AGRICULTURAL SITUATION IN INDIA

JUNE, 2015

GENERAL SURVEY OF AGRICULTURE

FARM SECTOR NEWS RELEASES

ARTICLES

Growth of Rice Production in Tamil Nadu:Progress and Prospects

A Study of Growth of Value Productivity and Component Analysis of Important Crops in Himachal Pradesh:1951-52 to 2010-11

Socio-Economic Anlysis of Celery Crop in Punjab

AGRO ECONOMIC RESERCH
Farmers' Income in India: Evidence from Secondary Data

COMMODITY REVIEWS
Foodgrains
Commercial Crops

TRENDS IN AGRICULTURE: Wages & Prices

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

Note to Contributors

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. Good articles in Hard Copy as well as Soft Copy (agri.situation@gmail.com) in MS Word, not exceeding five thounsand words, may be sent in duplicate, typed in double space on one side of foolscap paper in Times New Roman font size 12, addressed to the Editor, Publication Division, Directorate of Economics and Statistics, M/o Agriculture, C-1, Hutments Dalhousie Road, New Delhi-110 011 along with 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.

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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 of Agriculture

Third Advance Estimates of Production for 2014-15

The 3rd Advance Estimates of production of major crops for 2014-15 have been released by the Department of Agriculture & Cooperation on 13th May, 2015. It may be noted that production of kharif crops during 2014-15 suffered due to bad monsoon. Unseasonal rains/hailstorm during Feb-March 2015 had significant impact on production of rabi crops. As a result of setback in kharif as well as rabi seasons, the production of most of the crops in the country has declined during 2014-15.

As per 3rd Advance Estimates for 2014-15, total food-grains production in the country is estimated at 251.12 million tonnes which is lower by 13.92 million tonnes than the last year's record foodgrains production of 265.04 million tonnes.

Total production of rice is estimated at 102.54 million tonnes which is lower by 4.11 million tonnes than the last year's record production of 106.65 million tonnes.

Production of wheat estimated at 90.78 million tonnes is lower by 5.07 million tonnes than the record production of 95.85 million tonnes achieved during 2013-14.

Total production of coarse cereals estimated at 40.42 million tonnes is also lower by 2.87 million tonnes than their production during 2013-14.

Production of pulses estimated at 17.38 million tonnes is lower by 1.87 million tonnes than their production during the last year.

With a decrease of 5.37 million tonnes over the last year, total production of oilseeds in the country is estimated at 27.38 million tonnes.

Production of sugarcane is estimated at 356.56 million tonnes which is higher by 4.42 million tonnes as compared to last year.

Total production of cotton estimated at 35.32 million bales (of 170 kgs each) is marginally lower than last year but higher by 2.85 million bales than the average production of last 5 years.

Production of jute & mesta is estimated at 11.49 million bales (of 180 kg each) which is marginally lower than their production during the last year.

Area Coverage during 2014-15(3rd Advance Estimates)

As per 3rd Advance Estimates for 2014-15, area sown under all rabi crops taken together has been 608.2 lakh hectares at all India level as compared to 643.9 lakh hectares during last year.

Area reported was lower by 6.6 lakh ha. under rice, 2.0 lakh ha. under jowar, 2.4 lakh ha. under maize, 15.4 lakh ha. under gram and 6.5 lakh ha. under rapeseed & mustard as compared to last year. However, area coverage under wheat and urad has been higher by 7.2 lakh hectares and 1.4 lakh hectares respectively.

Trends in Foodgrain Prices

During the month of April, 2015, the all India Index Number of Wholesale Price (2004-05=100) of foodgrains increased by 0.64 percent from 235.6 in March, 2015 to 237.1 in April, 2015.

The Wholesale Price Index (WPI) number of cereals increased by 0.22 percent from 230.9 to 231.4 and WPI of pulses increased by 2.44 percent from 257.8 to 264.1 during the same period.

The Wholesale Price Index number of wheat increased by 0.42 percent from 215.5 to 216.4 and rice increased by 0.17 percent from 233.6 to 234.0 during the same period.

Weather, Rainfall and Reservoir Situation during May, 2015

Cumulative Pre-Monsoon Season (March to May) rainfall for the country as a whole during the period 01st March to 27th May, 2015 is 42% higher than Long Period Average (LPA). Rainfall in the four broad geographical divisions of the country during the above period was higher than LPA by 100% in Central India, 95% in North West India and 48% in South Peninsula but lower by 06% in East & North East India.

Out of a total of 36 meteorological sub-divisions, 34 sub-divisions received excess/normal rainfall and 02 sub-divisions received deficient rainfall.

Central Water Commission monitors 91 major reservoirs in the country which have a total live capacity of 157.80 BCM at Full Reservoir Level (FRL). Live storage in these reservoirs as on 28th May, 2015 was 43.14 BCM as against 44.59 BCM on 28.05.2014 (last year) and 31.82 BCM of normal storage (average storage of the last 10 years).

Current year's storage is 97% of the last year's and 136% of the normal storage.

Economic Growth

The growth rate of Gross Domestic Product (GDP) at constant (2011-12) market prices is estimated at 7.4 per cent in 2014-15 (advance estimates), as compared to 6.9 per cent and 5.1 per cent in 2013-14 and 2012-13 respectively, (Table 1).

The growth rate of Gross Value Added (GVA) at constant (2011-12) basic prices for agriculture & allied sectors, industry sector and services sector are estimated to be at 1.1 per cent, 5.9 per cent and 10.6 per cent respectively, in 2014-15 compared to 3.7 per cent, 4.5 per cent and 9.1 per cent respectively, in 2013-14 (Table 1).

The growth rate of GVA at constant basic prices for the first, second and third quarters of 2014-15 is estimated at 7.0 per cent 7.8 per cent 7.5 per cent respectively, compared to 7.2 per cent,7.5 per cent and 6.6 per cent respectively, during the corresponding quarters of previous year (Table 2).

The final consumption expenditure as a percentage of GDP increased from 69.7 per cent in 2012-13 to 7.10 per cent in 2013-14 and further to 72.1 per cent in 2014-15. Gross Fixed Capital Formation (GFCF) as a percentage of GDP declined from 31.4 per cent in 2012-13 to 29.7 per cent in 2013-14 to 28.6 per cent in 2014-15.

There has been a decline in the rate of gross domestic saving from 33.9 per cent of the GDP in 2011-12 to 31.8 per cent in 2012-13 and further to 30.6 per cent in 2013-14. This was caused mainly by the sharp decline in the rate of household physical savings.

Agriculture and Food Management

All India Production of Foodgrains

As per the 3rd advance estimates released by Ministry of Agriculture on 13.05.2015 production of total foodgrains during 2014-15 is estimated at 251.1 million tonnes compared to 265.6 million tonnes in 2013-14 and 257.1 million tonnes in 2012-13 (Table 3).

Procurement

Procurement of rice as on 08.05.2015 was 26.3 million tonnes during kharif marketing season (October-September) 2014-15 and procurement of wheat was 22.5 million tonnes during rabi marketing season (April-March) 2015-16 (Table 4).

Off-take

Off-take of rice in February 2015 was 29.0 lakh tonnes. This comprises 24.3 lakh tonnes under TPDS and 4.7 lakh tonnes under other schemes. In respect of wheat, the off-take was 24.0 lakh tonnes comprising of 14.4 lakh tonnes under TPDS and 9.6 lakh tonnes under other schemes.

Stocks

Stocks of foodgrains (rice and wheat) held by FCI as on May 1, 2015 were 56.5 million tonnes, which is lower by 10.4 per cent compared to 63.1 million tonnes as on May, 2014 (Table 5).

TABLE 1 GROWTH OF GVA AS BASIC PRICES BY ECONOMIC ACTIVITY (AT 2011-12 PRICES) (In Per Cent)

Sector	Growth			Share in GVA		
	2012-13	2013-14	2014-15 (AE)	2012-13	2013-14	2014-15(AE)
Agriculture, forestry & fishing	1.2	3.7	1.1	17.7	17.2	16.2
Industry	2.4	4.5	5.9	32.3	31.7	31.2
Mining & quarrying	-0.2	5.4	2.3	3.0	3.0	2.9
Manufacturing	6.2	5.3	6.8	18.3	18.1	18
Electricity, gas, water supply & other utility services	4.0	4.8	9.6	2.4	2.3	2.4
Construction	-4.3	2.5	4.5	8.6	8.3	8
Services	8.0	9.1	10.6	50.0	51.1	52.6
Trade, hotels, transport, communication and services related to broadcasting	9.6	11.1	8.4	18	18.8	18.9
Financial, real estate & professional services	8.8	7.9	13.7	19.5	19.7	20.9
Public administration, defence and other services	4.7	7.9	9.0	12.5	12.6	12.8
GVA at basic prices	4.9	6.6	7.5	100.0	100.0	100.0
GDP at market prices	5.1	6.9	7.4	---	---	---

Source: CSO. AE: Advance Estimates.

Table 2 Quarter-wise Growth of GVA at Constant (2011-12) Basic Prices (in per cent)

Sectors	2013-14				2014-15		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Agriculture, forestry & fishing	2.7	3.6	3.8	4.4	3.5	2.0	-0.4
Industry	4.8	4.0	5.0	4.3	6.1	6.0	3.9
Mining & quarrying	0.8	4.5	4.2	11.5	5.1	2.4	2.9
Manufacturing	7.2	3.8	5.9	4.4	6.3	5.6	4.2
Electricity, gas, water supply & other utility services	2.8	6.5	3.9	5.9	10.1	8.7	10.1
Construction	1.5	3.5	3.8	1.2	5.1	7.2	1.7
Services	10.2	10.6	9.1	6.4	8.6	10.1	13.5
Trade, hotels, transport, communication and services related to broadcasting	10.3	11.9	12.4	9.9	9.4	8.7	7.2
Financial, real estate & professional services	7.7	11.9	5.7	5.5	11.9	13.8	15.9
Public administration, defence and Other Services	14.4	6.9	9.1	2.4	1.9	6.0	20.0
GVA at basic prices	7.2	7.5	6.6	5.3	7.0	7.8	7.5

Source: CSO.

Table 3 Production of Major Agricultural Crops (3rd Adv. Est.)

Crops	Production (in Million Tonnes)		
	2012-13 (Final)	2013-14 (Final)	2014-15 (3rd AE)
Total Foodgrains	257.1	265.6	251.1
Rice	105.2	106.7	102.5
Wheat	93.5	95.9	90.8
Total Coarse Cereals	40.0	43.3	40.4
Total Pulses	18.3	19.8	17.4
Total Oilseeds	30.9	32.8	27.4
Sugarcane	341.2	352.1	356.6
Cotton	34.2	35.9	35.3

Table 4 Procurement in Million Tonnes

Crop	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Rice#	34.2	35.0	34.0	31.8	26.3*	--
Wheat@	22.5	28.3	38.2	25.1	28.0	22.5*
Total	56.7	63.4	72.2	56.9	54.4	22.5

#Kharip Marketing Season (October-September), @ Rabi Marketing Season (April-March), *Position as on 08.05.2015

Table 5 Off-Take and Stocks of Foodgrains (Million Tonnes)

Crops	Off-take				Stocks	
	2011-12	2012-13	2013-14	2014-15 (Till Feb.)	May 1, 2014	May 1, 2015
1. Rice	32.1	32.6	29.2	30.3	20.4	17.0
2. Unmilled Paddy#					12.3	8.0
3. Converted Unmilled Paddy in terms of Rice					8.2	5.3
4. Wheat	24.3	33.2	30.2	24.6	34.4	34.1
Total (Rice & Wheat) (1+3+4)	56.4	65.9	59.8	54.9	63.1	56.5

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

Farm Sector News Releases

Assistance Provided to Farmers of Hilly States

Financial assistance for purchase of electrical pump-sets upto ten horsepower is provided to the farmers under National Mission on Oilseeds and Oil Palm (NMOOP) @ 50% of the cost limited to Rs. 15,000 per pump-set and under National Food Security Mission (NFSM) @50% of the cost limited to Rs. 10,000 per pump-set. The seed subsidy provided to the farmers by the Department of Agriculture & Cooperation under various schemes is as under:

Crops	Rate of Subsidy (Rs. per Quintals)#
Rice Hybrid	5000
Rice High Yielding Varieties (HYVs)	1000
Wheat HYVs	1000
Coarse Cereals Hybrid	5000
Coarse Cereals HYVs	1500
Pulse HYVs	2500
Oilseeds HYVs	1200
Oilseeds Hybrid	2500

or 50% of cost whichever is less

Additional transport subsidy on movement of seeds of all crops excluding potato is available to North - Eastern States including Sikkim, Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Hill areas of West Bengal as under:

(i) 100% difference between road and rail transportation charge is reimbursed to implementing States/Agencies for movement of seeds produced from outside the State to the identified State Capital/District Headquarter.

(ii) Actual cost restricted to maximum limit of Rs.120/- per quintal whichever is less, is reimbursed for movement of seeds transported within the State from State Capital/District Headquarter to sale outlets/sale counters.

With a view to increase investments in agricultural sector, accelerate agricultural growth and to raise farm incomes, Government of India provides financial incentives, grants, concessions and subsidies on agricultural inputs under various programmes/schemes which have been recently restructured and grouped into following Mission/ Schemes:

1. National Crop Insurance Programme (NCIP)
2. Krishonnati Yojana (Central Sector)
3. Krishonnati Yojana (State Plan)
4. Rashtriya Krishi Vikas Yojana (RKVY)
5. Pradhan Mantri Krishi Sinchai Yojana

Setting up of Price Stabilization Fund

The Government has approved the setting up of a Price Stabilization Fund (PSF), as a Central Sector Scheme, with a corpus of Rs.500 crores, to support market interventions for price control of perishable agri-horticultural commodities during 2014-15 to 2016-17. Initially the fund is proposed to be used for market interventions for onion and potato only.

PSF Scheme provides for advancing interest free loan to State Governments/Union Territories(UTs) and Central agencies to support their working capital and other expenses on procurement and distribution interventions for such commodities.

The Price Stabilization Fund will be managed centrally by a Price Stabilization Fund Management Committee (PSFMC), which will approve all proposals from State Governments and Central Agencies. The PSF will be maintained as a Central Corpus Fund by Small Farmers Agribusiness Consortium (SFAC), which will act as Fund Manager. Funds from this Central Corpus will be released in two streams, one to the State Governments/ UTs as a onetime advance to each State/UT based on its first proposal and the other to the Central Agencies. The Central Corpus Fund has already been established by SFAC in 2014-15.

The one time advance to the States/UTs based on their first proposal along with matching funds from the State/UT will form a State/UT level revolving fund, which can then be used by them for all future market interventions to control prices of onions and potatoes based on approvals by State Level Committee set up explicitly for this purpose. In case of North Eastern States, the State level corpus will comprise of 75% funds from Centre and 25% from the State.

While the advance is returnable, the Central Government will share 50% of losses (75% in case of NE States), if any, at the time of settlement of the advance on 31st March, 2017. The Central Government likewise also intends to share the profits, if any, in the same ratio. The States could also request Central Agencies to undertake such operations on their behalf to be supported out of the State corpus. Additionally, the Centre can also requisition the Central Agencies like Small Farmers' Agri Business Consortium (SFAC), National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED), etc. to undertake price control operations for onion and potato.

Procurement of these commodities will be undertaken directly from farmers or farmers' organizations at farm gate/mandi and made available at a more reasonable price to the consumers to manage prices of perishable agri-horticultural commodities.

Reclamation of Land Unsuitable for Agriculture

As per the latest report on Land Use Statistics for 2011-12 compiled by Directorate of Economics & Statistics, Ministry of Agriculture, out of total Geographical Area of 3287.3 lakh hectares in the country, 1467.5 lakh hectares is non-agricultural land/ area. Area under non-agricultural land consists of forests, area under non-agricultural uses, Barren and un-culturable land, permanent pastures and other grazing land.

The reclamation of area under Non-Agricultural Land is generally not viable due to ecological and cost considerations. However, to improve fertility of soils in the country, the Government under the component of Soil Health Management of National Mission on Sustainable Agriculture (NMSA) is promoting soil test based balanced and integrated nutrient management through setting up/ strengthening of soil testing laboratories, establishment of bio-fertilizer and compost units, use of micronutrients, trainings and demonstrations on balanced use of fertilizers etc. Recently, a National Mission on Soil Health Card has been launched to provide soil tested based fertilizer recommendation to all the farmers in the country. Further, Ministry of Rural Development is implementing an Integrated Watershed Management Programme (IWMP) for development of rainfed/degraded areas.

Promoting Judicious Use of Chemical Fertilizers and Pesticides

Government is promoting safe and judicious use of pesticides through Central Integrated Pest Management Centres situated in different parts of the country. Farmer's field Schools are conducted to create awareness on Integrated Pest Management strategies. State Governments and stakeholders are being exhorted to support a 'Grow Safe Food' campaign centred around five essential principles of judicious use-application of pesticides on the right crop, against pests for which the pesticide has been approved, at the right time, in approved doses, and as per approved method of application through training and media campaigns in Gram Panchayats and rural areas. Advisories have been sent to pesticides dealers to educate them on judicious use of pesticides in accordance with label instructions.

Government is promoting and recommending soil test based balanced and integrated nutrient management through conjunctive use of both inorganic and organic sources of plant nutrient management to sustain good soil health and higher crop productivity.

Under soil health management (SHM) component of National Mission for Sustainable Agriculture (NMSA), financial assistance for training to farmers including field demonstrations on balanced use of fertilizers is provided @ Rs.10,000 per training for 20 or more participants. Financial assistance for frontline field demonstrations is also provided @ Rs.20,000 for frontline field demonstrations.

Under National Mission of Sustainable Agriculture, there is a provision of financial assistance under Capital Investment Subsidy Scheme (CISS) through NABARD for establishment of bio-fertilizer/bio-pesticides production units (200 TPA) in which 100 percent assistance is provided to State Government up to a maximum limit of Rs.160 lakh per unit and @ 25 percent cost limited to Rs.40 lakh to individuals/private agencies.

There is no scientific evidence that about 75 percent of the cultivable land in the country has been adversely affected by excessive use of chemical fertilizers and pesticides and has high level of toxins. However, indiscriminate and imbalanced use of fertilizers coupled with low addition of organic matter over years may result into multinutrient removal is greater than the addition.

PMSBY, PMJJBY & APY are Path Breaking Initiatives for Social Security, says Shri Radha Mohan Singh, Union Minister for Agriculture

Shri Radha Mohan Singh, Union Minister for Agriculture, has said that Pradhan Mantri Suraksha Bima Yojana, Pradhan Mantri Jivan Jyoti Bima Yojana and Atal Pension Yojana, three social security schemes are the result of the farsightedness of our Prime Minister, Shri Narendra Modiji who is committed to the economic empowerment of the poor.These unique schemes would be path breaking initiatives towards providing social security at a very nominal cost to the millions of countrymen. Shri Radha Mohan Singh was addressing the function organised at the Tamil nadu launch of the schemes at Chennai. Full text of his speech is as follows:

"It gives immense pleasure to be part of this historical event in which Pradhan Mantri Suraksha Bima

Yojana, Pradhan Mantri Jivan Jyoti Bima Yojana and Atal Pension Yojana are going to be launched. These three social security schemes are the result of the far-sightedness of our Prime Minister Shri Narendra Modiji who is committed to the economic empowerment of the poor.

These unique schemes would be path breaking initiatives towards providing social security at a very nominal cost to the millions of countrymen. These are designed to provide utmost convenience with auto debit facility from the bank account of the subscriber. Pradhan Mantri Suraksha Bima Yojana and PM Jivan Jyoti Bima Yojana would provide insurance to individuals in any unfortunate event causing death or disability. The Atal Pension Yojana would address the problem of income security during old age. There are millions of senior citizens who do not have any secure source of income during the ripe years of their life. You are aware how our elders are finding it helpless to live without any source of income. These schemes have been designed in such a way as to provide a very convenient delivery mechanism. These schemes will also address issues like very low coverage of life or accident insurance as well as old age income security products in this vast country.

Let me now briefly explain to you, how innovatively these schemes are designed. Pradhan Mantri Suraksha Bima Yojana will provide insurance coverage of Rs.2 lakhs for individuals on payment of just Rs.12/- per annum. This scheme can benefit all the savings bank account holders in the age group of 18-70 years. Public sector general insurance companies or other general insurance companies that are willing to offer insurance coverage to individuals on similar terms would offer and administer this scheme. The scheme is delivered through banks including regional rural banks as well as cooperative banks.

Pradhan Mantri Jivan Jyothi Bima Yojana is another well thought out scheme which offers Life Insurance coverage of Rs.2 lakhs for any savings bank holders in the age group of 18-50 years on payment of just Rs.330/- per year. This scheme is offered through LIC of India or other Life Insurance companies that are willing to offer life insurance on similar terms.

Coming to Atal Pension Yojana, it focuses on the unorganized sector where nearly 400 million employees representing more than 80 per cent of all employees are engaged. Atal Pension Yojana would provide a fixed minimum pension Rs.1000 to Rs.5000 per month starting from the age of 60. The amount of pension will depend on the monthly contribution by the employee and the age at which the employee subscribes the insurance. In any case the individual will have to subscribe under Atal Pension Yojana for a minimum of 20 years. The most significant part of this yojana is co-contribution by government of Rs.1000/- per annum or 50% of the total contribution whichever is lower, for the first 5 years if one joins the scheme before the end of this year, that is 31st December, 2015.

I am sure you will appreciate that ours is a great country with enormous social capital. Due to the change in family and social structure, the social security inherent in our society is slowly getting weak. As a result, a large number of people are exposed to un-foreseen eventualities which leave them helpless and insecure. The three yojanas being launched in this state will go a long way in addressing the growing insecurity among the poor and needy. I thank our Prime Minister Shri Narendra Modiji who has presented this country with these three unique schemes and ushered in a new era of providing social security en-mass. I thank profusely His Excellency the Governor of Tamil nadu Shri Rosiah ji who is going to launch these unique yojanas in your state. I also thank Shri Vishwanathan ji for his presence here. I thank you one and all for being here on this historic occasion marking a beginning for a new era of social security in this country."

Odisha Assured Increased Allocation of Fertilizers & Included in National Food Security Mission to Promote Sugarcane Cultivation

Union Agriculture Minister, Shri Radha Mohan Singh has assured adequate allocation of fertilizer to Odisha for ensuing Kharif Season and inclusion of the state under National Food Security Mission to promote cultivation of sugarcane.

He said, in view of high priority to eastern states, the centre will provide all possible assistance to Odisha for development of Agriculture.

During a call on meeting by Chief Minister of Odisha, Shri Naveen Patnaik, Shri Radha Mohan Singh directed deparment of fertilizer to allocate 10.75 lakh ton fertilizers to the state as per state's requirement. He also directed officials of his Ministry to ensure timely delivery of allocated fertilizers to the state.

Shri Radha Mohan Singh also announced inclusion of Odisha under National Food Security Mission to promote cultivation of sugarcane in the states. Only twelve states were getting assistance under the mission from 2014-15.

In view of good scope of horticulture produce in the states, he assured assistance for setting up of cold storage in six districts of Odisha.

Union Minister for Agriculture launches the website of Multi-State Cooperative Societies

A portal for Multi State Cooperative Societies, http:/mscs.dac.gov.in has been launched by Union Minister for Agriculture ShriRadha Mohan Singh. This website would provide easy access of information relating to the status of the societies to the applicants as well as to the general public.

Initially, the website shall facilitate access to information like status of applications, notices, orders, certificates issued to the societies and contact details of officers. The website shall also provide link to the websites of the offices of State Registrars of Cooperative Societies. Subsequently,the website shall be upgraded by inducting other web enabled services for the applicants as well as for the registered societies.

The "Office of Central Registrar of Cooperative Societies" functioning under the Department of Agriculture & Cooperation, Ministry of Agriculture, handles the work of registration and management of multi state cooperative societies. The number of multi state cooperative societies has crossed 1400 on account of which it has become crucial to have a speedy mechanism for disposal of applications for registration/amendment, effective monitoring and record keeping. At present the information like status of applications, copies of notices/orders and list of multi state cooperative societies is available on the ministry's web-site. However owing to manifold increase in the work related to multi state cooperative societies, need for separate web-site for the multi state cooperative societies was felt.

Export of Potato is Free without any Quantitative Restrictions

At present, export of potato is free without any quantitative restrictions. Earlier Minimum Export Prices (MEP) of US$ 450/MT on Potato was imposed on 26th June, 2014 to augment domestic supplies in view of rising retail and wholesale prices in domestic markets. However, in recent times, keeping in view the surplus supply of potato in the domestic markets and consequent rapid fall in price (In domestic and retail), MEP on export of Potato was removed by Department of Commerce vide Notification No. 112 (RE-2013)/2009-14 dated 20th Feb, 2015.

Growth of Rice Production in Tamil Nadu: Progress and Prospects

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Abstract

Paddy cultivation is the most important agricultural operation in the country, not only in terms of food security, but also in creating better livelihoods, opportunities for rural population. It plays a major role in the people's diet, economy and employment. Nearly 90 percent of paddy is produced and consumed within the country. It contributes nearly 15 percent of India's annual Gross Domestic Product (GDP) and provides 31 percent of the total calorie supply. The main objective of this paper is analysis the growth trend of paddy production in Tamil Nadu for the past three decades. The area under paddy crop occupies highest share among foodgrains in Tamil Nadu due to the adoption of modern technology. A study of the period of 30 years shows that during the earlier period of 1985-90, most of the districts in Tamil Nadu had shown increasing trend in terms of area and production of paddy than later period 2011-14, during which the growth rate of production declined in majority of the districts in Tamil Nadu except in Virudhunagar and Thiruvallure.

Introduction

Agricultural sector plays a crucial role in India's economic development. The share of agricultural sector in Gross Domestic Product (GDP) declined from 55.1 percent in 1950-51 to 13.4 percent in 2013-14.About 63 percent of population is depending upon the agricultural sector for their livelihood. The achievement of the high growth rate in the agricultural sector in the long-run is due to regional growth of the State's economy. Before Independence, there was massive famine in Bengal; the trend continued upto 1960s. During this period, there was heavy food shortage in India and the domestic agricultural sector was unable to solve the problem, then the idea of HYV seeds in agriculture had been implemented. The HYV seed programme gave the best results in agricultural production. Foodgrains output is increased from 50 MT (Million Tonnes) in 1950-51 to 255.56 MT in 2012-13 (Economic Survey, 2014). It increased five times over a period of six decades. The remarkable changes in foodgrains production were attributed to Green Revolution.

In India, the production of rice and wheat has more than doubled between 1960 and 2013. The total annual foodgrain production rose from 77 MT to 255.5 MT during this period. The area under HYVs increased from 56.38 lakh ha (15.11 percent) in 1970-71 to 321.62 lakh ha (74 percent) in 1996-97 and it further increased to 396.24 lakh ha in 2012-13. Productivity and production increased mainly due to the use of HYV seeds.

Foodgrain Production

India has made enormous progress towards food security over a period of six decades. Indian population has tripled, but foodgrain production has more than quadrupled: There has been a significant increase in availability of foodgrain per capita. The initial increase in production was centered on the irrigated areas of the Indian states of Punjab, Haryana and western Uttar Pradesh. Both the farmers and the Government officials focused on farm productivity and knowledge transfer and India's total foodgrain production soared. Per hectare yield of Indian wheat was on an average 0.8 tonnes in 1948 and that increased to 4.7 tonnes in 1975 from the same land. Such rapid growth in farm productivity enabled India to become self-sufficient by 1970s. It also empowered the small farmers to seek further means to increase food production per hectare. By 2000, Indian farms were adopting wheat varieties capable of yielding 6 tonnes of wheat per hectare. After the success of agricultural policy in wheat, India's Green Revolution technology spread to rice production. However, since irrigation infrastructure was very poor, Indian farmers continued farming mostly with tube-wells to harvest ground water. When gains from the technology reached their limits in the states of initial adoption, the technology spread in 1970s and 1980s to the states of eastern India(Bihar,Odhisha and West Bengal). The lasting benefits of the improved seeds and new technology expanded principally to the irrigated areas which account for about one-third of the harvested crop area. In 1980s, Indian agricultural policy shifted to "evolution of a production pattern in line with the demand pattern" leading to a shift that emphasized to other agricultural commodities like oilseeds, fruit and vegetables. Farmers began to adopt improved methods and technologies in dairy, fisheries and livestock sectors to meet the diversified food needs of India's growing population. As with rice, the lasting benefits of improved seeds and farming technologies now largely depend on whether, India develops infrastructures such as irrigation network, flood control systems, reliable electricity production capacity, all season rural and urban highways, cold storage, modern retail and competitive buyers of produce from the Indian

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farmers. India's agricultural economy is undergoing structural changes. This is not because of reduced importance of agriculture, or as a consequence of agricultural policy. This is largely because of the rapid growth in services, industrial output, and non- agricultural sectors in India after the economic reforms period.

Area under foodgrains cultivation in India is presented in Table 1. The total area under foodgrains production increased from 97.32 million ha in 1950-51 to 120.16 m. ha in 2012-13. Out of that, during that period, the share of paddy crop area increased from 30.81 m. ha to 42.41m. ha. The percentage share of paddy crop area has increased to 35.29 percent from 31.66 percent. The area under wheat has increased from 9.75m. ha to 29.65 m. ha in the same period. That is, the area under wheat increased from 10.02 percent to 24.68 percent. The total share of cereals area increased from 78.23 m. ha in 1950-51 to 96.69 m.ha in 2012-13. But there was no improvement in percentage share of production. The pulses increased from 19.09m .ha to 23.47 m. ha. Altogether, the area under total foodgrains increased by 23 m. ha during the six decades.

Table 1: Area under Foodgrains Cultivation in India: 1950-51 to 2012-13

Year	Area in Million Hectares						Percentage Share to Total Foodgrains				
	Rice	Wheat	Coarse Cereals	Total Cereals	Pulses	Total Foodgrains	Rice	Wheat	Coarse Cereals	Total Cereals	Pulses
1950-51	30.81	9.75	37.67	78.23	19.09	97.32	31.66	10.02	38.71	80.38	19.62
1960-61	34.13	12.93	44.96	92.02	23.56	115.58	29.53	11.19	38.90	79.62	20.38
1970-71	37.59	18.24	45.95	101.78	22.54	124.32	30.24	14.67	36.96	81.87	18.13
1980-81	40.15	22.28	41.78	104.21	22.46	126.67	31.70	17.59	32.98	82.27	17.73
1981-82	40.71	22.14	42.45	105.3	23.84	129.14	31.52	17.14	32.87	81.54	18.46
1990-91	42.69	24.17	36.32	103.18	24.66	127.84	33.39	18.91	28.41	80.71	19.29
2000-01	44.71	25.73	30.26	100.7	20.35	121.05	36.94	21.26	25.00	83.19	16.81
2005-06	43.66	26.48	29.04	99.18	22.39	121.57	35.91	21.78	23.89	81.58	18.42
2010-11	42.56	29.25	27.64	99.45	26.28	125.73	33.85	23.26	21.98	79.10	20.90
2011-12	43.97	29.9	26.37	100.52	26.22	125.03	35.17	23.91	21.09	80.40	20.97
2012-13*	42.41	29.65	24.64	96.69	23.47	120.16	35.29	24.68	20.51	80.47	19.53

Source: Ministry of Agriculture, Government of India, Note: Data for 2012-13 are based on Advance Estimates.

Table 2 : Foodgrains Production in India: 1980-81 to 2012-13

Year	in Thousand Tonnes					Percent Share to Total Foodgrains			
	Rice	Wheat	Coarse Cereals	Pulses	Foodgrains	Rice	Wheat	Cereals Cereals	Pulses
1980-81	53631.7	36312.6	29017.7	10626.8	129588.8	41.39	28.02	22.39	8.20
1990-91	74291.4	55134.5	32699.1	14265.3	176390.3	42.12	31.26	18.54	8.09
2000-01	84976.6	69680.8	31081	11075.4	196813.8	43.18	35.40	15.79	5.63
2005-06	91793.4	69354.5	34069.3	13384.4	208601.6	44.00	33.25	16.33	6.42
2010-11	95979.8	86874	43397.1	18240.9	244491.8	39.26	35.53	17.75	7.46
2011-12	104322	93903.6	42008.5	17207.9	257441.9	40.52	36.48	16.32	6.68
2012-13	104398.7	92458.2	40058.4	18446	255361.2	40.88	36.21	15.69	7.22

Source: Agricultural Statistics at a Glance, Ministry of Agriculture, Government of India, Note: 1. All India data are inclusive of Union Territories. 2. The States of Chhattisgarh, Jharkhand and Uttarakhand were carved out of Madhya Pradesh, Bihar and Uttar Pradesh, respectively during 2000-01.The production figures of Madhya Pradesh, Bihar and Uttar Pradesh for the period 1980-81 to 1999-2000 refer to States.

The foodgrains production in India is given in Table 2. The share of foodgrains production has increased from 129588.8 thousand tonnes in 1950-51 to 255361.2 TT in 2012-13.Paddy accounted for a major share in the total foodgrains. Paddy production has declined from 41.39 percent in 1980-81 to 40.88 percent in 2012-13. But the share of wheat production from 36312.6 (28 percent) to 92458.2 thousand tonnes (36 percent). It is nearly increased to 56146 thousand tonnes.The increase in foodgrain production was largely due to the Green Revolution.

Trends of Paddy Production

Paddy cultivation is the most important agricultural operation in the country, not only in terms of food security, but also in creating better livelihoods, opportunities for rural population. It plays a major role in the people's diet, economy and employment. Nearly 90 percent of paddy is produced and consumed within the country. It contributes nearly 15 percent of India's annual Gross Domestic Product (GDP) and provides 31 percent of the total calorie supply. The area under paddy increased from 31.29 million ha in 1953-54 to 42.56 million ha.(125.73 million ha. of foodgrains) in 2010-11, while productivity increased from 902 kg/ha to 2240 kg/ha during the period. The area under paddy accounted for 33.85 percent of India's food crops and 42.79 percent of its cereal crops area during 2010-11.

Growth of Paddy Crop in Tamil Nadu

Details of the foodgrains production in Tamil Nadu during 1980-81 to 2012-13 are given in Table 3. The area under foodgrain cultivation increased from 5487 million ha. in 1980-81 to 8617 m. ha. in 2000-01. Thereafter, it declined to 6294 m. ha in 2012-13. But during 2011-12, the area under foodgrains was 9640.6 ha. The area under paddy crop occupies highest share among foodgrains in Tamil Nadu. The area under paddy crop increased from 75.80 percent (4159 m. ha.) in 1980-81 to 85.49 percent (7366 m. ha.) in 2000-01. Thereafter, it is declined to 69.90 percent (4399 m. ha.) in 2012-13. The area under paddy is the highest due to the adoption of modern technology in agriculture.

