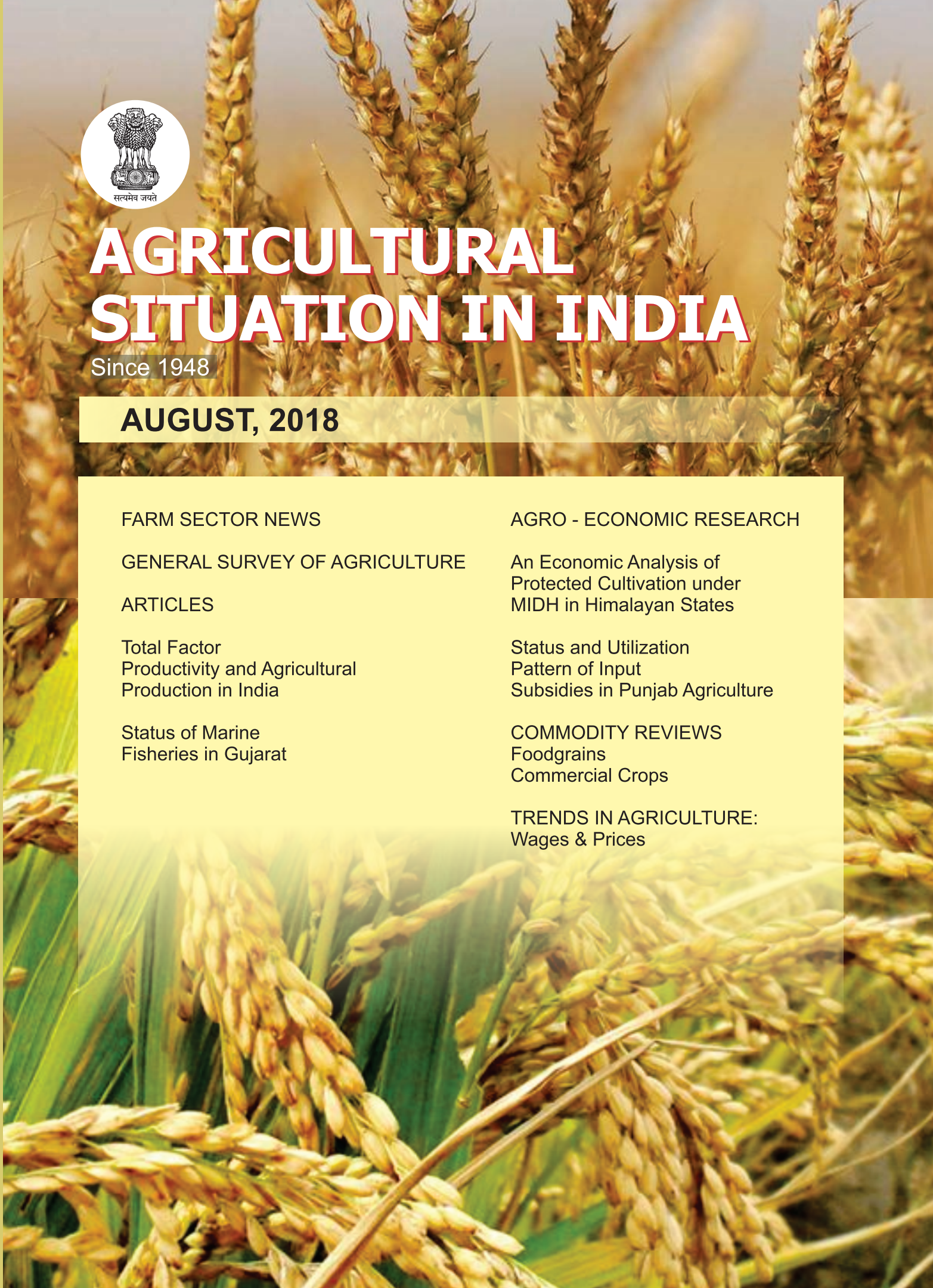

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CONTENTS

From Editor's Desk

This issue of Agricultural Situation in India brings to the readers some interesting farm sector news; agriculture policy alerts; a brief status report on agriculture, two research articles in the field of agriculture and allied sectors, and provides summary reports of two agro-economic research studies pertaining to some recent developments in the Indian agriculture.

