: IRRIGATION INTENSITY IN PADDY CROP ON VARIOUS SIZE GROUP OF FARM

(Per cent)

Crop	No. of irrigation	Marginal	Small	Medium	Large
Paddy	5	55	40	5	-0-
	6	25	25	20	5
	7	20	20	35	30
	8	-0-	15	20	35
	9	-0-	-0-	15	20
	10	-0-	-0-	5	10

Perusal of table indicates that against the five critical growth stages for irrigation in paddy crop, 5 to 10 irrigations were applied to this crop in the region with varying magnitude across the farm size groups. Majority of the marginal farmers had applied 6 to 7 irrigations whereas; most of the small farmers had applied 5 to 6 irrigations. However, on medium and large farms majority of farmers had applied 7 to 8 irrigations.

Level of overall technological gap

TABLE 13: DISTRIBUTION OF RESPONDENT PADDY GROWERS BY THE LEVEL OF OVERALL TECHNOLOGICAL ADOPTION INDEX

Sr. No.	Technological gap categories	No. of respondent	Percentage
1	Low (0-25%)	-0-	-0-
2	Medium (25- 50 %)	22	27.5
3	High (50- 75 %)	52	65
4	Very high (75- 100%	6	7.5

The data in the table revealed that most of the respondent (65 per cent) paddy growers fall in high category of technological while 7.5 per cent of them were in very high technological gap category. Only 27.5 per cent of the respondents were in medium category, while none of the respondent fall under low technological gap category.

Constraints in adoption new farm technology

Constraints in adoption of optimum dates of sowing

With respect to adoption of optimum dates of sowing quite an amazing picture emerged that farmers were aware about the optimum dates of sowing but due

to non preparation of land at required time on account of unavailability of farm machinery and implements they were lacking behind the full adoption level of this component of technology.

TABLE 14: CONSTRAINTS IN ADOPTION OF OPTIMUM DATES OF SOWING

Constraints in adoption of Optimum sowing dates		Garrett mean score	
		Overall	
		Mean score	Rank
a.	Unawareness	65.92	2
b.	Late harvest of previous crop	50.15	5
c.	Lack of pre sown irrigation at required time	59.6	3
d.	Late availability of required crop variety	66.20	1
e.	Non preparation of land at required time due to unavailability of farm machinery	56.34	4

It is revealed from the table that majority of the farmers of different farm size groups had realized that late availability of crop variety was the major constraint behind adoption of optimum dates of sowing and had given first rank to this constraint with the mean score of 66.20. Unawareness about this component of technology emerged as the second main constraint with the mean score of 65.92. Whereas, lack of pre sown irrigation and non preparation of land at required time due to unavailability of farm machinery and implements also played a crucial role in non-adoption of optimum sowing dates in the district.

Constraints in adoption of optimum Plant Nutrients

Non-availability of plant nutrients at fair price shop appeared as the number one constraint across the farm size groups as majority of the farmers were encountering this constraint. Unawareness about optimum doses of plant nutrients was found second major constraint across the farm size groups. As already observed in the section (5.2.1.6), there appeared imbalance use of plant nutrient by majority of the farmers. While quite a substantial proportion felt that more use of urea leads to higher yield and the quality of P and K are poor at private shops. Quite a few farmers felt that the prices of P and K are quite high and soil does not respond to low level.

TABLE 15: CONSTRAINT IN ADOPTION OF OPTIMUM PLANT NUTRIENTS

Constraints in adoption of optimum plant nutrient		Garrett mean score	
	Overall		
		Mean score	Rank
a.	Unawareness	61.0	2
b.	More use of urea leads to higher yield	60.5	3
c.	Soil does not response to low level	30.2	6
d.	High prices of P and K fertilizers	49.31	5
e.	Non availability at fair price shops	70.5	1
f.	Quality of P and K fertilizers are poor at private shops	56.9	4

Constraints in proper adoption of high yielding varieties (HYV)

Though there was almost complete adoption of HYVs in major crops across the farm size group but still, the farmers in the study area faced some problems associated with its smooth adoption. The constraints opined by the farmers across the farm size groups are presented in the table 15.On marginal and small farm size groups, price of HYV seed emerged as a major constraints in timely adoption of HYV, because the Garret mean score was highest for this constraints as compared to the other constraints.

On the other hand medium and large farmers had given first rank to the constraints viz., non availability of required variety seed of crop at required time and place with the garret mean score of 68.8 and 78, respectively.

TABLE16: CONSTRAINTS IN PROPER ADOPTION OF HIGH YIELDING VARIETIES

Constraints in adoption of HYVs		Farm size group									
	Marginal		Small		Medium		Large		Overall		
	Mean Score	Rank	Mean Score	Rank	Mean score	Rank	Mean Score	Rank	Mean score	Rank	
a.	Non availability at required time and place	65.15	2	65.3	2	68.8	1	78	1	65.3	1
b.	Poor quality at private seed agency	54.99	5	61.5	3	44.15	3	63.3	2	60.0	3
c.	Non suitability to the area	43.2	6	50.1	6	30.25	6	20.3	6	35.9	6
d.	Seed is costly	68.92	1	68.95	1	54.75	2	52	3	64.9	2
e.	HYV'S are comparatively more susceptible to insect and disease	55.75	3	51.3	5	44.0	5	32.3	5	41.9	5
f.	Taste of local variety is better	48.99	4	58.9	4	42.1	4	33.5	4	50.6	4

Constraints in full adoption of Optimum seed rate

As is clear from the preceding section that farmers were adopting broadcasting method in wheat crop and this was the major constraint in non adoption of optimum seed rate. Same result is revealed from the table that majority of the farmers across the farm size groups had felt that broadcasting method was responsible for non-adhering the optimum seed rate in the study area.

TABLE 17: CONSTRAINTS IN FULL ADOPTION OF OPTIMUM SEED RATE

Constraints in adoption of Optimum seed rate		Farm size group									
	Marginal		Small		Medium		Large		Overall		
	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean score	Rank	Mean score	Rank	
a.	Unawareness	65.01	2	56.37	3	62.12	2	69.8	3	62.5	2
b.	Same rate is used by other farmers	69.95	1	63.98	2	62	3	70.12	2	58.2	3
c.	Late sowing leads to increase in seed rate	59.23	5	39.5	5	48.1	5	46.82	4	45.67	5
d.	Chance of poor germination	60.25	3	48.90	4	53.7	4	31.1	5	50.09	4
e.	Seed is broadcasted	60.03	4	69.95	1	65.12	1	71.98	1	69.53	1

Constraints in seed treatment and chemical use

It has already been observed that there was very poor adoption of seed treatment and plant protection chemicals in the district excepting few cases. In view of poor knowledge regarding importance of seed treatment and chemical use majority of the farmers under different categories of farms felt that appropriate chemical is not known for different insects and diseases. Also a substantial number of farmers across the farm size groups felt that these chemicals are costly and required more expenditure in its application.

TABLE18: CONSTRAINTS IN ADOPTION OF SEED TREATMENT AND CHEMICAL USED

Constraints in adoption of seed treatment and chemical		Farm size group									
	Marginal		Small		Medium		Large		Overall		
	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean score	Rank	Mean score	Rank	
a.	Does not affect yield substantially	71.25	1	70.25	2	54.5	4	45.66	5	58.2	4
b.	Chemical is costly	69.35	2	75.23	1	56.8	3	68.2	3	63.1	2
c.	Appropriate chemical is not known for different insects and disease	50.35	6	65.5	4	72.5	2	71.75	2	68.0	1
d.	Injurious to health	51.8	5	49.25	5	42.2	6	24.6	6	45.9	6
e.	Poor quality at shop	32.5	7	35.4	7	32.5	7	76.9	1	58.0	5
f.	Leads to occurrence of new disease	55.5	4	45.25	6	46.9	5	23.7	7	39.0	7
g.	Require more expenditure in its application	58.25	3	68.42	3	75.2	1	59.75	4	60.5	3

Constraints in adoption of optimum plant nutrients:

Non-availability of plant nutrients at fair price shop appeared as the number one constraint across the farm size groups as majority of the farmers were encountering this constraint. Unawareness about optimum doses of plant nutrients was found second major constraint across the farm size groups. As already observed in the section (5.2.1.6), there appeared imbalance use of plant nutrient by majority of the farmers. While quite a substantial proportion felt that more use of urea leads to higher yield and the quality of P and K are poor at private shops.