Table3 Area under Foodgrains in Tamil Nadu: 1980-81 to 2012-13

	Area in Million Hectares				Percentage Share to Total Foodgrains			
Year	Rice	Wheat	Coarse Cereals	Pulses	Food Grains	Rice	Coarse	Pulses
1980-81	4159	0.5	1180.6	146.7	5486.8	75.80	21.52	2.67
1990-91	5782.4	0.2	1307.3	348.2	7438.1	77.74	17.58	4.68
2000-01	7366.3	0.1	937.8	312.7	8616.9	85.49	10.88	3.63
2005-06	5220	-	730.2	177	6127.2	85.19	11.92	2.89
2010-11	6139.4	-	1878.2	296	8313.6	73.85	22.59	3.56
2011-12	6893.9	-	2347.3	399.5	9640.6	71.51	24.35	4.14
2012-13	4399.5	-	1645.4	249.1	6294.1	69.90	26.14	3.96

Source: Ministry of Agriculture, Government of India, Note: Data for 2012-13 are based on Advance Estimates.

Table 4 Area, Production of Foodgrains in Tamil Nadu: 1950-51 to 2012-13

	Paddy			Foodgrains			Percent share in Paddy	
Year	Area (in ha.)	Production (in tonnes)	Yield (kg / ha)	Area (in ha.)	Production (in tonnes)	Yield (kg / ha)	Area	Production
1	2	3	4	5	6	7	8	9
1950-51	1686764	2458530	1457	4040821	4499420	1114	41.74	54.64
1960-61	2517615	3559300	1414	5101349	5302460	1039	49.36	67.13
1970-71	2635718	5000920	1897	5109729	6706780	1313	51.58	74.57
1980-81	2299460	4278820	1861	4246750	5651440	1331	54.15	75.72
1990-91	1855741	5782440	3116	3885132	7495640	1929	47.77	77.14
2000-01	2080010	7366320	3541	3500788	8616783	2461	59.42	85.49
2005-06	2050455	5209433	2541	3316637	6116145	1844	61.82	85.18
2009-10	1845553	5665258	3069	3034124	7504548	2474	60.83	75.49

1	2	3	4	5	6	7	8	9
2010-11	1905726	5792415	3039	3173775	7594120	2393	60.04	76.27
2011-12	1903772	7458657	3918	3208669	10151780	3164	59.33	73.74
2012-13	1493276	4050334	2712	2647586	5605436	2117	56.40	72.25

Source: Department of Economics and Statistics, Government of Tamil Nadu, Chennai-18.

Table 4 gives details of area and production of foodgrains in Tamil Nadu during 1950-51 to 2012-13.The area of foodgrains cultivation increased from 40.40 lakh ha. in 1950-51 to 51.09 lakh ha. in 1970-71. After that, it declined to 30.34 lakh ha. in 2009-10. During 2011-12, the area increased to 32.08 lakh ha. and again declined to 26.47 lakh ha. in 2012-13. The foodgrains production increased from 44.99 lakh tonnes in 1950-51 to 67.06 LT in 1970-71. After that, it increased to 86.17 LT in 2000-01. Again it declined to 75.94 LT in 2010-11. During 2011-12, there was tremendous increase in rice production;it increased to 101.51 LT but it declined to 56.05 LT in 2012-13. This implies that whenever there was increase the area under foodgrains, automatically there was increase in production of paddy. It may by note that higher yield and area expansion have led to increase in foodgrains production in Tamil Nadu.

Paddy occupied the single most important component in Tamil Nadu agriculture. The area under paddy increased from 16.86 lakh ha. (41.74 percent) in 1950-51 to 26.35 lakh ha.(56.51 percent) in 1970-71.At the same time, paddy production also increased by 50.00 lakh tonnes (74.57 percent) in 1970-71 against 24.58 lakh ha. (54.64 percent) in 1950-51. It may be noted that there was two fold increases in production over the thirty years. Thereafter, although the area declined to 20.80 lakh ha. (59.42 percent) but the production increased to 73.66 lakh tonnes (85.49 percent) in 2000-01. Again the area declined to 18.45 lakh ha. (60.83 percent) production declined to 56.65 lakh tonnes (75.49 percent) in 2009-10.The area and production increased to 19.03 lakh ha. (59.33 percent) and 74.58 lakh tonnes (73.74 percent) in 2011-12. During 2012-13, it declined to 14.93 lakh ha. (56.40 percent) and 40.50 lakh tonnes (72.25 percent). The area under paddy increased from 41.74 percent in 1950-51 to 54.15 percent in 1980-81. The percentage share of paddy in foodgrains also increased from 54.64 percent to 75.72 percent the same period. Again they increased to 61.82 percent and 85.18 percent respectively in 2005-06. After that, they declined to 56.40 percent and 72.25 percent during in 2012-13 respectively.Thus, we find that paddy accounted for more than 75 percent of the total foodgrain output in Tamil Nadu since 1970s.This is largely because of the adoption of HYV seeds, use of more chemical fertilizers and water. But production of paddy increased at a declining rate mainly because of the shrinkage of area under paddy crop.

District-wise Area and Production of Paddy in Tamil Nadu

Paddy is a major crop cultivated in many districts of Tamil Nadu. Farmers cultivate paddy during three seasons: Kar/ Kuruvai/Sornavari (April to July), Samba/ Thaladi/ Pishanam (August to November) and Navarai/ Kodai (December to March). The ACR of district-wise area, production and productivity of paddy crop in Tamil Nadu during 1985-86 to 2012-13 is shown in Table 5. The area under paddy cultivation declined at an AGR of -2.81 percent in 1985-86 to 1989-90 and -1.19 percent in 2000-01 to 2009-10. There was a positive growth rate of 1.55 percent in Tamil Nadu during 1990-91 to 1999-2000. It may be noted that there is an expansion of area under cultivation of paddy crop during1990-91 to 1999-2000 period due to adequate supply of water, good rainfall and use of hybrid varieties of seeds in Tamil Nadu.

ACGR of production of paddy in Tamil Nadu increased to 2.68 percent during 1990-91 to 1999-2000 as against to 2.46 percent during 1985-86 to 1989-90; in other words, the ACR increased to 0.22 percent during 15 year period. Thereafter, the growth rate declined to -2.59 percent during 2000-01 to 2009-10 and there was some recovery in the growth rate to -0.09 percent during the past ten years. Tsunami had a negative impact on the production level of paddy because of soil erosion in the sea shore areas of the districts; Thana and Neelam disasters had also affected the production in the cultivated areas.

Among the districts, Erode had the highest ACGR of 19.92 percent during 1985-90, followed by Salem (10.72 percent). The ACGR of Thoothukudi (8.91 percent), Madurai (6.34 percent), Dindugal (5.54 percent), Virudhunagar (5.32 percent), Coimbatore (3.69 percent), Dharmapuri (2.73 percent), Sivagangai (2.29 percent), Trichy (1.20 percent), Ramanathapuram (0.70 percent) was the result of the extension in the cultivated area during 1985-90. During 2000-01 and 2009-10, Krishnagiri (5.27 percent), Thiruppur (3.98 percent), Ariyalur (2.82 percent), Thiruvannamalai(2.55 percent), Thoothukudi (2.27 percent), Thirunelveli (1.21 percent), Ramanathapuram (0.75 percent), Pudukkottai(0.05 percent) had exhibited positive growth rate trend. There was also extension in the cultivation of land area under paddy cultivation in Ramanathapuram from 0.70 percent in 1985-90 to 0.75 percent in 2000-10. In Thoothukdui, the area under cultivation declined from 8.91 percent to 2.27 percent and in Virudhunagar, it declined to 0.23 percent from 5.32 percent.

TABLE 5 DISTRICTS-WISE AREA, PRODUCTION AND YIELD OF PADDY CROP IN TAMIL NADU: 1985-86 TO 2009-10 (ACGR)

Name of the Districts	Area				Production				Yields			
	1985-86 to 1989-90	1990-91 to 1999-200	2000-01 to 2009-10	2010-11 to 2012-13	1985-86 to 1989-90	1990-91 to 1999-2000	2000-01 to 2009-10	2010-11 to 2012-13	1985-86 to 1989-90	1990-91 to 1999-2000	2000-01 to 2009-10	2010-11 to 2012-13
Kancheepuram	-7.23	-4.60	-3.71	-6.69	-3.84	-4.23	-2.69	-3.06	3.65	0.38	1.06	3.88
Thiruvallur	-	0.90	-1.39	-2.00	-	7.72	-2.48	6.29	-	6.77	-1.10	-1.02
Cuddallore	-6.85	-4.48	-0.25	-1.12	-4.17	-3.24	-2.59	4.01	2.87	1.29	-2.34	-8.50
Villupuram	-	3.07	-0.33	-8.30	-	3.56	-0.87	-8.17	-	0.48	-0.54	-4.64
Vellore	-30.14	3.73	-2.71	-6.17	-25.73	7.97	-4.33	0.00	6.43	4.09	-1.66	2.66
Thiruvannamalai	-	6.21	2.55	-9.90	-	6.30	2.77	-3.09	-	0.08	0.22	-3.56
Salem	10.72	4.47	-6.14	-27.04	15.74	7.04	-6.17	-28.98	4.50	2.46	-0.03	1.17
Namakkal	-	-2.71	-6.73	-26.66	-	3.54	-6.87	-27.88	-	6.43	-0.14	-2.61
Dharmapuri	2.73	6.25	-9.63	-19.33	5.61	7.63	-8.36	-16.80	2.78	1.29	1.40	4.17
Krishnagiri	-	-	5.27	2.81	-	-	6.21	0.98	-	-	7.39	0.93
Coimbatore	3.69	-0.16	-14.88	-6.83	-1.12	1.01	-14.97	-8.80	-4.69	1.16	-0.10	-2.56
Thiruppur	-	-	3.98	-72.51	-	-	-	-76.58	-	-	-	-14.63
Erode	19.92	-0.63	-4.12	-43.53	21.70	0.03	-4.98	-42.66	1.48	0.66	-0.90	3.70
Tiruchirapalli	1.20	-1.35	-2.30	-12.34	8.85	1.71	-1.72	-19.84	7.56	3.10	0.60	-8.28
Karur	-	5.91	-1.77	5.77	-	9.50	-2.33	-13.89	-	3.39	-0.56	-19.32
Perambalur	-	2.47	-14.00	-8.52	-	6.27	-13.21	-6.95	-	3.88	0.91	0.72
Ariyalur	-	-	2.82	-33.85	-	-	-	-40.24	-	-	-	-10.21
Pudukkottai	-4.16	3.77	0.05	-3.46	-3.88	7.50	-5.25	4.79	0.29	3.59	-5.30	-10.07
Thanjavur	-2.33	-8.50	-1.62	-4.02	6.68	-7.35	-5.07	-3.30	9.23	1.26	-3.51	-9.47
Thiruvarur	-	1.30	-0.47	-0.28	-	19.73	-3.09	-12.27	-	18.19	-2.63	-32.54
Nagapatinam	-	-7.53	-0.58	-3.05	-	-7.58	-2.34	-14.41	-	-0.05	-1.77	-28.98
Madurai	6.34	-3.63	-4.03	-33.42	13.00	-1.14	-4.57	-37.01	6.26	2.58	-0.56	-3.03
Theni	-	-0.73	-1.68	-12.40	-	1.84	-0.39	-13.66	-	2.59	1.31	5.28
Dindigul	5.54	2.59	-3.15	-19.77	14.89	5.44	-3.08	-32.03	8.84	2.79	0.08	-6.33
Ramanathapuram	0.70	-1.51	0.75	-3.93	10.39	-10.67	-0.09	-35.37	9.63	-9.30	-0.83	-47.02
Virudhunagar	5.32	-1.21	0.23	32.20	13.82	0.60	-1.21	11.30	8.07	1.83	-1.43	-22.44
Sivagangai	2.29	-0.14	-0.82	-33.96	25.48	-1.83	-4.48	-57.37	22.67	-1.69	-3.69	-23.64
Thirunelveli	-8.66	-1.60	1.21	-18.52	-7.30	-0.19	0.49	-1.02	1.51	1.43	-0.71	0.57
Thoothukudi	8.91	-4.80	2.27	-32.21	13.42	-5.28	3.59	-35.16	4.14	-0.50	1.29	-0.38
The Nilgiris	-7.82	-3.52	-12.94	-9.93	0.44	1.48	-14.31	-10.38	8.14	5.18	-1.57	5.64
Kanyakumari	-0.32	-2.66	-4.90	-9.66	5.33	1.58	-5.55	-6.40	5.67	4.36	-0.69	0.14
Tamil Nadu	-2.81	1.55	-1.19	-7.81	2.46	2.68	-2.59	-11.24	5.42	1.11	-1.42	-5.92

Source: Directorate of Economics and Statistics, Government of Tamil Nadu, Chennai-18

Among the districts of Tamil Nadu, Virudhunagar was one of the leading districts in production with an ACGR of 11.30 percent during 2010-14 followed by Thiruvallure (6.29 percent), Thiruvallure (4.79 percent). On the other hand, out of 32 districts the production of paddy had exhibited increasing trend in four districts, during the last ten years (2010-14). The dynamics of cultivation of paddy crop in Tamil Nadu show that there were wide variations in area and production of paddy crop among the districts. A study of the period of 30 years shows that during the earlier period of 1985-90, most of the districts in Tamil Nadu had shown increasing trend in terms of area and production of paddy than later period 2011-14, during which the growth rate of production declined in majority of the districts in Tamil Nadu except in Virudhunagar, Thiruvallure and Thiruvallure. Among the districts, when we look at the average rate of yield in paddy crop in Tamil Nadu, Theni had the highest yield rate of 5.28 percent during 2010-14, followed by Dharmapuri (4.17 percent), Kancheepuram (3.88 percent), Erode (3.70 percent) and Vellore (2.66 percent).

Hybrid Rice Cultivation

The area covered under hybrid rice cultivation in Tamil Nadu during 2006-07 to 2011-12 is presented in the Table 6. The percentage share of area under hybrid rice cultivation in total area of rice in Tamil Nadu increased to 0.59 percent in 2011-12 against 0.06 percent in 2006-07. That shows the area under hybrid rice cultivation expanded by 0.53 percent between 2006-07 to 2011-12. It also means in a way that the state has not evinced much interest in hybrid rice technology. Tamil Nadu had only less than one percent of total area under hybrid rice cultivation compared to all-India percentage of 3.5 percent. From the observation,

it may be noted that the state could not adopt the hybrid rice technology even after two decades. The technology did not spread too many districts of Tamil Nadu in a big way.

The area expanded under hybrid rice cultivation was only 0.01 percent:Thiruvarur (265 ha), Kancheepuram (248 ha.), Theni (173 ha.), Thanjavur (116 ha.) and Perambalur (100 ha.). The percentage share of hybrid rice in total area under rice recorded the highest percentage (0.28 percent) in Thiruvarur (5330 ha.), followed by Theni (1618 ha.) with 0.08 percent Pudukkottai (1494 ha.) with 0.08 percent and Cuddalore (1250 ha) with 0.07 percent in 2011-12.

The lowest share was recorded by Erode (4.38 ha.) at 0.0002 percent. Districts like Kancheepuram, Perambalur and Thanjavur stopped cultivating hybrid rice during 2011-12 period. The above empirical evidence shows that many districts adopted hybrid rice varieties only to a small extent. Even today some of the districts in Tamil Nadu like Thiruvallur, Karur, Dindugal, and Kanyakumari did not adopt the hybrid rice technology,mainly because of lack of awareness among the farmers, shortage in the supply of hybrid seeds, technical problems, and high cost of cultivation and absence of enthusiasm from government side.

TABLE 6 AREA UNDER HYBRID RICE IN TAMIL NADU DURING 2006-07 TO 2011-12 (AREA IN HA.)

Districts	2006-07		2007-08		2008-09		2009-10		2010-11		2011-12	
	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%
Kanchiuram	248	0.01	361	0.02	523	0.03	-	-	-	-	-	-
Thiruvallur	-	-	-	-	-	-	-	-	-	-	-	-
Cuddalore	10	0.001	120	0.01	210	0.01	0	0.00	1600	0.08	1250	0.07
Villupuram	-	-	-	-	50	0.003	21	0.001	-	-	-	-
Vellore	48	0.002	64	0.004	102	0.01	-	-	-	-	-	-
T.V.Malai	-	-	-	-	50	0.003	77	0.004	1002	0.05	-	-
Salem	70	0.004	150	0.01	200	0.01	155	0.01	155	0.01	-	-
Namakkal	46	0.002	58	0.003	150	0.01	-	-	-	-	-	-
Dharmapuri	5	0.0003	-	-	40	0.002	100	0.01	-	-	-	-
Krishnagiri	-	-	-	-	-	-	55	0.003	-	-	-	-
Coimbatore	-	-	-	-	50	0.003	-	-	-	-	230	0.01
Erode	-	-	-	-	120	0.01	32	0.002	-	-	4.38	0.0002
Trichy	-	-	-	-	20	0.001	-	-	-	-	-	-
Perambalur	100	0.01	-	-	250	0.01	-	-	-	-	-	-
Karur	-	-	-	-	-	-	-	-	-	-	-	-
Pudukkottai	20	0.001	120	0.01	615	0.03	566	0.03	480	0.03	1494	0.08
Thanjavur	116	0.01	-	-	125	0.01	25	0.001	-	-	-	-
Nagapattinam	-	-	20	0.001	1250	0.06	1500	0.08	-	-	247.75	0.01
Thiruvarur	265	0.01	410	0.02	675	0.03	785	0.04	-	-	5330	0.28
Madurai	-	-	20	0.00	20	0.001	-	-	-	-	-	-
Theni	173	0.01	579	0.03	625	0.03	4840	0.26	-	-	1618	0.08
Dindigul	-	-	-	-	-	-	-	-	-	-	-	-
Ramnad	-	-	50	0.003	110	0.01	50	0.003	90	0.005	129	0.01
Sivaganga	-	-	50	0.003	160	0.01	750	0.04	-	-	280	0.01
Virudunagar	-	-	-	-	20	0.001	-	-	-	-	-	-
Tirunelveli	-	-	-	-	280	0.01	-	-	-	-	-	-
Toothukudi	-	-	-	-	80	0.004	-	-	-	-	709	0.04
Kanyakumari	-	-	-	-	-	-	-	-	-	-	-	-
Tamil Nadu	1101	0.06	2002	0.11	5725	0.30	8956	0.49	3327	0.17	11292.13	0.59
Total Rice Area	1931397	100.00	1789170	100	1931603	100	1845553	100	1905726	100	1903772	100

Source: Directorate of Economics and Statistics, Government of Tamil Nadu, Chennai-18.

System of Rice Intensification

The adoption of *SRI method* in Indian soil is a very slow process when compared to other rice growing countries. Firstly SRI method was adopted in Tamil Nadu Agricultural University, Coimbatore during 2001-02. In India, some of the states like Andhra Pradesh, Tirupura and Tamil Nadu are leading the adoption of that method. In Tamil Nadu, SRI was promoted under the Integrated Cereal Development Programme. The target was to cover 9000 acres during 2004-05.

SRI is a method of adoption for cultivation of rice production in India and Tamil Nadu. It creates better soil health and reduces inputs like seeds, water, and labour. The farmers got high yields, while using less water and thus succeeded lowering the production costs.By adopting this method of cultivation, farmers managed to save as much as 50% of the water.

TABLE7 TARGET AND ACHIEVEMENT OF AREA UNDER SRI IN TAMIL NADU: (AREA IN LAKH HA.)

Year	SRI Area		Percent of Achievement	Area in Rice	Percentage of SRI to total Rice Area
	Target	Achievement			
2006-07	-	-	-	19.31	-
2007-08	7.955	4.476	56.3	17.89	25.02
2008-09	7.5	5.114	68.2	19.32	26.47
2009-10	7.5	6.498	86.64	18.46	35.02
2010-11	8.5	8.499	99.99	20.48	41.5

Source: Season Crop Report of Tamil Nadu, Commisionerate of Agriculture, Chennai-5

Area under SRI cultivation has been increasing over a period of two decades in India and Tamil Nadu. The average area increased from 4.48 lakh ha in 2006-07 to 8.50 lakh ha in 2010-11. It accounts for 47.30 percent over the five year period due serious efforts taken by Department of Agriculture, Government of Tamil Nadu. The share of area under SRI in total rice area is increasing from 25.02 percent in 2007-08 to 41.50 percent in 2010-11. It is noted that the 17 percent of area under SRI increased over a period of time. In recent years, Government of Tamil Nadu has given high priority to the SRI farmers. Financial and technological support is given to the farmers for the expansion of area under SRI method in Tamil Nadu.

Conclusion and Policy Implications

The area under paddy crop occupies the highest share among foodgrains in Tamil Nadu. The area increased from 75.80 percent in 1980-81 to 85.49 percent in 2000-01. Thereafter, it is declined to 69.90 percent in 2012-13. The area under paddy is the highest due to the adoption of modern technology in agriculture.

Production level increased to 2.68 percent during 1990-91 to 1999-2000 from 2.46 percent during 1985-86 to 1989-90. Thereafter, it declined to -2.59 percent during 2000-01 to 2009-10 and there was some recovery to -0.09 percent during the past ten years. Tsunami had a negative impact on the production level of paddy because of soil erosion in the sea shore areas of the districts; Thana and Neelam disasters had also affected the production in the cultivated areas.

A study of the period of 30 years shows that during the earlier period of 1985-90, most of the districts in Tamil Nadu had shown increasing trend in terms of area and production of paddy than later period 2011-14, during which the growth rate of production declined in majority of the districts in Tamil Nadu except in Virudhunagar and Thiruvallure. Among the districts, when we look at the average rate of yield in paddy crop in Tamil Nadu, Theni had the highest yield rate of 5.28 percent during 2010-14, followed by Dharmapuri (4.17 percent), Kancheepuram (3.88 percent), Erode (3.70 percent) and Vellore (2.66 percent).

The percentage share of area under hybrid rice cultivation in total area of rice in Tamil Nadu increased to 0.59 percent in 2011-12 against 0.06 percent in 2006-07. It also means in a way that the state has not evinced much interest in hybrid rice technology. Tamil Nadu had only less than one percent of total area under hybrid rice cultivation compared to all-India percentage of 3.5 percent. From the observation, it may be noted that the state could not adopt the hybrid rice technology even after two decades. The technology did not spread to many districts of Tamil Nadu in a big way.

The above empirical evidence shows that many districts adopted hybrid rice varieties only to a small extent. Even today some of the districts in Tamil Nadu like Thiruvallur, Karur,Dindugal, and Kanyakumari did not adopt the hybrid rice technology,mainly because of lack of awareness among the farmers, shortage in the supply of hybrid seeds, technical problems, and high cost of cultivation and absence of enthusiasm from government side.

The share of area under SRI in total rice area is increasing from 25.02 percent in 2007-08 to 41.50 percent

in 2010-11. It is noted that the 17 percent of area under SRI increased over a period of time. In recent years, Government of Tamil Nadu has given high priority to the SRI farmers. Financial and technological support is given to the farmers for the expansion of area under SRI method in Tamil Nadu.

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Socio- Economic Analysis of Celery Crop in Punjab

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Abstract

The study was conducted with the objective to evaluate the socio-economics of celery growers in Amritsar district of Punjab, India. In celery farms, average male members were found to be more than their female counterparts. Majority of the farmers were literate. Farming followed by service and business was the main occupation of adult family members. All income measures per hectare were found to be positive for celery crop. 42% and 54% of selected celery farmers responded regarding availability of good quality seed/ seedlings and disease problem in seedlings in the initial stage of sowing of celery crop respectively. Most of the farmers responded for lack of extension training facilities, un-remunerative price of produce, lack of favourable Govt. policies, and lack of cheap credit from banks for celery farming. Strengthening R&D work, extension services, training of farmers, and establishment of regulated markets for better celery farming were suggested.

Introduction

The celery plant (Apium graveolens) from Apiaceae family is a mainly biennial, occasionally an annual yield, widely cultivated for its fleshy leafstalk, used as a vegetable and seeds which yield essential oil. The seed contains 2-3% essential oil and 17-18% fatty oil. The essential oil has d-selenene, sedlanolide and sedanoic acid anhydride contributing to its flavour and 60% of d-limonene. Its seed and seed oil is used for flavouring tinned food and sauces. It is also used in pickles. The seed has carminative and nerve stimulant properties; it is used as a neuro-tonic in domestic medicine. The leaves are used in salad and also cooked as vegetable.

The crop area at present is five thousand ha and is being cultivated mainly in the states of Punjab (Jallandhar, Gudaspur and Amritsar Districts), Haryana and western Uttar Pradesh (Ladhwa and Saharanpur Districts). About 90% of the total produce comes from Punjab, where it is grown for production of seed and seed oil and is exported mainly to USA (http://nhb.gov.in).

The seed contains 2.2% essential oil (2.2 - 3.0 %). The oil is pale yellow in colour, contains d-limonene (60%), ß-selinene (10-12 %), sedanoic acid anhydride (0.5 %) and sedanolide (2.5-3.0 %). The later two components contribute to its characteristic odour. The leaves are rich source of minerals like Ca, P, Fe, vitamin A and vitamin C for which it is consumed in salad.

The dried, ripe seeds are used as spice to flavour food and liquids; the seed is a stimulant and carminative and is used as a nerve tonic in indigenous medicine systems. It is also used as a remedy for rheumatism. The seed oil is used for flavouring food items and in the perfumery and pharmaceutical industries. The fatty oil obtained from the fruit is used as an antispasmodic and nerve stimulant.

Estimated production of celery seed oil is about 50 t/ annum whereas India produces half of its production. Celery of Indian origin dominates the world market. India exports celery seed to American and European markets. Celery seed has a ready market as it is also used as a source of commercial drug Ajmoda and in flavouring tomato juice and sauces.

Celery crop being a medicinal crop, it is interesting to study the socio- economics characteristics of celery growers, economics of growing celery crop and issues/ constraints related to this crop. The present study is an attempt in this direction

Methodology

For evaluating the objectives of the study, the data were collected through personal interview method with the help of a well structured and pre-tested schedule for the year 2012-13. The primary data with respect to costs, returns and the problems involved in cultivation of celery was collected from selected celery growers from Punjab.

A field survey was undertaken to work out the economics of celery, factors affecting its productivity and the constraints in the production of this crop in the Punjab state. Data on area under celery crop was not available from the Department of Agriculture, Punjab. Producers and area under its production was selected through multistage purposive sampling. In the first stage, Amritsar district having maximum producers and area under celery crop was selected. Secondly, three blocks (Amritsar, Verka and Tarsikka from Amritsar district) having concentration of celery growing farmers and area were selected. Celery is mostly grown in pea growing areas and these blocks are known for pea production. Depending on the number of

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growers and area under celery; three villages from Amritsar block and one each village from Verka block and Tarsikka block were selected purposively. Further, 26 farmers from Amritsar Block, 13 farmers from Verka block and 11 farmers from Tarsikka block were selected. The complete list of selected district, blocks, villages and number of respondents is presented in the Table 1.

TABLE 1 DISTRICT-WISE CELERY RESPONDENTS SELECTED FROM CLUSTER VILLAGES

District	Block	Villages	Respondents (Number)
Amritsar	Amritsar	Fatehpur Rajputan	16
		Nangal Dial	5
		Ajaibwali	5
	Verka	Fatehgarh Shukarchakk	13
	Tarsikka	Rasulpur	11
Total	3	5	50

Data Collection

For collection of primary data, a specially designed schedule was prepared, which was also pre-tested before data collection. The respondent farmers were interviewed personally for data collection. The relevant information such as household composition, educational profile, land ownership, cropping pattern, inputs used in production and output obtained pertaining to celery growers of Punjab was collected. Special emphasis was laid to record data on various constraints faced by celery growers of Punjab.

Economics of Celery Crop

The data pertaining to input use pattern in celery farming of Punjab was collected from the sample farmers for the year 2012-13. For valuation of various inputs, market price or cost was used in the analysis. For various machine related farm operations, rental value of farm operation prevailing in the selected villages was used for calculating total variable cost. Irrigation cost was worked out by enquiring about the maintenance cost of submersible pump/ electric motor on the sample farms (as electricity is free for farm sector in Punjab) and rental value of irrigation applied through generator/ tractor operated generator. Farm labour used in various farm operations was imputed at the prevailing wage rate. Interest on the working capital was calculated @ 7 per cent for the life period of the celery crop as per its season. Besides, for bringing out the gross returns, price realized by the respondent farmers by selling the produce was used. Average output obtained was recorded on the basis of respondent's perception. Benefit cost ratios were calculated for celery crop to make the results of the study more specific.

Cost Concepts

Costs were computed as per the guidelines of CACP (Commission for Agricultural Costs and Prices) discussed below:

(a) Cost A 1:

Includes following costs

(i) Value of hired human labour, (ii) Value of hired bullock labour, (iii) Value of owned bullock labour, (iv) Value of owned machinery, (v) Hired machinery charges, (vi) Value of seed/ seedlings , (vii) Value of manures , (viii) Value of fertilizers, (ix) Value of plant protection chemicals , (x) Irrigation charges, (xi) Depreciation on farm buildings and implements, (xii) Interest on working capital, (xiii) Insurance premium (xiv) Land revenue, and (xv) Miscellaneous expenses

(b) Cost A_2: Cost A_1 + rent paid for leased-in land

(c) Cost B_1: Cost A_1+ interest on fixed capital (excluding land)

(d) Cost B_2: Cost B_1+ rental value of owned land + rent paid for leased-in land

(e) Cost C_1: Cost B_1 + imputed value of family labour

(f) Cost C_2: Cost B_2+ imputed value of family labour

(g) Cost C_3: Cost C_2+10 per cent of cost C_2 as management cost

Income Measures

For working out profitability of celery cultivation in the study areas following income measures were worked out:

(a) Family Labour Income (FLI)

It is the return to family labour (including management).

F.L.I. = Gross income - Cost B_2

(b) Net Income (NI)

It is the net profit after deducting all cost items i.e., variable and fixed costs from gross income.

NI = Gross income - Total cost (Cost C_2)

(c) Farm Business Income (FBI)

It is the disposal income out of the enterprise and is defined as:

FBI = Gross income - Cost A_1 (cost A_2 in case of tenant operated land)

(d) Return Per Rupee (RPR)

$$RPR = \frac{\text{Gross Income /ha}}{\text{Total Cost (Cost } C_2\text{)/ha}}$$

Functional Analysis

To examine the factors affecting value productivity of celery crop of Punjab, both linear and log-linear production function were fitted and numerous equations were tried by taking different explanatory variables. Best fit function was determined on the basis of level of significance of the explanatory variables, the value of coefficient of multiple determinations (R_2) and the logical signs of the explanatory variables included in the model. Cobb-Douglas function of the following form was considered the most appropriate for the present investigation

$$Y = A \prod_{i=1}^{n} X_i^{bi} e^u$$

Where, Y represented the value productivity per hectare of celery crop under study. XI the selected explanatory variables (per hectares); A, the technical efficiency parameter and bi the coefficient of production elasticity of the respective variable XI at the mean level of input used and output obtained. The 'e' is an error term. The estimated form of the equation becomes

$$\text{Log } Y = \text{Log } A + \sum_{i=1}^{n} b_i \log x_i + u$$

$$\text{Log } Y = \text{Log } A + b_i \log x_1 + b_2 \log x_2 + \ldots + b_n \log x_n + u$$

Function Fitted for Celery Crop was

$$\text{Log } Y = \text{Log } A + b_i \log x_1 + b_2 \log x_2 + \ldots + b_8 \log x_s + u$$

Where,

Y = Value productivity per hectare of celery crop (Rs./ha)

X_1 = Value of seed (Rs./ha)

X_2 = Fertilizers (Rs./ha)

X_3 = Plant protection chemical (PPC) measures (Rs./ha)

X_4 = Bullock labour (Rs./ha)

X_5 = Irrigations (Rs./ ha)

X_6 = Human labour charges (Rs./ha)

X_7 = Machine labour charges (Rs./ha)

X_8 = Area under crop (hectares)

Statistical Significance of the Estimates

To test the statistical significance of these estimates, t-value of the estimates was worked out at (n-k) degrees of freedom. The t-value of the regression coefficients (bi) were worked out as under

$$t_{(n-k)} = \frac{bi}{S.E.(bi)}$$

Where S.E. is the standard error of the variable X_i

Coefficient of Determinations (R^2)

The coefficient of determination was worked out to estimate the proportion of variations in total output/gross returns per hectare explained by the different explanatory variables, taken together in the analysis. Statistical significance of R2, which examines the goodness of fit of the function, was tested by working out F-ratio as follows

$$F = \frac{R^2/k}{(1 - R^2) / n\text{-}k}$$

Where,

R^2 is the value of the coefficient of multiple determinations, n is the number of observations and k is the number of parameters included in the study.

Constraints Analysis

The respondent farmers were asked about the various constraints affecting the productivity of celery crop. Simple tabular analysis using averages and percentages was also carried out to fulfill the objectives of the study.

Result & Discussion

Socio-Economic Characteristics of Sample Celery Respondents

It is necessary to look into the various socio-economic characteristics of sample farmers before proceeding for analyzing a particular enterprise undertaken on the farm. This section deals with various socio- economic characteristics of sample respondents which includes their household composition, educational status, occupational status, land details, and cropping pattern followed on their farms.

(a) Household Composition

The family composition of the sample households is displayed in Table 2. The average number of male members, female members, children (of 12-18 years age) and children (below 12 years age) per farm were found to be 2.72, 2.24, 0.70 and 1.10 respectively. Further, the percentage of male members, female members, children (of 12-18 years age) and children (below 12 years age) was found to be 40.24%, 33.14%, 10.36% and 16.27% respectively for celery farms.

Thus, in celery farms average male members as well as their percentage were found to be more than their female counterparts.

TABLE 2 Household Composition of Sample Celery Farms

Family composition	Number per household
Male	2.72 (40.24)
Female	2.24 (33.14)
Children (12- 18 yr)	0.70 (10.36)
Children (below 12 yr)	1.10 (16.27)
Total	6.76 (100.00)

Note: Figures in parentheses are percentages of total.

(b) Educational Status

The educational level of a person plays an important role in adoption of latest farm technology. Therefore, the educational status of head of the family who acted as decision maker was enquired from the sample farms. The educational status of head of the family members is depicted in Table 3. It was found that 10 % were illiterate, 8% were who can read & write, 8 % having elementary education, 50% were having education up to secondary school and 14 % were graduate. Thus majority of the farmers were literate.

TABLE 3. Educational Status of Head of the Family on Sample Celery Farms

Particulars	In percentage
Illiterate	10.00
Read & Write	8.00
Elementary (1 to 5 class)	8.00
Middle (6 to 7 class)	10.00
Secondary (8 to 12 class)	50.00
Graduate	14.00

(c) Occupational Status

The occupational status of adult family members is displayed in Table 4. It is clear from the table that farming is the main occupation for 88.23 % of the celery farmers, whereas only 9.56 % and 2.21 % were engaged in service sector and petty business.

TABLE 4. Occupational Status of Adult Family Members on Sample Celery Farms

Particulars	Occupation/ farm
Farming	2.40 (88.23)
Business	0.06 (2.21)
Service sector	0.26 (9.56)

Note: Figures in parentheses are percentages of total.

(d) Land Holding Details

Table 5 shows that the average operational holding was 8.02 hectares for celery farms of Punjab. Owned and leased in land holding for celery farms were 4.50 and 3.52 hectares respectively.