Major recent initiatives and schemes talked about in this issue comprise the Cabinet's approval for the hike in Minimum Support Price for Kharif crops for 2018-19 season; the formulation and release of the Model Act on Contract Farming, 2018 to facilitate the entire value and supply chain from pre-production to post-harvest marketing for the agricultural produce and livestock; implementation of Soil health Card Scheme, Neem Coated Urea, Paramparagat Krishi Vikas Yojana, Pradhan Mantri Krishi Sinchai Yojana, National Agricultural Market Scheme, Pradhan Mantri Fasal Bima Yojana, etc., for enabling farmers to realize higher yields at lower cost as well as for holistic development of the agriculture sector. Other important farm sector news covered are related to training and demonstration on paddy sowing machines at various locations of the country on 20th July, 2018.

Discussed in the policy alerts are: emerging critical situations and threats being perceived, as evident from the latest agro-economic research studies by the agro-economic research centres, in the matter of onion price volatility in Bihar and appropriate policies required to address these; implementational issues related to the farm insurance scheme called Pradhan Mantri Fasal Bima Yojana (PMFBY) and necessary policy intervention; and finally policy measures for addressing the issue of distressed migration of agricultural labourers from South West Tamil Nadu.

So far as the agricultural outlook is concerned, the Wholesale Price Index (WPI) of foodgrains noted a decrease of 1.74 percent in June, 2018 as compared to that in June, 2017. While the WPI of pulses showed a decreasing trend; there was an increase in case of cereals, wheat and paddy during the same period. The cumulative south-west monsoon rainfall in the country has been 3 percent lower than the long period average during 1st June, 2018 to 25th July, 2018. Current live storage in 91 major reservoirs in the country was 66.33 BCM as against 57.21 BCM of normal storage based on the average storage of last years.

In our academic column, we are sharing two research articles on contemporary issues pertaining to the agricultural growth in relation to total factor productivity (TFP); and marine fisheries sector. The first article on TFP and agricultural production in India made an attempt to investigate the empirical relationship between TFP and agricultural growth using national level data. The study is based on simple regression techniques and a finite distributed lag model. The findings reveal that the TFP has a positive and significant role in value addition in agriculture. The results indicate that the digital financial services, as a proxy of TFP, could deal with various challenges faced by agricultural value chain units. Consequently, mass implementation of these services in agriculture and allied value chains in future is suggested. The second article examines the status of the marine fisheries sector in Gujarat. The study finds that the Porbandar and Veraval harbours are overcrowded; and, consequently, fishing activity exceeds the capacity of these harbours. With policy front, this study suggests to expand the harbour regions as well as construction of more jetties/landing platforms; protect the fish breeding places from encroachment and prohibit fishing during the ban period; prohibit the dumping of hazardous chemical waste from industries into the sea, etc.

There are two agro-economic research reports shared in this issue. The first report is a study on protected cultivation under MIDH in the Himalayan states, prepared by AERC, Himachal Pradesh University, Shimla. The study endeavours to examine the progress and expenditure in providing assistance for establishing the poly houses under MIDH programme; to study the economics of production of flowers and vegetables under protected conditions; to analyze the marketing system of the produce under protected conditions; to study the problems faced by the farmers in the production and marketing of the produces under protected conditions, etc. The results of the study, based on the primary survey conducted in Jammu and Kashmir, Himachal Pradesh and Sikkim, reveal that the cultivation of flowers and vegetables in a poly house has improved the quality of life of the growers by improving their income and employment. The policy implications of this study suggest to adopt low-cost technologies on small holdings; arrange adequate storage facilities for perishable items; provide latest information regarding prices and arrivals of the vegetables; strengthen the marketing system by organizing cooperative societies for ensuring better producers' share in consumers' rupee; provide proper training to the growers pertaining to various cultural practices; promote organic farming in the poly houses for growing more healthy crop, etc. The second report is a study on the status and utilization pattern of input subsidies in Punjab agriculture, conducted by AERC, Punjab Agriculture University, Ludhiana. The objectives of this study are: to examine the trends, distribution pattern and utilization pattern of various input subsidies; and to study the overall effect of differences in the input subsidy levels on cropping pattern and intensity, input use, crop productivity, etc. Based on its major findings, the study recommends to: provide target group-based direct subsidy benefits, especially for the small and marginal farmers; continue indirect subsidies such as fertilizer and power subsidies for marginal and small farmers, etc, for rational use of agricultural subsidies and bridging disparity among various category of farmers.