Table 19: Constraint in adoption of optimum plant nutrients

Constraints in adoption of optimum plant nutrient	Farm size group										
	Marginal		Small		Medium		Large		Overall		
	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean score	Rank	
a.	Unawareness	75.03	3	65.2	3	68.92	2	58.6	2	61.0	2
b.	More use of urea leads to higher yield	70.5	4	54.92	4	56.24	3	48.6	3	60.5	3
c.	Soil does not response to low level	65.9	5	35.20	6	38.67	6	39.8	5	30.2	6
d.	High prices of P and K fertilizers	80.15	1	72.52	2	47.56	5	30.0	6	49.31	5
e.	Non availability at fair price shops	79.32	2	78.13	1	72.90	1	67.6	1	70.5	1
f.	Quality of P and K fertilizers are poor at private shops	62.5	6	50.12	5	49.50	4	46.5	4	56.9	4

Constraints in adoption of optimum irrigation scheduling

It has already been observed in the second section (5.2.1.8) that there was quite a large variation in the number of scheduling across the farm size groups in all the crops. Table 5.5.1.7 reveals that Non-availability at required time due to lack of owned irrigation sources and another constraint hired irrigation being costlier, were found to be the two major constraints affecting optimum irrigation scheduling of the crops across the farm size groups.

TABLE 20: CONSTRAINTS IN FULL ADOPTION OF OPTIMUM IRRIGATION SCHEDULE

Constraints in adoption of optimum irrigation scheduling		Farm size group									
	Marginal		Small		Medium		Large		Overall		
	Mean Score	Rank	Mean Score	Rank	Mean score	Rank	Mean score	Rank	Mean Score	Rank	
a.	More irrigation leads to higher yield	58.05	4	52.78	4	52.6	4	60.4	4	50.3	4
b.	Due to canal and owned irrigation sources more irrigation applied	34.05	5	49.35	6	49.25	5	59.6	5	39.9	6
c.	Non availability at required time due to lack of owned irrigation source	79.92	1	75.25	1	79.25	1	66.65	1	68.30	1
d.	Canal water is not available at required time	79.5	2	60.65	3	65.65	3	64.75	2	52.71	3
e.	Electricity supply is not proper	----		50.48	5	48.24	6	63.05	3	40.0	5
f.	Hired irrigation is costlier	62.5	3	63.05	2	70.68	2	42.9	6	60.2	2

The table also revealed that there were few farmers who found that electricity supply is not proper and had given fifth rank to this constraint.

Conclusion and policy implications

The study has revealed that Technology adoption was not more satisfactory in the study area and about 27 per cent of the respondent paddy growers belong to the medium technological gap category. Also higher deviation of technology from recommended technology were observed in plant protection chemicals, level of phosphorus and potash use and optimum time of sowing. Relatively the level of technology adoption was found lower on marginal and small farms. Hence, there is ample scope for improvement in the status of technology adoption among

different categories of farmers. Quite a large variation was observed in adhering to optimum sowing dates across the farm size groups. Non-availability of plant nutrient at fair price shops acted as the most important constraint on all farm size groups except on marginal farms who had ranked it at seconds place. Hiring of irrigation was found to be the major constraints affecting optimum irrigation scheduling of the crops on all the farms across the farm size groups. The major constraints faced by the farmers in the study area were lack of availability of required variety of seeds at required place and time, lack of awareness regarding the use of particular fertilizer and plant protection chemicals, non availability of quality seeds and improved farm implements with technical knowhow and training on major practices to needy farmers, lack of irrigation network and proper infrastructural facilities in the area.

Reference

Ahire, M.C., Khalache and Gaikwad (2002). The technological gap in adoption of recommended practices of beetlevine and its marketing. *Maharashtra Journal of Extension Education*., 21:87-89.

Abara, I. O. C. & Singh, S. (1993). Ethics and biases in technology adoption: The small farm argument. Technological Forecasting and Social Change, 43, 289-300.

Adger, W.N., S. Agrawala, M.M.Q. Mirza, C. Conde, K. O'Brien, J. Pulhin, R. Pulwarty, B. Smit and K. Takahashi, 2007: Assessment of adaptation practices, options, constraints and capacity.

Atibudhi, H. N. (1993). 'An Economic Analysis of Rice Based Cropping System', *Agricultural Situation in India*, 47(12): 897-902.

Baidu-Forson, J. (1999). Factors influencing adoption of land-enhancing technology in the Sahel: Lessons from a case study in Niger. *Journal of Agricultural Economics*, 20, 231-239.

Balasubramani, N.,Swathilekshmi, P.S. and Chandrakandan, K. (2004). A study on the yield gap analysis in paddy in the Erode district of Tamil Nadu. *Asian Journal of Extention Education,* 23 (2): 78-86.

Bangrawa, G.S., Sharma, K.C. and Kole, D.N. (1993). Technological gap in recommended ground nut production technology. *Prasarika Rajstham Journal of Extention Education.*, 1(3): 77-88.

Bhairamkar, M.S., Sawant, P.A. and Tawade. N.D. (2005). Technological gap in cashew cultivation. *Indian Journal of Extension Education,* 1:7-75.

Chaves, B. & Riley, J. 2001. Determination of factors influencing integrated pest management adoption in coffee berry borer in Colombian farms. Agriculture, Ecosystems and Environment 87 (2001) 159-177.

Chitere, O.P. 1998. Diffusion and adoption of farm technologies among resource-limited farmers: experiences from the ICIPE/UNECA Integrated Pest Management Project in Western Kenya. *International Journal of Pest Management*, 44 (2) 49-52.

CIMMYT. 2009. The verdict is in: Conservation trials needed for the long run. CIMMYT E-News, vol 6 no.5, August 2009.

David, C. C., & Otsuka, K. (1994). Modern rice technology and income distribution in Asia, Boulder: Lynne Riener Publishers.

Dhondyal, S. P. (1991). *Farm Management (An Economic Analysis)*, Aman Publishing House, pp 270-271.

Economic Survey (2011-12). Govt. of India, Ministry of Finance, Department of Economic Affairs, Economic division.

Economic Survey (2012-13). Govt. of India, Ministry of Finance, Department of Economic Affairs, Economic division.

Evenson, R., & Gollin, D. (2003). Assessing the impact of the Green Revolution: 1960 to 2000." Science, 758-762.

Feder, G. & Slade R. (1984). The acquisition of information and the adoption of new technology. *American Journal of Agricultural Economics*, 66, 312-320.

Feder, G., Just E. R. & Zilberman D. (1985). "Adoption of agricultural innovations in developing countries: A survey. Economic Development and Cultural Change, 33, 255-298.

Harper, J. K., Rister, M. E., Mjelde, J. W., Drees, B. M. & Way, M. O. (1990). Factors influencing the adoption of insect management technology. *American Journal of Agricultural Economics*, 72(4), 997 1005.

Harris, B. 1972. Innovation Adoption in Indian Agriculture – the High Yielding Varieties Programme. *Modern Asian Studies*, 6, 1 (1972), pp. 71-98.

Hassanali, A. et al. 2008. Integrated Pest Management: the Push-Pull Approach for Controlling Insect

Pests and Weeds of Cereals, and Its Potential for Other Agricultural Systems Including Animal Husbandry. Phil. Trans. R. Soc. B2008 363, 611-621.