TABLE 5. Land Holding Details on Sample Celery Farms

Particulars	Hectares per farm
Owned	4.50 (56.11)
Leased in	3.52 (48.89)
Leased out	Nil
Average operational holding	8.02 (100.00)

Note: Figures in parentheses are percentages of total.

(e) Cropping Pattern and Cropping Intensity

The cropping pattern has been analysed of the sample farms in order to work out the relative share of various crops grown as kharif and rabi crops on the sample farms. The cropping intensity was worked out to see the number of crops grown on the farms. Cropping pattern and cropping intensity of sample celery farms is presented in Table 6.

Table shows that relative share of paddy (90.48%) was much higher than vegetables (3.64%) and fodder crops (5.78%) for kharif season on celery farms.

It is also evident from the table that wheat, potato, pea and celery are the major rabbi crops of celery growing farms. The relative share of wheat (65.20%), potato (35.89%), pea (35.19%) and celery (25.42%) was much higher than fodder crops (5.18%), vegetables excluding potato and pea crop (3.34%) and winter maize (0.70%) on celery farms. Cropping intensity during the study period worked out to be 271.82% on celery farms.

TABLE 6 Cropping Pattern and Cropping Intensity on Sample Farms

Crops	Ha per farm
Kharif Crops	
Paddy	7.26 (90.48)
Maize	0.01 (0.10)
Vegetables	0.29 (3.64)
Fodder crops	0.46 (5.78)
Rabi crops	
Wheat HYV	5.23 (65.20)
Sunflower	0.06 (0.80)
Potato	2.88 (35.89)
Pea	2.82 (35.19)
Other vegetables	0.27 (3.34)
Fodder crops	0.42 (5.18)
Celery	2.04 (25.42)
Winter maize	0.06 (0.70)
Gross cropped area	21.80
Cropping intensity	271.82

Note: Figures in parentheses are percentages of the total.

Benefit Cost Ratio (BCR)

Benefit cost ratio (BCR) was undertaken to examine the profitability from celery crop on sample farm and has been shown in Table 7.

TABLE 7 Benefit Cost Analysis of Different Medicinal Crops on Sample Celery Farms

Particulars	Per hectare
Human labour (Rs.)	14612
Machine labour (Rs.)	12809
Seed/ seedlings (Rs.)	1669
Fertilizer use (Rs.)	5226
Plant protection chemicals i.e. PPC (Rs.)	399
Irrigations (Rs.)	1957
Interest on variable cost @ 7% p.a. (Rs.)	1283
Total variable cost (Rs.)	37955
Rental value of owned land (Rs.)	15926
Depreciation (Rs.)	7611
Interest on fixed capital @ 12% p.a. (Rs.)	8617
Total cost	69468
Yield (kg/ha)-main product	1758.44
Gross returns (Rs.)	74946
Returns over variable cost (Rs.)	36991
BCR (over total variable cost)	2.009
BCR (over total cost)	1.079

Table reveals that total variable cost of growing celery, worked out to be Rs. 37955 per hectare. The major constituents of total variable cost came out to be human labour (Rs. 14612), machine labour (Rs. 12809), fertilizers (Rs. 5226), irrigations (Rs. 1957), planting material/ seed (Rs. 1669.00) and plant protection chemicals (Rs.399.00). Yield of celery on an average was worked out to be 1758.44 kg/ha and gross returns were worked out as Rs. 74946/ha. Returns over variable cost for celery crop was worked out at Rs. 36991/ha. BCR (over total variable cost) as well as BCR (over total cost) was 2.009 and 1.079 respectively for celery crop. Returns over variable cost, and BCR (over total variable cost) were found to be positive and more than one respectively for celery crop, which reveals that farmers are cultivating this crop to recover variable costs as well as getting returns over variable costs incurred.

Cost Concepts and Income Measures

Cost concepts (A1, A2, B1, B2, C1 and C2) and income measures (family labour income, farm business income, net income and return per rupee) for celery crop has been presented in Table 8. Overall costs A1, A2, B1, B2, C1 and C2 were worked out at Rs. 42850, Rs. 58556, Rs. 51666, Rs. 83298, Rs. 53741 and Rs. 85373 respectively for celery crop. Family labour income, farm business income, net income and returns per rupee were worked out at Rs. (-) 8352, Rs. 16390, Rs. (-) 10427 and 0.888 respectively for celery crop. From the analysis, it is clear that family labour income and net income were negatives for celery crop. Major reason was low market prices for this crop during the study period. Market prices are decided by the private players in MAP crop business based on the demand projections in the world market. Farmers continue to do farming of these risky and highly price volatile crops as during some years it gives high profits.

Farmers grow these crops only in some proportion and majority of the crops are those having minimum support price (MSP) like wheat and paddy for having assured income.

TABLE 8. COST CONCEPTS AND INCOME MEASURES FOR CELERY CROP ON SAMPLE FARMS

Per ha

Particulars	Celery
Cost Concepts	
Cost A1	42850
Cost A2	58556
Cost B1	51666
Cost B2	83298
Cost C1	53741
Cost C2	85373
Cost C3	93911
Income Measures	
Family labour income (Rs.)	-8352
Farm business income (Rs.)	16390
Net income (Rs.)	-10427
Return per rupee (RPR)	0.888

Factors Affecting Productivity of Celery Crop

The discussion in previous section was focused on studying the various parameters related to economics of celery crop. Various factors affecting productivity of celery are discussed in this section. This section will bring out the strategies needed to augment the value productivity of these crops.

The regression coefficients of various explanatory variables included in the model for celery crop have been depicted in Table 8. The table reveals that the value of adjusted coefficient of multiple determinations (R2) came out to be 0.072 for celery crop which shows that only 7.2 per cent of the variation in the model has been explained by the explanatory variables included in the model.

TABLE 8. REGRESSION COEFFICIENTS OF COBB-DOUGLAS FUNCTION FOR CELERY CROP

Particulars	Celery
Intercept	4.926 (0.679)
Planting material (Rs./ha)	0.013 (0.010)
Fertilizers (Rs./ha)	0.035** (0.013)
Plant protection chemicals *i.e.* PPC (Rs./ha)	-0.018* (0.009)
Bullock Labour (Rs./ha)	-
Irrigation (Rs./ha)	0.006 (0.055)
Human labour (Rs./ha)	-0.031 (0.062)
Machine labour (Rs./ha)	-0.015 (0.081)
Area under crop (ha)	-0.005 (0.010)
Coefficient of multiple determination (R^2)	0.204
Adjusted coefficient of multiple determination (R^2)	0.072

NOTE: Figures in parentheses are standard errors of regression coefficients

**, *, indicate significance at 1 per cent and 5 per cent level of significance

The coefficient of expenditure on Fertilizers & FYM was found to be positive and significant at one per cent level of significance showing thereby that with increase in expenditure on Fertilizers & FYM by one per cent the resultant value productivity of celery increases by 0.035 per cent. The coefficients of expenses incurred on plant protection chemicals were negatively related to value productivity of celery at five per cent level of significance. It shows the excessive use of PPC on the celery crop. Hence, with increase in expenses on PPC by one per cent, the resultant value productivity decreases by 0.018 per cent. The regression coefficients of other explanatory variables such as expenditure on planting material/ seed and irrigation were found to be positive but non-significant. The coefficient of human labour, mechanical labour and area under celery crop was found to be negative but non-significant.

Therefore, the explanatory variables affecting the value productivity of celery crop positively were found to be, expenses on Fertilizers & FYM.

Issues/ Problems Related to Celery Farming

Since cultivation of celery farming has both direct and indirect effect on the establishment and working of herbal industry related to value addition of celery, so it becomes important to study the problems/ issues related to the celery farming. The problems/ issues highlighted by farmers during survey are presented in Table 9.

(a) Seed/ Seedling Issues

Certain issues related to seedlings were studied for celery crop. When asked about the availability of sufficient quantity of planting material, all the farmers of celery farms responded for the availability. 42%, 86% and 54% of selected celery farmers' respondended regarding availability of good seed/ seedlings, availability of seed/ seedlings at reasonable price, and disease problem in seed/ seedlings in the initial stage of sowing of celery crop respectively.

(b) Input Issues

Regarding know- how support from any organization, 70% of celery farmers responded positively. All the celery growers responded for availability of inputs (fertilizers/ chemicals), whereas regarding availability of labour, 64% responded positively.

TABLE 9. PROBLEMS/ ISSUES RELATED TO CELERY FARMING

Issues/Problems	Response	
	Yes	No
A. Seed/ Seedlings Issues:		
• Getting seed/ seedlings in sufficient quantity	50 (100)	0 (0)
• Getting good quality seed/ seedlings	21 (42)	29 (58)
• Reasonable price of seed/ seedlings	43 (86)	7 (14)
• Any special subsidy on seed/ seedlings	0 (0)	50 (100)
• Disease problem	27 (54)	23 (46)
B. Input Issues		
• Know- how support from any organization	35 (70)	15 (30)
• Availability of inputs (fertilizers/ chemicals)	50 (100)	0 (0)
• Labour availability	32 (64)	18 (36)
C. Agronomic Issues		
• Availability of package of practices	18 (36)	32 (64)
• Lack of extension training facilities	42 (84)	8 (16)
• Weed problem	40 (80)	10 (20)
• Insect/pest problem	39 (78)	11 (22)
• Favorable Government Policies	10 (20)	40 (80)
D. Marketing Issues		
• Adopting grading system	14 (28)	36 (72)
• Getting prices according to grades	25 (50)	25 (50)
• Marketing through middleman	38 (76)	12 (24)
• Availability of regulated market	0 (0)	50 (100)
• Unremunerative prices	47 (94)	3 (6)
• High cost of marketing of produce	25 (50)	25 (50)
• Own Means of transport	47 (94)	3 (6)
E. Credit Issues		
• Acquired loan from bank	23 (46)	27 (54)
• Lack of credit facility	21 (42)	29 (58)
• Lack of cheap credit	36 (72)	14 (28)

NOTE: Figures in parentheses are percentages of the total.

(c) Agronomic Issues

When asked about certain agronomic issues, 36% of celery farmers reported that there is availability of package of practices in local language, 84% respondents were of the view that there is lack of extension training facilities, problem of weed infestation was reported by 80% respondents and 78% responded that there is insect/pest infestation. Only 20% responded for favour of Govt. policies for celery farming.

(d) Marketing Issues

Marketing issues were also studied for celery crop. 28% of celery growers adopted grading system, 50% were getting prices according to grades and all the celery growers were marketing their produce through middlemen. 94% responded there is an un-remunerative price of produce, 50% responded that cost of marketing of produce was high; all the respondents were having own means of transport for the produce.

(e) Credit Issues

When asked about the availability of credit, 46 % respondents said that they avail the facility of crop loan from bank, 42% responded that there is lack of credit facility and 72% responded that there is lack of cheap credit from banks for celery farming.

Conclusion

In celery farms average male members as well as their percentage were found to be more than their female counterparts. In case of educational status of head of the family members, 50% having secondary school (8 to 12 class) education and 14% were graduates. Farming followed by service and business was the main occupation of adult family members. Owned and leased in land holding for celery farms were 4.50 and 3.52 hectares respectively. Cropping intensity during the study period was 271.82% on celery farms. Returns over variable cost for celery crop was worked out as Rs. 36991/ha. BCR (over total variable cost) as well as BCR (over total cost) was worked out as 2.009 and 1.079 respectively for celery crop. Family labour income and net income were found out to be negatives for celery crop; major reason was low market prices for this crop during the study period. Forty-two percent and 54% of selected celery farmers' responded regarding availability of seed/ seedlings and disease problem in seed/ seedlings in the initial stage of sowing of celery crop respectively. Eighty-four percent responded that there is lack of extension training facilities, 80% responded that there is problems of weed infestation and 78% responded that there is insect/ pest infestation. Ninety-four percent responded there is an un-remunerative price of produce, 50% responded that cost of marketing of produce was high, all the respondents were having own means of transport for the produce, and only 20% responded for favour of Govt. policies for celery farming. Seventy-two percent responded that there is lack of cheap credit from banks for celery farming. Farmers continue to do farming of this risky and highly price volatile crop in some proportion as during some years it is highly profitable. For having assured income, most of the crops grown by the farmers are those having minimum support price (MSP) like wheat and paddy.

Suggestions to Overcome the Constraints:

- More emphasis should be given on R&D to release new varities/ seed for better yield and more resistance from insect- pests and diseases.
- Organizations should provide more extension services for better farming practices of celery farming.
- Farmers should also be trained for grading practices of celery produce for having better market prices.
- Govt. should make provision for establishment of regulated market to curb the malpractices of middlemen.
- Govt. should also make provision for cheap financial services to promote celery farming.

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A Study of Growth of Value Productivity and Component Analysis of important Crops in Himachal Pradesh: 1951-52 to 2010-11

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Abstract

The present study is an attempt to investigate the growth of value productivity of five important crops in Himachal Pradesh (HP), Viz. wheat, maize, paddy, barley and gram and their contribution in the growth of HP's agriculture. The study also endeavors to examine the influence of area of production, yield per hectare and changes in cropping pattern on the agricultural output of HP. The data was collected from Directorate of Land Records, HP over the period of 1951-52 to 2010-11. To capture a more clear-cut view, the study period was further segregated into three sub-periods, namely, pre-green revolution period (1951-52 to 1965-66), green revolution period (1966-67 to 1989-90), economic reforms period (1990-91 to 2010-11). The productivity is defined as a ratio of output to input and measured at constant prices as well as variable prices. The growth rates are calculated using exponential growth formula. The study suggested that more and more area under agricultural production should be provided assured irrigation facility as the future prospect of HP's Agro sector depends on the extent of area of production. The agricultural productivity of the State should also be enhanced because there is a very modest possibility to increase arable land further. Farmers should properly be trained for successful implementation of latest packages of technology for plant care which help them to go for multiple cropping and crop rotations in HP.

Introduction

Agriculture is the main occupation of the people of Himachal Pradesh. Himachal Pradesh is the only state in the country wherein 90 percent population, as per 2011 census, lives in rural areas. Therefore, agriculture/ horticulture provides direct employment to about 70 percent of total workers in the state.

Agriculture happens to be the premier source of state income (SGDP). About 15 percent of the total SGDP comes from agriculture and its allied sectors. Improvement in the overall output is possible only through intense activity in agro-sector.The pace of development is largely conditioned at the rate at which productive assets/ resources are created in the region concerned. Out of the total geographical area of 55.67 lakh hectare, the area of operation holding is about 9.68 lakh hectare and is operated by 9.33 lakh farmers. On account of adverse climatic conditions and uneven topography, the use of improved technology in agriculture is limited and considerable amount of cereals are imported into the state every year to meet the food shortages.

Keeping in view the importance of agriculture a quantitative assessment of various factors contributing to growth of crops output at the state level seems helpful in reorienting the programmes and priorities of agricultural development to achieve higher rate of growth. There are so many factors which affect the growth of crop output. The introduction of multiplicity of factors and evaluation oftheir contributions within the framework of some mathematical model, to growth of crop output is, however, limited by the lack of availability of comparable time series data.

There are, in general, three factors normally believed to influence the productivity of a crop, viz.,area, yield and cropping pattern. The interactions among them are also supposed to be important which should be taken into account. The endeavor is to study the growth of value production of important crops and their contribution in the growth of aggregate output during pre-green revolution period (1951-52 to 1965-66), green revolution period (1966-67 to 1989-90), after economic reforms period (1990-91 to 2010-11) and the overall period (1951-52 to 2010-11) in Himachal Pradesh. It is hoped that such a study will help the state in assessing the development of agricultural sector and in policy formulation.

Methodology

The study mainly confines to five important crops grown in the state namely wheat, maize, paddy, barley and gram. All these crops together claim more than 82 percent of the total cropped area. Detailed statistics in respect of area, yield/ production, crop productivity and farm harvest prices were collected from the Directorate of Land Records, Himachal Pradesh (2014) for the period 1951-52 to 2010-11.

In order to carry out a systematic study of important crops,the total period has been divided in four sub- periods as follows:

- **Period I:** Pre- green revolution period, 1951-52 to 1965-66
- **Period II:** Green revolution period 1966-67 to 1989-90

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- **Period III:** Economic reforms period, 1990-91 to 2010-11 and
- **Period IV:** Overall period 1951-52 to 2010-11.

Broadly, the present study has been divided in two analytical parts:

(a) In the first part, it is proposed to examine the effect of yield on cropping pattern, value productivity per hectare of each crop included in the study. An estimation is made at variable and constant prices i.e. anaverage of first three years. The price was kept constant because the objective here has been to examine the effect of yield and shift in the cropping pattern. A rise or fall in prices over time would have concealed the effect of these factors. The value productivity per hectare was estimated as under.

Value productivity, V,(Minhas 1966) per hectare for a particular year may be expressed as:

$$V = \Sigma_I c_{ij} p_i / \Sigma_I A_{ij}$$

Here c_{ij} is the production of the i^{th} crop for the j^{th} year, p_i is the constant price of the i^{th} crop and A_{ij} is the net area sown under selected crop in the state for the i^{th} year.

In order to examine the rate of growth of value productivity, V, per hectare, estimation was made by fitting an exponential function over a period of time.

$V=V_0B^t$

Where V= value productivity per hectare

V_0 = constant

B=exp (a)

a= the growth rate

t= time variable over the total period, 1951-52 to 2010-11.

The natural logarithm (ln) of B was taken to have the growth rate 'a'.

(b) Another part is to find contribution of different components to the growth of output in the state which was estimated with the help of model developed by Minhas and Vaidyanathan (1965). As already mentioned there are three factors believed to be responsible for the production of crop, viz., area,yield and cropping pattern, In addition,the interactions among themselves, within the framework of additive model, also become important contributing factors. An attempt was made to calculate separate contributions of acreage, yield and cropping pattern and their interactions,on the growth of crop output in Himachal Pradesh during the four periods as mentioned above. The crop-wise analysis of output highlighted some interesting features that helped in visualizing and interpreting the results. The additive model may be described as follows:

Define $P_0 = A_0 \sum_i^n w_i\, c_{i0}\, Y_{i0}$

$P_t = A_t \sum_i^n w_i c_{it} Y_{it}$

Then the total change in agriculture production is given by

Pt -P0 = (At- A0)wi ci0 Yi0 + A0wi ci0 (Yit-Yi0) + A0wi (cit- ci0) Yi0 +

(At- A0) wi (cit- ci0) Yi0+ (At- A0) wici0(Yit-Yi0) + A0wi(cit- ci0) (Yit-Yi0) +

(At- A0) wi(cit- ci0)(Yit-Yi0)

Where Pt = Production at period t

P0 = Production atperiod 0

At = Cropped area at time t

A0 =Cropped area at time 0

Yit = Yield of the ith crop at theperiod t

Yi0 = Yield of the I th crop atthe period 0

cit=Proportion of the areaunder ith cropfor the period t

ci0=Proportion of the area under ithcropfor the period 0

wi =Weight: (an average of three years of farm harvest prices)

'0'=The Base period and 't' = Current period

In the above decomposition scheme,the first term on the right hand side is the area effect. This gives us the impact of change in the total agricultural production due to the change in area assuming that all other variables remain unchanged during this periods. The second term is the yield effect on the total agricultural production. Likewise, the third term reflects the impact of cropping pattern during the current period as compared to the base period on the increase in agricultural production.Fourth, fifth and sixth terms are respectively the first order interactions between area and cropping pattern, area and yield rate and yield and cropping pattern. These effects signify the influence of any of the two factors (among Area, Yield and Cropping

pattern) in bringing change in the production. The last term is the second order inter action between the three variables (Area, Yield and Cropping pattern) considered which gives the mutual inter dependence among the three variables, if any.

Results and Discussion

Productivity is a concept that expresses the relationship between the quantity of goods produced (output) and that of resources which produces it. The measurement of productivity differs between levels of economic activity, so does its use and its sole purpose at the micro level is to provide basis for effective management and control of various resources. For this purpose, the productivity may be defined as a simple ratio of output to input. Here the purpose is confined to measure the value productivity of important crops during different periods in the state of Himachal Pradesh. In particular, the growth of value productivity of important crops, namely, paddy, wheat, maize, barley and gram,at constant price and variable price are estimated using exponential growth formula and presented in Table I. These represent crop-wise growth rate of value productivity per hectare in Himachal Pradesh at constant prices as well as at variable prices.

TABLE I: CROP-WISE GROWTH RATES OF VALUE PRODUCTIVITY PER HECTARE IN HIMACHAL PRADESH

(Growth rate (%) / annum)

Crop	Value Productivity at constant price				Value Productivity at variable price			
	Period I	Period II	Period III	Period IV	Period I	Period II	Period III	Period IV
Paddy	3.12	-0.8	1.19	0.32	4.57	3.87	6.11	5.73
Maize	7.57	0.3	0.57	1.73	8.52	5.16	6.3	7.8
Wheat	2.38	1.31	-0.01	1.69	5.72	5.56	6.26	7.63
Barley	3.86	-0.83	-0.31	1.45	8.38	4.56	7.58	8.20
Gram	2.15	-3.5	2.04	0.52	5.89	6.4	8.94	9.30
All crops	4	-0.82	0.82	1.06	5.85	4.94	7.13	7.51

Table I reveals the value productivity at constant and variable prices for different crops during different study periods. The value productivity growth at constant farm prices (an average of first three years of farm harvest prices) were found to be positive for 1st period and IV for all the selected crops. This is because of yield shows an increasing trend. In Ist period (pre-green revolution period) the maximum growth was shown by maize followed by barley, paddy, wheat and gram. For overall period (1951-52 to 2010-11) growth was lower in comparison to first period and the order of growth slightly changed, namely maximum growth rate in maize followed by wheat, barley and paddy. In 2nd period (Green Revolution Period 1966-67 to 1989-90) the maximum growth rate was found in wheat followed by maize while other crops showed negative growth rates. This is because in the green revolution period wheat and maize crop benefitted more by this programme and other crops like Barley and Gram did not benefit as much by this programme, so the value productivity is negative. Secondly, with the introduction of new technology, the area under cash crop shows an increasing trend due to this, the area under paddy, barley and gram decreased during this period resulting value productivity decreased. Thirdly, the constant prices was lower of Barley and Gram during initial year of 2nd period because during that time these crops are considered rough grain (mota anaj). In 3rd period the maximum growth was shown by gram followed by paddy and maize, this is mainly due to higher prices of gram.

Value productivity at the variable prices for all the crops showed positive growth rate in all the four periods. This is because of the rising trend of prices, the value productivity at variable price was significant even for those crops which did not show significant rate of growth when prices were kept constant. Value productivity per hectare worked out with the constant and variable prices did not show any definite trend in the growth rate of different crops. However, three crops, namely, wheat, maize and paddy have positive growth rate with constant and variable prices in all periods, except of constant prices at third period in case of wheat.

The results of decomposition analysis and effects of various individual and interaction terms within the framework of additive model,has presented in Table II.

TABLE II: DECOMPOSITION OF OUTPUT PERCENTAGE ATTRIBUTED TO

Periods	Individual Effects			Interaction effects			
	Area	Yield	Crop Pattern	Area & Cropping Pattern	Area and Yield	Yield & Cropping Pattern	Area Yield & Cropping Pattern
				Paddy			
Period I	47.76	19.77	2.11	2.68	25.16	1.11	1.41
Period II	18.06	39.23	59.38	-4.55	-3	-9.87	-0.05
Period III	-27.02	150.95	-8.07	0.69	-13.01	-3.89	-0.03
Period IV	31.56	65.34	-10.27	-7.72	49.09	-15.98	-0.64
				Maize			
Period I	31.39	33.1	-0.37	-0.42	37.24	-0.44	-0.5
Period II	35.27	40.26	6.88	2.11	12.33	2.41	0.74
Period III	-28.79	139.64	-0.72	0.05	-9.95	-0.24	0.01
Period IV	14.3	27.3	1.23	2.02	44.94	3.86	6.35
				Wheat			
Period I	94.81	0.34	2	2.41	0.42	0.01	0.01
Period II	26.45	40.35	8.25	3.12	15.27	4.76	1.8
Period III	-30.37	122.59	12.28	-0.62	-6.2	2.51	-0.13
Period IV	14.06	26.94	1.23	2.1	44.89	4.03	6.72
				Barley			
Period I	147.2	134.94	-122.02	-50.49	55.83	-46.23	-19.15
Period II	54.75	-36.42	83.3	-22.08	9.66	14.69	-3.9
Period III	55.88	-32.8	77.86	-11.72	4.94	6.88	-1.04
Period IV	71.93	-519.84	208.96	-48.06	11.56	347.34	-79.89
				Gram			
Period I	36.11	2.45	10.6	33.57	7.76	2.28	7.22
Period II	71.5	-77.37	86.93	-40.86	36.36	44.21	-20.78
Period III	154.7	-145.59	-85.75	69.77	118.81	-65.86	53.75
Period IV	99.01	-184.5	99.47	-89.48	182.66	183.51	-181.67
				All Crops			
Period I	48.21	24.1	0.23	0.59	27.28	-0.24	-0.16
Period II	30.1	40.67	5.42	3.13	14.85	4.36	1.46
Period III	-29.72	132.86	4.68	-0.2	-8.43	-0.84	-0.04
Period IV	14.59	28.46	0.81	1.84	44.97	3.21	6.12

It may be seen from the analysis that the contribution of change in area, yield and cropping pattern are positive towards the growth of aggregate output of all crops together in the state during the pre-Green Revolution Period 1951-52 to 1965-66, Green Revolution Period 1966-67 to 1989-90, Economic Reform Period 1990-91 to 2010-11 and Overall Period of 1951-52 to 2010-11 except for area in Economic Reform Period where it shows negative contribution of -29.72 percent because the whole of the focus to increase the aggregate output by productivity. In Economic Reform Period (1990-91 to 2010-11), the contribution of the interaction effect of first order between yield and cropping pattern, second order interaction between area and yield, and third order yield and cropping pattern and fourth interaction between area, yield and cropping pattern was negative. However, in Green Revolution Period and overall period all the four interactions were positive. During the fourth period (overall period 1951-51 to 21-11) the contribution of interaction effect of area and yield was contributed sufficiently *i.e.* 44.97 percent which was much higher than the contribution of single individual as well as other individual interaction effects. In the entire periods yield was the main factor responsible for increase in aggregate output. During Economic Reform period the share of yield towards total production was highest to the extent of 132.86 percent as compared to pre-Green Revolution Period, Green Revolution Period and overall period which were 24.10, 40.67 and 28.46 percent respectively. The contribution of area towards production in pre Green Revolution period was highest, accounting for 48.21 percent followed by 30.10 percent in Green Revolution Period, 14.59 percent in overall period and minus 29.72 percent in Economic Reform Period. The change in cropping pattern was almost same for 2nd period (Green Revolution Period) and 3rd period (Economic Reform Period) *i.e.* 5.42 and 4.68 percent respectively whereas the contribution of cropping pattern towards growth of output was 0.23 percent during pre-Green Revolution Period and 0.81 in 4th period (Overall Period).The all four interaction effects together accounted for 27.47, 23.80, -9.51 and 56.14 percent towards the additional growth of output in the state, respectively during Pre-Green Revolution Period, Green Revolution Period, Economic Reform Period and Overall Period.

Most of the paddy production came from area and yield and their interaction. Area and yield that is 47.76, 19.77 and 25.16 percent respectively during the 1st period (pre-Green Revolution), wherein the cropping pattern has a negligible contribution of 2.11 percent. In Green Revolution Period, share of cropping pattern was highest among all the periods and account 59.38 followed by yield 39.23 percent and area 18.06 percent and all interaction effect contribution was marginally negative. This is because of Green Revolution took palce in agriculture where emphasis has laid on the cropping pattern and yield. In 3rd period, Economic Reforms, started with a paradigm shift to use the area for higher value cash crops resulting more yield for production of paddy and contribution of yield is 150.59 percent. At Overall Period *i.e.* 4th Period, yield, area and its interactions are the main factors for production of paddy *i.e.* 65.34, 31.56 and 49.09 percent respectively.

For maize crop similar trend like paddy was followed because of Green revolution and Economic Reforms fully affected the maize production.

In case of wheat, contribution of area, yield and cropping pattern in the production of wheat was positive in all the periods. In pre-Green Revolution Period, area was the main factor, accounting for 94.81 percent share in increase of wheat output because of staple food crop of the people of Himachal Pradesh. During the 2nd study period, area and yield and its interaction (Area and Yield) that accounted for 26.45, 40.35 and 15.27 percent respectively are the major main responsible factors for increasing the output of wheat. In 3rd period, Economic Reforms has started and main stress given on yield, that accounts for 122.59 percent. At Overall Period *i.e.* 4th Period, interaction of area and yield was mainly responsible for production of wheat which accounted for 44.89 percent, followed by yield which accounted for 26.24 percent and area which accounted for 14.06 percent. Other factors contributed marginally.

In all study periods, area was the main factor responsible for increase in the out come of barley. Area and cropping pattern effects show a negative contribution in all study periods.

In case of gram area was mainly responsible for increasing the out turn of gram. Yield contribution was almost negative in all the periods except for the first period where it was marginally positive accounting for 2.45 percent. In overall period, the interaction of area and yield contributed sufficiently accounting for as much as 182.86 percent.This was followed by third study period where it accounted for 118.81 percent. This neutralizes the effect of yield on output which was negative during period IV.

Conclusions and Suggestions

It may be noted that the productivity of a particular crop depends on the availability of irrigation or timely rainfall,

fertilizers, application and adoption of other improved techniques. Since new agricultural strategy of the Government is oriented towards assured water supply, the future development of agro sector in the State will ultimately depend upon the extent of the area which could be brought under assured irrigation. This will not only increase the supply of food grains by bringing in more and more area under high yielding varieties but farmers too would be able to adopt better cropping patterns, thereby supplementing cash crop with food crops.

Agricultural development in the State has to be promoted through enhancement of productivity of the farms. Since there is little scope of increasing arable land in the State, productivity gains alone can contribute to enhanced production. Nevertheless, on technological front the State farmers will have to be trained to use the suitable packages of technology for plant care which could facilitate them to go in for double/ triple cropping in a year and better rotations of crops in Himachal Pradesh.

For better production of important crops, the timely supply of inputs like HYV seeds, fertilizers and plant protection material, in addition to enhanced irrigation facility, are to be ensured by the Government of Himachal Pradesh. These inputs are to be provided at the approachable sites for farmers in the State. For all this the small farmers of the State should be assisted financially also.

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Agro-Economic Research

Farmers' Income in India: Evidence from Secondary Data*

1. Introduction

This study is an attempt to estimate the incomes earned by farm households in India. The emphasis of the current study is to look in the evidence on this from the data collected in recent years. For this purpose, the study estimates incomes of farm households based on the Situation Assess Survey of farmers conducted during the 70th round of National Sample Survey (NSS). This survey was conducted over the period ranging from January 2013 to December 2013 by visiting farm households in various regions of India twice. The survey covered 35,200 farmer households across 36 states and union territories of India in the first visit which spanned from January to July 2013 and collected information of incomes generated by farm households in the reference period of July 2012 to December 2012. In the second round of the survey, 34,907 households which had been covered in the first round were surveyed and information related to incomes generated in the period of January 2013 to June 2013 was collected. The data was made public in December 2014 and thus provides the most recent estimates of incomes earned by farmer households.

The current report provides an analysis of various aspects of incomes of farmer households. A farmer household earns incomes from various sources. The most important source is through cultivation of crops in either the land possessed by the households or in a land leased by it. The other sources of income include wages and salary. The most common source of these wages is through agricultural labour in farms owned by other households. The other source of this income is through either casual labour or regular labour in nonfarm industries. Apart from this households might earn incomes through household nonfarm enterprises. The following subsections provide the background of the survey and the definition of different components of total income of a farm household.

1.1 The Survey

The 70th round of NSS had a schedule that looked into the situation of agricultural households. A similar survey was conducted in 2002-03 during the 59th round of NSS survey. There are a few minor differences in the sample covered in two surveys. While the first survey used land ownership as a criterion for a per ha was INR 45,318 across all India. This amount was more than INR 1,00,000 for the states of Kerala (INR 3,57,535) and Tamil Nadu (1,29,369).

- The Gini coefficient of total household income of farm households in India is 0.56. The Gini of income from cultivation, income from livestock, income from wages/salary is 0.74, 0.81, 0.96 and 0.77 respectively. The Gini correlation between the four income components and total income is 0.80, 0.64, 0.70 and 0.66 respectively.
- On decomposing income inequality, we find that increasing share of cultivation income by 1% will increase Gini by 2.7% Similarly 1% share increase in nonfarm business income will increase Gini by 1.6% Increasing 1% share of livestock and wage income will decrease Gini by 1.1% and 3.2% respectively.

household being referred a farm household, the current survey does not have land ownership as a criterion. Also, the first survey did not have any criterion related to value of agricultural produce of a household. But the current survey only considered households that had a value of agricultural produce above INR 3000. Since possession of land was not required, the recent survey defines agricultural production unit as a household that receives an agricultural produce value greater than INR 3000 and having at least one member self-employed in agriculture either in the principal status or in subsidiary status during 365 days prior to the survey date. In our study, we use farm households to refer to these households.

The survey collected various information related to different aspects of their livelihood from these farm households. Information was collected on various aspects relating to farming and other socio-economic characteristics of agricultural households. Information was collected from households on consumer expenditure, income and productive assets, indebtedness, farming practices and preferences, resource availability, awareness of technological developments and access to modern technology in the field of agriculture, information on crop loss, crop insurance and awareness about Minimum Support Price (GoI, 2014). Our analysis will look primarily into the information related to income of the households. The survey collected information on income from various sources—cultivation, livestock, wages and salary, nonfarm businesses and sale and purchase of assets.

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1.2 Definition of Income

A farm household earns its incomes from various sources. The current study will analyse the following sources of income:

- Income from cultivation—This is the income a household earns from cultivation of various crops. These could be seasonal crops or annual crops. Also, some of these will be food crops, a part of which could be used for own consumption of the household. Cultivation yields some by-products which could be sold. The total value from cultivation is the sum of value from sale of primary products and sale of by-products. The costs incurred in cultivation includes a variety of things like seed costs, fertilizer costs, manure costs, pesticide costs, interest, costs of irrigation, cost incurred in hiring machinery, minor repairs, hired labour, animal labour and so on. The total costs is subtracted from the total value is used to arrive at the total income from farming. Income from this is collected in the survey for two reference periods and so we have information on incomes from cultivation from July 2012-June 2013.
- Income from livestock—This is the income a household earns from sale of various products like milk, eggs and live animals. Total value from this income source is calculated as the total value of milk, egg, live animals, wool, fish, honey, hides, bones, manure and so on. The costs incurred will include cost of animal 'seeds', animal feeds, veterinary charges, interest, lease rent, labour charges and other expenses. The total costs are subtracted from total value to obtain net income from animals. This data was collected for a period of 30 days before the survey in visits one and two. We multiply each of this by 6 and add it together to get the total annual income from livestock for the farm household.
- Income from wages and salary—This is the income derived by various household members employed in labour outside their household—either in other's fields or in nonfarm enterprises. The wages and salary earned by each of the individuals in the two reference periods was collected in the survey. Information was also collected on the principal and subsidiary industry of the individual and current status in both the industries. The sum of the wages and salaries of all individuals in the household in the two reference periods becomes the total wage and salary income earned by the household.
- Income from nonfarm business—This is the income that the household earns by engaging in nonfarm businesses. Information related to expenses, output and net receipt of up to five nonfarm businesses engaged by households was collected in the NSS survey. The data was collected for a period of 30 days before the survey in the two visits. We multiply the total net receipt from up to five businesses in each visit by 6 and add it together to arrive at total household income fromk nonfarm businesses.