P. C. Bodh

Farm Sector News

National Policy on Marine Fisheries, 2017 to guide the development of marine fisheries sector for the next 10 years: Shri Radha Mohan Singh

The Ministry of Agriculture and Farmers Welfare has notified the "National Policy on Marine Fisheries, 2017", which will guide the development of marine fisheries sector for the next 10 years. The Union Agriculture and Farmers Welfare Minister, Shri Radha Mohan Singh, said this at the inter-session meeting of the consultative committee of the Ministry of Agriculture and Farmers Welfare on Marine Fisheries-Mariculture in India in Rameswaram, Tamil Nadu on 2nd July, 2018. The meeting was organized by the Ministry of Agriculture and Farmers Welfare to discuss and deliberate various issues related to Marine Fisheries-Mariculture in India.

Shri Singh informed that the government has also included a sub-component, namely, 'Assistance for Deep-Sea Fishing' under 'Blue-Revolution'. Under this scheme, traditional fishermen, their associations/organizations or self-help groups are provided with central financial assistance upto 50% of the cost of the vessels, i.e., Rs 40 lakh for 'Deep-Sea Fishing Vessels'. For implementation of this scheme, Rs 312 crore of central share has been released in the first year (2017-18) to benefit the traditional fishermen of the country.

Agriculture Minister further said that fish production in India is estimated 11.4 million tonnes, out of which 68% is registered from inland fisheries sector and the remaining 32% from marine sector. It is expected that the indigenous fish requirement by 2020 would be 15 million tonnes as against the production of 11.4 million tonnes. This gap of 3.62 million tonnes is expected to be made up by inland aquaculture and also through mariculture.

Estimates by scientists show that the fishery resources of near-shore waters within the 200 meters depth zone are either optimally utilized or sometimes over-exploited, which is a matter of serious concern for the livelihood of traditional fishermen, he added. In this context, a meeting was held on May 17, 2018 with the Fisheries Ministers of all coastal States/ UTs to discuss the issues relating to "Marine Fisheries". In this meeting, all the coastal States were called upon to adopt necessary reforms towards responsible and sustainable fisheries.

Shri Singh said that considering the negligible opportunities of additional fish production from the near shore area, the government has decided to promote 'marine culture fisheries' and included the sub-components of 'Mariculture' under 'Blue Revolution' Scheme. Open sea cage farming is one of the eco-friendly farming activities under mariculture which is being practiced in the open sea where wave action is less. The fishes that are being cultured in cages are high value fishes; hence there is a huge export demand for cage cultured fishes.

He informed that the National Fisheries Development Board (NFDB), Hyderabad, which functions under the Ministry, has provided financial assistance of Rs 114.73 lakh to the Central Marine Fisheries Research Institute (CMFRI)in 2011 for implementation of a technology upgradation project on demonstration of open sea cage farming in 14 locations along the coasts of almost all maritime states on pilot basis. Based on the successful implementation and outcome of the pilot projects, it was recommended that open sea cage farming would be established across the country.

Agriculture Minister concluded by saying that the Department of Animal Husbandry, Dairying & Fisheries (DADF) has formulated a document on Mission Mariculture-2022 with the main objective of enhancing fish production from marine sector. It is proposed to promote mariculture including open sea cage culture activity in all maritime States and UTs on a priority basis with the active participation of maritime States/UTs and fishers.

The Cabinet approved hike in MSP for Kharif Crops for 2018-19 Season

Giving a major boost to the farmers' income, the Cabinet Committee on Economic Affairs, chaired by Prime Minister Shri Narendra Modi, approved the increase in the Minimum Support Prices (MSPs) for all kharif crops for 2018-19 season on 4th July, 2018.