Khalache and Gaikwad (2008) 'A Study of Marketing Behavior Profile and Suggestions of Respondent Paddy Grower of District Sitamarhi in Bihar', *Indian Journal of Agricultural Economics*, 03(4):244-248.

Koppol, B. M. (1995). Induced innovation theory, agricultural research, and Asia's green revolution: a Reappraisal. In B. M. Koppol (Ed.), Induced innovation theory and international agricultural development: A reassessment (pp. 56e72).

Sthapit, B. R., Joshi, K. D., & Witcombe, J. R. (1996). Farmer participatory crop improvement, III: participatory plant breeding, case of high altitude rice from Nepal. *Experimental Agriculture*, 32, 479e496.

Tripathi, J., Bhatta, M. R., Justice, S., Shakya N. K. (2004). Direct seeding: an emerging resource conserving technology for rice cultivation in the rice-wheat system. Rice Research Proceeding of the 24th Summer Corp Workshop, pp. 273e281.

Assessment of pre and post harvest losses of wheat and soybean in Madhya Pradesh*

The estimation of crop loss due to pests and diseases is a complex subject. It is in fact, difficult to assess the loss caused by the individual pest as a particular crop may be infested by the pest complex in the farmers' field conditions. Further, extent of crop loss either physical or financial depends on the type of variety, stage of crop growth, pest population and weather conditions. Nevertheless, the crop estimates have been made and updated regularly at global level. The worldwide yield loss due to various types of pest was estimated at as: 37.4 per cent in rice, 28.2 per cent in wheat, 31.2 per cent in maize and 26.3 per cent in soybean (Oerke, 2007). At all India level, crop loss estimates due to insect pests have been provided by Dhaliwal et al (2010), 25 per cent losses in rice and maize, 5 per cent in wheat, 15 per cent in pulses and 50 per cent in cotton. The crop loss has increased during post-green revolution period when compared to pre-green revolution period. The severity of pest problems has reportedly been changing with the developments in agricultural technology and modifications of agricultural practices. The damage caused by major inspect-pests in various crops has also been compiled and reported by Reddy and Zehr (2004). Further, a number of studies have established the strong relationship between pest infestation and yield loss in various crops in India (Nair, 1975), Dhaliwal and Arora, 1994; Muralidharan, 2003; Rajeswari et al, 2004; Muralidharan and Pasalu, 2006; Rajeswari and Muralidharan, 2006, Nag et al. 2000, Solanki et al, 2011). To estimate the crop loss, most of the existing studies have adopted experimental treatment approach (with or without pest attack through artificial infestation) or fields with natural infestation wherein half of the field is protected against the pest while the other half is not. But, the results obtained from artificial infestation or natural infestation in the selected plots/fields will not be appropriate for extrapolation over a geographical area (Groote, 2002). It is for the reason that the estimated crop losses under these conditions may not represent the actual field conditions of farmers. Alternatively, the estimates collected directly from the farmers through sample survey may be reliable and could be used for extrapolation in similar geographical settings. However, the farmers' estimates are likely to be subjective and these should be validated with expert estimates of the state department of Agriculture.

Consider all these facts in mind the present study has been formulated with following objective:

1. To estimate the physical and financial losses caused by pests and diseases in wheat and soybean at farm level
2. To examine the measures of pest and disease management to reduce the crop loss due to pests and diseases at farm level.
3. To arrive at post harvest losses in wheat and soybean under different agro climatic conditions of Madhya Pradesh
4. To identify factors responsible for such losses and suggest ways and means to reduce the extent of losses in different operations in order to increase national productivity.

Wheat and soybean crops have been considered for assessment of pre and post harvest losses in Madhya Pradesh as stage has remarkable position in the area and production of these crops in India. The primary, secondary and tertiary data has been collected for the study. The primary data were

*A.E.R.C. for Madhya Pradesh & Chhatttisgarh, Jawaharlal Nehru Krishi Vishwa Vidhyalaya, Jabalpur (M.P.)

collected from the selected respondents of the study area with survey method with the help of interview schedule provided by the project coordinator of the study. The secondary data related to area, production and yield of selected crops i.e. wheat and soybean were collected for the period of 30 years from 1981-2010. These data were collected from Department of Farmers' Welfare and Agricultural Development, Madhya Pradesh, Bhopal, Directorate of Economics and Statistics, Madhya Pradesh, Bhopal and Land Record Office, Madhya Pradesh, Gwalior and Office of Madhya Pradesh Mandi Board, Bhopal (M.P.). The tertiary data related to various cost and profitability parameters of selected crops for 1980-81, 1985-86, 1990-91, 1995-96, 2000-01, 2005-06, 2010-11 were collected from Comprehensive Scheme for studying the Cost of Cultivation of Principal Crops for Madhya Pradesh and Chhattisgarh, Jawaharlal Nehru Agricultural University, Jabalpur (M.P.) and published by Commission for Agricultural Cost and Prices, Ministry of Agriculture and Cooperation, New Delhi.

A Multistage sampling technique has been used for selection of respondents of the study. At the first stage Hosangabad & Vidisha districts from Central Narmada Valley and Vindhyan Plateau agro-climatic regions for wheat, and Ujjain and Raisen districts for soybean from Malwa Plateau and Vindhyan Plateau respectively have been selected as these districts have remarkable position in area and production of Wheat and soybean in M.P. Further, 3 villages near by the regulated market (in radius of 10 KM) and 3 villages far away from the regulated market (<10 Km from regulated market) have been selected for the study. A list of all the farmers of the selected village has been prepared and classified them in marginal (below 2 acre), small (2-4 acre), medium (4-10 acre) and large (above 10 acre) categories according to their size of operational holdings and 20 farmers were selected randomly in each category and for each crop for the study.

The collected data has been classified, tabulated and analyzed in the light of stated objectives of the study using statistical package of social science (SPSS). The analysis of data was done in light of suitable statistical tools such as mean, percentage, trend, growth, absolute change, relative change, regression analysis etc.

The Specific Findings of the Study are as under:

The area production and productivity of both the selected crops i.e. wheat and soybean found to be increased in Madhya Pradesh. The area, production and yield of wheat increased with a linear growth of 0.77 per cent, 2.60 per cent and 1.87 per cent per year respectively, while the area, production and yield of Soybean increased with linear growth of 6.07 per cent, 6.89 per cent and 1.74 per cent per year respectively in last 30 years (1981-2010).

The expenses in all the input variables used in cultivation of wheat and soybean found to be increased approximately 1000 to 2000 per cent respectively in the year 1009-10 as compared to 1980-81 except expenses on manures (wheat), with the result of this the gross income and net income at variable cost found to be increased manifolds.

The review on various studies related to post harvest losses revealed that the loss varies between 6 to 9.70 per cent. Amongst all the post harvest losses, storage losses were found to be a main component followed by threshing, winnowing and transportation losses.

The socio economic characteristics of sample farmers have been revealed and found that:

An average HH had a family of 7 members, out of which 2 were found earner and the percentage of male, female and children to total family member were found to be of 36.58, 29.80 and 31.43 per cent. On an average 85.94 per cent of HHs were found to be head of the family and remaining 14.06 per cent their family members, who were in farming business.

The majority of HHs belonged to age group above 40 years (59.06%) followed by age group between 25 to 40 years (35.63%) and less than 25 years (5.31%) and had an education status up to secondary (31.88%) followed by primary (25%), illiterate (29.06%), graduate and above (16.25%) and higher secondary (7.81%). The majority of the total HHs belonged to Other Backward Class (OBC) (55.94%) followed by General (30.94%), Schedule Caste (11.25%) and Schedule Tribes (1.88%).

The annual earning of an average HH was found to be Rs. 1.09 lac and found to be increased with the increase in size of farm from marginal (Rs. 0.31 lac to large (Rs. 2.59 lac).