All these incomes are added to obtain total annual household income of a farm household. The estimates of all India data are obtained by using appropriate weights presented in the NSS survey. All the summary statistics provided henceforth are obtained using the weights and hence represent population statistics. The report is further structured as follows. Section 2 analyses the total income of farmer households. Section 3 analyses the income of farm households from cultivation. Section 4 looks into the income from livestock. Section 5 analyses the incomes from nonfarm businesses. Section 6 analyses wage and salary income of the farm households. Section 7 provides some description of poverty, inequality and indebtedness prevalent in farm households. Section 8 provides conclusions and policy recommendations from our analysis.

2. Total Incomes of Farm Households

This section will look in to the total income of farm households in India. Firstly, we look at incomes at all India level. Then, we will look into the income across households having different principal income sources, land holding sizes, state and caste.

2.1 All India Farm Household Incomes

Table 2.1 provides the summary statistics of total income and income components of farm households in India.

TABLE 2-1 Annual Incomes of Farm Households

	2002-03 Mean	*Mean*
Income from Farming	11628	36960
Income from Livestock	1092	9943
Income from Nonfarm Business	9828	6138
Income from Wages and Salary	11628	24847
Total Income	25380	77888

The average total annual income of a farm household is INR 77,888 which roughly turns out to be around INR 6,491 per month. This figure was INR 25,380 per year or INR 2,115 per month in 2002-03 based on a similar survey conducted by NSS (GoI, 2005). This roughly translates to a compound annual growth rate of 3.4% per annum for real income of farm households[1]. The CAGR for farming income, livestock income, wage/salary income and nonfarm business income are 3.7%, 14.3%, 1.4% and -0.1% respectively. We find that livestock incomes have grown at a very high rate during the period under consideration.

[1]We use CPIAL Index from July 2012 to June 2013 and July 2002 and June 2003 to deflate the incomes of 2012-13.

Nonfarm incomes and wages/salary of farm households have grown at a much slower rate than cultivation for farm households. A high growth in nonfarm incomes might help farmers move out of agriculture into non-agricultural activities. But, we find that this has not happened and this might be the reason why even with impending agrarian crisis farmers are not leaving cultivation. In the farm survey conducted in 2002-03, a high percentage of farmers had indicated that they would shift out of crop cultivation if provided with an option. One of the reasons this might not have happened is because the growth rate of cultivation and wages have been higher than growth in nonfarm business incomes. The low wage growth is also surprising given the positive effects MGNREGA is supposed to have had on rural wages. In this regard, the negative growth rate of wages in period prior to MGNREGA could have played a role (Gulati, Jain and Satija, 2013). We should also keep in mind while interpreting these growth rates that that the year 2002-03 was a drought year and 2012-13 was not.

In terms of components of total income, the average farming income of the households is highest from farming which comes to INR 36,960. Income from wages and salary is the second highest source of inome with the average earning of farm households at INR 24,847. The average income from livestock and nonfarm business are lower and are INR, 9,943 and INR 6,138 respectively. Figure 2.1 and Figure 2.2 provide the composition of annual household income for the recent survey and the 2002-03 survey.

Figure 2-1 Composition of Annual Income of a Farm Household 2012-13

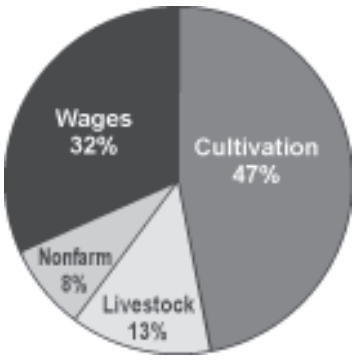
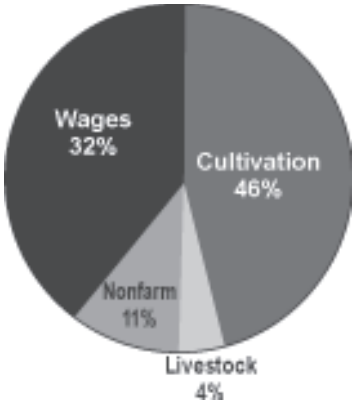


Figure 2-2 Composition of Annual Income of a Farm Household 2002-03



From Figure 2.1, we observer that average income from farming is 47% of the total annual income. Average income from wages and salary are 32% of average annual income. Average income from livestock is 13% of average annual income and nonfarm income average is only 8% of total annual income. Compared to 2002-03, the wages and salary income have shrunk and largest expansion has happened in income from livestock. The nonfarm incomes have also shrunk slightly and there is a slight expansion in the farm income as a percentage of total annual income.

The income as discussed previously is the sum of incomes derived in two reference periods (July-December, 2012 and January to July 2013).

TABLE 2-2 Income of Farm Households from July 2012-December 2012

	Mean
Income from Farming	21489
Income from Livestock	4684
Income from Nonfarm Business	2883
Income from Wages and Salary	11236
Total Income	40293

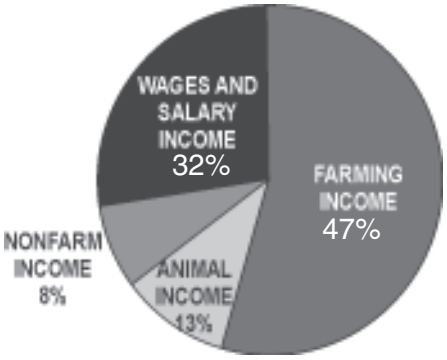
TABLE 2-3 Income of farm Households from January 2013-July 2013

	Mean
Income from Farming	15457
Income from Livestock	5332
Income from Nonfarm Business	3326
Income From Wages and Salary	13565
Total income	37681

From Table 2.2 and Table 2.3, we observe that the households earn slightly more in the first reference period as it coincides with the Kharif period for seasonal crops and also period in which most rainfall in the country occurs. The average income from farming is around INR 6000 more or 40% more in the period as compared to the second reference period. But the average incomes from livestock, nonfarm business and wages/salary are higher in the second reference period. The incomes from livestock, nonfarm business and wages/salary are 12%, 13% and 17% lower in the first reference period as compared to the second reference period respectively. The total income though is still 7% higher than the second reference period during July to December 2012. The composion of total annual income is also different in the two reference periods. We refere to the first and second reference period as kharif and rabi in the report henceforth through they may not exactly correspond to kharif and rabi seasons respectively for all agricultural household considered in the study. Figure 2.3 and 2.4 provide the composition of household income for kharif and rabi period respectively.

Figure 2-3 Composition of Annual Household Income of farm Household in Kharif

Figure 2-4 Composition of Annual Household Income of farm Household in Rabi



From Figure 2.3 and Figure 2.4, we observe that a average income from livestock and income from nonfarm business as a percentage of average total income is almost similar in both kharif and rabi. The average farm income as a share of total income is higher in kharif compared to rabi and average wage/salary income as a percentage of average total income is lower in kharif compared to rabi. This is expected as farm households might engage more in farming when rainfall happens during months July to December and less in farming and more in labour during the period of January to June.

2.2 Farm Household Incomes across Different Principal Income Sources

The incomes and the composition of household incomes will differe based on their principal income sources. Though households are farm households, their principal income sources could be cultivation, livestock, wage/salaried employment, nonfarm enterprises, other agricultural activities, pension, remittances or other activities. Table 2.4 provides the incomes and income cmposition of farm households having all the different principal income sources.

TABLE 2-4 Income of Farm Households across Different Principal Income Sources

Principal income Source	proportion of Total farm Households	Inome from farming	Income from Livestock	Income from nonfarm Business	Income from wages/ Salary	Total Annual Income
Cultivation	63.5%	50874 (68)	9157(12)	3538(5)	11408(15)	74977
Wage/Salaried Employment	22.0%	10595(12)	7906(9)	1540(2)	72089(78)	92132
Non-Agricultural Enterprise	4.7%	14726(14)	6187(6)	72550(69)	11130(11)	104593
Livestock	3.7%	14218(19)	49465(65)	1632(2)	11324(15)	76639
Remittances	3.3%	8151(53)	4430(29)	410(3)	2418(16)	15409
Pension	1.1%	20869(42)	5284(11)	6396(13)	17150(35)	49700
Other Agricultural Activity	1.1%	49572(51)	9673(10)	6574(7)	30739(32)	96558
Other	0.7%	12444(29)	6287(15)	5492(13)	18983(44)	43207

Note: Figures in brackets indicates the share of component income in total income.

From Table 2.4, we observe that majorityof the farm households (64%) have cultivation as their principal income source. A large number (22%) have wage/salaries employment as the principal income source. About 4.7% and 3.7% have nonfarm enterprise and livestock as their principal income source. Remittances also form a principal income source for substantial proportion (3.3%) of farm households. The total income is highest for households having nonfarm enterprises as their principal income source. These households earn about INR 1,04,593 in a year. This is followed by households that have other agricultural activity as their principal income source. They earn about 92% of the incomes earned by households with nonfarm enterprises as principal income source. Households with wage and salaried employment as the principal income source also earn about 88% of incomes earned by households with non agricultural enterprises as the principal income source. Cultivation and livestock households earn substantially lesser and their incomes are 72% and 73% of annual income of nonfarm household respectively. Pension, other and remittance households earn very less incomes and their incomes come to 48%, 41% and 15% of nonfarm households respectively.

In terms of the components of income, the principal income source contributes to the highest income shares of a household. Agricultural households earn 68% of their incomes through cultivation and wages and livestock incomes contribute to 15% and 12% of total incomes. Agricultural households with cultivation as principal income source earn about INR 50,874 in a year. Other agricultural activity households also earn similar amounts but all the other households earn much lesser around 16-41% of this income from cultivation. Livestock households earn 65% of their incomes from livestock. They earn 19% and 15% from cultivation and wages. They earn about INR 49,465 from livestock in a year. The other households earn much lesser which accounts to roughly 9-20% of this amount. The nonfarm enterprises households earn 69% of their total income from nonfarm business. They earn 14% and 11% from cultivation and wages respectively. These households roughly earn INR 72,550 in a year from nonfarm businesses. The other households earn much lesser which accounts to roughly 1-9% of this amount. The wage/salaried employment households earn about 78% of their incomes from wages and 12% and 9% from cultivation and livestock. They roughly earn INR 72,089 in a year from their principal income sources. The other households earn about 3-43% of this amount in a year. All the other households earn majority of their incomes from cultivation (29-53%) and wages (16-44%). From these observations it seems that all households are able to diversity significantly in cultivation, livestock and wages. But nonfarm businesses are not something that is an income source for many. Nonfarm households earn a high amount from these businesses and other households do seem to earn only a low percentage of this in these businesses. This is unlike wage employment. Though the wage employment households earn significant amount in wages, the other households also earn a reasonable percentage of this amount from it. One of the reasons for this disparity could be because of entry barriers posed by capital and other requirements in nonfarm businesses. This could also be a reason for slow growth of nonfarm sector among farm households.

2.3 State-wise Farm Household Incomes

The incomes and composition will also be different across of the country. Table 2.5 provides the state-wise farm households incomes and their composition.

TABLE 2-5 INCOMES OF FARM HOUSEHOLDS ACROSS DIFFERENT STATES

States	Income From Farming	Income From Livestock	Income From Nonfarm Business	Income From Wages/ Salary	Total Annual Income
1	2	3	4	5	6
A& N Islands	34922(26)	6693(5)	26475(20)	65898(49)	133988
Andhra Pradesh	24209(34)	13025(18)	4534(6)	29760(42)	71528
Arunachal Pradesh	77785(64)	8466(7)	10919(9)	24916(20)	122086
Assam	50521(63)	9553(12)	3078(4)	17176(21)	80328
Bihar	20627(47)	4831(11)	2829(6)	15885(36)	44172
Chandigarh	40403(16)	57627(22)	0(0)	162016(62)	260046
Chhattisgarh	40229(63)	934(1)	14(0)	22177(35)	63354
D & N haveli	7272(8)	929(1)	16145(18)	63551(72)	87897

TABLE 2-5 INCOMES OF FARM HOUSEHOLDS ACROSS DIFFERENT STATES STATE-CONTD.

1	2	3	4	5	6	7
Daman & Diu	2479(3)	4626(5)	13861(16)	66983(76)	87949
Delhi	14079(6)	38554(17)	1939(1)	178167(77)	232739
Goa	16893(19)	15097(17)	12243(13)	46865(51)	91098
Gujarat	35152(37)	24179(25)	4538(5)	32095(33)	95964
Haryana	94411(54)	32678(19)	5201(3)	41873(24)	174163
Himachal Pradesh	35001(33)	12905(12)	9784(9)	48278(46)	105968
Jammu & Kashmir	36635(24)	11129(7)	18081(12)	88220(57)	154065
Jharkhand	17385(29)	16916(29)	2935(5)	22066(37)	59302
Karnataka	59047(55)	8907(8)	7489(7)	32116(30)	107559
Kerala	42479(29)	8303(6)	31303(22)	63211(44)	145296
Lakshadweep	8734(4)	1386(1)	1521(1)	199921(94)	211562
Madhya Pradesh	48039(64)	9174(12)	1569(2)	15930(21)	74712
Maharashtra	46385(51)	9308(10)	10044(11)	25764(28)	91501
Manipur	35059(33)	18470(17)	6835(6)	45743(43)	106107
Meghalaya	77354(54)	9808(7)	10888(8)	45308(32)	143358
Mizoram	54729(50)	10499(10)	314(0)	43858(40)	109400
Nagaland	38545(34)	10398(9)	740(1)	64718(57)	114401
Odisha	16892(28)	15477(26)	6451(11)	20620(35)	59440
Puducharry	19132(27)	580(1)	3104(4)	48446(68)	71262
Punjab	130163(60)	21157(10)	8800(4)	57330(26)	217450
Rajasthan	37621(43)	11894(14)	8499(10)	30002(34)	88016
Sikkim	20350(24)	13536(16)	11986(14)	37361(45)	83233
Tamil Nadu	22989(27)	13623(16)	13646(16)	34772(41)	85030
Telengana	50813(66)	6181(8)	3074(4)	17392(22)	77460
Tripura	33270(51)	3684(6)	1976(3)	26187(40)	65117
Uttar Pradesh	34197(57)	7094(12)	4617(8)	13775(23)	59683
Uttaranchal	30351(54)	10394(18)	2947(5)	12974(23)	56666
West Bengal	11737(24)	2966(6)	8008(17)	25484(53)	48195

NOTE: Figures in brackets of other columns indicate the share of income component in total income.

Among the states, farm households in Chandigarh, Delhi and Punjab have the highest incomes while farm households in Bihar West Bengal and Uttaranchal have the lowest total incomes. A farm household in Chandigarh earns INR 2,60,046 in a year or approximately INR 21,671 per month while a farm household in Bihar earn INR 44,172 in a year or approximately INR 3,681 a month. This is just 17% of what a farm household in Chandigarh earns. Delhi and Punjab farm households earn 89% and 84% of Chandigarh farm households respectively while farm households in West Bengal and Uttaranchal earn 19% and 22% of Chandigarh farm households respectively.

With respect to income from farming Punjab and Haryana earn the highest while Goa, Odisha, Delhi, West Bengal, Lakshadweep, D & N Haveli and Daman & Diu earn the lowest. Average earning from farming of a farm household in Punjab is INR 1,30,163 per year or

INR 10,847 per month. For West Bengal, this income is INR 11,737 per year or approximately INR 978 per month. Haryana farm households earn a farm income that is 73% of Punjab farm household's farm income while farm household in Odisha and West Bengal earn farm incomes that is 13% and 7% of Punjab farm household's farm incomes. In terms of shares, Telangana, Arunachal Pradesh, Madhya Pradesh, Assam Chattisgarh and Punjab have 60% or more of their total income coming from farming while Goa, Chandigarh, D & N Haveli, Delhi, Lakshadweep and Daman & diu have less than 20% of the total incomes from farming.

In livestock, Chandigarh and Delhi have high incomes while Chattisgarh, D & N Haveli and Puducherry have low incomes. Average income from livestock for a farm household in Chandigarh is INR 57,627 per year or INR 4,802 per month while that for a farm household in Chattisgarh is INR 934 per year or INR 78 per month. Farm households in Delhi earn livestock income that is 67% of livestock income in Chandigarh while a farm household in Chattisgarh earns a livestock income that is only 2% of livestock income of Chandigarh farm household. In terms of shares, farm households in Chandigarh, Gujarat, Odisha and Jharkhand earn more than 20% of total Income through livestock while farm households in Chattisgarh, Puducherry, D & N Haveli and Lakshadweep earn less than 1% of their incomes from livestock.

In nonfarm business, farm households in Kerala and A & N Islands earn the highest while those in Chandigarh and Chattisgarh earn the lowest. Average nonfarm income in Kerala is INR 31303 per year or INR 2609 per month while that is Chandigarh is INR 0 per year. In terms of shares, farm households in Kerala and A & N Islands earn more than 20% of their incomes from nonfarm businesses while farm households in Chandigarh, Chattisgarh and Mizoram almost earn no incomes from nonfarm businesses.

In wages and salaries, lakshadweep, Delhi and Chandigarh farm households earn the highest while Bihar, Uttar Pradesh and Uttaranchal earn the lowest. The average wage/salary income in Lakshadweep is INR 1,99,921 per year or INR 16,660 per month while that in Uttaranchal is INR 12,974 per year or INR 1,081 per month. While wage/salary income of Delhi farm households is 89% of Chandigarh's, Bihar, Uttar Pradesh and Uttaranchal farm households earn wage/salary incomes that 8%, 7% and 6% of Chandigarh's. In terms of shares, Lakshadweep, Delhi and Daman & Diu farm households earn more than 3/4ths of their incomes from wages/salarly while households in Haryana, Uttar Pradesh, Uttaranchal, Telangana, Assam, Madhya Pradesh and Arunchal Pradesh earn less than 1/4th of their total incomes from wage/salary.

To observe the relation between income from different sources and total income, we found the correlation between income from different sources and total income of the households across different states. We find that the correlation between income from wage/salaried employment and total income is the highest (0.82) followed by income from livestock (0.65), cultivation (0.37) and nonfarm business (0.08). This means that the incomes of states are driven by wage/salaried employment and livestock than cultivation or nonfarm income. Higher the wage/slarlied employment in the state, higher is the farm household income in the state. We also found correlation between shares of component incomes with total income of farm households. Again, we find that the correlation of share of income from wage/salaried employment has the highest and positive correlation (0.37) with total income. All the other shares have negative correlation. The share of cultivation has the highest negative correlation (-0.28) with total income followed by nonfarm business income shares (-0.22) and livestock income shares (-0.01). This means that the higher the share in agriculture of farm households in a state, lower is the income of the state. The stranger finding is a quite high negative correlation between nonfarm income shares and total income. This would mean that the shares of nonfarm usiness incomes are lower in high income states. As the share of wage/salaried employment incomes increases in a state, there is an increase of total income of farm households. Livestock income shares do not seem to have much of influence on total income. We also calculated the state-wise compound annual growth rates for 14 major states in India for different components of farm household income and total farm household income over the period 2002-03 to 2012-03. Table 2.6 provides these growth rates.

TABLE 2-6 STATE-WISE GROWTH RATES OF DIFFERENT INCOME COMPONENTS AND TOTAL INCOME OF FARM HOUSEHOLDS

States	Income From Farming	Income From Livestock	Income From Nonfarm Business	Income From Wages/ Salary	Total Annual Income
1	2	3	4	5	6
Andhra Pradesh	5.89%	14.35%	-0.36%	3.78%	5.45%

1	2	3	4	5	6	7
Assam	0.70%	9.47%	-7.77%		-3.99%	-0.34%
Bihar	-0.78%	-3.64%	-6.29%		1.95%	-0.75%
Chhattisgarh	6.34%	...	-52.74%		1.74%	3.98%
Gujarat	1.40%	7.10%	2.28%		2.81%	3.12%
Haryana	8.77%	...	-5.87%		2.29%	8.32%
Jammu & Kashmir	-5.51%	1.04%	1.04%		4.86%	0.66%
Jharkhand	-2.53%	20.13%	-6.17%		-0.95%	0.87%
Karnataka	5.76%	9.46%	5.28%		1.51%	4.48%
Kerala	3.64%	7.23%	5.05%		1.75%	3.20%
Madhya Pradesh	6.10%	...	-5.28%		0.83%	6.91%
Maharashtra	3.32%	8.96%	3.97%		2.09%	3.46%
Odisha	6.48%	36.08%	5.89%		3.13%	7.57%
Punjab	5.64%	12.27%	-2.70%		4.00%	5.13%
Rajasthan	13.84%	45.11%	4.65%		2.17%	8.10%
Tamil Nadu	2.84%	15.53%	9.64%		1.82%	4.47%
Uttar Pradesh	4.44%	16.32%	-0.55%		-0.63%	3.31%
West Bengal	-5.01%	3.82%	-2.16%		0.90%	-1.25%

From, Table 2.5, we find that growth rates of total income in the decade have been highest in Haryana (8.3%), Rajasthan (8.1%) and Odisha (7.6%) while it is lowest in the states of Assam (-0.3%), Bihar (-0.8%) and West Bengal (-1.3%). Haryana's growth has largely come from incomes from cultivation (8.8%) while that of Rajasthan and Odisha has come through growth in incomes from livestock (45.1%) and 36.1% respectively). In the low growth states, Assam has suffered decelaration in non-farm business income (-7.8%) and wage incomes (-4%). Bihar's low income comes from decelaration in all sectors except wage income. West Bengal has seen major decelaration in incomes from cultivation (-5%) and non-farm business (-2.2%) during this period.

In terms of component-wise Growth, the three high growth states based on total income are the highest growing states in income from cultivation as well. In terms of low growth states, the low growing states in total income are among the lowest five states in term of growth rate in income from cultivation as well. Jammu and Jharkhand have also seen deceleration incomes from cultivation (-6% and -3% respectively). This shows that there exists a high correlation of farming incomes growth and total income growth of farm households. Incomes from livestock also show a high correlation with growth rates of total income. Even in this case, the three high growting states in terms of livestock incomes are the three high growing states in terms of total income. On the low income states, Bihar has shown the lowest growth (-3.6%) in livestock incomes. Non-farm business income growths have been high in Tamil Nadu (9.6%); Odisha (5.9%) and Karnataka (5.3%) and lowest in Bihar (-6.3%), Assam - (-7.8%) and Chattisgarh (-52.7%) Wage income growth has been highest in Andhra (3.8%), Jammu (4.9%) and Punjab (4%) and lowest in UP (-0.6%), Jharkhand (-1 %) and Assam (-4 %). The correlation between different component growth rates and total income growth rates were calculated. Highest correlation with total income growth rate was with cultivation growth rate (0.89) and livestock growth rate (0.77) The correlation of total income growth rate with wage income growth rate was 0.37 while that with non-farm business income was 0.1. Both incomes from cultivation and livestock are exposed to problems from weather and a high correlation with total incomes of farm househelds is not necessarily an encouraging one. If the farm households could have opportunities in non-farm business and non-agricultural wage labour during times of distress, these correlation could reduce further.

2.4 Farm Household Incomes Across Landholding Classes

Table 2.7 provides the income and composition of income across different landholding classes. The landholding classification is based in NSS classification on total land possessed.

TABLE 2-7 INCOMES OF FARM HOUSEHOLDS ACROSS DIFFERENT LANDHOLDING CLASSES 2012-13

Size Class of Land Prossessed (Ha)	Proportion of total Farm Household	Income from Farming	Income from Livestock	Income from Nonfarm Business	Income Annual Wages/ Salary	Total Annual Income
<0.01	2.64%(0.005)	356(1)	14557(26)	5366(10	34825(63)	54147
0.01-0.40	31.86%(0.19)	8232(16)	7685(15)	5505(11)	28629(57)	50193
0.41-1.00	34.92%(0.66)	25726(40)	8467(13)	5546(9)	24135(38)	63791
1.01.-2.00	17.16%(1.38)	50501(56)	11090(12)	7113(8)	20735(23)	90036
2.01-4.00	9.31%(2.57)	88297(68)	15155(12)	6643(5)	19882(15)	132335
4.01-10.00	3.72%(5.66)	182916(77)	19112(8)	10338(4)	24377(10)	234938
10.00+	0.39% (15.25%)	428224(86)	33157(7)	21244(4)	15730(3)	452299
All	100% (1.036)	36960(47)	10046(13)	6212(8)	24847(32)	78065

NOTE: Figures in brackets in first column indicates the average landholding for particular landholding class: Figures in brackets of other columns indicate the share of income component in total income.

From table 2.7, we observe that 69.42% of farm households in India own less than I ha land and 86.58% of farm households own less than 2 ha land. The average landholding of farmers with less than 1 ha land is 0.42 ha. The small farmers with 1-2 ha land are 15.87% and their average landholding is 1.38 ha. The semi-medium (possessing 2-4 ha land), medium (possessing 4-10 ha land) and large farmers (possessing land greater than 10 ha) comprise of 9.31%, 3.72% and 0.39% of total with average landholding of 2.57ha, 5.66ha and 15.25 ha. In 2002-03, the percentage of various landholding classes were 3.66%, 28.78%, 32.84%, 18.09%, 10.84%, 4.89% and 0.91% respectively. So, the percentage of farmers possessing less than 1 ha has increased by 4.15% and those possessing land less than 2 ha has increased by 3.23%. The average land possessed was also 1.23 ha in the 2002-03 survey. So the average land possessed also has decreased by 15%. Here again, there is a caveat in interpreting the results. During the 2002-03 survey, only those households which owned some land were surveyed which was not the case in 2012-13. Though this might mean that the extent of marginalisation in terms of households possessing land less than 2 ha and in terms of average land size is lesser than what the figures show, there is no doubt of a trend towards increased marginalisation of land possession among farm households.

For the lowest two landholding classes, wages from the most important source of income contributing to 63% and 57% of household income. Importance of crop cultivation incomes increase along with landholding sizes with it contributing to just 1 % of the lowest landholding class and 86% of household income to the largest landholding class. Livestock is more crucial for lower landholding classes with it contributing 26% of household income to lowest landholdings class and 7% to highest landholding class. Nonfarm business incomes contribute to 11% and 10% to the lower landholding classes while it contributes to around 4% to largest landholding class. Wages/salary contributes to only 3% of household income of the largest landholding class. This shows that apart from crop cultivation incomes, other incomes are more crucial to households lesser lesser land and thus policies on improving these incomes could provide an impetus for equitable growth.

We also find that at very low levels of less than 0.4 ha, farm households possessing land less than 0.01 ha on average earn more than those possessing land greater than 0.01 ha but less than 0.4 ha. They do this by earning more in livestock and wages than the farm households in second category. The 0.01 to 0.4 ha land class earn more than the households with less than 0.01 ha in crop cultivation but because of time they put into crop cultivation are not earning as much in wages or livestock. On the nonfarm businesses, households in both the categories earn pretty much the same amount. For households having land greater than 0.4 ha, the average annual household income increase with land sizes. Income from crop cultivation and livestock also increase with land sizes with the households possessing land greater than 0.4 ha and less than 1 ha on average earning INR 25,726 in crop cultivation and INR 8,467 in livestock while a household possessing more than 10 ha earns INR 4,28,224 in crop cultivation and INR 33,157 in livestock. Thought both the incomes increase with land sizes, we find that the crop cultivation incomes are highly biased to towards large landholders as compared to livestock income. A rough indication on this is that the ratio of average crop cultivation income between those households possessing more than 2 ha to those households

possessing less than 1 ha is 7.43, while the same for livestock income is 2.01. The same ratio for nonfarm incomes is 1.47 and the wage income, which is baised towards households possessing lesser land is 0.79. The ratio for total income is 2.98 which would mean that households possessing land sizes more than 2 ha earn on average 3 times the income of housholds prossessing less than 1 ha. The ratio of avearage crop cultivation income, livestock income, nonfarm income, wage income and total annual income between households land greater than 2 ha to those possessing land less than 1 ha in 2002-03 was 6.81, 0.46, 1.41, 0.69 and 2.66 respectively. So we observe that inequalities on account of land holdings have increased for all income sources and total incomes as well.

2.5 Farm Household Incomes Across Various Castes

Table 2.8 provides the proportion of different caste households in agriculture and their income and income compositions.

TABLE 2-8 INCOMES OF FARM HOUSEHOLDS ACROSS DIFFERENT CASTES

	Proportion of total Farm Household	Income from Farming	Income from Livestock	Income from Nonfarm Business	Income Annual Wages/ Salary	Total Annual Income
ST	13.44%	30734(43)	10598(15)	2084(3)	27431(39)	70846
SC	16.26%	17670(32)	6476(12)	3596(6)	27745(50)	55486
OBC	45.43%	37333(48)	10642(14)	6897(9)	22576(29)	77448
Others	24.87%	52226(54)	1088(11)	8894(9)	25517(26)	97519

NOTE: Figures in brackets of other columns indicate the share of income component in total income.

From Table 2.5, we observe that 13.44% of farm households belong to Scheduled Tribes, while 16.26%, 45.43% and 24.87% belong to Scheduled Caste, Other Backward Castes and Others belonging to other castes and religion. The income is highest among others, followed by OBC, ST and SC. The others earn INR 97,519 per annum of approximately INR 8,127 per month. Farm households belonging to OBC, ST and SC earn total incomes that are 79%, 73% and 57% of total income of Others. Others earn highest in cultivation, livestock and nonfarm businesses, while SCs, earn highest in wages/salary, SCs earn the least in farming followed by STs, OBCs and Others earning the highest in cultivation. The ordering is same for incomes from livestock. In nonfarm business, STs earn the least followed by SCs, OBCs and Others earning the highest. In wage incomes, OBCs earn the least followed by others, STs and SCs earning the most. Wage income forms a high share of total income for SC and ST farm households while cultivation income forms the high share for OBCs and Others.

3 Incomes from Cultivation

This section analyses the incomes from cultivation of the farm households. First, we analyse the cultivation incomes for households across all India. Then we look at the differences in cultivation economics for households across different states, crops and land classes. We also took into issues related to tenancy and diversification and its implications on crop cultivation incomes.

3.1 Income from Cultivation for Farm Households Acroos All India

The economics of cultivation across the two seasons and households involved in cultivation in the two seasons are not same. So, we present the analysis for two different seasons separately. Table 3.1 provides the economics of cultivation across two seasons for alll farming households in India.

TABLE 3.1. ECONOMICS OF CULTIVATION FOR FARM HOUSEHOLDS ACROSS INDIA

	Kharif	Rabi
1	2	3
Households Undertaking Cultivation	85.8%	70.8%
Households having access to Irirgation	59.1%	68.6%
Average Land Owned by Cultivating Households (ha)	1.011	0.956
Average Land Under Cultivation (ha)	0.944	0.785
Average Irrigated Land Under Cultivation (ha)	0.469	0.622

TABLE 3.1. ECONOMICS OF CULTIVATION FOR FARM HOUSEHOLDS ACROSS INDIA—CONTD.

1	2	3
Average Unirrigated Land Under Cultivation (ha)	0.468	0.161
Total Value from Farming (INR) (TV)	40821	36745
Seed Cost	1859(11.9)	1560(10.5)
Fertilizer Cost	3381(21.6)	3231(21.6)
Manure Cost	406(2.6)	327(2.2)
Plant Protection Chemicals Cost	1245(8)	1037(6.9)
Diesel Cost	675(4.3)	850(5.7)
Electricity Cost	242(1.5)	345(2.3)
Human Labour Cost	3559(22.7)	2847(19.1)
Animal Labour Cost	290(1.9)	143(1)
Irrigation Cost	350(2.2)	667(4.5)
Minor Repair Cost	311(2)	299(2)
Interest Cost	229(1.5)	214(1.4)
Machine Hiring Cost	1498(9.6)	1794(12)
Lease Rent	1080(6.9)	1144(7.7)
Other Expense	530(3.4)	470(3.1)
Total Cost (TC)	15656(100)	14928(100)
Returns (TV-TC)	25165	21817
GVO/Costs (TV/TC)	2.61	2.46
TV/TC (2002-03)	2.27	2.37
Change in TV/TC	15%	7%

NOTE: Figures in brackets indicate the percentage of cost component to total cost

From Table 3.1, we observe that 85.5% and 70.8% of total households were involved in cultivation during Kharif and Rabi respectively. As we would expect, more households were involved in cultivation in Kharif period than Rabi. Out of these households that participated in cultivation, 59.1% and 68.1% households had access to irrigation in Kharif and Rabi respectively. Irrigation is required more during the rabi season, so we observe that larger percentage of households cultivating in Rabi have access to irrigation. The average land under cultivation in the two periods are 0.944 ha and 0.785 ha. The average land owned by households undertaking cultivation in Kharif and Rabi is 1.011 ha and 0.956 ha. This means 93% of land owned by households cultivating in Kharif and 82% of land owned by households cultivating in Rabi is put under cultivation. Also, the average irrigated and unirrigated land is almost same in Kharif (0.469 and 0.468 ha respectively) while average irrigated land is much higher in Rabi compared to average unirrigated land (0.622 and 0.161 ha respectively). This again underlines the importance of irrigation in Rabi compared to Kharif for farm households.

The total value realised by farm households in Kharif and Rabi are INR 40,821 and INR 36,745 respectively. The total value realised in Kharif incomes is 11% higher than that realised in Rabi. In terms of cost components in agriculture, human labour (22.7%) forms the highest in Kharif followed by fertilizer costs (21.6%) while in Rabi, fertilizer costs (21.6%) is highest followed by human labour costs (19.1%). Seed cost forms the next highest component (11.9%) in Kharif while machine hiring costs (12%) form the third highest cost component in Rabi. Machine hiring costs (9.6%) is the fourth highest component in Kharif and seed cost (10.5%) is the fourth highest in Rabi. Plant protection chemical costs (8% and 6.9%), lease rent cost (6.9% and 7.7%) and diesel costs (4.3% and 5.7%) are other significant costs in both Kharif and Rabi. Irrigation costs (4.5%) are significant in Rabi but not so significant

(2.2%) in Kharif. The low animal labour costs (1.9% and 1%) and higher machine hiring costs confirm an increasing mechanisation in agriculture and its impact on different land classes might be important to understand. We also find that significant costs are incurred in diesel, machine hiring and irrigation in Rabi indicating a high dependence of electricity subsidy on Rabi returns for farm households than Kharif returns. We also observe that total value of Rabi is 90% of total value of total value of Kharif, but the Rabi returns is lesser at 86% of Kharif net returns. This is because some of the cost components have increased disproportionately in Rabi as compared to total value. If we look closer we find that there were five costs components that are higher in Rabi as compared to total value. Irrigation costs (191%), electricity costs (143%), diesel costs (126%), machine hiring costs (120%) and lease rent (106%) are higher in Rabi than Kharif by percentages indicated in brackets. Similarly, animal labour and human labour costs in Rabi are only 49% and 80% of the same in Kharif. Both the findings seem to indicate a higher mechanisation in Rabi than in Kharif.