Source: www.pib.nic.in

The decision of the CCEA is a historic one as it redeems the promise of the pre-determined principle of fixing the MSPs at a level of at least 150 percent of the cost of production announced by the Union Budget for 2018-19. The Commission for Agricultural Costs and Prices (CACP) has recommended MSPs for all kharif crops broadly in line with the announced principle. The Minimum Support Prices (MSPs) for all kharif crops of 2018-19 season were increased as follows:

(Rs/quintal)

Commodity	Variety	MSP for 2017-18 Season	MSP approved for 2018-19 Season	Increase		Return*over cost in percent
				Absolute	Percentage	
Paddy	Common	1550	1750	200	12.90	50.09
	Grade A	1590	1770	180	11.32	51.80
Jowar	Hybrid	1700	2430	730	42.94	50.09
	Maldandi	1725	2450	725	42.03	51.33
Bajra	-	1425	1950	525	36.84	96.97
Ragi	-	1900	2897	997	52.47	50.01
Maize	-	1425	1700	275	19.30	50.31
Arhar(Tur)	-	5450	5675	225	4.13	65.36
Moong	-	5575	6975	1400	25.11	50.00
Urad	-	5400	5600	200	3.70	62.89
Groundnut	-	4450	4890	440	9.89	50.00
Sunflower Seed	-	4100	5388	1288	31.42	50.01
Soyabean	-	3050	3399	349	11.44	50.01
Sesamum	-	5300	6249	949	17.91	50.01
Nigerseed	-	4050	5877	1827	45.11	50.01
Cotton	Medium Staple	4020	5150	1130	28.11	50.01
	Long Staple	4320	5450	1130	26.16	58.75

* Includes all paid out costs such as those incurred on account of hired human labour, bullock labour/machine labour, rent paid for leased in land, expenses incurred on use of material inputs like seeds, fertilizers, manures, irrigation charges, depreciation on implements and farm miscellaneous expenses, and imputed value of family labour.

The Budget for 2018-19 had indicated that a paradigm shift in the agricultural policies is needed to achieve the objective of doubling farmers' income by 2022 through greater emphasis on generating higher incomes of farmers. The increase in the MSPs of nigerseed at Rs.1827 per quintal, moong by Rs.1400 per quintal, sunflower seed by Rs.1288 per quintal and cotton by Rs.l130 per quintal is unprecedented.

Amongst cereals and nutri-cereals, in terms of absolute increase, MSP of paddy (common) has been raised by Rs 200 per quintal, jowar (hybrid) by Rs 730 per quintal and ragi by Rs 997 per quintal. The highest percentage increase in MSP over the previous year is for ragi (52.47 %) followed by jowar hybrid (42.94%). For pulses, apart from moong, MSP of arhar (tur) has been raised by Rs 225 per quintal yielding a return over cost by 65.36 percent and urad by Rs 200 per quintal with a return over cost by 62.89 percent in order to maintain inter-crop-price parity. Similarly, the MSP of bajra has been raised by Rs.525 per quintal yielding a return of 96.97 percent over cost.

Promoting cultivation of pulses can help India to overcome nutrition insecurity, improve soil fertility by nitrogen fixation and provide income support to farmers. Thus, increased MSPs for pulses will give a price signal to farmers to increase acreage. Further, enhanced MSPs would boost production of oilseeds and encourage investment in its productivity and help to reduce India's import bill. Increase in MSPs of nutri-cereals will improve nutritional security and allow farmers to get higher prices.

Food Corporation of India (FCI) and other designated State Agencies would continue to provide price support to the farmers in the case of cereals including nutri-cereals. National Agricultural Cooperative Marketing Federation of India Limited (NAFED), FCI, Small Farmers Agri-Business Consortium (SFAC) and other designated Central Agencies would continue to undertake procurement of pulses and oilseeds. Cotton Corporation of India (CCI) will be the central nodal agency for undertaking price support operations for cotton.

Kharif crop sowing crossed 333.76 lakh hectares

The total sown area as on 6th July, 2018, as per reports received from states, stood at 333.76 lakh hectares as compared to 388.89 lakh hectares at this time last year.

It is reported that rice has been sown/transplanted in 67.25 lakh hectares, pulses in 33.60 lakh hectares, coarse cereals in 57.35 lakh hectares, oil seeds in 63.59 lakh hectares, sugarcane in 50.44 lakh hectare and cotton in 54.60 lakh hectares.