The HHs of the study area covered an average distance of about 14 Km. to sell their produce.

An average HH holds 11.32 acres of land, which was found to be 1.80, 4.28, 10.10 and 29.12 acres in marginal, small, medium and large size farms respectively and all the HHs cultivated their total owned land and none of them found to lease out their land to other cultivators. In case of lease in only 1.52 acres of land was found to be leased in by an average HH of the study area. The 10.67 acres (83.43%) land was under irrigation out of total net operated area (12.79 acre). The marginal farmers (195.68%) were found to use their land more intensively as compared to small (189.00%), medium (187.54%) and large (185.47%) size of farm. An average HH found to use 89.42% of total net area sown in twice a year.

The nature of tenancy was found to be at fixed rent in cash (Rs. 7777 /per acre per year) at overall level and ranged between Rs. 6050/- per acre (marginal) to Rs. 8521 / per acre (small). At overall level 13.75 percent of total HHs leased in land to other farmers, which was found to be 12.76% of their net operated land and ranged between 5.72 per cent (large) to 17.51 per cent (small) in different size of farms.

Tube well (electric + diesel) (67.19%) followed by canal (16.37%), canal + tube well (15.46%) and tanks sources (0.99%) were found to major source of irrigation in the study area. On an average 62.81 per cent tube wells were found to be operated by electricity, while 4.38 per cent operated with diesel. The majority of marginal and small

farmers were depended on canal, whereas majority of medium and large farmers on tube wells.

Soybean (46.81%), Wheat (40.78%) were important crops of the study area grown by HHs in *kharif* (rainy) and *rabi* (winter) seasons respectively. Gram (8.19%), Rice (5.07%), Tur (1.52%), Lentil(1.31%) and potato(1.17%) were found to be other crops. An average HH of the study area used 73.29 per cent (Rice) to 100% (Soybean) seeds of HYVs in their total area of cultivation. While in case of lentil, cultivators still use local varieties of lentil, due to its bold seed quality. Wheat (13.91 q/acre) gave highest yield followed by rice (8.57 q/acre), potato (5.84 q/acre), soybean (4.53 q/acre), gram (4.33 q/acre), tur (2.84 q/acre) and lentil (1.97 q/acre).

The magnitude of marketed surplus to the total production was found to be high in oilseeds followed by pulses and cereal crops. In case of soybean an average HH marketed 87.68% of production in the market, while he marketed 80.10, 77.62, 69.80, 57.15, 53.58 and 46.24 per cent of production respectively for gram, lentil, wheat, rice, tur and potato. An average HH got Rs. 361052.36/- per farm and received 77.41 per cent of total income from marketed of farm products. It is also observed that as the size of farms increases the percentage of output marketed found to be increased from 69.75 per cent (marginal) to 91.82 per cent (large). An average HH got Rs. 361052.36/- per farm and received 80.42 per cent of total income from marketed surplus. It is also observed that as the size of farms increases the percentage of output marketed found to be increased from 72.45 per cent (marginal) to 83.83 per cent (large).

The constraints faced by the wheat and soybean growers in identification, incidence, attack and control of insect and weeds with source of information received from different sources have been observed during the course of investigation and found that:

The deficiency of water for irrigation and high cost of input were found to be most important constraints, while incidence of pest and their control, poor quality of seed and low price of output were the least important constraints in cultivation of wheat in the area under study. The 94.38 per cent of wheat growers of the study area were found to be able to distinguish pest and diseases attack and 79.47 per cent of them could not distinguish pest and disease attack by qualitative assessment. Only 5.96% of wheat growers able to assess the pest and disease attack by quantitative assessment in cultivation of wheat. The attack of major pest i.e. aphids (48.13%), termite (65.00%) and rat (44.38%) was not so important in cultivation of wheat. The frequency of attack of aphid (100%) was found to every season, while the attack of termite (45%) and rat (43.75%) was found once in two seasons and once in three seasons respectively in the area under study and incurred the loss of grain below 5% in cultivation of wheat. The rust, smut and leaf blight were the major diseases of wheat in the study area. But the majority of them reported that these were least important. The rust was found to occur once in two seasons (78.13%) followed by every year (16.88%) and once in three years (5.00%).

The attack of leaf blight found to occur once in three seasons (46.25%) followed by once in two seasons (41.25%)and every season (12.00%) in cultivation of wheat. As regards to infestation of weeds the Phalaris minor, and broad leaf weeds i.e., *motha, hirankhuri, badi dudhi, chhoti dudhi, sarson, chitchita* etc. were the major weeds of wheat but found less severe as reported by about 86% HHs. The frequency of attack of weeds was found in every season but the production losses were found below 5% as reported by the majority of HHs. As the size of farm increased the percentage of losses over actual and normal production were found to be increased from 6.89% (marginal) to 13.56% (large) over actual production and from 7.40% (marginal) to 15.68% (large) over normal production of wheat. None of the HHs used insecticides to control insect as the infestation of insect not crossed the economic threshold level in whet. An average HH found to invest Rs. 299.60/acre in weedicide. Cost of weedicide found to be the highest at medium size of farm (Rs. 307.25/ acre) followed by large (Rs. 306.57/ acre), small (Rs. 302.10/acre) and marginal (Rs. 282.47/acre). Generally hand-weeding is found in practice to control weeds in wheat. As wheat is a winter season crop and infestation of weeds is not a burning problem. *Phalaris minor* is a common weed of the wheat in the study area, which seems like wheat hence, hand weeding is the only option to solve the problem. An average wheat grower invested Rs. 51.33/acre on seed treatment with fungicides viz. Bavistin, Thairum and Carbandazim etc. As the size of farm increases the cost of fungicides found to be increased from marginal (Rs. 31.44/acre) to large (Rs. 73.88/acre).

As regards to soybean the high cost of input (60.00%) was found to be important constraint in the cultivation of soybean. The cent percent soybean growers able to distinguish pest and disease attack in cultivation of soybean crop. The majority (67.50%) of them assess the severity of the attack by quantitative assessment. Only 15% of HHs able to assess the pest and disease attack by qualitative analysis in cultivation of soybean crop. In soybean Girdle beetle and caterpillar were found to be very important pest of soybean in the study area as their rank of severity was found to be of very important as reported by 91.25% (Girdle beetle) and 57.50% (caterpillar) of HHs. The root rot (73.75%), mosaic (58.75%) and wilt (50.00%) were found to be major diseases of soybean as reported by the majority of HHs. The frequency of attack was found to be every season for mosaic and root rot as reported by 53.75% and 47.50% of HHs, while in case of wilt, it occurred once in a two season (48.75%) as reported by the majority of HHs. But the losses occurred by these diseases was not found more than 5% as reported by the more than 85% of HHs. Samel, Dudhi, Motha and Krishaneel were found to be very important weeds of the soybean as reported by 63.75, 77.30, 92.50 and 60 per cent of soybean growers respectively. The frequency of all these weeds were found to be every season but the production losses were found to be less than 5% as majority of soybean growers apply weedicide to control these weeds in their field. On an average size of farm the losses occurred were found to be 13.50 and 11.83 percent over actual

(5.59 q/ac) and normal (6.33 q/ac) production in soybean. As the size of farm increases the percentage of actual and normal production were found to be increased from 10.10% (marginal) to 16.51% (Large) over actual production and from 9.17% (marginal) to 14.71% (large) over normal production of soybean. The control of weeds is the major problem in cultivation of soybean. Chemical control (weedicide) found to be most popular and only method to control weeds in the area under study, as hand weeding is not possible due to moisture in the soil (black cotton soil). An average soybean grower invested Rs. 411.60/acre to control weeds in soybean. The cost of weedicide found to be increased with the size of farms from Rs. 393.59/acre (marginal) to Rs. 419.48/acre(large). Incidence of insect in soybean was found to be very common in study area and all the farmers were found to use insecticide to control insects. An average soybean grower found to invest Rs. 555.29/acre in insecticide. Medium farmers (Rs. 568.78/ acre) used more insecticides as compared to marginal (Rs. 542.00/ acre), small (Rs. 545.72/acre) and large (Rs. 564.66/acre). An average soybean grower invested Rs. 97.69/ acre in fungicide. The cost of seed treatment was found to be some what more in medium (Rs. 105.00/ acre) followed by large (Rs. 102.00/ acre), small (Rs. 94.00/acre) and marginal (Rs. 89.25/acre) farms.