The returns in both the periods are INR 25,165 and INR 21,817 in Kharif and Rabi respectively. The total value as a ratio of total costs is 2.61 and 2.46 in Kharif and Rabi. This ratio for a farm household in 2002-03 for total farming was 2.27 and 2.37 respectively. The average farm profitability increased by 15% and 7% for crop cultivation as a whole in 2012-13 as compared to 2002-03. We will explore the heterogeneities in this change in the subsequent subsections.

3.2 Income from Cultivation for Farm Households in Different States

Table 3.2 and Table 3.3 provide the cultivation economics across different states for Kharif and Rabi season respectively. The tables provide the data for only 18 major states in the country, but data on other states for the two seasons.

TABLE 3.2. ECONOMICS OF CULTIVATION FOR FARM HOUSEHOLDS IN DIFFERENT STATES (KHARIF)

State	AP	ASSAM	BIHAR	CHH	GUJ	HAR	J&K	JH	KAR	KER	MP	MAH	OD	PUN	RAJ	TN	UP	WB
Proportion cultivated (%)	78.7	93.4	87.9	97.6	82.2	70.8	94.4	98.1	94.1	96.8	92.1	91.5	96.3	65.9	89.7	48.4	85.1	89.3
Average land cultivated	1.644	0.779	0.563	1.160	1.312	1.633	0.418	0.515	1.385	0.425	1.305	1.363	0.683	2.172	1.285	0.666	0.556	0.380
Total Value	54494	36959	18321	47087	47763	109813	36282	16004	67489	41434	38432	64794	22276	191263	29673	41029	29196	17111
Seed Cost	3878	387	588	1110	3993	5899	290	810	2182	575	2374	4553	333	3929	2446	2831	929	679
Fertilizer Cost	7727(19)	913(18)	1626(20)	2713(25)	3532(19)	5656(14)	1095(24)	1259(28)	6312(26)	2533(17)	2641(21)	7429(29)	2368(27)	10052(13)	1298(13)	4594(23)	2391(25)	2024(18)
Manure Cost	758(2)	196(4)	325(4)	658(6)	271(1)	525(1)	58(1)	143(3)	946(4)	1556(10)	362(3)	645(3)	227(3)	540(1)	304(3)	1147(6)	220(2)	202(2)
Plant Protection Chemical Cost	4253(10)	322(6)	228(3)	885(8)	1342(7)	5023(12)	402(9)	90(2)	1643(7)	575(4)	1457(11)	2296(9)	583(7)	8842(12)	312(3)	1361(7)	642(6)	508(5)
Diesel Cost	517(1)	148(3)	539(7)	93(1)	930(5)	2773(7)	133(3)	117(3)	364(1)	28(0)	653(5)	300(1)	88(1)	10080(13)	294(3)	808(4)	1166(11)	314(3)
Electricity Cost	79(0)	2(0)	11(0)	37(0)	493(3)	1427(3)	40(1)	2(0)	166(1)	125(1)	333(3)	949(4)	20(0)	54(0)	407(4)	1(0)	178(2)	81(1)
Human Labour Cost	10235(25)	1543(31)	1931(24)	2357(21)	3669(20)	7580(18)	1007(22)	936(21)	6729(28)	7105(47)	1918(15)	4981(19)	2763(31)	12775(17)	1629(16)	5190(26)	1846(17)	4554(41)
Animal Labour Cost	999(2)	147(3)	50(1)	44(0)	293(2)	134(0)	389(9)	175(4)	1046(4)	53(0)	49(0)	1076(4)	188(2)	9(0)	50(0)	291(1)	64(1)	188(2)
Irrigation Cost	203(0)	42(1)	897(11)	84(1)	358(2)	475(1)	17(0)	79(2)	158(1)	51(0)	80(1)	474(2)	80(1)	491(1)	135(1)	217(1)	594(6)	580(5)
Repair	273(1)	61(1)	92(1)	217(2)	336(2)	1499(4)	259(6)	69(2)	520(2)	107(1)	308(2)	466(2)	113(1)	2011(3)	314(3)	478(2)	345(3)	82(1)
Interest	1553(4)	11(0)	24(0)	133(1)	91(1)	400(1)	6(0)	8(0)	698(3)	362(2)	58(0)	101(0)	54(1)	2672(3)	111(1)	233(1)	95(1)	49(0)
Hiring Cost	2935(7)	715(14)	842(11)	1483(13)	1889(10)	4402(11)	338(7)	498(11)	1779(7)	286(2)	1871(15)	1670(7)	863(10)	4851(6)	2390(23)	2287(11)	1008(9)	999(9)
Lease Rent	6995(17)	59(1)	570(7)	635(6)	436(2)	4962(12)	43(1)	56(1)	953(4)	1170(8)	257(2)	78(0)	877(10)	19270(25)	187(2)	201(1)	717(7)	497(5)
Other Expense	943(2)	491(10)	240(3)	564(5)	565(5)	772(2)	458(10)	256(6)	946(4)	443(3)	383(3)	589(2)	259(3)	1092(1)	404(4)	608(3)	416(4)	284(3)
Total Cost	41347	5036	7964	11013	18199	41527	4534	4498	24443	14970	12745	25607	8816	76666	10281	20247	10612	11025
Returns	13148	31023	10357	36074	29564	68286	31748	11506	43047	26464	25687	39188	13460	114597	19392	20782	18585	6086
GVO/Costs	1.32	7.16	2.30	4.28	2.62	2.64	8.00	3.56	2.76	2.77	3.02	2.53	2.53	2.49	2.89	2.03	2.75	1.55

TABLE 3-3 Economics of Cultivation for Farm Households in Different State (Rabi)

State	AP	ASSAM	BIHAR	CHH	GUJ	HAR	J&K	JH	KAR	KER	MP	MAH	OD	PUN	RAJ	TN	UP	WB
Proportion Cultivated (%)	54.88%	89.40%	88.88%	28.83%	48.77%	70.33%	82.75%	77.40%	43.34%	96.69%	83.10%	44.31%	49.08%	66.30%	64.91%	59.24%	89.59%	78.59%
Average Land Cultivated	1.192	0.607	0.582	0.780	1.016	1.579	0.382	0.211	0.920	9.380	1.330	0.994	0.422	2.133	1.261	0.784	0.668	0.339
Total Value	86391	28947	22763	25967	37586	1000165	10820	10868	63154	30146	46347	39828	14626	147337	46605	45047	32419	22216
Seed Cost	3396(6)	471(10)	1211(12)	611(8)	2071(14)	3585(10)	456(16)	625(21)	2262(11)	710(6)	1992(12)	2558(16)	449(7)	3744(6)	180512)	2960(13)	1299(11)	1587(11)
Fertizer Cost	9699(16)	1042(21)	2376(24)	2022(27)	2918(19)	6005(17)	719(26)	594(20)	5194(26)	1811(14)	4253(25)	4632(29)	1335(20)	10419(16)	2263(17)	4189(18)	3010(25)	3093(22)
Mnaure Cost	1021(2)	124(3)	265(3)	203(3)	393(3)	367(1)	39(1)	43(1)	657(3)	1112(9)	433(3)	342(2)	160(2)	242(0)	594(4)	1162(5)	125(1)	203(1)
Plant Protection Chemicals Cost	7610(13)	505(10)	328(3)	1072(14)	1194(8)	2996(9)	106(4)	231(8)	1885(9)	328(3)	948(6)	1101(7)	896(14)	6993(11)	355(2)	1477(6)	514(4)	738(5)
Diesel Cost	620(1)	210(4)	492(5)	57(1)	997(7)	3639(10)	78(3)	190(6)	412(2)	19(0)	1204(7)	218(1)	168(3)	7123(11)	1524(10)	452(2)	1190(10)	305(2)
Electricity Cost Hummn Labour Cost	62(0)	20(0)	13(0)	75(1)	895(6)	1210(3)	40(1)	12(0)	196(1)	80(1)	1433(8)	1240(8)	22(0)	8(0)	1009(7)	3(0)	140(1)	57(0)
Human Labour Cost	14722(24)	1309(27)	1714(17)	1756(23)	3115(20)	4537(13)	491(18)	537(18)	5191(26)	5999(47)	1998(12)	2978(19)	1667(25)	5944(9)	2168(14)	6697(29)	1526(13)	4319(30)
Animal Labour Cost	748(1)	179(4)	24(0)	32(0)	94(1)	65(0)	87(3)	49(2)	621(3)	122(1)	15(0)	656(4)	105(2)	18(0)	4(0)	310(1)	26(1)	232(2)
Irrigation Cost	743(1)	12(0)	1099(1)	85(1)	1127(7)	439(1)	3(0)	87(3)	400(2)	23(0)	529(3)	411(3)	191(3)	366(1)	728(5)	374(2)	915(8)	421(10)
Repair	259(0)	59(1)	118(1)	135(2)	248(2)	1048(2)	143(5)	68(2)	450(2)	94(1)	444(3)	278(2)	63(1)	2143(3)	541(4)	588(3)	302(3)	102(1)
Interest	2050(3)	0(0)	18(0)	106(1)	20(0)	334(1)	1(0)	12(0)	421(2)	702(5)	236(1)	125(1)	87(1)	2581(4)	133(1)	400(2)	79(1)	62(0)
Hiring Cost	4295(7)	476(10)	1390(14)	1023(14)	1760(11)	5786(17)	412(15)	297(10)	1737(9)	326(3)	2791(16)	1051(7)	569(9)	6436(10)	2990(19)	2914(13)	1681(14)	1074(8)
Lease Rent	13429(22)	5(0)	544(6)	33(0)	5(0)	3946(11)	26(1)	58(2)	28((0)	1106(9)	307(2)	47(0)	710(11)	18111(28)	69(0)	698(3)	680(6)	759(5)
Other Expense	1893(3)	437(9)	216(2)	358(5)	487(3)	765(2)	181(7)	196(7)	652(3)	372(3)	385(2)	345(2)	161(2)	938(1)	801(5)	855(4)	403(3)	255(2)
Total Cost	60524	4849	9805	7568	15321	34722	2781	3000	20107	12803	16967	15981	6583	65066	15384	23078	11889	14207
Return	25844	24099	12958	18399	22265	6543	8039	7867	43047	17342	29380	23847	8043	82271	31221	21969	20530	8009
GVO/Cost	143	5.97	2.32	3.43	2.45	2.88	3.89	3.62	3.14	2.35	2.73	2.49	2.22	2.26	3.03	1.95	2.73	1.56

From Table 3.2 and Table 3.3, we find that the total value per unit cost in Kharif is highest in the state of Jammu & Kashmir, (8.00), Assam (7.16) and Chhattisgarh (4.28) and lowest in the state of Tamil Nadu (2.03), West Bengal (1.55) and Andhra Pradesh (1.32). The same ratio in Rabi is highest for the state of Assam (5.97), Jammu & Kashmir (3.89), Jharkhand (3.62) and Chhattisgarh (3.43) and lowed for Tamil Nadu (1.95), West Bengal (1.56) and Andhra Pradesh (1.43). We find that almost the same states figure in both the seasons. Actually, we find the correlation between Kharif GVO/cost ratio and Rabi ratio to be 0.93.Given that the crop profiles in two seasons might not be same for many states, this seems to indicate that GVO/ Cost ration might depend more on state dependent factors that crop dependent factors.

To analyse the impact of various cost component shares on GVO/cost ratio, we. found correlations between the GVO/cost ratio and different cost component shares for Kharif and Rabi. For seed cost, we found the correlation to be -0.231 in Kharif and 0.260 in Rabi. This meant that profitability reduced with increase in seed cost shares in Kharif whereas profitability increased with seed cost shares in Rabi. For fertilizer cost shares, the correlations are 0.129 and 0.253 for Kharif and Rabi respectively. This means that GVO/cost responds positively to increased fertilizer cost shares in both season and the response is more positive in Rabi season compared to Kharif. The correlation for manure cost shares and GVO/cost ratio is -0.038 -0.046 for Kharif and Rabi respectively and the correlation for that for pesticide cost share is 0.009 and 0.055 for Kharif and Rabi respectively. This means that there is negligible effect of these cost on crop profitability. The correlation for diesel cost share with GVO/cost ration is -0.117 and 0.086 for Kharif and Rabi respectively. This means that the increase in diesel cost has a negative influenace in Kharif while a positive influence on profitability in Rabi. Human labour cost share has a negative insignificant correlation with GVO/cost ratio in Kharif (-0.053) and Rabi (-0.074). Animal labour has a correlation of 0.605 and 0.431 with GVO/cost ratio and Kharif and Rabi respectively. This means that higher share of animal labour cost in total cost increased profitability in farming and more in Kharif compared to Rabi. Irrigation cost shares had a high negative correlation with GVO/cost ratio in Kharif (-0.258) and Rabi (-0.373) respectively. This meant that farm households that had to spend more share of total costs on irrigation lost out on profitability in both the seasons, but relatively higher in Rabi. Minor repair cost shares had a high positive correlation with GVO/cost ratio in Kharif (0.478) and Rabi (0.211) respectively. The spending on repair could be considered a kind of a private investment and it is good to find having postive association with farm profitability in both seasons. Interest cost shares (correlation with GVO/ cost in Kharif and Rabi:-0.393 and -0.384) and lease rent cost shares (correlation with GVO/cost in Kharif and Rabi: -0.368 and -0.464) have high negative correlation with GVO/ cost in both seasons. Machine hiring costs have a positive correlation of 0.112 and 0.223 with GVO/cost ratio in both the seasons respectively.

3.3 Income from Cultivation for Farm Households for Different Crops:

The income from cultivation for different crops in both season were calculated for the study. We found out that more than 138 different crops were cultivated by formers in Kharif and more than 140 crops were cultivated by Indian farm households in Rabi. We have economics of cultivation for all these crops and could be provided on request. In the current report we present the economics of cultivation for 10 crops in Kharif and Rabi. We have only selected those 10 crops which were cultivated by atleast 2% of farm households in the country. Table 3.4 provides the economics of cultivation for the crops in Kharif.

TABLE 3-4 Economics of Cultivation for Different Crops (Kharif)

Crop	Paddy	Maize	Bajra	Cotton	Soyabean	Jowar	Sugarcane	Urad Dal	Tur Dal	Groundnut
1	2	3	4	5	6	7	8	9	10	11
Proportion of farmers cultivating the crop	49.5%	10.3%	7.3%	7.0%	5.5%	4.9%	4.5%	3.9%	3.6%	2.59%
Land cultivated by the farmers	0.778	0.885	1.157	2.088	1.865	1.756	1.056	1.093	1.889	1.727
Land under crop	0.629	0.401	0.648	1.189	1.283	0.661	0.598	0.389	0.540	0.836
Irrigated Land under Crop	0.422	0.143	0.211	0.544	0.289	0.178	0.596	0.157	0.086	0.275
Unirrigated Land Under Crop	0.207	0.256	0.437	0.6.45	0.993	0.481	0.003	0.232	0.454	0.561
Proportion of households having										

TABLE 3-4 ECONOMICS OF CULTIVATION FOR DIFFERENT CROPS (KHARIF)—CONTD.

1	2	3	4	5	6	7	8	9	10	11
irrigation	68.0%	37.8%	36.2%	44.8%	22.7%	31.8%	99.5%	36.6%	23.0%	40.3%
Yield in Irrgiated Land (Kg/ha)	3811	2121	1799	1402	1169	3870	56106	563	860	977
Yield in Unirrigated Land (Kg/ha)	3819	2747	3205	1685	1310	9839	56316	532	819	1390
Total Value	26554	10535	9500	60489	45385	11501	91675	6453	12102	28493
Seed Cost	712(6)	645(13)	520(11)	5194(19)	3455(20)	723(11)	3151(11)	265(9)	426(7)	4038(29)
Fertilizer Cost	2324(21)	1269(26)	899(19)	6063(22)	3647(21)	1713(26)	5762(28)	597(20)	1507(25)	2508(18)
Mannure Cost	253(2)	176(4)	120(3)	529(2)	336(2)	160(2)	443(2)	117(4)	104(2)	279(2)
Plant Protection Chemicals Cost	789(7)	334(7)	179(4)	3156(11)	2020(12)	529(8)	883(4)	292(10)	811(13)	943(7)
Diesel Cost	606(6)	122(2)	150(3)	736(3)	722(4)	254(4)	1283(6)	144(5)	71(1)	253(2)
Electricity Cost	89(1)	122(2)	160(3)	407(1)	276(2)	162(2)	1003(5)	23(1)	52(1)	239(2)
Human Labour Cost	2819(26)	869(18)	727(15)	5209(19)	2901(17)	1296(20)	4088(20)	563(18)	1484(24)	2708(20)
Animal Labour Cost	141(1)	149(3)	70(1)	625(2)	295(2)	278(4)	468(2)	39(1)	243(4)	467(3)
Irrigation Cost	343(3)	101(2)	139(3)	246(1)	91(1)	791	823(4)	73(2)	58(1)	52(0)
Repair	201(2)	115(2)	183(4)	347(1)	384(2)	124(2)	703(3)	158(5)	66(1)	222(2)
Interest	163(1)	52(1)	38(1)	378(1)	135(1)	77(1)	163(1)	38(1)	94(2)	458(3)
Hiring Cost	1108(10)	647(13)	1053(22)	2000(7)	2275(13)	619(10)	1057(5)	532(17)	463(8)	989(7)
Lease Rent	1073(10)	159(3)	302(6)	1959(7)	155(1)	249(4)	569(3)	101(3)	477(8)	282(2)
Other Expense	388(4)	192(4)	179(4)	608(2)	454(3)	229(4)	536(3)	108(4)	207(3)	286(2)
Total Cost	11009	4952	4719	27457	17146	6492	20931	3049	6062	13725
Returns	11095	5074	4987	26781	17032	6850	20455	3147	6604	14767
GVO/Cost	2.41	2.13	2.01	2.20	2.65	1.77	4.38	2.12	2.00	2.08

From the table, we observe that almost 50% the households cultivate paddy. Maize is cultivated by around 10% of the households, bajra and cotton by around 7% households, soyabean, jowar and sugarcane by around 5% urad and tur dal around 4% households and groundnut by roughly 3% of households. Farm households cultivating paddy on average have 0.78 ha land under cultivation in Kharif. The total land cultivated by farm households cultivating maize (0.89 ha), bajra (1.16 ha), sugarcane (1.06 ha) and urad dal (1.09 ha) all hover around 1 ha. The total and cultivated by farm household cultivating cotton (2.09 ha), soyabean (1.87 ha), Jowar (1.76 ha), tur dal (1.89 ha) and groundnut (1.73ha) are much higher and more in the vicinity of 2 ha. As a percentage of land cultivated under a crop to total land under cultivation, it is above 50% for paddy (81%), soyabean (69%), sugarcane (57%) , cotton (57%) and bajra (56%) suggesting these might be used more as major crops for farmers doing intercropping. These number are less than 50% for groundnut (48%), maize (45%), jowar (38%), urad dal (36%) and tur dal (29%) suggesting these might be used as more as minor crops by farmers doing intercropping. Also, the percentage of land under irrigation is high for surgarcane (100%), paddy (67%) and cotton (46%) while it is low for jowar (27%), soybean (23%) and groundnut (16%). The irrigated land yield as a percentage of unirrigated land yield is very high for jowar (254%), bajra (178%) and groundnut (142%) and not so high for maize (130%), cotton (120%) and soybean (112%). The irrigated yield is almost the same or lower than unirrigated land yield for paddy (100%), urad dal (95%) and tur dal (94%).

In terms of profitability, sugarcane has the highest GVO/cost ratio of 4.38 while jowar has the lowest GVO/ cost ratio of 1.77. On observing the relation between cost component share and GVO/cost ratio, we find that electricity cost has a high correlation (0.77) with GVO/ cost ratio. This indicates that crops that have high share of costs in electricity tend to have high profitability. Similarly, irrigation cost (0.63), diesel cost (0.57) and fertilizer cost (0.44) shares also indicate high correlation with GVO/cost ratio. This would indicate that crops which involve irrigation and which depend on fertilizer are the ones that

give high profitability. Also, machine hiring cost has a high negative correlation (-0.40) with GVO/cost ratio. This indicates that crops requiring high share of machine hiring are the ones with low profitability. Pesticide cost also has a high negative correlation (-0.38) with profitability. Table 3.5 shows the economics of cultivation for 10 crops in Rabi.

TABLE 3-5 Economics of Cultivation for Different Crops (Rabi)

Crop	Wheat	Paddy	Rapeseed & Mustard	Gram	Potato	Maize	Coconut	Sugar Cane	Masur	Jowar
Proportion of farmers cultivating the crop	38.70%	9.33%	8.83%	6.69%	5.20%	3.00%	2.41%	2.41%	2.07%	1.68%
Land cultivated by the farmers	0.87	0.756	1.031	1.526	0.588	0.835	0.572	1.045	0.893	1.355
Land under crop	0.616	0.594	0.375	0.741	0.177	0.504	0.224	0.548	0.260	0.701
Irrigated Land under Crop	0.584	0.486	0.326	0.438	0.133	0.373	0.145	0.538	0.179	0.151
Unirrigated Land Under Crop	0.032	0.108	0.049	0.303	0.044	0.129	0.076	0.005	0.081	0.547
Proportion of households having irrigation	93%	83%	85%	59%	80%	76%	46%	97%	61%	30%
Yield in Irrigated Land (Kg/ha)	3121	4636	1391	1003	15121	4769	8383	53668	975	3219
Yield in Irrigated Land (Kg/ha)	1874	4061	958	820	6341	3005	8199	30366	922	1197
Total Value	26486	35889	15549	19692	14941	25140	9323	84095	8755	12117
Seed Cost	973(10)	1129(6)	391(7)	1429(17)	1616(25)	1536(11)	70(2)	3127(14)	324(12)	419(8)
Fertilizer Cost	2301(23)	3573(19)	1223(22)	1717(21)	1386(22)	3385(25)	742(18)	6286(28)	681(25)	1455(27)
Manure Cost	913(2)	246(1)	125(2)	126(2)	173(3)	323(2)	316(8)	649(3)	20(1)	133(3)
Plant Protection Chemicals Cost	553(5)	1701(9)	199(4)	644(8)	340(5)	785(6)	182(4)	824(4)	140(5)	212(4)
Diesel Cost	881(9)	341(2)	546(10)	439(5)	146(2)	404(3)	80(2)	1143(5)	236(9)	166(3)
Electricity Cost	290(3)	62(0)	240(4)	380(5)	34(1)	96(1)	40(1)	967(4)	79(3)	177(3)
Human Labour Cost	1312(13)	5094(27)	931(17)	1275(15)	1265(20)	2555(19)	1697(40)	4019(18)	426(15)	1090(21)
Animal Labour	34(0)	209(1)	21(0)	66(1)	152(2)	214(2)	55(1)	491(2)	6(0)	433(8)
Cost Irrigation Cost	591(6)	600(3)	351(6)	230(3)	413(6)	729(5)	206(5)	845(4)	115(4)	117(2)
Repair	259(3)	203(1)	186(3)	153(2)	46(1)	130(1)	52(1)	545(2)	67(2)	133(3)
Interest	123(1)	387(2)	43(1)	95(1)	23(0)	126(1)	204(5)	186(1)	27(1)	41(1)
Hiring Cost	1536(15)	2044(11)	974(18)	1148(14)	418(7)	1567(12)	173(4)	1491(7)	492(18)	519(10)
Lease Rent	815(8)	2458(13)	190(3)	273(3)	206(3)	1170(9)	199(5)	1001(5)	95(3)	187(4)
Other Expense	314(3)	610(3)	123(2)	320(4)	168(3)	412(3)	175(4)	577(3)	46(2)	210(4)
Total Cost	10173	18657	5542	8294	6386	13433	4191	22152	2755	5292
Returns	17232	11708	19236	8727	18555	4252	61943	4922	5662	8555
GVO/Costs	1.92	1.87	2.11	1.91	3.40	2.00	3.80	2.00	1.59	2.34

From Table 3.5, we observe that around 40% farmers cultivate wheat in Rabi. Paddy and rapeseed & mustard are cultivated by around 10% farmers in Rabi as well. Around 7% and 5% farmers cultivate gram and potato in Rabi. Maize, cotton and sugarcane are cultivated in Rabi by around 3% and masur and jowar are cultivated by approximately 2% of farm households in Rabi.

Farm households cultivating wheat on average have 0.87 ha land under cultivation in Rabi. The total land cultivated by farm households cultivating paddy (0.76 ha). rapeseed & mustard (1.03 ha), potato (0.59 ha), maize (0.84 ha), coconut (0.57 ha), sugarcane (1.05 ha), and masur (0.89 ha) all hover around 0.5 to 1 ha. The total and cultivated by farm household cultivating gram (1.53 ha) and jowar (1.36 ha) are higher and more in the vicinity of 1.5 ha. As a percentage of land cultivated under a crop to total land under cultivation, it is above 50% for paddy (79%), wheat (71%), maize (60%), sugarcane (52%) and jowar (52%) suggesting these might be used more as major crops for farmers doing intercropping in Rabi. These number are less than 50% for gram (49%), coconut (39%), rapeseed & mustard (46%), potato (30%) and masur (29%) suggesting these might be used as more as minor crops by farmers doing intercropping in Rabi. Also, the percentage of land under irrigation is high for sugarcane (98%), wheat (95%) and rapeseed & mustard (87%) while it is low for jowar (22%) and gram (59%). The difference between unirrigated and irrigated yield generally seems to be higher in Rabi as compared to Kharif. The irrigated land yield as a percentage of unirrigated land yield is very high for jowar (269%), potato (238%), sugarcane (177%), wheat (167%), maize (159%) and rapeseed & mustard (145%) and not so high for gram (122%), paddy (114%) masur (106%) and coconut (102%).

In term of profitability, coconut has the highest GVO/cost ratio of 3.80 while masur has the lowest GVO/cost ratio of 1.59. On observing the relation between cost component share and GVO/cost ratio, we find that manure cost share has a high correlation (0.85) with GVO/cost ratio. This indicates that crops that have high share of costs in manure tend to have high profitability. Similarly, human labour cost share (0.72), and interest (0.51) also indicate high correlation with GVO/cost ratio. This would indicate that crops which involve more human labour cost share in Rabi have higher profitability. Aslo, machine hiring cost has a high negative correlation (-0.75) with GVO/cost ratio. This indicates that crops requiring high share of machine hiring are the ones with low profitability. Diesel costs (-0.55), fertilizer cost (-0.43), electricity cost (-0.43) and minor repair cost (-0.42) also has a high negative correlation with profitability.

In both Kharif and Rabi, seed cost shares has very low correlation (0.03 & 0.11) with profitability of different crops. But, to understand the influence of seed cost on profitability, we might have to look at how seed costs in each crop varied based on variety of seeds used (hybrid/genetically modified/indigenous seeds). Fertilizer cost shares have positive correlation (0.44) for Kharif crops and high negative correlation (-0.44) for Rabi crops. This might mean high retruns to fertilizer usage for Kharif crops and low returns to fertilizer usage for Rabi crops. For manure, we find the reverse with small negative correlation (-0.24) in Kharif and high positive correlation (0.85) in Rabi. Pesticide costs have a high negative correlation (-0.38 and -0.37) in both Kharif and Rabi. this might indicate why farmers would spend more on seeds which could reduce pesticide costs. The seed cost shares have negligible influence on profitability while pesticide cost shares seem to have a negative impact on profitability. This claim would have to be tested more rigorously. Diesel cost share (0.57 and -0.55), electricity cost share (0.77 and -0.43), minor repair costs (0.13 and -0.42) have positive correlation with profitability in Kharif crops and negative correlation with profitability with Rabi crops. Irrigation cost shares (0.63 and 0.33) and human labour cost shares (0.44 and 0.72) have positive correlation with profitability for both Kharif and Rabi crops. Animal labour cost share (-0.25 and 0.14) and interest (-0.22 and 0.51) have negative correlation with profitability in Kharif and positive correlation with profitability in Rabi. Machine hiring share (-0.40 and -0.75) and lease cost -0.22 and -0.25) have negative correlation with profitability for both Kharif and Rabi crops. Land and machine ownership would be able to reduce these costs and increase profitability. The criticality of owning means of production (land and machine) needs to be studied in detail for understanding this aspect.

3.4 Economics of Cultivation for Different Landholding Classes

Table 3.6 shows cultivation economics of farm households belonging to different land classes for Kharif 2012-13. The total value and cost components are expressed in per ha terms for easier comparability. We also ignore farm households which possess less than 0.01 ha from our analysis as it is a very small share of total households and also only a very small proportion of these households are involved in crop cultivation.

Table 3-6 Economics of Cultivation for Different Landholding Size Classes (Kharif)

Land Classes based on	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Total Land Possessed (in ha)							
Proportion of Farm Households	31.86%	34.92%	17.16%	9.31%	3.72%	0.39%	100.00%
% Cultivating	79.3%	91.4%	93.0%	93.4%	93.2%	96.7%	85.8%
Irrigated Land	0.125	0.305	0.617	0.993	2.080	4.473	0.469
Total Land	0.195	0.581	1.240	2.106	4.409	9.963	0.939
Total Value (TV)	49100	43449	40774	42723	45005	48317	43499
Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Seed Cost	2010(9)	1701(10)	1668(11)	2271(137)	2383(14)	2433(12)	2005(12)
Fertilizer Cost	4895(23)	3787(23)	3345(21)	3546(21)	3405(20	3331(16)	3598(22)
Manure Cost	607(3)	515(3)	399(3)	462(2)	306(2)	341(2)	432(3)
Plant Protection Chemical Cost	1205(6)	1048(6)	1081(7)	1414(8)	1751(10)	1956(10)	1325(8)
Diesel Cost	637(3)	521(3)	522(4)	700(4)	983(6)	1871(9)	719(4)
Electricity Cost	135(1)	296(2)	242(2)	227(1)	260(2)	457(2)	258(2)
Human Labour Cost	4557(21)	3827(23)	3383(23)	3993(24)	3633(21)	4310(21)	3787(23)
Animal labour Cost	492(2)	423(3)	304(2)	290(2)	188(1)	91(0.4)	309(2)
Irrigation Cost	1492(7)	555(3)	301(2)	199(1)	141(1)	176(1)	373(2)
Minor Repair Cost	386(2)	274(2)	286(2)	345(2)	364(2)	586(3)	331(2)
Interest Cost	114(1)	172(2)	216(1)	295(2)	312(2)	348(2)	244(1)
Machine Hiring Cost	2473(12)	1787(11)	1534(10)	1558(9)	1331(8)	1062(5)	1595(10)
Lease Rent Cost	1186(6)	682(4)	848(6)	1106(7)	1660(10)	3165(16)	1150(7)
Other Cost	1139(5)	712(4)	568(4)	484(3)	360(2)	265(1)	564(3)
Total Cost (TC)	21328	16300	14697	16892	17078	20393	16691
TV/TC	2.30	2.67	2.77	2.53	2.64	2.37	2.61
TV/TC 2002-03	2.32	2.36	2.39	2.34	2.10	1.92	2.27
Change in TV/TC Profitability	-1%	13%	16%	8%	25%	24%	15%
TV-TC (per ha)	27772	27149	26077	25831	27927	29725	26808
TV-TC (per ha) 2002-03	8037	7839	7355	6848	5811	3827	6725
Change in TV-TC Returns	246%	246%	255%	277%	381%	630%	299%

From Table 3.6. we find that more than 20% of farm households in the lowest land class do not participate in cultivation. For other land classes it is less than 10% and decreases with land sizes. The total value per hectare decreases with land sizes for first 3 land classes but rises again for the next 3 landholding classes. In 2002-03 survey, the total value per hectare decreased as we moved across lowest to highest land classes (Gaurav & Mishra, 2014)[2]. As far as total costs per ha are concerned, it declines from lowest land class to 1-2 ha land class and then increases thereafter. In 2002-03, the total costs decreased from lowest land class to 2-4 ha land class and then increased for the last two land classes. In effect, the returns per has decreases as we move from lowest land class to 2-4 ha land class and then increases thereafter. In 2002-03, this returns decreased as we moved from lowest to highest land classes. This might indicate that the inverse size class productivity might not be holding in the Indian context and this could be because of increased efficiency of operations in large farms or decreased efficiency of operations in small farms. Profitability in terms of TV/TC increased from lowest land class to 1-2 ha land class and then decreases for 2-4 ha land class, increases again for 4—10 ha land class and decreases for 10+ha land class. In 2002-03, this ratio increased from lowest to 1-2 ha land class and then decreased therefater. The lowest land class had lost 1% of this ratio from 2002-03 while the other land classes have improved this ratio. This ratio has improved more for the larger land holding with the land class 2-10 ha and 10+ha gaining 25% and 24%. All this seems to indicate that the economics of cultivation has deteriorated for the lowest land class and has improved for other land classes and that the largest land classes have gained disproportionately. Looking at the cost structure of the different land classes could indicate us if that is the case.

In terms of cost components, seed cost as a share of total cost increases from lowest to highest land class except the last land class. Fertilizer cost as a share of total decreases from lowest to highest land classes. Share of plant protection chemical costs increases from lowest to highest land classes. Diesel cost. shares increases and 9% to highest land class. Irrigation cost shares decrease from lowest to highest land classes with it being 7% for lowest land class and 1% for highest land class. Machine hiring costs also decline with land classes and contribute to 12% for lowest land class and 5% to highest land class. Human labour cost shares is almost constant across land classes with the middle land classes having slightly higher shares. Lease rent costs seem to be increasing with land class except for the land class 0.4-1 ha. Particularly, the lease rent cost shares for 4-10 ha and 10+ha are 10% and 16% respectively. For the lower 4 land classes, human labour, fertilizer, seed and machine hiring costs are the most significant costs. For the upper 2 land classes, human labour, fertilizer, seed, lease rent and plant protection costs are the most significant costs. The findings seem to suggest that there is mechanisation across all land classes and ownership of machines is distributed in favour of higher land classes. This is seen from higher machine hiring cost shares for the lower land classes. There seems to be some tendency of reverse tenancy as seen from the lease rent cost share of larger land classes. In terms of changes in cost structure from 2002-03 Kharif, we may not be able to make exact comparisons as the cost components collected were different in 2002-03. Also, while 2002-03 costs were referred to as Kharif costs, the costs of 2012-13 was the particular reference period. Still, a rough comparison is bound to give us some broad trends and we present the changes in value and selected costs in Table 3.7 and changes in shares of the cost components in Table 3.8.

TABLE 3-7 Changes in Value and Selected Costs from 2002-03 (Kharif)

Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Total Value (TV)	248%	219%	222%	257%	306%	503%	262%
Seed Cost	166%	107%	107%	171%	177%	246%	146%
Fertilizer	223%	173%	162%	212%	185%	289%	194%
Plant Protection	248%	161%	159%	217%	241%	365%	203%
Manual Labour	190%	150%	151%	207%	172%	302%	179%
Interest	109%	155%	133%	212%	197%	330%	178%
Lease rent	307%	126%	281%	413%	581%	1056%	361%
Total Cost (TC)	251%	182%	177%	231%	224%	388%	216%
TV/TC	-1%	13%	16%	8%	25%	24%	15%
TV-TC	246%	246%	255%	277%	381%	630%	299%

[2]The economics of cultivation for 2002-03 Kharif and Rabi season are provided in Table A-1 and Table A-2 of Appendix A

From Table 3.7, we observe that for farm households as a whole total value increased by 262%, but total costs increased by 216%. So TV/TC increased by 15% and TV-TC (per ha) increased by 299%. Among the different cost, only lease rent costs increased by more than total value (361%) and seed costs showed the smallest increase (146%). For each land class, we observe that the total cost increased by lesser than total value for all land class except the lowest. For the lowest land class, total cost increased by 251% while the total value increased by 248%. Among the various cost components for this land class, plant protection and lease rent cost increased by 248% and 307% respectively. Apart from the 0.4-1 land class, lease rent has increased by more than total value for other classes. This seems to indicate a wide scale increase in either tenancy or rents in tenancy. We will explore this in detail in the next subsection.