The details of the area covered so far and that covered during this time last year are given below:

(In lakh hectares)

Crop	Area sown in 2018-19	Area sown in 2017-18
Rice	67.25	79.08
Pulses	33.60	41.67
Coarse Cereals	57.35	66.27
Oilseeds	63.59	73.45
Sugarcane	50.44	49.64
Jute & Mesta	6.93	6.96
Cotton	54.60	71.82
Total	333.76	388.89

The Union Minister of Agriculture and Farmers Welfare, Shri Radha Mohan Singh, addressed 90th Foundation Day ceremony of Indian Council of Agricultural Research

The Union Minister of Agriculture and Farmers Welfare, Shri Radha Mohan Singh, congratulated scientists and officials of the of Indian Council of Agricultural Research (ICAR) along with farmers from across India on ICAR's 90th Foundation day and award ceremony function in New Delhi on 16th July, 2018. Shri Singh said that the efforts of the ICAR not only helped India transform from an importing nation to an exporting nation but also provided self-sufficiency and nutritional security in foodgrains. Due to the efforts of our skilled scientists and the hard work of the farmers, the country today has a buffer stock in foodgrain.

Working towards the government's mantra of Sabka Sath, Sabka Vikas, Shri Singh said that ICAR has established the Indian Agricultural Research Institute (IARI), Assam and IARI, Jharkhand on the lines of India's leading agricultural research institute IARI, Pusa.

ICAR is playing a vital role in fulfilling the government vision of doubling farmers' income by 2022. Keeping in mind the suggestions of the Council, the government, besides increasing budgetary allocation, has also created several corpus funds to improve the infrastructure of dairy, cooperative, fisheries, animal husbandry, agriculture market, small irrigation scheme, water bodies management, etc.

The Minister informed a Soil Health Card scheme has been initiated so that farmers can know before sowing the health of the soil in his farm, the kind of crop to be grown and the type and quantity of nutrients to be used. Simultaneously, with the motto of 'Har Khet Ko Paani', around 100 irrigation projects are being completed under the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). In order to ensure better price discovery for farmers, the online platform e-NAM has been started. The government has also fulfilled its promise of providing MSP at 1.5 times and more over the cost of production for 14 Kharif crops.

Shri Singh expressed happiness and said that due to the techniques developed by ICAR and hard work of the farmers, foodgrain production touched

275.68 million tonnes this year, which is 10.64 million tonnes more than 265.04 million tonnes recorded in 2013-14. Horticulture production has touched 305 million tonnes this year. The country is also moving forward in pulses production and with around 23 million tonnes of pulses production this year, close to self-sufficiency. Due to this, the import of pulses has gone down from 10 lakh tonnes in 2016-17 to 5.65 lakh tonnes in 2017-18, saving the country Rs 9775 crore in foreign exchange. The Pusa basmati 1121 variety of basmati rice developed by ICAR has helped India earn more than Rs 18,000 crore in foreign exchange every year. During 2010-14, India earned Rs 62,800 crore in foreign exchange from exports, which rose to Rs Rs 71,900 crore in 2014-18.

The Union Minister further said that in order to tide over the problems associated with climate change, 45 integrated farming systems were developed by including 15 agro-climatic zones. In order to resolve the issue of environment pollution due to stubble burning, it has been decided that for management of crop residue, financial assistance @80% of the project cost will be provided to establish Farm Machinery Banks for Custom Hiring of in situ crop residue management machinery and financial assistance @50% of the machinery/equipment will be provided to individual farmer for crop residue management. A comprehensive campaign was initiated by ICAR's 35 KVKs. An awareness campaign was carried out amongst 45,000 farmers and on waste management activities, 1,200 live demonstrations were done in 4,708 hectare area.

The Agriculture Minister said the skill development of students in the Student READY (Rural Entrepreneurship Awareness Development Yojana) programme has now been included for one complete year to attract youth to agriculture education. Besides, Agri services & Business by Harnessing Youth through Agricultural Skills, the one-year diploma course is proposed to be started, which will help young people to access information on agriculture thereby facilitating them to get jobs or start their own business. By coordinating ICAR's agricultural research, education and advance line activities at a national level, more than 750 start-ups and agri entrepreneurs were developed, including farmer entrepreneurs in various areas of agriculture. In the agribusiness incubation centres established in 24 ICAR centres, technical assistance is being provided to the entrepreneurs.

Promoting paddy sowing machines

The training and demonstration on paddy sowing machine is provided at Farm Machinery Training & Testing Institute (FMTTI) located at Budni, (M.P.), Hisar (Haryana) , Ananatapur (A.P.) and Biswanath Chariali (Assam); and also through ICAR's All India Crop Research Projects (AICRP) located at TNAU, Coimbatore; IIT Kharagpur; OUAT, Bhubaneswar; NERIST, Nirjuli; and at CIAE, Bhopal on 20th July, 2018. The funds under Sub Mission on Agricultural Mechanization (SMAM) scheme of Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) are also provided to State Governments for conducting training and demonstrations of various agricultural machineries.