None of the soybean and wheat grower followed the biological method for control of inset, pest and diseases in the area under study. The cost of chemical in soybean crop for control of pest and disease was found to be more as compared to wheat crop. The 77.50% and 26.25% HHs were found to be seeking advice related to control of pest and disease respectively for soybean and wheat crop. Private input dealers were found to be most important source of seeking advice on pest and disease control management as reported by 64.29% of HHs followed by agricultural university/KVKs (7.14%) and TV/Radio service/Newspaper (4.76%), while government extension agent were found to be important source of seeking advice on plant geometry and soil testing as reported by 76.19% of HHs followed by private input dealers (21.43%), agricultural university/ KVKs (19.05%) and TV/radio service/ News paper (16.67%). It is observed from the data that the majority of sample soybean growers were suggested proper technical guidance about pest & disease control measure including integrated pest management techniques (97.50%) followed by timely availability of recommended pesticides & weedicides (95.63%), timely availability of plant protection equipments viz. sprayer, duster etc. at village on rental basis (95.63%), subsidy on insecticide, pesticide & weedicide and plant protection equipments viz. light traps, sprayer, duster etc. (47.50%) and organized skill orientation programme regarding to pest and disease control (48.75%) for proper adoption of plant protection measures in their fields. These suggestions were also reported by wheat growers with minor variations.

As regards to post harvest losses related to wheat and soybean it was found during the course of investigation that:

The cultivators of study area found to be preferred early (78.04%) and mid (21.96%) varieties of wheat. All the wheat growers who were found to be sown mid varieties preferred harvested their produce manually. The wheat growers who sown early varieties of wheat, majority of them (73.61%) were found to be preferred mechanical method of harvest. The estimation of losses was found to be more in mid varieties (2.84 kg/q) as compared to early varieties (2.79 kg/q) of wheat. The HHs whether related to wheat or soybean threshed their harvested produce through mechanical thresher cum winnower. The majority of wheat growers were found to be preferred tractor trolley (49.44%) followed by bullock cart (14.56%) to transport and handling their wheat from threshing floor to market. The majority of wheat growers whether preferred tractor trolley or bullock cart ranked losses low to medium during transportation of grains. The average loss during transportation was found to be 0.18 Kg./q) and observed more in bullock cart (0.23 Kg/q) as compared to tractor trolley (0.19 Kg/q). The average loss during handling of grains of wheat has been found to be 0.40 Kg/q and found more in tractor trolley (0.42 Kg) as compared to bullock cart (0.37 Kg/q). The maximum quantity was found to be stored in kachha house (30.14q) as compared to pucca house (12.00 q). The kothi/bin kachha, pucca, followed by gunny bags/ plastic bags and open space had been found to be mode of storage in the study area. An average wheat grower of the study area stored their grains approximately for the period of 190 days. All the wheat growers reported that rank of loss at low level, the quantity lost during the storage was mainly due to rodent (8.46 Kg/q) and fungus (1.13 Kg/q). The cost of storage was found to be Rs. 4.19 per quintal in the study area. The majority of wheat growers reported that they used metal/cemented (53.75%) roof of storage structure followed by crop by product (40.00%) and grass thatched (6.25%). The wall of storage structure was found to be made up of mud (61.25%) followed by bricks/ cemented (38.75%) as reported by majority of wheat growers. They also reported that floor of storage structure was found to be made of earth (63.13%) and concrete (36.88%). The majority of wheat growers reported that their storage structures roof was good roof (100%) with good condition of walls (100%) and has no rat guard (100%). The average cost of kachha/ cemented storage structure was found to be Rs. 49987.75/- per HH. The majority of wheat growers reported that they repaired their storage structure in every two years (51.25%) to 2-5 years (48.75%). All the wheat growers reported that they never followed sun drying, smoking, admixing with ash and other plant material in their storage structures and only 32.41%of them reported that they removed infested grains from storage and destroyed it annually. On an average 8.61 Kg/q had been found to be lost for wheat grain. The maximum quantity of loss had been found to be in the storage (56%) followed by harvest (33%), handling (5%) threshing & winnowing (4%) and transportation (2%) of grains in wheat. The quantity losses of wheat grains has been found some what more in large (9.05 Kg/q), followed by small(7.95 Kg/q), medium (7.74 Kg/q) and marginal (7.42 Kg/q). Amongst different mode of storage capacity the capacity utilization of kothi / bhukari / bin kachha (84.00%)has been found to be more as compared to gunny /plastic bags (36.74%) and open place (17.31%) for storage of wheat grains by the HHs of the study area.

All the soybean growers were found to be cultivated early varieties of soybean viz., JS 93-05 and JS-335. The majority of them were found to prefer mechanical method (68.37%) followed by manual method (31.63%) of harvest. An average soybean grower found to be covered 15.86 km distance to market his 50.98 q produce. Here also the majority of soybean growers reported low (88.75%) followed by medium (7.50%) and high (3.75%) rank of loss during transportation of produce from threshing floor to market. An average soybean grower reported 0.23 kg/q loss during transportation of soybean produce from threshing floor to market. The average loss during handling of soybean had been found to be 0.34 kg/q in the study area. Out of the total quantity of the soybean (43.55 q/

HH), an average soybean grower stored 31.78 q(72.97%) of soybean grains in kachha house and 11.77q(27.03%) in pucca house. The maximum quantity of soybean grains was found to be stored in open space followed by gunny/plastic bags and *kothi bin, kachha, pucca* irrespective of kachha & pucca house. None of the soybean growers was found to be stored their soybean grains in steel drums etc. An average soybean grower of the study area found to store their soybean grain for the period of 87 to 93 days. The majority of them reported low followed by medium rank of loss in storage of soybean grains. The maximum quantity lost during storage was found due to weigh loss followed by rodents and fungus. An average soybean grower spent Rs. 4.72 per quintal and Rs. 9.20 per quintal to store their soybean grains in kachha and pucca house, respectively. Whereas only approximately 40 per cent of capacity utilization of different mode of storage were found to be utilized by the soybean growers for soybean grains for kothi/ bin kachha, gunny / plastic bags and open space. As regards to kothi/ bin pucca the HHs was found to be utilized its 14.80% capacity for soybean grains. On an average 12.56 kg/q had been found to be lost for soybean grain. The maximum quantity had been found to be lost in harvest (56%), followed by storage (20%), threshing & winnowing (19%), handling (3%) and transportation (2%) of grain in soybean. The quantity loss of soybean grain was found to be some what more in large (14.50 kg/q) followed by small (12.53 kg/q), marginal (11.76 kg/q) and medium (11.42 kg/q). The majority of soybean growers found to be used metal/ cemented (40.00%) roof of storage structure followed by crop by product (36.25%) and grass thatched (23.75%). The wall of storage structure was found to be made up of mud (61.25%) followed by bricks/cement (38.75%) as reported by the majority of soybean growers. The majority of them also reported that the floor of storage structure was found to be made of earth (55.00%) and concrete (45.00%). As regards to the height of the platform the majority of the soybean growers reported that it was less than 6 inches (68.52%) to 6-12 inches (31.48%). As regards the physical condition of roof, walls, guard and floor, the majority of soybean growers reported that their storage structure's roof was good (100.00%), with good condition of walls (100.00%) and have not rate guard (100.00%). The average cost of kachha /cemented storage structure was found to be Rs. 29,789.92 per HH. The majority of soybean growers reported that they repaired their storage structure in 2-5 years (56.25%) followed by every 2 years(40.00%). The walls and rat guard required no maintenance as reported by the majority of soybean growers. All the soybean growers reported that they never followed sun drying, admixing with ash, smoking and other pest measures and other plant material in their storage structure.