TABLE 3-8 Changes in Shares of Selected Costs from 2002-03 (Kharif)

Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Seed Cost	-3%	-4%	-4%	-3%	-2%	-5%	-3%
Fertilizer	-2%	-1%	-1%	-1%	-3%	-4%	-2%
Plant Protection	0%	-1%	-1%	0%	1%	0%	0%
Manual Labour	-5%	-3%	-2%	-2%	-4%	-5%	-3%
Interest	0%	0%	0%	0%	0%	0%	0%
Lease rent	1%	-1%	2%	2%	5%	9%	2%
Other costs including irrigation, electricity, machine hiring, etc	9%	9%	4%	7%	4%	5%	6%

From Table 3.8, we observe that farm households in general are spending lesser shares in seeds (-3%), fertilizers (-2%) and manual labour (-3%) and higher shares in lease rent (+2%) and other costs including machine hiring, irrigation, diesel, electricity, animal labour, marketing, etc (+6%). The seed cost shares have reduces across all land classes by 3-5% and fertilizer cost shares have reduced by 1-4% across all land classes. Plant protection cost and interest cost shares have remained more or less the same. Lease rent shares have increased for all land classes except 0.4-1 ha and it has increased the most for last two land classes by 5% and 9%. This again indicated a tendency towards increasing reverse tenancy. Given total shares of these cost components have shown a general decline the other shares must have risen. Though the exact composition of this cost share change cannot be deciphered, what we seem to find is that cost shares including machine hiring, diesel, animal hiring, irrigation, etc., have increased. This means that out of every rupee spent in farming a larger share now goes to mechanization and lease rent than 2002-03. As we observed previously, these changes in farming seem to have affected farm households belonging to lowest class (0.01-0.4 ha) adversely. We also inquire similar issues for Rabi. Table 3.9 shows the economics of cultivation for different land classes in Rabi 2012-13.

TABLE 3-9 ECONOMICS OF CULTIVATION FOR DIFFERENT LANDHOLDING SIZE CLASSES (RABI)

Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Proportion of Farm Households	31.86%	34.92%	17.16%	9.31%	3.72%	0.39%	100.00%
%Cultivating	71.9%	74.9%	70.3%	72.0%	69.0%	74.5%	70.84%
Irrigated Land	0.168	0.428	0.799	1.566	2.719	6.524	0.622
Total Land	0.200	0.529	1.029	1.979	3.530	8.260	0.785
Total Value (TV)	50775	49220	47781	43386	46537	43021	46917
Seed Cost	2621(11)	2143(11)	2125(11)	1694(10)	1923(10)	1432(8)	2004(11)
Fertilizer Cost	5330(23)	4705(23)	4176(22)	3625(21)	3530(19)	3047(18)	4116(22)
Manure Cost	525(2)	410(2)	481(2)	354(2)	410(2)	273(2)	416(2)
Plant Protection Chemical Cost	1129(5)	1162(6)	1403(7)	1279(8)	1634(9)	1239(7)	1321(7)
Diesel Cost	755(3)	888(4)	964(5)	1102(7)	1508(8)	1758(10)	1083(6)
Electricity Cost	212(1)	462(2)	534(3)	428(3)	431(2)	369(2)	440(2)
Human Labour Cost	3349(15)	3871(19)	3989(21)	3361(20)	3377(18)	3314(19)	3627(19)
Animal labour Cost	283(1)	235(1)	234(1)	132(1)	84(0)	67(0)	182(1)
Irrigation Cost	2440(11)	1199(6)	826(4)	452(3)	289(2)	235(1)	850(4)
Minor Repair Cost	377(2)	321(2)	340(2)	411(2)	472(3)	424(2)	380(2)
Interest Cost	104(0)	143(1)	241(1)	414(2)	344(2)	463(3)	273(1)
Machine Hiring Cost	3413(15)	2898(14)	2344(12)	1760(10)	1668(9)	1566(9)	2287(12)
Lease Rent Cost	1575(7)	1087(5)	998(5)	1389(8)	2387(13)	2594(15)	1457(8)
Other Cost	911(4)	718(4)	642(3)	479(3)	436(2)	366(2)	599(3)
Total Cost (TC)	23023	20242	19297	16879	18493	17148	19035
TV/TC	2.30	2.67	2.77	2.53	2.64	2.37	2.61
TV/TC 2002-03	2.32	2.36	2.39	2.34	2.1	1.92	2.27
Change in TV/TC	-1%	13%	16%	08%	25%	24%	15%
TV-TC (per ha)	27752	28978	28484	26507	28044	25874	27882
TV/TC (per ha) 2002-03	10892	8306	9171	9879	9477	8196	9225
Change in TV-TC (per ha)	155%	249%	211%	168%	196%	216%	202%

From Table 3.9, we find that roughly 25-30% of farm households of all land classes do not participate in cultivation. The total value per hectare decreases with land classes except the 5th land class which is higher than 4th and 6th land class. In 2002-03 survey, the total value per hectare for 0.4-1 ha was lower than that of 0.01-0.4 ha. This value then increased up to 2-4 ha land class and then decreased thereafter. As far as total costs per ha are concerned, it declines from lowest land class to 2-4 ha land class and then increases for 4-10 ha land class and decreases for 10+ ha land class. In 2002-03 the total costs decreased from lowest land class to 0.4-1 ha land class and then increased for 1-2 ha and then decreased thereafter. In effect, the returns per ha increases as we move from lowest land class to 1-4 ha land class and then decreases till 2-4 ha and then increases for the last two land classes. In 2002-03, this returrn decreased as we moved from lowest to 1-2 ha then increased for 2-4 ha and then decreased for last two land classes. Profitability in terms of TV/TC increases from lowest land class to 2-4 ha land class and then decreases for last two land classes. In 2002-03, this ratio decreased from lowest to 0.4-1 ha land class and then increased till 2-4 ha and then decreased for last two land classes. The lowest land class has lost 5% of this ratio from 2002-03 while the other land classes have improved this ratio. This ratio has improved more for the larger land holding with the land class 4-10 ha and 10+ ha gaining 12% and 18%. All this again seems to indicate that the economics of cultivation has deteriorated for the lowest land class and has improved for other land classes and that the largest land classes have gained disproportionately. Looking at the cost structure of the different land classes in Rabi, we find that the trends for most cost components remain the same. Fertilizer cost shares, plant protection chemical cost shares, diesel cost shares all increases from lowest to highest land class. Seed cost shares, unlike in Kharif decreases from lowest to highest land classes. Irrigation cost shares and machine hiring costs decrease from lowest to highest land classes. Human labour cost shares is almost constant across land classes with the middle land classes having slightly higher shares and also households seem to spending leasser share of total costs in human labour in Rabi as compared to Kharif. Lease rent cost seem to be increasing with land class except for the land class 0.4-1 ha and 1-2 ha. Particularly, the lease rent cost shares for 4-10 ha and 10+ ha are 13% and 15% respectively. This again seems to support out hypothesis of increasing reverse tenancy. In terms of changes in cost structure from 2002-03 Rabi, we present the changes in value and selected costs in Table 3.10 and changes in shares of the cost components in Table 3.11.

TABLE 3-10 CHANGES IN VALUE AND SELECTED COSTS FROM 2002-03 (RABI)

Land Class based on Total Land Processed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Total Value (TV)	160%	235%	195%	161%	189%	214%	194%
Seed Cost	72%	92%	76%	45%	82%	59%	74%
Fertilizer	157%	222%	168%	152%	158%	202%	180%
Plant Protection	202%	278%	294%	256%	258%	217%	259%
Manual Labour	132%	243%	215%	170%	157%	154%	190%
Interest	467%	323%	487%	894%	604%	553%	558%
Lease rent	300%	232%	239%	254%	454%	406%	291%
Total Cost (TC)	166%	216%	174%	150%	179%	211%	182%
TV/TC	-5%	5%	5%	8%	12%	18%	7%
TV-TC	155%	249%	211%	168%	196%	216%	202%

From Table 3.10, we observe that for farm households as a whole total value in 2012-13 Ravi increased by 194%, but total costs increased by 182%. So TV/TC increased by 7% and TV-TC (per ha) increased by 202%. Among the different cost components, plant protection chemcial cost (259%), interest cost (558%) and lease rent costs (291%) increased by more than total value and seed costs showed the smallest increase (74%). For each land class, we observe that the total cost increased by lesser than total value for all land class except the lowest. For the lowest land class, total cost increased by 166% while the total value increased by 160%. Among the various cost components for this land class, plant protection, interest and lease rent cost increased by 202%, 467% and 300% respectively. Apart from the 0.4-1 land class, lease rent has increased by more than total value for other classes. This again seems to support our conjecture of increased tenancy or tenancy costs.

TABLE 3-11 CHANGES IN SHARES OF SELECTED COSTS FROM 2002-03 (RABI)

Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Seed Cost	-6%	-7%	-6%	-7%	-6%	-8%	-7%
Fertilizer	-1%	0%	-1%	0%	-2%	-1%	0%
Plant Protection	1%	1%	2%	2%	2%	-%	1%
Manual Labour	-2%	2%	3%	2%	-2%	-4%	1%
Interest	0%	0%	1%	2%	1%	1%	1%
Lease rent	2%	0%	1%	2%	6%	6%	2%
Other costs including irrigation, electricity, machine hiring, etc	6%	3%	0%	-1%	-1%	6%	2%

From Table 3.11, we observe that farm households as a whole are spending lesser shares in seeds (-7%) and higher shares in plant protection chemicals (+1%), manual labour (+1%), interest (+1%) lease rent (+2%) and other costs including machine hiring, irrigation, diesel, electricity, animal labour, marketing, etc (+2%). The seed costs shares in rabi have reduced across all and classes by 6-8% and fertilizer cost shares have reduced by 0-2% across all land classes.Plant protection cost share increased by 0 to 2%. Lease rent shares have increased for all land classes except 0.4-1 ha and it has increased the most for last two land classes by 6%. Labour shares have increased for 0.4-1 ha, 1-2 ha and 2-4 ha land classes and decreased for other classes. The other cost shares in Rabi have remained the same for 1-2 ha land class, declined by 1% for 2-4 and 4-10 ha and increased for other land classes.

3.5 Tenancy and its Impact on Economics of Cultivation

We observe from the previous section that farmers across all land classes are spending more on lease rent. This could be due to increase in instance or tenancy or due to increase in lease rent amounts. We check on the prevalence of tenancy across different states and land classes. For understanding this, we estimate the number of farm households that are leasing in land. Table 3.12 shows the proportion of farm households that are leasing in land across different states of India.

TABLE 3-12 CHANGES IN TENANCY ACROSS DIFFERENT STATES

	Proportion of Farm Households Leasing-in Land in 2012-13	Proportion of Farm Households Leasing-in Land in 2002-03	Change
1	2	3	4
All India	16.42%	12.76	3.66%
Jammu & Kashmir	0.91%	1.00%	-0.10%
Himachal Pradesh	9.30%	8.86%	0.44%
Punjab	22.55%	14.76%	7.78%
Chandigarh	3.71%	38.78%	-35.07%
Uttaranchal	8.78%	5.10%	3.68%
Haryana	13.91%	14.29%	-0.38%
Delhi	6.28%	2.42%	3.86%
Rajasthan	9.38%	5.52%	3.86%
Uttar Pradesh	16.43%	16.96%	-0.53%
Bihar	29.28%	19.52%	9.76%
Sikkim	17.24%	19.32%	-2.09%
Arunachal Pradesh	6.64%	7.40%	-0.76%
Nagaland	3.25%	1.49%	1.76%
Manipur	9.56%	14.60%	-5.03%
Mizoram	1.89%	1.47%	0.42%
Tripura	18.38%	18.12%	0.25%
Meghalaya	10.56%	17.70%	-7.15%
Assam	11.22%	10.00%	1.22%
West Bengal	37.18%	19.11%	18.07%
Jharkhand	10.71%	3.87%	6.84%
Odisha	25.99%	23.39%	2.60%
Chhattisgarh	17.72%	11.71%	6.00%
Madhya Pradesh	7.11%	7.26%	-0.15%
Gujarat	6.24%	3.96%	2.29%
Daman & Diu	1.85%	0.00%	1.85%
D & N Haveli	1.11%	0.05%	1.06%
Maharashtra	5.21%	6.43%	-1.22%
Andhra Pradesh	35.59%	16.92%	18.68%
Karnataka	9.97%	5.70%	4.27%
Goa	15.41%	20.63%	-5.21%
Lakshadweep	6.77%	2.63%	4.15%
Kerala	15.86%	7.69%	8.17%
Tamil Nadu	11.30%	13.32%	-2.03%
Puducherry	14.06%	25.28%	-11.22%
A & N Islands	3.37%	5.25%	-1.88%
Telengana	14.14%	—	—

From, Table 3.2, we observe that incidence of tenancy has increased at all level. The percentage of farm households leasing-in land has increased by 3.66% from 12.76% to 16.42%. This increase in highest in Andhra Pradesh and West Bengal. In the two states, percentage of farmers leasing in land increased from 16.92% to 35.59% and 19.11% to 37.18% respectively. In Bihar, percentage of farm households leasing-in land increased from 19.52% to 29.28%. There have been very few major states in which percentage of farmers leasing-in land has decreased. The percentage of farm households leasing-in land decreased from 13.32% to 11.3% in Tamil Nadu will it decreased from 6.43%to 5.21 in Maharashtra.

Table 3.13 presents the percentage of farm households leasing-in land across different land classes and changes from 2002-03.

TABLE 3-13 Changes in Tenancy Across Different Land Classes

Land class based on total land possessed	Proportion of Farm Households Leasing-in Land in 2012-13	Proportion of Farm Households Leasing-in Land in 2002-03	Changes
1	2	3	4
<0.01	1.72%	2.7%	-1.02%
0.01-0.4	17.71	11.83%	5.88%
0.4-1	15.88%	14.14%	1.74%
1-2	15.10%	13.58%	1.52%
2-4	16.73%	12.77%	3.96%
4-10	25.01%	12.99%	12.02%
10+	28.36%	14.49%	13.87%
All	16.42%	12.76%	3.66%

From the Table 3.13, we observe that except for lowest land class, percentage of farm households leasing in land has increased for all the land classes. The increase is less for 0.4-1 ha and 1-2 ha where the percentage of households leasing-in land increased by 1.74% and 1.52% only. Across 0.01-0.4 ha, the increase was 5.88% while that for 2-4 ha is 3.96%. The highest increase in percentage farm households leasing-in-land is across 4-10 ha and 10+ ha and the increase is 12.02% and 13.87% respectively. This indicates that both tenancy among farm households with very low and reverse tenancy among farm households with very large land are on rise. The percentage of farm households leasing-in-land across different landholding classes for different states for 2012-13 and 2002-03 are presented in Table A-1 and Table A-2 of Appendix A. To reiterate, the comparison has to be made with the caveat in mind that the 2012-12 survey included those households which did not own any land but 2002-03 survey did not. Table 3.14 looks at economics of cultivation for tenants across different land classes in Kharif 2012-13.

TABLE 3-14 Economics of Cultivation for Tenants (Kharif 2012-13)

	Households leasing in land and land class category						
	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Total Value (TV)	47873(97)	40649(92)	28584(65)	45980(109)	54798(132)	46728(95)	43156(99)
Seed Cost	2196(112)	1705(100)	1091(60)	2881(134)	2416(102)	2069(78)	2010(100)
Fertilizer Cost	5005(103)	4016(107)	2699(77)	4566(137)	3917(122)	3770(124)	3815(108)
Manure Cost	365(54)	514(100)	292(69)	665(158)	202(59)	274(71)	382(86)
Plant Protection	1299(110)	1427(146)	1041(95)	2333(189)	2156(134)	2176(120)	1737(142)
Chemical Cost	0.01-0.4	0.01-0.4	0.01-0.4	0.01-0.4	0.01-0.4	0.01-0.4	0.01-0.4
Diesel Cost	831(142)	658(133)	343(61)	872(131)	1208(134)	1985(110)	884(131)
Electricity Cost	31(19)	131(40)	171(66)	194(83)	225(83)	134(20)	169(60)
Human Labour Cost	6936(177)	4797(132)	3436(102)	6589(189)	4129(119)	5463(153)	4830(137)
Animal labour Cost	196(34)	326(74)	180(54)	411(154)	192(103)	149(275)	250(77)
Irrigation Cost	1724(121)	791(155)	271(88)	301(168)	138(97)	312(353)	432(121)
Minor Repair Cost	402(105)	192(66)	157(49)	394(118)	482(149)	275(35)	312(93)
Interest Cost	126(114)	188(111)	271(134)	757(371)	424(155)	401(128)	386(186)
Machine Hiring Cost	2859(121)	2194(128)	1179(73)	1777(117)	1785(152)	847(71)	1694(108)
Lease Rent Cost	5646(86447)	4260(29217)	3644(2478)	6668(247391)	6348(10782955)	8089(57106)	5492(13277)
Other Cost	1030(88)	630(87)	406(67)	758(176)	391(112)	265(100)	534(93)
Total Cost (TC)	28646(148)	21830(143)	15184(104)	29167(202)	24012(164)	26211(157)	22927(152)
TV-TC	19228(64)	18819(66)	13400(46)	16813(61)	30786(114)	20517(63)	20229(71)
TV/TC	1.67(66)	1.86(65)	1.88(63)	1.58(54)	2.28(80)	1.78(60)	1.88(65)

NOTE: Value and Cost figures are in per ha. Figures in brackets indicate the ratio of the statistic for farmers leasing-in land to those not leasing-in land in the same land class.

For tenants across all land classes, the total value generated per ha by farm households leasing-in land is INR 43,156 per ha which is almost same as the value generated by farmers who do not lease-in any land. But, the costs incurred by tenant farmers are much higher than that of that of non-tenant farmers. Tenant farmers spend INR 2,29,27 per ha in Kharif which is 152% of non-tenant farm households. As a result the returns for tenant farmers is INR 20,299 per ha which is 71% of the non-tenant farm households. Profitability as measure by TV/TC is 1.88 which is just 65% of that of non-tenant households. Apart from lease rent which is higher for tenant farm households, they also seem to spend more that non-tenants in interest, plant protection chemicals, human labour, diesel, irrigation, machine hiring and fertilizers. They spend lesser in seeds, minor repair, manure, animal labour and electricity. The tenants possessing land in 0.01-0.4 ha spend more in seed costs along with the costs mentioned above and genarate 97% of TV as the non-tenants in the same land class. Returns for tenants in this class are 64% of non-tenants in this class and profitability was 66% of non-tenants in the same land class. For the land classes 0.41-1 ha, 1-2 ha, 2-4 ha, 4-10 ha and 10+ha, the returns per has for tenants was 66%, 46%, 61%, 114%, 63% and 71% of the non-tenants in their corresponding land classes. Similarly, the profitability for tenants was 65%, 63%, 54%, 80%, 60% and 65% of the non-tenants in their corresponding land classes. The tenant farm households were able to generate a higher profitability in returns per ha for tenants in relation to non-tenants in Kharif 2002-03. This seems to indicate that long with increasing tenancy, the situation of tenants also has become relatively bad. The economics of cultivation for tenants in Kharif 2002-03 and Rabi 2002-03 are mentioned in Table C-1 and Table C-2 of Appendix C respectively. In 2002-03, tenant households spent more than non-tenant households in all cost components to produce value higher than non-tenants. But, in 2012-13, tenant households are not spending more in some cost heads, probably because of high lease rents, but total costs is higher for these households. Since they do no spend in some heads like fertilizer, manure, seed, etc., they seem to generating value less than non-tenant households. Rabi costs show similar trends, but value generated by tenant farm households is higher than non-tenant housholds across all the land classes. But the high total cost means lower returns per ha and lower profitability for tenant households. Table 3.15 shows the economics of cultivation for tenants in Rabi 2012-13.

TABLE 3-15 Economics Of Cultivation For Tenants (Rabi 2012-13)

	Households leasing in land and land class category						
	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Total Value (TV)	54371(109)	50333(103)	56927(124)	61062(153)	56156(131)	49177(125)	55218(123)
Seed Cost	3049(122)	2393(115)	2229(106)	2229(140)	2303(129)	1909(167)	2334(121)
Fertilizer Cost	6327(126)	5307(116)	5313(135)	5352(162)	4337(134)	3308(114)	5040(130)
Manure Cost	530(101)	400(97)	316(61)	492(150)	479(124)	268(97)	421(101)
Plant Protection Chemical Cost	1509(149)	1595(149)	3304(327)	2821(287)	2526(194)	1764(191)	2366(223)
Diesel Cost	940(135)	791(87)	761(76)	1294(122)	1562(105)	2005(125)	1163(109)
Electricity Cost	29(11)	153(29)	289(49)	290(64)	261(53)	267(62)	226(46)
Human Labour Cost	4928(171)	5736(165)	6666(194)	6922(258)	4566(155)	4560(178)	5712(184)
Animal labour Cost	191(62)	217(91)	226(96)	157(123)	139(219)	80(134)	176(96)
Irrigation Cost	3032(134)	1656(151)	1432(204)	571(133)	226(72)	287(141)	1112(142)
Minor Repair Cost	182(42)	274(82)	287(82)	456(113)	512(12)	546(156)	377(99)
Interest Cost	102(98)	224(179)	563(323)	1585(836)	400(124)	977(631)	637(351)
Machine Hiring Cost	3258(94)	3367(120)	2505(108)	1988(16)	2081(137)	1927(143)	2529(114)
Lease Rent Cost	5172(1051)	5431(3751)	5616(12021)	8260(11083)	8641(12110)	6793(9856)	6799(5624)
Other Cost	798(84)	671(92)	963(167)	1126(317)	475(113)	423(128)	763(137)
Total Cost (TC)	30048(144)	28216(152)	30471(179)	33542(245)	28507(193)	25115(203)	29655(181)
TV-TC	24322(84)	22117(73)	26456(92)	27520(105)	27649(98)	24062(89)	25563(90)
TV/TC	1.81(76)	1.78(67)	1.87(69)	1.82(62)	1.97(68)	1.96(62)	1.86(68)

NOTE: Value and Cost figures are in per ha. Figures in brackets indicate the ratio of the statistic for farmers leasing-in land to those not leasing-in land in the same land class.

3.6 Diversification and its Impact of Economics of Cultivation

Farm households diversify their crop portfolio by cultivating more than one crop in their fields. In the survey, data on upto 5 crops cultivated by farm households was collected. We analyse the economics of cultivation based on number of crops cultivated by them in Kharif and Rabi 2012-13. table 3.16 shows diversification and its impact on economics of cultivation for Kharif 2012-13 and Table 3.17 shows the same for Rabi 2012-13.

TABLE 3-16 DIVERSIFICATION AND ECONOMICS OF CULTIVATION (KHARIF 2012-13)

Number of Crops	1	2	3	4	5
% of Cultivating	60.4%	24.3%	9.8%	3.5%	2.0%
TV	38487(100)	47013(122)	50412(131)	43421(113)	50451(131)
Seed Cost	1732(100)	2297(133)	2171(125)	2267(131)	1842(106)
Fertilizer	3490(100)	3600(103)	3663(105)	3924(112)	4238(121)
Manure	426(100)	455(107)	434(102)	308(72)	610(143)
Plant Protection	1102(100)	1434(130)	1678(152)	1618(147)	1113(101)
Diesel	499(100)	938(188)	909(182)	856(172)	604(121)
Electricity	191(100)	324(170)	272(142)	342(179)	382(200)
Human Labour	3782(100)	3856(102)	3667(97)	3411(90)	4867(129)
Animal Labour	311(100)	315(101)	310(100)	295(95)	237(76)
Irrigation	482(100)	336(70)	239(50)	162(34)	241(50)
Minor Repair	261(100)	394(151)	360(138)	443(170)	395(151)
Interest	185(100)	222(120)	410(222)	364(197)	181(98)
Machine hiring	1760(100)	1543(88)	1439(82)	1293(73)	1014(58)
Lease rent	1065(100)	1310(123)	1361(128)	564(53)	1114(105)
Other cost	606(100)	558(92)	520(86)	389(64)	610(101)
Total cost	15892(100)	17582(111)	17433(110)	16235(102)	17450(110)
TV-TC (per ha)	22595(100)	29431(130)	32979(146)	27186(120)	33001(146)
TV/TC	2.42(100)	2.67(110)	2.89(119)	2.67(110)	2.89(119)

NOTE: Value and Cost figures are in per ha. Figures in brackets indicate the ratio of the statistic for farm households cultivating 'n' crops to those cultivating only 1 crop

TABLE 3—17 DIVERSIFICATION AND ECONOMICS OF CULTIVATION (RABI 2012-13)

Number of Crops	1	2	3	4	5
% of Cultivating	55.5%	27.5%	9.9%	4.2%	2.9%
TV	45286(100)	47759(105)	47290(104)	46501(103)	57913(128)
Seed Cost	1846(100)	2040(111)	2049(111)	2516(136)	2393(130)
Fertilizer	4199(100)	3978(95)	3999(95)	4214(100)	5052(120)
Manure	496(100)	351(71)	352(71)	292(59)	708(143)
Plant Protection	1383(100)	1336(97)	1249(90)	1068(77)	1244(90)
Diesel	654(100)	1337(204)	1437(220)	1423(218)	1222(187)
Electricity	382(100)	493(129)	448(117)	454(119)	530(139)
Human Labour	3818(100)	3101(81)	3565(93)	4014(105)	6661(174)
Animal Labour	274(100)	106(39)	126(46)	166(61)	175(64)
Irrigation	1027(100)	793(77)	597(58)	643(63)	959(93)
Minor Repair	284(100)	474(167)	385(135)	437(154)	443(156)
Interest	224(100)	328(147)	232(104)	351(157)	362(162)
Machine hiring	2464(100)	2343(95)	1841(75)	2009(82)	2324(94)
Lease rent	1248(100)	1631(131)	1799(144)	1003(80)	1311(105)
Other cost	769(100)	533(69)	377(49)	485(63)	557(72)
Total cost	19069(100)	18843(99)	18457(97)	19076(100)	23941(126)
TV-TC (per ha)	26218(100)	28916(110)	28833(110)	27425(105)	33973(130)
TV/TC	2.37(100)	2.53(107)	2.56(108)	2.44(103)	2.42(102)

NOTE: Value and Cost figures are in per ha. Figures in brackets indicate the ratio of the statistic for farm households cultivating 'n' crops to those cultivating only 1 crop

From Table 3.16 and 3.17 we observe that 60.4% of farmers who cultivate in Kharif and 55.5% of farmers who cultivate in Rabi cultivate only one crop. 24.3% of them in Kharif and 27.5% in Rabi cultivate 2 crops in their farm, 9.8% in Kharif and 9.9% in Rabi cultivate 3 crops. 5.5% of cultivating farm households in Kharif and 7.1% of cultivating farm households in Rabi cultivate 4 or more crops in their farm. This indicates a higher diversification in terms of number of crops cultivated in Rabi. In both Kharif and Rabi, total value generated by farm households per ha is higher among farm households cultivating more than 1 crop as compared to those who are practising mono-cropping. Though the farm households cultivating more than 1 crop also incur more costs in Kharif, the gain in total value is higher than the increased total costs for all n. In rabi, the per ha costs are lower for households cultivating 2 and 3 crops compared to mono-cropping households and higher for farm households cultivating 4 and 5 crops compared to moni-cropping farm households. In effect returns per ha for farm households cultivating 2, 3, 4 and 5 crops is 130%, 146%, 120% and 146% that of farm households who practice mono-cropping in Kharif 2012-13 and 110%, 110%, 105% and 130% that of farm households who practice mono-cropping in Rabi 2012-13. Similarly, profitability (TV/TC) for farm households cultivating 2, 3, 4 and 5 crops is 110%, 119% 110% and 119% that of farm households who practice mono-cropping in Kharif 2012-13 and 107%, 108%, 103% and 102% that of farm households who practice mono-cropping in Rabi 2012-13. It seems that higher diversification is profitable and provides higher returns per ha than mono-cropping.

4. Incomes from Livestock

This section discusses the economics of livestock for the farm households engaged in it. Farm households earn value from eggs, milks, live animals and other by-products of livestock and spend money on buying the animals ('seeds'), feeds for them, labour, interest and other charges. Table 4.1 below shows the economics of livestock for farm households in Kharif and Rabi. It shows the share of total value earned by households through sale of different products and share of different cost components in total cost for Kharif and Rabi.

TABLE 4.1 ECONOMICS OF LIVESTOCK

	July-December 2012	January-June 2013
Total Value	17940	16761
Egg	129(0.7)	155(0.9)
Milk	12180(67.9)	11611(69.3)
Live Animals	3348(18.7)	2661(15.9)
Wool	80(0.4)	11(0.1)
Fish	318(1.8)	394(2.4)
Honey, Hide, Bone and		
Manure	1094(6.1)	1136(6.8)
Other	791(4.4)	792(4.7)
Total Cost	9228	7630
Seed' Costs	974(10.6)	524(6.9)
Green Fodder	696(7.5)	454(6)
Dry Fodder	2342(25.4)	1433(18.8)
Concentrates	3662(39.7)	3779(49.5)
Other Feed	381(4.1)	356(4.7)
Veterinary	651(7.1)	631(8.3)
Interest	27(0.3)	12(0.2)
Lease	19(0.2)	27(0.4)
Labour	173(1.9)	173(2.3)
Other	305(3.3)	241(3.2)
Returns	8712	9131
Total Value/ Total Cost	1.94	2.20

From Table 4.1, we observe that households earn a total value of INR 17,940 in Kharif but a lesser total value of INR 16,761 in Rabi. The Rabi total value is 93% of Kharif total value. This is largely due to reduction in total value in milk and live animals which are 95% and 79% of the respective total values in Kharif. But the reduction in Rabi total value does not reduce the returns as costs are disproportionately lesser in Rabi. The average income in Rabi is INR 9,131 which is 105% of Kharif net income of INR 8,712. If we look at the cost shares concentrate and dry fodder feed are the highest cost items in total cost across two seasons. The total cost in Rabi is only 83% of total cost in Kharif. The reduction is largely due to lesser seed costs, green fodder and dry fodder costs in Rabi. This could also be because green and dry fodder could be obtained as by-products from Kharif cultivation and thus could reduce livestock costs in Rabi. The profitability measured as GVO/ cost is 1.94 in Kharif while it is 2.2 in Rabi. Both of these are lesser than that realised in cultivation.

5 Incomes from Nonfarm Business

Farm households earn incomes from various nonfarm businesses. Only 8.54% of all the farm households were involved in nonfarm businesses. The nonfarm businesses belonged to various industries. Based on NIC 2008 classification, the farm households were involved in as many as 21 various industry divisions. Out of this, 1 or 2 households were involved in as many as 9 industries. So, we just present the data of output, expenses, net receipt and profitability (output/expenses) for 12 industries only. Table 5.1 provides the data.

TABLE 5-1 Nonfarm Business Incomes Across Different Industries

Industry	Proportion of households involved in Nonfarm Business	Output	Expenses	Net Receipt	Profitability
Agriculture, forestry and fishing	0.60%	254255	83878	170377	3.03
Mining and Quarrying	0.34%	2132745	1631022	501722	1.31
Manufacturing	27.32%	197160	131433	65727	1.50
Electricity, gas, steam and air-conditioning supply	0.03%	47505	5420	42085	8.76
Water supply, sewerage and waste management	0.02%	998739	748709	250030	1.33
Construction	4.02%	281355	223017	58338	1.26
Wholesale and retail trade	41.99%	394019	329908	64111	1.19
Transportation and storage	12.64%	345566	215553	130013	1.60
Accomodation and food service	4.06%	305992	209651	96342	1.46
Information and Communication	0.23%	157278	107662	49616	1.46
Financial and Insurance Activities	0.75%	193091	96563	96528	2.00
Real estate activities	0.77%	707516	279944	427572	2.53
All Nonfarm Business		281130	208402	72728	1.35

From Table 5.1, we observe that average output from nonfarm business is INR 2,81,130 for which the household has to spend INR 2,08,402. The net receipt is INR 72,728. The output per rupee spent is very low as compard to cultivation or livestock at 1.35. This seems to indicate that farm household enter into these businesses more as a last resort than in a lookout for profitable opportunities. Around 42% of household that participate in nonfarm businesses do so in the wholesale and retail industry and it has a very poor profitability of 1.19. Manufacturing and Transportation & Storage industries have slightly better profitability but also slightly lower participation with 27% and 13% of households participating in these industries respectively. Around 4% of houiseholds participate in both Construction and Accommodation & Food service and the profitability is 1.26 and 1.46 in these industries respectively.

6 Income fromWages/Salary

Farm households earnwages and salary from variety of industries. In Kharif, 43.24% of the farm household participate in activities that provide wages and salary while in Rabi, 49.69% farm households participate in these activities. Higher proportions of households earn wage income in Rabi as compared to Kharif. Table 6.1 provides the data on participation of households and their average incomes related to wage/salaried employment in Kharif and Rabi. The classification is based on the NIC code of principal activity of the individual which is then added across the individuals in a household to get wage income from a particular industry for households.

TABLE 6-1 Incomes from Wage/Salaries Across Different Industries

Industry	Proportion of households earning wage incomes in Kharif	Proportion of household earning wage incomes in Rabi	Average wage/salary incomes in Kharif	Average wage/salary incomes in Rabi
1	2	3	4	5
Agriculture, forestry and fishing	61.93%	58.40%	13429	15079
Mining and Quarrying	0.85%	0.65%	37449	42963
Manufacturing	7.50%	7.73%	27514	28301
Electricity, gas, steam and air-conditioning supply	0.46%	0.41	67900	61106

TABLE 6-1 INCOMES FROM WAGE/SALARIES ACROSS DIFFERENT INDUSTRIES—CONTD.