There are about 19 manufactures of Self Propelled Paddy Transplanter machine in the country and the machine is adequately available in the market.

Under Phase-II (2014-17) of the Off-grid and Decentralized Solar PV Applications Scheme of Ministry of New and Renewable (MNRE), Central Financial Assistance up to 30% of the benchmark cost has been provided for installation of solar pumps. Further, due to provision of the scheme mandating procurement only through tender route, prices of solar pumps were reduced, which is reflected in the revised benchmark costs issued by MNRE in June, 2018.

Design refinements in the agricultural implements is a continuous exercise and are being carried out by centres of AICRP of ICAR to suit the requirement of agricultural workers of different region and based on feedback received from farmers and users. During last 4 years, ICAR has developed 48 technologies in the field of farm mechanization.

Model Act on Contract Farming

The Government formulated and released a progressive and facilitative Model Act "The…. State/ UT Agricultural Produce & Livestock Contract Farming and Services (Promotion & Facilitation) Act, 2018" in May, 2018 for its adoption by the states/Union Territories (UTs). The aforesaid Model Contract Farming Act covers the entire value and supply chain from pre-production to post harvest marketing including services contract for the agricultural produce and livestock.

The first draft of the Model Contract Farming Act was circulated to the States/ UTs and concerned Central Government Ministries/ Departments to solicit their comments. In addition, it was also placed on the public domain in December, 2017 by uploading on departmental website for extensive consultations with various stakeholders including farmers, trade & industry, economists, policy makers. It elicited a huge response from within India and from abroad. Based on suggestions received, the draft model Act was modified and placed again in public domain in February, 2018 for soliciting further comments/suggestions. All the suggestions/views received thereafter were considered /addressed and incorporated to give its final shape as "The …. State/ UT Agricultural Produce & Livestock Contract Farming and Services (Promotion & Facilitation) Act, 2018" in May, 2018.

The Government convened a meeting of State Agriculture Marketing Ministers' in May, 2018 under the chairmanship of the Union Agriculture Minister to release the model Act for adoption by States/Union Territories and also to explain them the details of the provisions of said Model Act. In the meeting, the Union Agriculture Minister requested the states/UTs to adopt the Model Act, as it may be an effective tool for mitigating price risk and market uncertainty. There was unanimity among the states to adopt this Model Act.

Model Act being a facilitative one with a wider scope of contracts in the entire agri-value chain starting from pre-production, production to post-production, private players including Farmer Producer Organizations (FPOs) will be encouraged to engage themselves in the contract farming and services contracts under the Act. The contract farming under this model will help in mitigating the price risk and market uncertainties through advance agreements and would encourage entry of private players into the farm sector.

Assistance to Small and Marginal Farmers

Government receives representation from various quarters on issues concerning farmers of different parts of the country including Bundelkhand. Government is implementing various schemes for the welfare of farmers including small and marginal farmers. The strategy is to improve net returns to the farmers by enabling them to realise higher yields at lower cost and benefit from better market prices. Some important schemes include Soil Health Card Scheme (SHC), Neem Coated Urea, Paramparagat Krishi Vikas Yojana (PKVY), Pradhan Mantri Krishi Sinchai Yojana (PMKSY), National Agriculture Market scheme (e-NAM), Pradhan Mantri Fasal Bima Yojana (PMFBY), etc.

The Government provides total interest subvention up to 5% (inclusive of 3 % prompt repayment incentive) on short-term crop loans upto Rs.3.00 lakh. Thus, loan is available to farmers at a reduced rate of 4% per annum on prompt repayment.

Under the Mission for Integrated Development of Horticulture (MIDH), for holistic growth of the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo, subsidy is provided to the farm size limited to 4 hectare, in majority of its interventions. Also, small and marginal farmers are mobilized to form Farmer Producer Organizations (FPOs)/ Farmer Interest Group (FIG) for aggregation and economies of scale. FPOs are eligible for financial assistance under MIDH.

Under National Food Security Mission (NFSM), at least 33% of funds are earmarked for small and marginal farmers.

Under the Sub Mission on Agricultural Mechanization (SMAM) under the main Mission, i.e., National Mission on Agricultural Extension and Technology (NMAET), it is providing a suitable platform for converging all activities for inclusive growth of agricultural mechanization by providing a 'single window' approach for implementation with a special focus on small & marginal farmers.