The harvest losses were found to be more in soybean (7.44 kg/q) as compared to wheat (2.82 kg/q). The quantity losses during threshing and winnowing have also been found to be more in soybean (2.34 kg/q) as compared to wheat (0.34 kg/q). As regards to the post harvest losses in different agro climatic regions the post harvest losses of whet were found to be more in Vindhyan plateau (9.50 kg/q)as compared to Central Narmada Valley (5.04 kg/q), whereas the maximum post harvest losses were found to be more in Vindhyan Plateau (14.62 kg/q) as compared to Malwa Plateau (10.96 kg/q) also in soybean. In order to minimize post harvest losses the suggestions of sample soybean growers mainly concentrated around proper care during harvesting, threshing & winnowing (92.50%), careful handling of grains at various post harvest stages (handling, weighing, transportation, storage etc.) (85.50%), immediate marketing after harvesting to avoid weight loss (73.75%), proper storage condition (47.50%), sun drying of grains every three months (46.25%), mix pesticides to avoid pest (81.88%), installation of rat guards (48.75%), timely supervision of store grains (49.38%) and fumigation in storage structure for proper pest control (28.75%). These suggestions were also reported by wheat growers with minor variations.

Policy implication:

As it is clear that the majority of respondents had lack of technical knowhow of post harvest technology specially storage techniques. They never found to be followed sun drying, admixing with ash, smoking and other pest control measures in their storage structure. Even they were not found to be followed rat guard and removed infested grain from their storage grain. Hence, efforts should be made to popularize post harvest technology amongst the farmers so that they could able to take advantage of time, place, form and possession utility of the product and earn more by reducing the pre and post harvest losses occurred in their products.

As high cost of input, lack of irrigation, water and electricity were found to be most important constraints in the area under study and the majority of farmers were found to be depended on private dealers. Hence, ever increasing prices of farm inputs especially pesticides and fungicides should be curtailed by keeping a check on the prices being charged by the private pesticide dealers to stop exploitation of the farmers.

There is a need of imparting new training programmes to farmers for timely and cheaper control of insect-pest and disease attack to minimize the production losses specifically biological plant protection measures as none of the farmer was found to be adopted these measures in cultivation of crops.

Timeliness in harvesting of wheat and soybean crops should be ensured for minimizing the harvest losses and untimely harvesting by the farmers should be discouraged by penalizing for the lapse.

It was observed during the course of investigation that wheat harvester/combiner used in soybean harvesting with adjustment in the machine, this enhanced the losses in soybean hence to minimization of post harvest losses in soybean there is a need to popularized separate harvester/combiner specific for soybean.

Commodity Reviews

Foodgrains

During the month of August,2014 the Wholesale Price Index (Base 2004-05=100) of pulses increased by 2.05%, Cereals increased by 0.64% and foodgrains increased by 0.85% respectively over the previous month.

All India Index Number of Wholesale Prices

Base: 2004-2005=100

Commodity	Weight	WPI for the Month of August 2014	WPI for the Month of July 2014	WPI A year ago	Percentage change during Amonth	Ayear
1	2	3	4	5	6	7
Rice	1.793	244.1	241.8	231.5	0.95	5.44
Wheat	1.116	210.1	208.7	208.7	0.67	0.67
Jowar	0.096	299.4	295.5	241.2	1.32	24.13
Bajra	0.115	256.4	258.7	252.2	-0.89	1.67
Maize	0.217	249.1	253.7	255.3	-1.81	-2.43
Barley	0.017	222.0	215.1	209.3	3.21	6.07
Ragi	0.019	330.7	325.4	356.9	1.63	-7.34
Cereals	3.373	235.5	234.0	227.1	0.64	3.70
Pulses	0.717	238.9	234.1	221.6	2.05	7.81
Foodgrains	4.09	236.1	234.1	226.1	0.85	4.42

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 August, 2014:

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

Procurement of Rice

0.243 million tonnes of Rice(including paddy converted into rice) was procured during August 2014 as against 0.225 million tonnes of rice(including paddy converted into rice) procured during August 2013 The total procurement of Rice in the current marketing season i.e 2013-2014, up to 28.08.2014 stood at 31.34 million tones, as against 33.82 million tonnes of rice procured, during the corresponding period of last year. The details are given in the following table :

Procurement of Rice

(In Thousand Tonnes)

State	Marketing Season 2013-14		Corresponding period of last year		Marketing Year (October-September)			
	(Upto 28.08.2014)		2012-13		2012-13		2011-12	
	Procure-ment	%age to Total	Procure-ment	%age to Total	Procure-ment	%age to Total	Procure-ment	%age to Total
1	2	3	4	5	6	7	8	9
Andhra Pradesh	3699	11.80	6437	19.03	6464	19.00	7548	21.53
Chhatisgarh	4290	13.69	4804	14.20	4804	14.12	4115	11.74
Haryana	2406	7.68	2609	7.71	2609	7.67	2007	5.72
Maharashtra	161	0.51	191	0.56	192	0.56	190	0.54
Punjab	8106	25.86	8558	25.30	8558	25.16	7731	22.05
Tamil Nadu	618	1.97	479	1.42	481	1.41	1596	4.55
Uttar Pradesh	1127	3.60	2286	6.76	2286	6.72	3357	9.58
Uttarakhand	463	1.48	497	1.47	497	1.46	378	1.08
Others	10470	33.41	7968	23.55	8129	23.89	8138	23.21
Total	31340	100.00	33829	100.00	34020	100.00	35060	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		Corresponding period of last year		Marketing Year (April-March)			
	(Upto 30.06.2014)		2013-14		2013-14		2012-13	
	Procure-ment	%age to Total	Procure-ment	%age to Total	Procure-ment	%age to Total	Procure-ment	%age to Total
1	2	3	4	5	6	7	8	9
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

(ii) Commercial Crops

OILSEEDS and EDIBLE OILS:
The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 217.8 in August, 2014 showing an increase of 1.7 percent and 12.4 percent over the previous month and previous year respectively. The Wholesale Price Index (WPI) of all individual oilseeds showed a mixed trend. The WPI of Copra (14.1 percent), Gingelly seed (5.5 percent), Niger Seed (4.8 percent), Groundnut seed (1.9 percent), Rape & Mustard Seed (0.6 percent) and Cotton Seed (0.6 percent) increased over the previous month. However, the WPI of Soyabean (4.3 percent) and Sunflower Seed (0.6 percent) decreased over the previous month. The WPI of Safflower seed remained unchanged over the previous month.

The Wholesale Price Index (WPI) of Edible Oils as a group stood at 145.5 in August, 2014 showing an increase of 0.1 percent over the previous month. However, it decreased by 0.4 percent over the previous year. The WPI of Copra oil (4.1 percent), Sunflower Oil (0.5 percent), Mustard Oil (0.2 percent) and Cottonseed oil (0.2 percent) increased over the previous month. However, the WPI of Soyabean Oil (1.2 percent), Gingelly Oil (0.7 percent) and Groundnut Oil (-0.1 percent) decreased over the previous month.

FRUITS & VEGETABLE:
The Wholesale Price Index (WPI) of Fruits & Vegetable as a group stood at 304.5 in August, 2014 showing an increase of 6.7 percent and 4.8 percent over the previous month and over the previous year, respectively.