1	2	3	4	5
Water supply, sewerage and waste management	0.26%	0.24%	67193	66948
Construction	19.76%	23.99%	22712	22500
Wholesale and retain trade	2.53%	2.97%	27559	27676
Transportation and storage	4.48%	4.39%	39380	38970
Accommodation and food service	0.40%	0.41%	25824	26226
Information and Communication	0.31%	0.25%	41985	49676
Financial and Insurance Activities	0.64%	0.56%	72332	72981
Real estate activities	0.01%	0.00%	47083	19153
Professional, scientific and technical	0.38%	0.34%	69897	72140
Administrative and support service	0.91%	0.83%	54123	48613
Public administration and defence	3.14%	2.74%	70425	83289
Education	5.20%	4.82%	61411	65565
Health	1.01%	0.87%	58999	57046
Arts	0.12%	0.19%	31704	28809
Other Services	0.73%	0.78%	20915	20824
Household activities	0.12%	0.23%	16629	5754
Other Industries	2.33%	3.52%	7521	19484

In terms of participation of households in wage income, 62% and 58% of households earning from wage/ salaried employment participate in Agricultural, forestry and fishing industry in Kharif and Rabi respectively. The next highest participation is in Construction where the proportion is 20% and 24% in Kharif and Rabi respectively. It is then followed by manufacturing (7.5% and 7.73% in Kharif and Rabi respectively). The other industries in which there is reasonable participation in Kharif and Rabi are Wholesale and retail trade (2.53% and 2.97%). Transportation & storage (4.48% and 4.39%), Education (5.2% and 4.82%) and Public administration and defence (3.14% and 2.74%). The percentage of households participating in wage employment in different industries for Kharif and Rabi remains mostly same except for Agriculture, fishing and forestry and Construction. While more households participate in agricultural sector in Kharif than in Rabi, more households participate in Construction in Rabi than in Kharif, Construction seems to be the most important source of wage income for farm households after agriculture. Manufacturing does not seem to provide enough employment opportunities to these households. In terms of average incomes earned by households in different industries participating in it, construction and agriculture are at bottom while manufacturing does slightly better than these two sectors in this regard.

We also look at the household incomes based on incomes earned by types of employment. For this we categorize individual income earned according to status of the principal activity. Table 6.2 below shows the participation of various households and income earned by households in each of these occupation categories.

TABLE 6-2 INCOMES FROM WAGES/SALARIES ACROSS DIFFERENT EMPLOYMENT TYPES

Employment type	Proportion of households earning wage incomes in Kharif	Proportion of household earning wage incomes in Rabi	Average wage/salary incomes in Kharif	Average wage/salary incomes in Rabi
1	2	3	4	5
Own Account Worker	27.1%	24.2%	7937	8613
Own Account Employer	1.1%	0.5%	9740	11735
Helper in HH Enterprise	16.8%	14.7%	7258	7921
Regular salaries/wage Employment	18.3%	16.6%	52882	57690
Casual labour other than MGNREGA	1.4%	1.4%	13941	15306
MGNREGA	1.5%	1.9%	8706	8050
Other types of casual work	32.0%	37.9%	22159	22065

From Table 6.2, we observe that 32% of households earning wage income in Kharif and 38% of households earning wage income in Rabi have individuals engaged in casual labour. The propotion engaged in MGNREGA is 1.4% and 1.5% Around 27.1% in Kharif and 24.2% in Rabi have individuals engaged in own account work. Hoiuseholds earn low incomes from own account work, as helpers and MGNREGA while they earn the highest from regular salaried/wage employment. More households have individuals participating in casual work and MGNREGA in Rabi than in Kharif.

7 Poverty and Inequality in Farm Households

Sections 2 to 6 provided the analysis of total income and income components of farm households. This section will analyse the implications of these numbers on poverty, indebtedness and inequality in farm households. Firstly, we will analyse state-wise variations in percentage of farm households earning below poverty line. After that, we look into state-wise increases in percentage of farmers having outstanding loand and changes since 2002-03. Then, we will analyse income inequality across farm households in India and decompose the effect of diferent income components on total income inequality.

7.1 Poverty among Farm Households in India

To estimate the percentage of population earning below poverty line, we use poverty lines for states as defined by the methodology suggested by Rangarajan committee (Planning commission, 2014)., Since the lines were suggested for 2011-12, we convert the income to 2011-12 incomes and divide by household size to get per capita incomes of the households. Then, percentage of households earning below poverty line was estimated for different states and union territories.

TABLE 7-1 Farm Hoseholds Earning less than Poverty Line

Sr. No.	State	Per Capita Poverty Line (INR Per Capita Per Month)	Percentage of Population earning Per Capita Incomes below Poverty Line
1	2	3	4
1.	Jammu & Kashmir	12534	32-75%
2.	Himachal Pradesh	12799	44.37%
3.	Punjab	13530	26.38%
4.	Chandigarh	15638	16.96%
5.	Uttaranchal	12179	66.91%
6.	Haryana	13534	32.52%
7.	Delhi	17910	9.12%
8.	Rajasthan	12432	49.17%
9.	Uttar Pradesh	10678	66.78%
10.	Bihar	11655	71.88%
11.	Sikkim	13515	38.88%
12.	Arunachal Pradesh	13812	58.10%
13.	Nagaland	14758	53.63%
14.	Manipur	14222	54.88%
15.	Mizoram	14772	51.61%
16.	Tripura	11226	49.41%
17.	Meghalaya	13328	30.17%
18.	Assam	12080	50.38%
19.	West Bengal	11209	56.94%
20.	Jharkhand	10848	62.12%
21.	Orissa	10517	58.03%
22.	Chhattisgarh	10942	51.07%
23.	Madhya Pradesh	11300	50.52%
24.	Gujarat	13234	34.73%
25.	Daman & Diu	14407	46.68%

TABLE 7-1 FARM HOSEHOLDS EARNING LESS THAN POVERTY LINE—CONTD.

1	2	3	4
26.	Dadra & Nagar Haveli	12101	30.96%
27.	Maharashtra	12940	49.30%
28.	Andhra Pradesh	12381	44.30%
29.	Karnataka	11705	41.83%
30.	Goa	14407	40.22%
31.	Lakshadweep	15933	34.49%
32.	Kerala	12648	26.31%
33.	Tamil Nadu	12983	47.11%
34.	Puducherry	13561	65.71%
35.	Andaman & Nicobar Islands	15780	47.74%
36.	Telangana	12381	39.65%
	All India		53.37%

From the Table 7.1, we find that the overall farm households earning below poverty line is 53.37%. A very high proportion of farm households in Bihar (71.9%), Uttaranchal (66.9%), Uttar Pradesh (66.8%), Puducherry (65.7%) and Jharkhand (62.12%) earn less than poverty line. All these states have more than 60% population earning below poverty line. Some states and union territories have a very low proportion of farm households earning below poverty line. Around 12 states have less than 40% population earning below poverty line. These states and union territories are Telangana (39.7%), Sikkim (38.9%), Gujarat (34.7%), Lakshadweep (34.5%), J&K (32.8%), Haryana (32.5%), D&N Haveli (31%), Meghalaya (30%), Punjab (26.4%), Kerala (26.3%), Chandigarh (17%) and Delhi (9.1%). All the other states have a population 40% to 60% earning below poverty line.

7.2 Indebtedness among Farm Households in India

Table 7.2 provides the details on percentage of farm households having outstanding loans, the percentage of farm households which had outstanding loans as on 2002-03, changes since then and the average outstanding loan and average outstanding loan across different states and groups of union territories in India.

TABLE 7-3 INDEBTEDNESS AMONG FARM HOUSEHOLDS ACROSS INDIAN STATES

	% Farm Houeholds outstanding Loan	% Farm Households Outstanding Loan 2002-03	Change in % Households Outstanding Loan	Average Outstanding Loan Amount	Average Outstanding Loan Amount per Ha
1	2	3	4	5	6
Andhra Pradesh	93%	82%	11%	123112	83363
Arunachal Pradesh	19%	6%	13%	5363	3186
Assam	18%	18%	-1%	3436	3186
Bihar	42%	33%	9%	16333	27375
Chhattisgarh	37%	40%	-3%	1023	8244
Gujarat	43%	52%	-9%	38124	29894
Haryana	42%	53%	-11%	79032	56141
Himachal Pradesh	28%	33%	-6%	28039	50028
Jammu & Kashmir	31%	32%	-1%	12176	24167
Jharkhand	29%	21%	8%	5650	9000
Karnataka	77%	62%	16%	97205	58848
Kerala	78%	64%	13%	213588	357535
Madhya Pradesh	46%	51%	-5%	32117	22379
Maharashtra	57%	55%	3%	54733	35111
Manipur	24%	25%	-1%	6072	7054

TABLE 7-3 INDEBTEDNESS AMONG FARM HOUSEHOLDS ACROSS INDIAN STATES—CONTD.

1	2	3	4	5	6
Meghalaya	2%	4%	-2%	1375	1299
Mizoram	6%	24%	-17%	2906	2784
Nagaland	2%	37%	-34%	601	544
Odisha	57%	48%	10%	28226	38193
Punjab	53%	65%	-12%	119550	77918
Rajasthan	62%	52%	9%	70511	39588
Sikkim	14%	39%	-24%	9864	14645
Tamil Nadu	83%	75%	8%	115872	129369
Telengana	89%	—		93450	61157
Tripura	23%	49%	-26%	5049	7016
Uttar Pradesh	44%	40%	4%	27292	41229
Uttaranchal	51%	7%	44%	35555	73189
West Bengal	52%	50%	1%	17756	40539
Group of Union Territories	27%	51%	-24%	52316	78010
All India	52%	49%	3%	46945	45318

From Table 7.2, we observe that 52% of farm households were under debt in 2012-13 while 49% farm households were under debt. Andhra Pradesh (93%), Telangana (89%), Tamil Nadu (83%), Kerala (78%), Karnataka (77%), Rajasthan (62%), Odisha (57%), Maharashtra (57%) and Punjab (53%) had higher than All India share (52%) farmers who had outstanding loans. The share of farm households having outstanding loans increased by a high percentage in Uttaranchal (44%), Karnataka (16%), Kerala (13%), Arunachal Pradesh (13%), Andhra Pradesh (11%) and Odisha (10%). This share decreased among smaller states, group of union territories, Punjab (12%), Haryana (11%) and Gujarat (9%). The average outstanding loan in 2012-13 was INR 46,945 across all households and was above INR 1,00,000 in states of Kerala (INR 2,13,588), Andhra Pradesh INR 1,23,112), Punjab (INR 1,19,550) and Tamil Nadu (INR 1,15,872). The average outstanding loan per ha was INR 45,318 across all India. This amount was more than INR 1,00,000 for the states of Kerala (INR 3,57,535) and Tamil Nadu (1,29,369).

7.3 Inequality among Farm Households in India

Income inequality is generally measured by Gini coefficient. We measure income inequality of farm households in India. Also, to understand which the income components that contribute to income inequality more, we discompose Gini coefficient by factor components using method suggested by Lerman and Yitzakhi (1985). The resulting decomposition is presented in Table 7.2

TABLE 7-2 DECOMPOSITION OF GINI COEFFICIENT OF INCOME

Source (k)	Share of Source in Total Income (S_k)	Source Gini (G_k)	Gini Correlation (R_k)	Share $\frac{S_k G_k R_k}{G}$	Percent change $\frac{S_k G_k R_k}{G} - S_k$
Income From Farming	0.46	0.74	0.80	0.49	0.027
Income From Livestock	0.14	0.81	0.64	0.13	-0.012
Income From Nonfarm Business	0.08	0.96	0.70	0.10	0.016
Income From Wages/Salary	0.31	0.77	0.66	0.28	-0.031
Household Annual Income		0.56			

From Table 7.2, we find that the Gini coefficient of total income among farm households in India is 0.56, which is a high number. The Gini among component incomes would be higher as not all households are involved in all activities and the zero incomes would play a role in higher component Gini. The Gini for farming income (G_k) is 0.74. The same (G_k) for livestock incomes, nonfarm business incomes and wage incomes are 0.81, 0.96, 0.77. The highest Gini is in nonfarm business incomes followed by livestock income, wage income and farming income. This does not mean that the income component with highest inequality will contribute highest to total income inequality as the share of income and distribution of the income will matter.The share of total income (S_k) is highest for farming (46%) followed by wage income (31%), livestock income (14%) and nonfarm business income (8%). Another component needs to be understood before we estimate the impact of a component on income inequiality. That is called the Gini correlation (R_k). This indicate how correlated is a particular component with total income distribution. If farm households earning high incomes from farming are the ones who earn high total incomes, then the Gini correlation for farming income will be high. If farm households belonging to lower total income strata earn high farming income, then this correlation will be low. So, a low Gini correlation means that a particular income source is biased towards the lower income strata and is likely to reduce income inequality. In this regard, we find that the Gini correlation is highest for farming income (0.80) followed by nonfarm business income (0.70), wage income (0.66) and livestock income (0.64). From these three things (Share (S_k), component Gini (G_k) and Gini correlation (R_k)) of each component income, we can derive the impact of a particular componenet on total income inequality.

From the Table we find that the share of a component in income inequality (column 5 of Table 7.2) is highest for farming (49%) and more than its share of income. The share of nonfarm business income in income inequality is 10% which is again higher than its share in income. For wage income and livestock income, the shares in income inequality are lower than their shares in income. For wage income the share in income inequality is 28% while the share in income is 31% while the same for livestock income is 13% and 14% respectively. By subtracting values in column 5 from column 2 we can estimate the impact of income component on total income inequality. The difference is provided in the last column of the table. We find that cultivation incomes and nonfarm business incomes increase income inequality where a 1% increase in share of these income will rise inequality by 2.7% and 1.6% respectively. Livestock incomes and wage incomes are inequality decreasing where a 1% increase in the shares of these incomes in total income will reduce income inequality by 1.2% and 3.1% respectively. So wage incomes and livestock incomes have potential to reduce inequality as lower strata earn more incomes from these sources than the high income strata. But, this is just the current situation. Nonfarm business needs to be made more equitable by reducing entry barriers pertaining to capital, information and education in nonfarm business. Livestock incomes have grown rapidly in the decade under consideration and given that it is more equitable than farming incomes, it could pave way for equitable development among farm households.

8. Conclusions

This study estimates the incomes of farm households in India. For this purpose, the study uses the most recent survey that assesses the situation of farmers in India. The data 70th round of National Sample Survey (NSS) conducted from January, 2013 to December, 2013 was used for the analysis. The survey includes various aspects of farming and pertains to the period from July, 2012 to June, 2013. The current report primarily focuses on aspects related to incomes of the farmers and particularly income derived from various components—incomes from cultivation, incomes from livestock, incomes from nonfarm business and income from wage or salaried employment. The survey was conducted across 35,200 farm households across 36 states and union territories in the first visit and 34,907 of these households were visited for a second round. The estimates pertain to population of Households and we use the weights specified in the NSS for our analysis.

We find that the average annual income of farm households is INR 77,794 per year or INR 6,498 per month. Out of this the Households earn INR 36,947 from crop cultivation, INR 24,801 from wage/salaried employment, INR 10,017 from livestock and INR 6,209 from nonfarm business. Compared to 2002-03, the share of livestock incomes in total income has increase from 4% to 13% while incomes from wage and salaried employment have reduced from 39% to around 31%. The livestock incomes in the decade from 2002-03 has seen an annual real CAGR of 14.59%. The CAGR in the same decade for cultivation income, wage income and nonfarm business incomes are 4.29%, 1.98% and 0.58%. The farm household incomes in total grew at a rate of 3.95% in the decade.

Farm households which have nonfarm business enterprises as their principal income source earn the most but they are small in proportion 4.7% of the farm households have nonfarm business as primary income sources and earn INR 1,04,593 per annum. Farm households in the states of Chandigarh, Delhi and Punjab have the highest income while farm households in Bihar. West Bengal and Uttaranchal have the lowest total incomes. We find that the farm households in states having high wage incomes also have high total income. Also, the states in which share of wage income in total income are higher have high total incomes.State-wise growth rates of incomes of farm households from 2002-03 to 2012-13 shows that

Haryana, Rajasthan and Odisha have shown high growth with Haryana having high growth from crop cultivation while Rajasthan and Odisha have high growth largely from livestock incomes. Growth rates have been low in Assam, Bihar and West Bengal. All these states have shown very low or negative growth in cultivation incomes and despite high livestock income growth in Assam, the farm household income growths in these states have been disappointing. As a general rule, states showing high growth in cultivation incomes and livestock incomes show high growth in total farm household incomes as well.

An analysis of landholdings shows a growing decline in land sizes and increasing number of marginal farmers. For landless and marginal farmers, income from wage and salary employment has become the highest contributor to their incomes. The growth in real wage income has been quite low in the decade and this low growth will affect large number of farm households if this trend continues. Caste of the household also seems to have a significant influence on the incomes of farm households with SC farm households earning lowest cultivation incomes and livestock incomes. STs earn the lowest nonfarm business income and income from wage and salaried employment. Farm households belonging to Other castes and religion other than Hindu earn the most in all the components of household income.

The analysis of incomes from cultivation shows that the profitability expressed by total value to cost has increased from 2.31 to 2.61 in Kharif and 2.45 in Rabi. The low animal labour costs and high machine hiring costs, electricity costs and irrigation costs indicate a high mechanisation in agriculture. Also, the mechanisation as seen from these costs is higher in Rabi as compared to Kharif. In analysing the incomes across different landholdings we find that profitability does not increase linearly with land sizes and there might be issues when land is not large enough to exercise economics of scale. For instance, the profitability of medium farmers is lower than semi-medium farmers in Kharif and only slightly higher in Rabi. This is a conjecture that has been suggested by others as well (Sen and Bhatia, 2004). Across states, we find that J&K,Chattisgarh and Assam have highest profitability while Tamil Nadu, West Bengal and Andhra Pradesh have low profitability. Among major crops in Kharif, sugarcane and soybean show high profitability while jowar and tur dal exhibit low profitability. Among major crops in Rabi, maize and sugarcane exhibit high profitability while masur dal and paddy exhibit low profitability. Pesticide costs have a negative correlation with profitability in both seasons. This might indicate that suboptimal usage of pesticides and they might be spending more than optimal amounts. Machine hiring costs and land lease costs also have negative correlation with profitability in both seasons which indicates the importance of land ownership and machine owership on profitability. If households own land and machine, they might have to spend lesser on machine hiring and land lease rent and have higher profitability. Analysis of profitability and returns show that farm households possessing land between 0.01-0.4 ha and tenant across land classes seem to be doing bad as compared to 2002-03.

The analysis of incomes from livestock shows that profitability expressed as ratio of total value to cost is 1.94 and 2.2 in Kharif and Rabi. The Rabi profitability is higher mainly due to lower costs in feed in Rabi. This might be because by-products from Kharif crop cultivation is used as part of feed in Rabi and thus reduces the feed costs.

The analysis of nonfarm business income shows that the profitability expressed as ratio of output to expenses is very low at 1.35. Wholesale and retail trade, manufacturing, transportation and storage, construction and accommodation and food services are the major industries that provide nonfarm business opportunities. The profitability in wholesale and retail trade, the major nonfarm business opportunity provider is very low at 1.19. It is also low for construction at 1.26. The ratio is slightly better for accommodation and food service (1.46), manufacturing (1.50) and transportation and storage (1.60). The very low profitability in most business indicates that farm households just resort to these for sustainability and not because these business provides profitable opportunities. Whatever growth is happening in this sector could then be only due to distress-driven 'push' factors and not due to growth-driven 'pull' factors. There has been a lot of debate that is unsettled in this regard on the nonfarm expansion over the last two decades in India and we hope our finding might give some evidence on recent trends (Abraham, 2009, Bhalla, 2002, Bhaumik, 2002; Binswanger-Mkhize, 2013; Chadha, 2002; Chadha and Sahu, 2002; Choudhury, 2011; Coppard, 2001; Himanshu, Murgai and Sterm, 2013' Lanjouw and Sharriff, 2004; Jatav, 2010; Jatav and Sen, 2013: Jha, 2007; Jha, 2011; Kashyap and Mehta, 2007; Sahu, 2003).

On analysing the income from wage and salaried employment, we find that agriculture and construction are the major industries that provide employment to farm households. Manufacturing, transportation & storage, wholesale & retail trade, education and public administration & defence also provide reasonable employment to farm households. Agriculture provides more opportunities in Kharif while construction provides employment to more farm households in Rabi compared to Kharif. Construction has thus emerged as leading industry providing nonfarm casual employment to farm households. The low access provided by manufacturing is a disappointment. Households are involved in nonfarm business related to manufacturing. Either impetus should be given to improving profitability of these enterprises should be done or more casual labour should be generated. This is particularly a concern keeping low agricultural labour incomes in mind.

We also performed an analysis of houlseholds earning incomes below poverty line. In this regard, we find that Bihar, Uttaranchal, Uttar Pradesh, Puducherry and Jharkhand have very high proportion of famers earning below poverty line while Punjab, Kerala, Chandigarh and Delhi have very low proportion of farm households earning incomes below poverty line. We also find that indebtedness has increased across the farm households in the country and states of India. The incidence of indebtedness has increased across southern state. Average loan amount outstanding and average outstanding loan per ha are also high for southern states.

We also calculate income inequality among farm households and decompose this into factor components. We find that the Gini of incomes earned by farm households is 0.56, which is a high number. We also find that incomes from cultivation as a leading source of income inequality as it is highly correlated with total income distribution. Nonfarm business incomes also increase inequality while wage income and livestock incomes have inequality decreasing characteristics. Given that livestock incomes have also generated high growth rates in the recent times and provide reasonable profitability compared to agriculture, they must be used as an engine for equitable growth. Changing diet patterns which might lead demand for consumption of food rich in proteins might just provide this impetus.

Few caveats are in place when interpreting the findings of our report. Any estimation of income is a complex issue and since households do not have accounts of receipts and expenses, incomes based on only two visits to a house is always only a raw estimate. The best hope we could have is that the error are not heterogenous. Also. some income data were collected for 30 day recall period like in case of livestock and nonfarm business while for some incomes 6 month recall period was used. This could also have caused some inconsistencies in income estimation. Also, incomes from cultivation and livestock are very much sensitive to weather and statistics related to growth could be prone to some weather related issues in base and the recent year data used. For example, some states might have seen a good growth in the year from, 2002-03 to 2011-12 and the year 2012-13 could have been a bad year because of the weather. The growth data will not be able to look into this particular aspect. Though this is applicable to all income data, it should be considered with slightly more seriousness when dealing with farm and farmer income data. Cost estimation for certain items in farming were jointly recorded. Crop-wise costs were allotted proportional to land allotted to the crop but this may not always be true. This has to be kept in mind while intepreting crop profitability. Some studies like Agrawal and Kumar (2012), Chandrashekar and Ghosh (2011) and Naik et al. (2012) have also raised some issues related to official statistics collected in India and these might also be kept in mind while interpreting the results.

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Appendix A Economics of Cultivation Across Different Land Classes 2002-03

TABLE A-1 Economics of Cultivation for Different Land Classes (Kharif) 2002-03

Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Proportion of Farm Household	28-78%	32.84%	18.09%	10.84%	4.89%	0.91%	100.00%
% Cultivating	82.79%	92.03%	91.53%	91.58%	90.52%	90.26%	86.04%
Total Land	0.225	0.581	1.190	2.173	4.336	10.198	1.067
TV (per ha)	14110	13612	12656	11952	11079	8007	12008
Seed Cost	755(12)	822(14)	807(15)	837(16)	862(16)	703(17)	816(15)
Fertilizer	1517 (25)	1388(24)	1279(24)	1138(22)	1195(23)	857(20)	1225(23)
Plant Protection	346(6)	401(7)	417(8)	446(9)	513(10)	421(10)	437(8)
Regular Labour	98(2)	87(1)	87(2)	139(3)	207(4)	310(7)	145(3)
Casual Labour	1473(24)	1444(25)	1259(24)	1164(23)	1126(21)	763(18)	1212(23)
Irrigation	718(12)	541(9)	498(9)	471(9)	414(8)	290(7)	477(9)
Minor Repair	75(1)	94(2)	100(2)	120(2)	110(2)	105(2)	105(2)
Interest	54(1)	67(1)	93(2)	95(2)	105(2)	81(2)	88(2)
Lease rent	292(5)	302(5)	222(4)	215(4)	244(5)	274(7)	250(5)
other rent	748(12)	629(11)	544(10)	480(9)	492(9)	378(9)	531(10)
Total Cost (TC) (per ha)	755(12)	822(14)	807(15)	837(16)	862(16)	703(17)	816(15)
TV-TC (per ha)	8037	7839	7355	6848	5811	3827	6725
TV/TC	2.32	2.36	2.39	2.34	2.10	1.92	2.27

Note: Value and costs are in per ha terms. Figures in brackets indicate the share of a particular cost component in total cost

TABLE A-2 Economics of Cultivation for Different Land Classes (Rabi) 2002-03

Land Class based on Total Land Possessed (in ha)	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Proportion of Farm Household	28-78%	32.84%	18.09%	10.84%	4.89%	0.91%	100.00%
% Cultivating	65.24%	61.18%	64.09%	62.87%	66.77%	57.57%	61.40%
Total Land	0.202	0.637	0.987	1.645	3.175	7.498	0.874
TV (per ha)	19552	14713	16206	166.35	16101	13710	15976
Seed Cost	1177(18)	1527(18)	1118(17)	1211(17)	1166(17)	1059(16)	901(16)
Fertilizer	1358 (21)	2071(24)	1459(23)	1559(22)	1437(21)	1370(21)	1010(18)
Plant Protection	192(3)	373(4)	307(5)	356(5)	359(5)	457(7)	390(7)
Regular Labour	28(0)	84(1)	59(1)	88(1)	118(2)	199(3)	339(6)
Casual Labour	810(13)	1359(16)	1070(17)	1174(17)	1125(17)	1112(17)	968(18)
Irrigation	1219(20)	1510(17)	1059(17)	1160(16)	1044(15)	939(14)	613(11)
Minor Repair	47(1)	71(1)	82(1)	128(2)	142(2)	159(2)	132(2)
Interest	13(0)	18(0)	34(1)	41(1)	42(1)	49(1)	71(1)
Lease rent	519(8)	394(5)	328(5)	295(4)	392(6)	431(7)	513(9)
other rent	1039(16)	1253(14)	892(14)	1023(15)	929(14)	850(13)	576(10)
Total Cost (TC) (per ha)	8660	6407	7035	6755	6624	5514	6750
TV-TC (per ha)	10892	8306	9171	9879	9477	8196	9225
TV/TC	2.32	2.36	2.39	2.34	2.10	1.92	2.27

Note: Value and costs are in per ha terms. Figures in brackets indicate the share of a particular cost component in total cost

Appendix B Tenancy Across States and Land Classes in 2012-13 and 2002-03

TABLE B-1 Tenancy Across States and Land Classes in 2012-13

	0.01	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Jammu & Kashmir	3.54%	0.17%	1.64%	2.43%	0.53%	11.15%	0.00%	0.91%
Himachal Pradesh	5.62%	7.43%	10.56%	16.14%	9.55%	2.22%	0.00%	9.30%
Punjab	2.84%	14.53%	9.36%	28.56%	29.96%	58.07%	69.74%	22.55%
Chandigarh	0.00%	0.00%	2.27%	0.00%	32.75%	0.00%	0.00%	3.71%
Uttaranchal	13.98%	10.32%	7.34%	1.96%	0.00%	7.71%	0.00%	8.78%
Haryana	0.00%	8.80%	13.52%	18.25%	10.80%	36.55%	32.10%	13.91%
Delhi	0.00%	19.35%	0.00%	4.34%	0.00%	87.50%	0.00%	6.28%
Rajasthan	1.41%	4.42%	6.07%	6.58%	16.52%	26.59%	11.14%	9.38%
Uttar Pradesh	0.63%	16.98%	17.50%	15.51%	18.30%	17.95%	36.25%	16.43%
Bihar	0.00%	32.41%	27.41%	32.64%	16.09%	4.86%	26.09%	29.28%
Sikkim	0.00%	31.30%	16.34%	5.77%	0.94%	0.00%	0.00%	17.24%
Arunachal Pradesh	2.12%	0.00%	7.84%	2.46%	11.67%	5.24%	0.00%	6.64%
Nagaland	0.54%	0.23%	2.18%	5.80%	5.51%	6.61%	0.00%	3.25%
Manipur	0.00%	7.65%	11.72%	7.94%	12.90	0.00%	0.00%	9.56%
Mizoram	0.00%	0.00%	2.33%	0.09%	5.03%	0.00%	0.00%	1.89%
Tripura	0.00%	22.38%	18.86%	9.21%	22.84%	0.57%	0.00%	18.38%
Meghalaya	16.45%	12.30%	6.09%	11.16%	0.00%	0.00%	0.00%	10.56%
Assam	1.33%	3.36%	13.83%	14.74%	10.62%	2.61%	100.00%	11.22%

TABLE B-1 TENANCY ACROSS STATES AND LAND CLASSES IN 2012-13—*(Contd.)*

	0.01	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
West Bengal	0.93%	38.22%	35.54%	33.46%	63.26%	20.39%	100.00%	37.18%
Jharkhand	0.00%	5.56%	16.03%	10.97%	3.92%	5.92%	0.00%	10.71%
Odisha	5.10%	21.84%	26.52%	33.68%	22.78%	43.22%	89.44%	22.99%
Chhatttisgarh	0.00%	30.60%	16.27%	13.13%	21.13%	23.21%	0.00%	17.72%
Madhya Pradesh	2.41%	9.46%	3.12%	8.37%	10.76%	14.23%	22.28%	7.11%
Gujarat	2.16%	0.90%	7.88%	7.57%	11.02%	8.82%	43.85%	6.24%
Daman & Diu	0.00%	2.36%	1.09%	0.00%	0.00%	0.00%	0.00%	1.85%
D & N Haveli	1.14%	0.94%	0.00%	0.00%	75.95%	0.00%	0.00%	1.11%
Maharashtra	3.22%	1.17%	4.66%	5.49%	6.15?%	10.02%	15.25%	5.21%
Andhra Pradesh	1.10%	13.31%	34.60%	37.92%	40.00%	54.98%	25.45%	35.59%
Karnataka	6.73%	2.17%	9.36%	7.59%	8.76%	34.62%	51.81%	9.97%
Goa	19.92%	13.89%	6.08%	6.17%	0.00%	0.00%	0.00%	15.41%
Lakshadweep	6.77%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.77%
Kerala	0.00%	14.68%	16.90%	14.25%	26.45%	20.44%	53.63%	15.86%
Tamil Nadu	2.72%	3.93%	11.14%	21.92%	17.33%	20.24%	12.66%	11.30%
Punducherry	13.11%	0.41%	15.67%	15.27%	38.21%	40.29%	0.00%	14.06%
A & N Islands	8.55%	1.86%	2.41%	2.94%	1.70%	0.00%	0.00%	3.37
Telengana	0.00%	0.31%	6.07%	18.32%	24.49%	40.10%	47.10%	14.14%

TABLE B-2 TENANCY ACROSS STATES AND LAND CLASSES IN 2012-13

	0.01	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Jammu & Kashmir	0.00%	0.97%	0.84%	2.13%	0.02%	0.00%	0.00%	1.00%
Himachal Pradesh	42.52%	8.05%	8.55%	7.39%	18.43%	2.77%	0.00%	8.86%
Punjab	2.76%	4.30%	18.63%	17.17%	30.25%	38.68%	46.23%	14.76%
Chandigarh	0.00%	11.76%	79.61%	41.06%	83.05%	76.36%	0.00%	38.78%
Uttaranchal	0.00%	4.04%	5.37%	8.56%	12.74%	0.00%	0.00%	5.10%
Haryana	0.95%	8.38%	8.46%	16.00%	33.25%	35.85%	23.36%	14.29%
Delhi	0.00%	8.10%	0.00%	0.00%	0.00%	0.00%	0.00%	2.42%
Rajasthan	0.13%	0.62%	3.96%	6.49%	7.31%	7.98%	16.97%	5.52%
Uttar Pradesh	1.64%	12.52%	20.39%	23.23%	20.30%	22.45%	11.69%	16.96%
Bihar	2.62%	19.14%	23.82%	21.12%	9.43%	10.74%	0.00%	19.52%
Sikkim	5.77%	21.29%	22.62%	9.58%	12.32%	7.31%	0.00%	19.32%
Arunachal Pradsh	0.61%	15.19%	0.82%	4.79%	6.12%	23.23%	100.00%	7.40%
Nagaland	13.46%	0.00%	1.02%	1.93%	0.46%	0.00%	0.00%	1.49%
Manipur	0.00%	10.81%	15.62%	18.23%	28.88%	24.85%	0.00%	14.60%
Mizoram	0.00%	17.18%	0.60%	2.00%	0.00%	0.00%	0.00%	1.47%
Tripura	0.86%	15.94%	19.27%	25.68%	0.00%	0.00%	0.00%	18.12%
Meghalaya	7.76%	13.99%	23.57%	19.57%	3.42%	0.00%	0.00%	17.70%
Assam	0.00%	4.20%	10.19%	16.42%	7.30%	9.07%	0.00%	10.00%
West Bengal	6.12%	19.26%	21.39%	15.84%	11.34%	8.64%	0.00%	19.11%
Jharkhand	0.00%	2.91%	4.45%	4.60%	6.55%	0.00%	0.00%	3.87%
Odisha	10.63%	18.40%	25.01%	29.86%	15.14%	18.48%	100.00%	23.39%
Chhattisgarh	11.24%	4.87%	11.67%	13.07%	16.24%	7.12%	19.17%	11.71%
Madhya Pradesh	0.00%	5.86%	8.33%	7.99%	7.12%	3.66%	11.61%	7.26%
Gujarat	3.03%	3.10%	4.26%	2.27%	4.62%	8.14%	3.45%	3.96%

TABLE B-2 TENANCY ACROSS STATES AND LAND CLASSES IN 2012-13—*(Contd.)*

	0.01	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
Daman & Diu	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
D & N Haveli	0.00%	0.00%	0.00%	0.45%	0.00%	0.00%	0.00%	0.05%
Maharashtra	3.43%	8.30%	5.40%	4.95%	6.15%	11.43%	10.24%	6.43%
Andhra Pradesh	3.08%	10.49%	16.80%	17.65%	24.47%	22.66%	4.09%	16.92%
Karnataka	10.17%	4.00%	4.64%	2.38%	9.24%	11.23%	25.36%	5.70%
Goa	24.38%	20.67%	1.44%	0.00%	0.00%	0.00%	0.00%	20.63%
Lakshadweep	2.95%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.63%
Kerala	78.59%	6.62%	8.89%	10.03%	8.71%	10.97%	5.76%	7.69%
Tamil Nadu	4.44%	14.45%	12.85%	15.79%	15.46%	8.02%	3.20%	13.32%
Puducherry	1.24%	7.84%	74.64%	0.00%	67.12%	0.00%	0.00%	25.28%
A & N Islands	43.54%	2.42%	9.33%	5.88%	0.00%	0.00%	0.00%	5.25%

Appendix C Economics of Cultivation of Tenants 2002-03

TABLE C-1 ECONOMIC OF CULTIVATION OF TENANTS (KHARIF) 2002-03

	Households leasing in land and land class category						
	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
TV	15915(115)	14483(108)	13100(104)	13356(114)	16442(159)	11038(148)	14014(120)
Seed Cost	992(137)	847(104)	831(103)	914(111)	1011(120)	915(138)	904(113)
Pesticide	403(119)	497(129)	418(100)	637(152)	904(197)	838(244)	620(151)
Fertilizer	1828(124)	1573(116)	1395(111)	1318(118)	1489(129)	1321(171)	1448(122)
Irrigation	935(136)	685(132)	594(123)	650(146)	741(202)	540(222)	665(149)
Minor Repair	70(92)	102(110)	110(111)	141(120)	205(213)	190(214)	140(141)
Interest cost	96(196)	97(155)	141(166)	125(139)	175(184)	104(136)	129(159)
Lease rent	2111(4689)	2054(13818)	1531(18526)	1689(19010)	1857(12368)	1512(3345)	1762(10306)
Regular labour	116(122)	`64(71)	50(54)	116(82)	168(79)	617(244)	154(107)
Casual Labour	1963(140)	1743(125)	1270(101)	1462(130)	1418(131)	894(121)	1432(122)
Other Expenses	954(132)	748(123)	648(123)	597(129)	695(150)	557(161)	672(132)
Total Expenses	9446(168)	8409(157)	6986(139)	7650(161)	8664(181)	7488(210)	7925(162)
TV-TC	6470(78)	6074(75)	6114(81)	5706(81)	7778(141)	3549(92)	6089(89)
TV/TC	1.68(68)	1.72(68)	1.88(75)	1.75(71)	1.9(88)	1.47(71)	1.77(74)

Table C-2 Economic of Cultivation of Tenants (Rabi) 2002-03

	Households leasing in land and land class category						
	0.01-0.4	0.4-1	1-2	2-4	4-10	10+	All
TV	20005103)	17656(124)	17468(109)	18227(111)	20568(135)	15469(117)	18252(117)
Seed Cost	1583(104)	1311(121	1325(111)	1359(120)	1020(96)	849(93)	1239(109))
Presticide	491(139)	443(156)	458(136)	447(130)	635(150)	501(138)	494(143)
Fertilizer	2385(118)	1824(131)	1629(105	1691(121)	1624(123)	972(95)	1670(117)
Irrigation	1706(115)	1384(138)	1226(107)	1241(123)	936(100)	548(87)	1173(114)
Minor Repair	73(103)	72(85)	206(182)	166(120)	224(152)	75(52)	151(129)
Interest Cost	43(298)	42(129)	39(94)	89(267)	160(576)	14(17)	71(199)
Lease Rent	1886(1278)	1742(2014)	1612(3752)	2140(2251)	2454(5253)	1677(759)	1938(2267)
Regular Labour	94(115)	17(26)	85(96)	85(68)	177(87)	142(37)	94(71)
Casual Labour	1587(120)	1374(135)	1241(107)	1304(119)	1490(143)	1366(157)	1367(127)
Other Expenses	1408(115)	1111(130)	987(96)	1305(151)	1049(129)	795(153)	1099(123)
Total Expenses	11256(137)	9319(158)	8807(132)	9826(158)	9768(162)	6941(135)	9296(148)
TV/TC	8749(78)	8337(100)	8661(93)	8401(83)	10800(117)	8528(105)	8956(97)
TV/TC	1.78(75)	1.89(79)	1.98(83)	1.85(71)	2.11(83)	2.23(87)	1.96(79)

Commodity Reviews

Foodgrains

During the month of May, 2015 the Wholesale Price Index (Base 2004-05=100) of pulses increased by 7.54%, cereals decreased by 0.56% foodgrains increased by 1.01% respectively over the previous month.