POTATO:
The Wholesale Price Index (WPI) of Potato stood at 362.0 in August, 2014 showing an increase of 6.3 percent and 61.6 percent over the previous month and over the previous year, respectively.

ONION:
The Wholesale Price Index (WPI) of Onion stood 399.9 in August, 2014 showing a fall of 2.2 percent and 44.7 percent over the previous month and over the previous year, respectively.

CONDIMENTS & SPICES:
The Wholesale Price Index (WPI) of Condiments & Spices (Group) stood at 308.6 in August, 2014 showing an increase of 3.9 percent and 33.1 percent over the previous month and over the previous year, respectively. The WPI of Black Pepper, Turmeric and Chillies (Dry) increased by 2.0 percent, 1.4 percent and 0.9 percent over the previous month.

RAW COTTON:
The Wholesale Price Index (WPI) of Raw Cotton stood at 221.0 in August, 2014 showing a fall of 3.0 percent and 12.0 percent over the previous month and over the previous year, respectively.

RAW JUTE:
The Wholesale Price Index (WPI) of Raw Jute stood at 267.3 in August, 2014 showing a fall of 4.0 percent over the previous month. However, it is higher by 9.5 percent over the previous year.

Wholesale Price Index Of Commercial Crops For The Month Of August, 2014

(Base Year: 2004-05=100)

Commodity	Latest August, 14	Month July, 14	Year August, 13	Percentage Variation Over	
				A Month	A Year
OIL SEEDS	217.8	214.1	193.8	1.7	12.4
Groundnut Seed	208.5	204.7	217.9	1.9	-4.3
Rape & Mustard Seed	191.1	190.0	184.7	0.6	3.5
Cotton Seed	183.5	182.4	183.5	0.6	0.0
Copra (Coconut)	213.5	187.1	102.2	14.1	108.9
Gingelly Seed (Sesamum)	460.0	436.2	382.3	5.5	20.3
Niger Seed	195.3	186.4	166.3	4.8	17.4
Safflower (Kardi Seed)	150.4	150.4	156.7	0.0	-4.0
Sunflower	185.1	186.3	197.6	-0.6	-6.3
Soyabean	231.6	241.9	203.9	-4.3	13.6
EDIBLE OILS	145.5	145.4	146.1	0.1	-0.4
Groundnut Oil	161.8	161.9	180.2	-0.1	-10.2
Cotton Seed Oil	178.1	177.8	176.8	0.2	0.7
Mustard & Rapeseed Oil	155.0	154.7	152.3	0.2	1.8
Soyabean Oil	154.6	156.5	159.0	-1.2	-2.8
Copra Oil	136.9	131.5	120.7	4.1	13.4
Sunflower Oil	126.8	126.2	134.3	0.5	-5.6
Gingelly Oil	179.8	181.0	172.8	-0.7	4.1
FRUITS & VEGETABLES	304.5	285.3	290.6	6.7	4.8
Potato	362.0	340.7	224.0	6.3	61.6
Onion	399.9	409.1	723.1	-2.2	-44.7
CONDIMENTS & SPICES	308.6	296.9	231.8	3.9	33.1
Black Pepper	770.2	755.4	532.1	2.0	44.7
Chillies(Dry)	289.5	287.0	252.3	0.9	14.7
Turmeric	219.4	216.4	212.5	1.4	3.2
Raw Cotton	221.0	227.8	251.2	-3.0	-12.0
Raw Jute	267.3	278.5	244.0	-4.0	9.5

Part II - Statistical Tables

Wages

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

State	District	Centre	Month & Year	Daily Normal Working Hours	Field Labour		Other Agri. Labour Carpenter		Herdsman		Skilled Labour		
											Carpenter	Black Smith	Cobbler
					M	W	M	W	M	W	M	M	M
Andhra Pradesh	Krishna	Ghantasala	March, 14	8	262.5	190	300	NA	150	NA	NA	NA	NA
	Guntur	Tadikonda	March, 14	8	265	200	250	NA	250	NA	NA	NA	NA
	Ranga Reddy	Arutala	March, 14	8	237.5	187.5	275	NA	NA	NA	NA	NA	NA
Karnataka	Banga-lore	Harisandra	Sep,13	8	250	200	200	175	200	180	300	250	NA
	Tumkur	Gidlahali	Nov & Dec,13	8	175	165	180	170	180	170	200	180	NA
Maharash-tra	Nagpur	Mauda	Feb,12	8	100	100	NA	NA	NA	NA	NA	NA	NA
	Ahmed-nagar	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. Daily Agricultural Wages in Some States (Operation-Wise)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Assam	Barpeta	Loharapara	March,12	M	8	180	180	180	180	180		180	180	180
				W	8	NA	NA	160	160	160	NA	NA	NA	NA
Bihar	Muzaffarpur	Bhalui Rasul	April to 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	May & June,12	M	8	NA	NA	185	NA	185	NA	245	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chhattis-garh	Dhamtari	Sihaba	March,14	M	8	NA	NA	150	80	80	80	250	100	80
				W	8	NA	NA	80	80	70	80	150	NA	NA
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

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

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Haryana	Panipat	Ugarakheri	March,14	M	8	300	300	300	300	300	NA	NA	NA	NA
				W	8	NA	250	200	250	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	NA	NA	NA
Kerala	Kozhikode	Koduvally	Jan,14	M	4-8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	4-8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Palakkad	Elappally	Jan,14	M	4-8	400	350	NA	450	433	NA	550	NA	NA
				W	4-8	NA	NA	300	450	250	NA	NA	NA	NA
Madhya Pradesh	Hosangabad	Sangarkhera	Jan,14	M	8	150	130	150	150	125	100	NA	NA	NA
				W	8	NA	130	150	150	125	100	NA	NA	NA
	Satna	Kotar	Jan,14	M	8	250	NA	150	150	250	150	350	350	350
				W	8	NA	NA	150	150	250	150	NA	NA	NA
	Shyopurkala	Vijaypur	Jan,14	M	8	NA	200	200	NA	NA	NA	250	250	NA
				W	8	NA	200	200	NA	NA	NA	NA	NA	NA
Odisha	Bhadrak	Chandbali	May,14	M	8	250	150	NA	NA	260	150	300	300	200
				W	8	NA	140	NA	NA	222	100	NA	NA	NA
	Ganjam	Aska	May,14	M	8	250	200	NA	250	225	200	400	400	400
				W	8	NA	100	100	150	110	100	NA	NA	NA
Punjab	Ludhiyana	Pakhowal	June,2013	M	8	265	270	270	270	260	NA	325	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rajasthan	Barmer	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	Pulvarnatham	May,14	M	8	NA	300	NA	300	301.62	NA	NA	NA	NA
				W	8	NA	120	126	122	133.33	NA	NA	NA	NA
	Tirunelveli	Malayakulam	May,14	M	8	NA	130	NA	300	404.47	NA	NA	NA	NA
				W	8	NA	150	138	150	300	NA	NA	NA	NA
Tripura	State Average		March,12	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
	Aurraiya	Aurraiya	Apr,14	M	8	NA	NA	NA	NA	150	NA	250	NA	NA
				W	8	NA	NA	NA	150	150	NA	NA	NA	NA
	Chandauli	Chandauli	Apr,14	M	8	NA	NA	200	200	200	NA	350	NA	NA
				W	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

2. Wholesale Prices of Certain Agricultural Commodities and Animal Husbandry Products at Selected Centres in India

(Month end Prices in Rupees)