INDEX NUMBER OF WHOLESALE PRICES

(Base: 2004-2005=100)

Commodity	Weight (%)	WPI for the month of May 2015	WPI for the month of April 2015	WPI A year ago	Percentage Change during	
					A month	A year
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rice	1.793	233.6	234.0	237.8	-0.17	-1.77
Wheat	1.116	213.5	216.4	208.1	-1.34	2.59
Jowar	0.096	286.0	282.6	282.6	1.20	1.20
Bajra	0.115	248.6	247.5	258.7	0.40	-3.94
Maize	0.217	243.6	246.8	234.3	-1.30	3.97
Barley	0.017	221.9	227.8	217.1	-2.59	2.21
Ragi	0.019	329.1	334.4	329.1	-1.58	0.00
Cereals	3.373	230.1	231.4	230.1	-0.56	0.00
Pulses	0.717	284.0	264.1	233.4	7.54	21.68
Foodgrains	4.09	239.5	237.1	230.7	1.01	3.81

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

The following Table indicates the State wise trend of Wholesale Prices of Cereals during the month of May, 2015.

Commidity	Main Trend	Rising	Falling	Mixed	Steady
Rice	Steady	Haryana Jharkhand	A.P. Assam		Gujarat Kerala U.P.
Wheat	Mixed	Karnataka		Haryana U.P.	
Jowar	Rising	A.P. Gujarat	Rajasthan	Karnataka	
Bajra	Rising	Karnataka Rajasthan	Gujarat	Haryana	
Maize	Falling	Gujarat U.P.	Haryana Karnataka Rajasthan		Jharkhand

Procurement of Rice

2.26 million tonnes of Rice (including paddy converted into rice) was procured during May 2015 as against 1.84 million tonnes of rice (including paddy converted into rice) procured during May 2014. The total procurement of Rice in the current marketing season i.e. 2014-15, up to 28.05.2015 stood at 28.06 million tonnes, as against 27.68 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 2014-15		Corresponding Period lf last Year		Marketing Year (October-September)			
	(upto 28.05.2015)		2013-14		2013-14		2012-13	
	Procurem	Percentage to total	Procurement	Percentage to Total	Procurement	Percentage to total	Procurement	Percentage to total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andhra Pradesh	3248	11.57	5851	21.13	3722	11.76	6464	19.00
Chhatisgarh	3355	11.95	4285	15.48	4290	13.56	4804	14.12
Haryana	2009	7.16	2405	8.69	2406	7.60	2609	7.67
Maharashtra	143	0.51	140	0.51	161	0.51	192	0.56
Punjab	7782	27.73	8106	29.28	8106	25.62	8558	25.16
Tamil Nadu	6	0.02	59	0.21	684	2.16	481	1.41
Uttar Pradesh	1646	5.87	1118	4.04	1127	3.56	2286	6.72
Uttarakhand	461	1.64	407	1.47	463	1.46	497	1.46
Others	9414	33.54	5315	19.20	10678	33.75	8129	23.89
Total	28064	100.00	27686	100.00	31637	100.00	34020	100.00

Source: Department of Food & Public Distribution.

Procurement of Wheat

The total procurement of wheat in the current marketing season i.e. 2015-2016 up to May, 2015 is 26.78 million tonnes against a total of 26.35 million tonnes of wheat procured during last year. The details are given in the following Table.

PROCUREMENT OF WHEAT

(in Thousand Tonnes)

State	Marketing Season 2015-16		Corresponding Period of last Year		Marketing Year (April-March)			
	(upto 28.05.2015)		2014-15		2014-15		2013-14	
	Procurement	Percentage to total	Procurement	Percentage to Total	Procurement	Percentage to total	Procurement	Percentage to total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Haryana	6756	25.23	6414	24.34	64.95	23.20	5873	23.41
Madhya Pradesh	7261	27.11	7094	26.92	7094	25.34	6355	25.33
Punjab	9886	36.91	10731	40.72	11641	41.58	10897	43.43
Rajasthan	1195	4.46	1762	6.69	2159	7.71	1268	5.06
Uttar Pradesh	1602	5.98	343	1.30	599	2.14	683	2.72
Others	81	0.30	6	0.092	6	0.02	16	0.06
Total	26781	100.00	26350	100.00	27994	100.00	25092	100.00

Source: Department of Food & Public Distribution.

Commercial Crops

Oilseeds and Edible Oils

The wholesale Price Index (WPI) of nine major oilseeds as a group stood at 215.4 in May, 2015 showing an incrase of 4.1 percent over the previous month. However, it is lower by 4.9 percent over the previous year. The WPI of soyabean (15.1 percent), groundnut seed (5.6 percent), sunflower seed (2.3 percent), cotton seed (1.6 percent). sunflower seed (1.3 percent) and rape & mustard seed (1.0 percent) increased over the previous month. However, the WPI of gingelly seed (7.2 percent), niger seed (6.7 percent) and copra (3.5 percent) decreased over the previous month.

The Wholesale Price Index (WPI) of edible oils as a group stood at 146.3 in May, 2015 showing an increase of 1.2 percent over the previous month. However, it is lower by 0.9 percent over the previous year. The WPI of copra oil (3.4 percent), mustard oil (2.5 percent), sunflower oil (2.4 percent), groundnut oil (0.8 percent), cotton seed oil (0.5 percent) and gingelly Oil (0.1 percent) increased over the previous month. However, the WPI of soyabean oil (0.9 percent) decreased over the previous month.

Fruits & Vegetable

The Wholesale Price Index (WPI) of fruits & vegetable as a group stood at 240.7 in May, 2015 showing a decrease of 0.8 percent over the previous month. However, it is higher by 3.1 percent over the previous year.

Potato

The Wholesale Price Index (WPI) of potato stood at 135.8 in May, 2015 showing an increase of 0.4 percent over the previous month. However, it is lower by 52.2 percent over the previous year.

Onion

The Wholesale Price Index (WPI) of onion stood at 312.1 in May, 2015 showing an increase of 0.8 percent and 19.4 percent over the previous over the previous months and year, respectively.

Condiments & Spices

The Wholesale Price Index (WPI) of condiments & spices (Group) stood at 313.4 in May, 2015 showing an increase of 1.0 percent and 12.7 percent over the previous month and year, respectively. The WPI of chillies (Dry) increased by 1.3 percent over the previous month. However, WPI of Turmeric decreased by 0.3 over the previous month and WPI of Black Pepper remained unchanged.

Raw Cotton

The Wholesale Price Index (WPI) of raw cotton stood at 199.8 in May, 2015 showing an increase of 5.0 percent over the previous month. However, it is lower by 17.7 percent over the previous year.

Raw Jute

The Wholesale Price Index (WPI) of raw jute stood at 311.1 in May, 2015 showing an increase of 1.0 percent and 7.3 percent over the previous month and year, respetively.

WHOLESALE PRICE INDEX OF COMMERCIAL CROPS

Commodity	Latest	Month	Year	% Variation Over	
	May, 2015	April, 2015	May, 2014	Month	Year
OIL SEEDS	215.4	207.0	217.6	4.1	-4.9
Groundnut Seed	245.8	232.7	202.9	5.6	14.7
Rape & Mustard Seed	206.0	203.9	186.7	1.0	9.2
Cotton Seed	167.1	164.4	177.8	1.6	-7.5
Copra (Coconut)	171.8	178..1	185.6	-3.5	-4.0
Gingelly Seed (Sesamum)	324.0	349.1	438.9	-7.2	-20.5
Niger Seed	225.3	241.4	177.1	-6.7	36.3
Safflower (Kardi Seed)	128.2	126.6	189.8	1.3	-33.3
Sunflower	190.8	186.6	185.0	2.3	0.9
Soyabean	231.3	200.9	268.2	15.1	-25.1
EDIBLE OILS	146.3	144.6	145.9	1.2	-0.9
Groundnut Oil	183.9	182.5	162.0	0.8	12.7
Cotton Seed Oil	172.9	172.1	181.4	0.5	-5.1
Mustard & Rapeseed Oil	165.2	161.1	154.8	2.5	4.1
Soyabean Oil	150.0	151.3	155.8	-0.9	-2.9
Copra Oil	161.4	156.1	128.3	3.4	21.7
Sunflower Oil	127.9	124.9	126.6	2.4	-1.3
Gingelly Oil	167.6	167.5	190.1	0.1	-11.9
FRUITS & VEGETABLES	240.7	242.7	235.5	-0.8	3.1
Patato	135.8	135.2	282.6	0.4	-52.2
Onion	312.1	309.6	259.2	0.8	19.4
CONDIMENTS & SPICES	313.4	310.2	275.3	1.0	12.7
Black Pepper	703.1	703.2	721.9	0.0	-2.6
Chillies (Dry)	317.4	313.2	268.0	1.3	16.9
Turmeric	255.5	256.3	214.2	-0.3	19.7
Raw Cotton	199.8	190.3	231.2	5.0	-17.7
Raw Jute	311.1	308.1	289.8	1.0	7.3

Statistical Tables

Wages

TABLE 1: DAILY AGRICULTURAL WAGES IN SOME STATES (CATEGORY-WISE)

(In Rs.)

State	District	Centre	Month & Year	Daily Normal Working	Field Labour		Other Agri. Labour		Herds man		Skilled Labour		
											Carpenter	Black Smith	Cobbler
				Hours	M	W	M	W	M	W	M	M	M
Andhra Pradesh	Krishna	Ghantasala	Feb., 15	8	292	258	325	NA	200	NA	300	NA	NA
	Guntur	Tadikonda	Feb., 15	8	250	200	275	NA	250	NA	NA	NA	NA
Telangana	Ranga Reddy	Arutala	Dec., 14	8	275	225	NA	NA	NA	NA	275	250	NA
Karnataka	Bangalore	Harisandra	Oct., 14	8	250	200	300	225	300	225	350	350	NA
	Tumkur	Gidlahali	Oct., 14	8	250	180	300	180	300	180	300	250	NA
Maharashtra	Nagpur	Mauda	Sept., 14	8	100	80	NA	NA	NA	NA	NA	NA	NA
	Ahmednagar	Akole	Sept., 14	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jharkhand	Ranchi	Gaitalsood	April, 12	8	100	100	NA	90	90	NA	170	170	NA

TABLE 1.1: DAILY AGRICULTURAL WAGES IN SOME STATES (OPERATION-WISE)

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Plough-ing	Sow-ing	Weed-ing	Harve-sting	Other Agri Labour	Herd-sman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Assam	Berpeta	Laharapara	Feb, 15	M	8	250	250	250	250	250	200	350	250	250
				W	8	NA	NA	200	200	200	NA	NA	NA	NA
	Muzaffarpur	Bhalui Rasul	June, 12	M	8	130	120	80	130	150	120	200	180	250
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bihar	Shekhpura	Kutaut	June, 12	M	8	NA	NA	185	NA	185	NA	245	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chhattisgrah	Dhamtari	Sihaba	March, 15	M	8	NA	NA	150	NA	100	150	250	150	NA
				W	8	NA	NA	120	NA	100	130	200	NA	NA
	Rajkot	Rajkot	Dec., 14	M	8	219	214	156	183	150	184	428	428	344
Gujarat*	Dahod	Dahod	Dec, 14	W	8	NA	164	164	164	136	NA	NA	NA	NA
Haryana	Panipat	Ugarakheri	Feb, 15	M	8	400	400	400	400	400	NA	NA	NA	NA
				W	8	NA	NA	300	300	300	NA	NA	NA	NA
Himachal	Mandi	Mandi	Dec, 13	M	8	NA	162	162	162	162	NA	260	240	240
Pradesh				W	8	NA	162	162	162	162	NA	650	NA	NA
	Kozhikode	Koduvally	Feb, 15	M	4-8	1030	600	NA	650	815	NA	700	NA	NA
Kerala				W	4-8	NA	NA	450	500	500	NA	NA	NA	NA
	Palakkad	Elappally	Feb,15	M	4-8	500	500	NA	500	466.66	NA	600	NA	NA
				W	4-8	NA	NA	300	300	300	NA	NA	NA	NA
	Hoshangabad	Sangarkhera	Apr, 15	M	8	200	200	200	200	200	150	400	400	NA
Madhya				W	8	NA	200	200	200	150	150	NA	NA	NA
Pradesh	Santa	Kotar	Apr, 15	M	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Shyopurkala	Vijaypur	Apr, 15	M	8	NA	200	NA	200	NA	200	300	300	NA
				W	8	NA	200	NA	200	NA	NA	NA	NA	NA

TABLE 1.1: DAILY AGRICULTURAL WAGES IN SOME STATES (OPERATION-WISE)—*(Contd.)*

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Plough-ing	Sow-ing	Weed-ing	Harve-sting	Other Agri Labour	Herd-sman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Bhadrak	Chandbali	Feb, 15	M	8	250	NA	250	250	250	250	300	NA	NA	
Odisha				W	8	NA	NA	200	200	200	200	NA	NA	NA
	Ganjam	Aska	Feb, 15	M	8	300	200	200	250	200	200	400	400	400
				W	8	NA	100	100	150	100	100	NA	NA	NA
	Ludhiyana	Pakhowal	July,14	M	8	300	300	300	NA	365	NA	395	395	NA
Punjab				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barmer	Kuseep	Jan, 15	M	8	NA	NA	NA	NA	NA	300	700	500	NA
Rajasthan				W	8	NA	NA	NA	NA	NA	200	NA	NA	NA
	Jalore	Sarnau	Jan, 15	M	8	350	350	350	350	NA	NA	400	400	NA
				W	8	NA	NA	NA	350	NA	NA	NA	NA	NA
	Thanjavur	Pulvarnatham	March, 15	M	8	NA	318.75	NA	306	312.62	NA	NA	NA	NA
Tamil				W	8	NA	100	115	116	119	NA	NA	NA	NA
Nadu*	Tirunelveli	Malayakulam	March 15,	M	8	NA	NA	NA	NA	431.25	NA	NA	NA	NA
				W	8	NA	165	152.5	170	262.5	NA	NA	NA	NA
Tripura	State Average		April, 14	M	8	287	263	264	277	261	270	305	212	285
				W	8	NA	197	201	209	197	200	NA	NA	NA
	Meerut	Ganeshpur	Dec, 14	M	8	275	263	261	263	260	NA	378	NA	NA
				W	8	NA	198	202	197	203	NA	NA	NA	NA
Uttar	Aurraiya	Aurraiya	Dec, 14	M	8	150	150	150	160	150	NA	250	NA	NA
Pradesh				W	8	NA	NA	NA	160	150	NA	NA	NA	NA
	Chandauli	Chandauli	Dec, 14	M	8	NA	200	200	200	200	NA	350	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA

M-Man
W-Woman
NA-Not Available

*States reported district average daily wages.

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

(Month end Prices in)

Commodity	Variety	Unit	State	Centre	May-15	Apr-15	May-14
1	2	3	4	5	6	7	8
Wheat	PBW 343	Quintal	Punjab	Amritsar	1500	1600	1405
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	1455	1550	1450
Wheat	Lokvan	Quintal	MadhyaPradesh	Bhopal	1419	1352	1520
Jower	—	Quintal	Maharashtra	Mumbai	2450	2300	2600
Gram	No III	Quintal	Madhya Pradesh	Sehore	4165	3650	2537
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1510	1415	—
Gram Split	—	Quintal	Bihar	Patna	4725	4600	4500
Gram Split	—	Quintal	Maharashtra	Mumbai	4300	4050	4550
Arhar Split	—	Quintal	Bihar	Patna	7975	7310	6765
Arhar Split	—	Quintal	Maharashtra	Mumbai	8000	7300	7400
Arhar Split	—	Quintal	NCT of Delhi	Delhi	6500	6335	6345
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	9700	9400	6500
Gur	—	Quintal	Maharashtra	Mumbai	3250	3200	3600
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	3800	3800	—
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2250	2400	2600
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	3620	3450	3200
Mustard Seed	Black	Quintal	West Bengal	Raniganj	4350	3750	3500
Mustard Seed	—	Quintal	West Bengal	Kolkata	4500	4100	3500
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	4240	4200	4160
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	3960	—	3785
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunag	1350	1600	1700
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	2000	2000	—
Castor Seed	—	Quintal	Andhra Pradesh	Hyderabad	4000	3600	3550
Seasamum Seed	White	Quintal	Uttar Pradesh	Varanasi	13790	13800	6310
Copra	FAQ	Quintal	Kerala	Alleppey	8750	9800	10500
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	4500	4500	—
Groundnut	—	Quintal	Maharashtra	Mumbai	5900	6000	5800
Mustard Oil	—	15 Kg.	Uttar Pradesh	Kanpur	1323	1223	1215
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1463	1275	1185
Groundnut Oil	—	15 Kg.	Maharashtra	Mumbai	1410	1425	1125
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	1590	1545	1275

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

(Month end Prices in)

Commodity	Variety	Unit	State	Centre	May-15	Apr-15	May-14
1	2	3	4	5	6	7	8
Linseed Oil	—	15 Kg.	Uttar Pradesh	Kanpur	1479	1425	1515
Castor Oil	—	15 Kg.	Andhra Pradesh	Hyderabad	1305	1163	1208
Seasamum Oil	—	15 Kg.	NCT of Delhi	Delhi	1850	1855	2245
Seasamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2175	2325	2250
Coconut Oil	—	15 Kg.	Kerala	Cochin	1905	2093	2295
Mustard Cake	—	Quintal	Uttar Pradesh	Kanpur	1950	1860	1800
Groundnut Cake	—	Quintal	Andhra Pradesh	Hyderabad	3500	3286	3071
Cotton/Kapas	NH 44	Quintal	Andhra Pradesh	Nandyal	4100	3950	4500
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunag	3606	3806	3806
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	3740	3275	3120
Jute Raw	W 5	Quintal	West Bengal	Kolkata	3670	3225	3050
Oranges	—	100 No.	NCT of Delhi	Delhi	500	500	NA
Oranges	Big	100 No.	Tamil Nadu	Chennai	440	370	650
Oranges	Nagpuri	100 No.	West Bengal	Kolkata	750	750	NA
Banana	—	100 No.	NCT of Delhi	Delhi	333	333	375
Banana	Medium	100 No.	Tamil Nadu	Kodaikkana	499	497	459
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	63000	64000	56000
Almonds	—	Quintal	Maharashtra	Mumbai	72000	71000	61000
Walnuts	—	Quintal	Maharashtra	Mumbai	68000	68000	64000
Kishmish	—	Quintal	Maharashtra	Mumbai	24500	24000	14500
Peas Green	—	Quintal	Maharashtra	Mumbai	4000	3900	4700
Tomatoes	Ripe	Quintal	Uttar Pradesh	Kanpur	1550	1550	550
Ladyfinger	—	Quintal	Tamil Nadu	Chennai	2500	2300	1500
Cauliflower	—	100 No.	Tamil Nadu	Chennai	2250	1700	1900
Potatoes	Red	Quintal	Bihar	Patna	700	650	1460
Potatoes	Desi	Quintal	West Bengal	Kolkata	680	560	1340
Potatoes	Sort I	Quintal	Tamil Nadu	Mettuppala	1656	1448	3389
Onions	Pole	Quintal	Maharashtra	Nashik	1000	1000	900
Turmeric	Nadan	Quintal	Kerala	Cochin	12000	12000	10000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	7800	8000	9800
Chillies	—	Quintal	Bihar	Patna	9200	9190	8540
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	59000	56500	66000

2. Wholesale Prices of Certain Agricultural Commodities and Animal Husbandry Products at Selected Centres in India—*(Concld)*

(Month end Prices in)

Commodity	Variety	Unit	State	Centre	May-15	Apr-15	May-14
1	2	3	4	5	6	7	8
Ginger	Dry	Quintal	Kerala	Cochin	22500	22000	35000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	106000	105000	125000
Cardamom	Small	Quintal	West Bengal	Kolkata	110000	110000	115000
Milk	Buffalo	100 Litres	West Bengal	Kolkata	3600	3600	3600
Ghee Deshi	Deshi No1.	Quintal	NCT of Delhi	Delhi	29015	29682	30015
Ghee Deshi	—	Quintal	Maharashtra	Mumbai	46000	43000	35000
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	34800	34600	32000
Fish	Rohu	Quintal	NCT of Delhi	Delhi	8100	9100	9500
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	36000	33500	36500
Eggs	Madras	1000 No.	West Bengal	Kolkata	3500	3600	3500
Tea	—	Quintal	Bihar	Patna	21050	21050	20250
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	35000	35000	—
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	30000	30200	—
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	15200	15500	—
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	4400	5000	4850
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	3400	3600	3800
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	3900	3900	3900
Rubber	—	Quintal	Kerala	Kottayam	11650	10500	14000
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	30250	29900	29700

3. Month end Wholesale Prices of Some Important Agricultural Commodities in International Markets during Year 2015

Commodity	Variety	Country	Centre	Unit	Jan.	Feb.	Mar.	Apr.	May
1	2	3	4	5	6	7	8	9	10
Cardamom	Guatmala Bold Green	U.K.	—	Dollar/M.T.	12000.00	12000.00	12000.00	12000.00	12000.00
				Rs./Qtl	74160.00	74100.00	75396.00	75948.00	76596.00
Cashew Kernels	Spot U.K. 320s	U.K.	—	Dollar/lbs	3.60	3.62	3.64	3.68	3.85
				Rs./Qtl	49034.59	49267.11	50405.74	51332.75	54162.31
	Spot U.K. 320s	U.K.	—	Dollar/MT	7877.32	7932.59	7644.65	8194.35	8431.63
				Rs./Qtl	48681.84	48983.74	48031.34	51862.04	53819.09
Castor Oil	Any Origin ex tank Rotterdam	Netherlands	—	Dollar/M.T.	1700.00	1525.00	1434.00	1434.00	1434.00
				Rs./Qtl	10506.00	9416.88	9009.82	9075.79	9153.22
Chillies	Birds eye 2005 crop	Africa	—	Dollar/M.T.	4100.00	4100.00	4100.00	4100.00	4100.00
				Rs./Qtl	25338.00	25317.50	25760.30	25948.90	26170.30
Cloves	Singapore	Madagascar	—	Dollar/M.T.	10500.00	10500.00	10500.00	10500.00	11200.00
				Rs./Qtl	64890.00	64837.50	65971.50	66454.50	71489.60
Coconut Oil	Crude Phillipine/ Indonesia	Netherlands	—	Dollar/M.T.	1080.00	1140.00	1040.00	1085.00	1125.00
				Rs./Qtl	6674.40	7039.50	6534.32	6866.97	7180.88
Copra	Phillipines CIF Rotterdam	Phillipine	—	Dollar/M.T.	679.50	726.00	657.00	682.50	714.00
				Rs./Qtl	4199.31	4483.05	4127.93	4319.54	4557.46
Corriander		India	—	Dollar/M.T.	2000.00	2000.00	2000.00	2000.00	2000.00
				Rs./Qtl	12360.00	12350.00	12566.00	12658.00	12766.00
Cummin Seed		India	—	Dollar/M.T.	2250.00	2250.00	2250.00	2250.00	2250.00
				Rs./Qtl	13905.00	13893.75	14136.75	14240.25	14361.75
Ginger	Split	Nigeria	—	Dollar/M.T.	2250.00	2250.00	2250.00	2250.00	2250.00
				Rs./Qtl	13905.00	13893.75	14136.75	14240.25	14361.75
Groundnut kernels	US 2005, 40/50	European Ports	—	Dollar/M.T.	1350.00	1350.00	1350.00	1320.00	1250.00
				Rs./Qtl	8343.00	8336.25	8482.05	8354.28	7978.75
Groundnut Oil	Crude any origin CIF Rotterdam	U.K.	—	Dollar/M.T.	1200.00	1200.00	1200.00	1200.00	1200.00
				Rs./Qtl	7416.00	7410.00	7539.60	7594.80	7659.60
Maize		U.S.A.	Chicago	C/56 lbs	373.25	375.75	395.00	372.50	349.50
				Rs./Qtl	906.53	911.86	975.34	926.52	876.73
Oats		Canada	Winnipeg	Dollar/M.T.	365.75	341.64	352.54	315.21	297.89
				Rs./Qtl	2260.34	2109.63	2215.01	1994.96	1901.43
Palm Kernal Oil	Crude Malaysia/Indonesia	Netherlands	—	Dollar/M.T.	945.00	1070.00	980.00	990.00	945.00
				Rs./Qtl	5840.10	6607.25	6157.34	6265.71	6031.94
Palm Oil	Crude Malaysian/Sumatra	Netherlands	—	Dollar/M.T.	630.00	678.00	658.00	655.00	648.00
				Rs./Qtl	3893.40	4186.65	4134.21	4145.50	4136.18
Pepper (Black)	Sarawak Black lable	Malaysia	—	Dollar/M.T.	10000.00	11000.00	11000.00	11000.00	12000.00
				Rs./Qtl	61800.00	67925.00	69113.00	69619.00	76596.00
Rapeseed	Canola	Canada		Can	449.80	458.50	460.60	445.10	468.90
			Winnipeg	Dollar/M.T.	2204.02	2264.53	2319.12	2318.97	2408.74
	UK delivered rapeseed delivered	U.K.	—	Pound/M.T.	242.00	240.00	233.00	242.00	247.00
				Rs./Qtl	2254.96	2285.04	2175.06	2305.29	2414.92
Rapeseed Oil	Refined bleached and deodorised	U.K.	—	Pound/M.T.	577.00	586.00	601.00	587.00	607.00
				Rs./Qtl	5376.49	5579.31	5610.34	5591.76	5934.64
Soyabean Meal	UK produced 49% oil & protein	U.K.	—	Pound/M.T.	334.00	319.00	317.00	306.00	294.00
				Rs./Qtl	3112.21	3037.20	2959.20	2914.96	2874.44
Soyabean Oil		U.S.A.	—	C/lbs Rs./Qtl	30.34	31.71	31.04	31.56	31.73
					4132.53	4315.64	4298.34	4402.34	4463.82
Soyabean Oil	Refined bleached and deodorised	U.K.	—	Pound/M.T.	756.00	611.00	593.00	558.00	595.00
				Rs./Qtl	7044.41	5817.33	5535.66	5315.51	5817.32

3. Month end Wholesale Prices of Some Important Agricultural Commodities in International Markets during Year 2015—*(Contd.)*

Commodity	Variety	Country	Centre	Unit	Jan.	Feb.	Mar.	Apr.	May
1	2	3	4	5	6	7	8	9	10
Soyabeans	US No. 2 yellow	Netherlands		Dollar/M.T.	420.90	409.40	418.00	392.80	380.90
			Chicago	Rs./Qtl	2601.16	2528.05	2626.29	2486.03	2431.28
		U.S.A.	—	C/60 lbs	970.25	1007.75	978.75	970.50	927.00
				Rs./Qtl	2200.59	2283.79	2256.86	2254.22	2171.55
Sunflower seed Oil	Refined bleached and deodorised	U.K.	—	Pound/M.T.	664.00	656.00	665.00	672.00	715.00
				Rs./Qtl	6187.15	6245.78	6207.78	6401.47	6990.56
Tallow	High grade delivered	U.K.	London	Pound/M.T.	295.00	295.00	290.00	330.00	335.00
				Rs./Qtl	2748.81	2808.70	2707.15	3143.58	3275.30
Wheat		U.S.A.	Chicago	C/60 lbs	505.25	497.75	519.00	498.75	487.75
				Rs./Qtl	1145.94	1128.01	1196.74	1158.47	1142.58

Source: Public Ledger

Exchange Rate	Jan.	Feb.	Mar.	Apr.	May
US Dollar	61.80	61.75	62.83	63.29	63.83
CAN Dollar	49.00	49.39	50.35	52.10	51.37
UK Pound	93.18	95.21	93.35	95.26	97.77

Crop Production

4. Sowing and Harvesting Operations Normally in Progress during July, 2015

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Winter Rice, Jowar (K), Bajra Maize (K), Ragi (K), Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Ginger, Chillies (Dry), Groundnut, Castorseed, Sesamum, Cotton, Mesta, Sweet Potato, Turmeric, Sannhemp, Nigerseed, Onion, Tapioca.	Autumn rice.
Assam	Winter Rice, Castorseed.	Autumn Rice, Jute.
Bihar	Autumn Rice, Winter Rice, Jowar (K) Bajra, Maize,Ragi, Small Millets (K) Tur (K), Groundnut, Castorseed, Sesamum, Cotton, Jute, Mesta.	Jute.
Gujarat	Winter Rice, Jowar (K), Bajra, Maize, Ragi, Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Chillies (Dry), Tobacco, Groundnut, Castorseed, Sesamum, Cotton, Sannhemp.	—
Himachal Pradesh	Summer Rice, Jowar (K), Bajra, Ragi, Small Millets (K) Urad (K), Mung (K), Other Kharif Pulses, Chillies (Dry), Sesamum, Sennhemp, Sumer Potato (Plains).	Winter Potato (Hills).
Jammu & Kashmir	Autumn Rice, Jowar (K) Bajra, Small Millets (K), Urad (K), Mung (K), Winter Potato, Ginger, Tobacco, sesamum, Jute, Onion.	Tobacco, Sesamum, Onion.
Karnataka	Autumn Rice, Winter Rice, Jowar (K), Bajra, Maize, Ragi, Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Winter Potato (Plains), Summer Potato (Plains) Black Pepper, Chillies (Dry), Tobacco, Groundnut, Castorseed, Sesamum, Cotton, Mesta, Sweet Potato, Turmeric, Sannhemp, Nigerseed, Onion, Tapioca.	—
Kerala	Ragi, Sweet Potato, Tapicoa.	Sesamum, Tapioca.
Madhya Pradesh	Autumn Rice, Jowar (K), Bajra, Maize, Ragi, Small Millets (K), Tur (K), Mung (K), Other Kharif Pulses, Summer Potato, Ginger, Chillies (Dry), Tobacco, Groundnut, Castorseed, Sesamum, Cotton, Jute, Mesta, Sweet Potato, Turmeric, Sannhemp, Nigerseed.	—
Maharashtra	Winter Rice, Jowar (K), Bajra, Maize, Ragi Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Summer Potato (Plains), Chillies (Dry) Tobacco, Groundnut, Castorseed, Sesamum, Cotton, Jute, Mesta, Sannhemp, Nigerseed.	—
Manipur	Winter Rice, Tur (K), Sesamum (K), Sweet Potato, Maize.	—
Orissa	Winter Rice, Jowar (K), Bajra, Maize, Ragi, Small Millets (K), Summer Potato (Plains), Chillies (Dry), Groundnut, Castorseed, Cotton, Mesta	Chillies (Dry.)

4. Sowing and Harvesting Operations Normally in Progress during July, 2015—*(Contd.)*

State	Sowing	Harvesting
(1)	(2)	(3)
Punjab and Haryana	Autumn Rice, Summer Rice, Jowar (K), Bajra, Maize, Ragi, Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Groundnut, Castorseed, Sweet Potato Turmeric, Sannhemp.	Small Millets, (K), Potato.
Rajasthan	Autumn Rice, Jowar (K), Bajra, Maize, Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Chillies (Dry), Groundnut, Castorseed, Cotton Sannhemp.	—
Tamil Nadu	Autumn Rice, Jowar (K), Bajra, Ragi, Small Millets (K), Tur (K), Urad (K), Summer Potato (Hills), Chillies (Dry), Groundnut, Castorseed, Seasamum, Cotton, Sannhemp, Onion, Tapioca.	Jowar (R), Summer Potato (Hills), Chillies (Dry), Sesamum, Cotton, Sannhemp.
Tripura	Winter Rice, Urad (K), Mung (K), Sesamum.	Onion, Autumn Rice.
Uttar Pradesh	Autumn Rice, Winter Rice, Jowar (K), Bajra Maize, Small Millets (K), Tur (K), Urad (K), Mung (K), Ohter Kharif Pulses Ginger, Groundnut, Castorseed, Sannhemp, Nigerseed, Tapicoca.	Small Millets (R), Chillies (Dry).
West Bengal	Autumn Rice, Winter (Rice), Tur (K), Ginger, Chillies (Dry).	Chillies (Dry), Sesamum.
Delhi	Summer Rice, Jowar (K), Bajra, Maize, Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Summer Potato (Plains), Chillies (Dry), Cotton, Sweet Potato.	Winter Potato (Plains), Onion.
Andaman & Nicobar Islands	Autumn Rice, Winter Rice.	—

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