Commodity	Variety	Unit	State	Centre	August-14	July-14	August-13
Wheat	PBW 343	Quintal	Punjab	Amritsar	1500	1500	1450
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	-	1430	1500
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	1732	1750	1514
Jowar	-	Quintal	Maharashtra	Mumbai	2350	2400	2350
Gram	No III	Quintal	Madhya Pradesh	Sehore	2551	2321	3380
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1260	-	-
Gram Split	-	Quintal	Bihar	Patna	4520	4560	4820
Gram Split	-	Quintal	Maharashtra	Mumbai	4000	3800	5700
Arhar Split	-	Quintal	Bihar	Patna	6800	6850	6350
Arhar Split	-	Quintal	Maharashtra	Mumbai	6600	6600	6250
Arhar Split	-	Quintal	NCT of Delhi	Delhi	6010	6000	6350
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	7800	6900	6500
Gur	-	Quintal	Maharashtra	Mumbai	4100	3600	3400
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4600	4600	4000
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2950	-	3140
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	3150	3220	3160
Mustard Seed	Black	Quintal	West Bengal	Raniganj	3600	3400	3600
Mustard Seed	-	Quintal	West Bengal	Kolkata	3850	3800	3900
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	4170	4110	4160
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	-	-	3640
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	1900	1750	1850
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	2375	1550	1550
Castor Seed	-	Quintal	Andhra Pradesh	Hyderabad	3850	3775	3300
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	9000	8020	6550
Copra	FAQ	Quintal	Kerala	Alleppey	10750	10250	5425
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	4800	4800	3800
Groundnut	-	Quintal	Maharashtra	Mumbai	5200	5100	7100
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1170	1191	1170
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1230	1215	1215
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	1155	1170	1425
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	1298	1200	1380
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1403	1395	1245

2. Wholesale Prices of Certain Agricultural Commodities and Animal Husbandry Products at Selected Centres in India-*Contd.*

(Month end Prices in Rupees)

Commodity	Variety	Unit	State	Centre	August-14	July-14	August-13
Castor Oil	-	15 Kg.	Andhra Pradesh	Hyderabad	1275	1253	1133
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	1860	1860	1480
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2325	2175	2400
Coconut Oil	-	15 Kg.	Kerala	Cochin	2430	2295	1185
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	1725	1740	1660
Groundnut Cake	-	Quintal	Andhra Pradesh	Hyderabad	3429	3029	3071
Cotton/Kapas	NH 44	Quintal	Andhra Pradesh	Nandyal	4600	4500	4700
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	3800	3800	-
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	2535	2750	2450
Jute Raw	W 5	Quintal	West Bengal	Kolkata	2485	2700	2430
Oranges	-	100 No	NCT of Delhi	Delhi	-	-	-
Oranges	Big	100 No	Tamil Nadu	Chennai	650	650	650
Oranges	Nagpuri	100 No	West Bengal	Kolkata	-	-	-
Banana	-	100 No.	NCT of Delhi	Delhi	333	417	208
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	477	472	410
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	57000	55000	53000
Almonds	-	Quintal	Maharashtra	Mumbai	64000	62000	48000
Walnuts	-	Quintal	Maharashtra	Mumbai	67000	65000	66000
Kishmish	-	Quintal	Maharashtra	Mumbai	17000	15000	12800
Peas Green	-	Quintal	Maharashtra	Mumbai	4600	4700	4100
Tomatoes	Ripe	Quintal	Uttar Pradesh	Kanpur	3000	2560	2240
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	2500	3000	2500
Cauliflower	-	100 No.	Tamil Nadu	Chennai	1400	1800	1600
Potatoes	Red	Quintal	Bihar	Patna	1730	1595	990
Potatoes	Desi	Quintal	West Bengal	Kolkata	1780	1480	810
Potatoes	Sort I	Quintal	Tamil Nadu	Mettuppalayam	3081	3728	2511
Onions	Pole	Quintal	Maharashtra	Nashik	1600	2000	3500
Turmeric	Nadan	Quintal	Kerala	Cochin	10000	10000	9500
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	9600	9800	9600
Chillies	-	Quintal	Bihar	Patna	9200	8800	7800
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	66000	70500	39000
Ginger	Dry	Quintal	Kerala	Cochin	29000	30000	15500
Cardamom	Major	Quintal	NCT of Delhi	Delhi	135000	135000	112000
Cardamom	Small	Quintal	West Bengal	Kolkata	120000	110000	85000
Milk	Cow	100 Liters	NCT of Delhi	Delhi	-	-	-
Milk	Buffalo	100 Liters	West Bengal	Kolkata	3600	3600	3600

2. Wholesale Prices of Certain Agricultural Commodities and Animal Husbandry Products at Selected Centres in India-*Contd.*

(Month end Prices in Rupees)

Commodity	Variety	Unit	State	Centre	August-14	July-14	August-13
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	30000	30667	29015
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	35000	34000	30500
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	32750	32850	29400
Fish	Rohu	Quintal	NCT of Delhi	Delhi	9000	10000	9500
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	33000	35000	29500
Eggs	Madras	1000 No.	West Bengal	Kolkata	4200	4000	3750
Tea	-	Quintal	Bihar	Patna	21300	21300	20000
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	13000	13000	9000
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	30000	26000	26000
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	15500	14000	14000
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	4850	4800	2780
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	3800	3800	2725
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	3900	3900	3600
Rubber	-	Quintal	Kerala	Kottayam	11950	12700	17600
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	29700	29700	28900

Sowing and Harvesting operations normally in progress during the month of October, 2014

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Paddy, Jowar, Maize, Tobacco, Groundnut, Mesta and Linseed	Paddy, Bajra, Ragi, Groundnut, Sesamum and Ginger
Assam	Paddy, Gram, Pulses, Potato and Linseed	Paddy and Mesta
Bihar	Wheat, Barley, Gram, Rapeseed & Mustard, Linseed and Potato	Paddy, Jowar, Bajra, Maize, Ragi and Sesamum
Gujarat	Paddy, Gram, Pulses and potato	Paddy, Jowar, Groundnut, Bajra and Cotton
Himachal Pradesh	Wheat, Barley Gram, Rapeseed, Mustard and Linseed	Paddy, Bajra, Maize, Pulses, Potato and Groundnut
Jammu & Kashmir	Wheat, Barley, Rapeseed, Mustard and Onion	Paddy, Bajra, Maize, Small Millets, Pulses, Potato and Chillies
Karnataka	Jowar, Potato, Tobacco, Linseed, Sweet Potato and Onion	Kharif jowar, Ragi, Small Millets, Chillies and Groundnut
Kerala	Paddy, Pulses and Sesamum	Paddy, Sweet Potato and Lemongrass
Madhya Pradesh	Wheat, Barley, Gram, Jowar, Rabi Pulses, Potato, Chillies, Rapeseed, Mustard and Onion	Paddy, Ragi, Kharif Pulses, Potato, Ginger, Chillies and Groundnut
Maharashtra	Wheat, Gram, Jowar, Barley and Pulses	Kharif Paddy, Jowar, Bajra, Maize, Groundnut and Sesamum
Manipur	Wheat, Potato, Rapeseed & Mustard	Sugarcane and Late paddy
Orissa	Wheat, Jowar, Gram, Rapeseed, Mustard and Linseed	Paddy, Kharif, Jowar and Sesamum
Punjab and Haryana	Wheat and Gram	Paddy, Cotton, Pulses and Early Sugarcane
Rajasthan	Wheat, Barley, Rapeseed, Mustard and Linseed	Jowar, Bajra, Maize, Cotton and Sannhemp
Tamil Nadu	Paddy, Jowar, Groundnut, Small Millets, Tobacco and Cotton	Kharif Paddy, Jowar, Maize, Cotton, Tapioca, Mesta and Ginger
Tripura	Pulses and Potato	Til
Uttar Pradesh	Wheat, Barley, Gram, Linseed, Rapeseed & Mustard	Paddy, Jowar, Bajra, Sesamum and Groundnut
West Bengal	Wheat, Barley, Rapeseed, Mustard, Tobacco, Chillies, Til, Potato and Pulses	Paddy, Jute and Red Chillies
Delhi	Wheat, Barley and Pulses	Paddy, Jowar, Bajra, Maize and Sugarcane