Under the Per Drop More Crop (micro irrigation), at least 50% of the allocation is to be utilized for small & marginal farmers. Further, 10% additional financial assistance is available to small & marginal farmers as compared to other farmers. National Mission for Sustainable Agriculture (NMSA) guidelines also envisage that at least 50% of the allocation is to be utilized for small & marginal farmers, i.e., for Rainfed Area Development (RAD) and Sub Mission on Agro Forestry (SMAF) Schemes.

Under the Soil Health Card Scheme (SHC), assistance is provided to all State Governments to evaluate soil health in all farm holdings across the

country and issue Soil Health Cards to farmers (including small and marginal farmers) regularly in a cycle of two years.

The Government directed NAFED to start disposal of gram stock

The market rate of gram reached around MSP levels, therefore, the Government directed National Agricultural Cooperative Marketing Federation of India (NAFED) to start disposal of gram stock on 24th July, 2018. In case of mustard, NAFED was directed to submit a proposal within 3 days based on the market rates and area sown. Area sown for urad is little less than last year's sown area. Therefore, NAFED was directed not to liquidate the urad stock for next 15 days and to review disposal based on sown area and market rates after a fortnight. It was observed that successful execution of procurement in coming kharif marketing season 2018 depends upon the disposal of procured commodities and making the godowns vacant for the coming season. It has been directed by the Ministry that old stocks be disposed off on FIFO (First in- First out) basis. This is especially important for disposal of tur, groundnut and summer moong and urad of Madhya Pradesh. This is important for maintaining the quality of stored commodities.

Agricultural Irrigation Projects

The Government has allocated Rs. 2600 crore for the year 2018-19 under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)- Har Khet Ko Pani (HKKP) component on 31st July, 2018. This budget is meant for:

i. Debt servicing on the loan availed from National Bank for Agriculture and Rural Development (NABARD) under Long term Irrigation Fund (LTIF) to fund prioritized projects under PMKSY- Accelerated Irrigation Benefits Programme (AIBP).

ii. Financial assistance to States/UTs under the scheme Surface Minor Irrigation and Repair, Renovation & Restoration (RRR).

During the year 2016-17, ninety-nine on-going Major/Medium irrigation projects under PMKSY-Accelerated Irrigation Benefits Programme (AIBP), having ultimate irrigation potential of 76.03 lakh hectares were prioritized in consultation with States, for completion in phases up to December, 2019 with balance estimated cost of Rs. 77595 crore along with their Command Area Development & Water Management (CADWM) works.

Implmentation of Pradhan Mantry Fasal Bima Yojana (PMFBY)

Due to the improved features of Pradhan Mantri Fasal Bima Yojana (PMFBY), the scheme has been received very well and has been opted for by 27 states and union territories in one or more seasons since inception. The first year of scheme launch, i.e., 2016-17 was a good monsoon year, despite which claim ratio was as high as 73%. Further in certain states claim ratios were to the extent of 114% in Andhra Pradesh, 135% in Karnataka, 132% in Kerala and 286% in Tamil Nadu. Overall Rs. 15349.68 crore were paid to 139 lakh farmer applicants in 2016-17 alone.

PMFBY is an actuarial premium based scheme under which farmer has to pay maximum premium of 2% for kharif, 1.5% for rabi food & oilseed crops and 5% for annual commercial/horticultural crops and remaining part of the actuarial/bidded premium is shared equally by the Centre and State Government. One of the objectives of the scheme is to facilitate prompt claims settlement. Towards this, the scheme guidelines provide that claims must be settled within two months of harvest subject to timely provision of both yield data and share of premium subsidy by the State Government.

The key highlights of the study on PMFBY include increase in both premium collected by insurance agencies (11.6%); and sum insured (per farmer as well as per hectare) during 2016-17; increase in total sum insured to Rs.1.91 lakh crore; and increase in number of farmers insured to 5.01 crore in 2017-18; increase in enrolment in some states and decrease in others; and decrease in total area covered to 4.89 hectare 2017-18.

Policy actionables include preventing exclusion of tenant farmers by linking Aadhaar Card to PMFBY enrolment; digitalization of land records; increasing enrolment by engaging Insurance Regulatory and Development Authority of India in popularising PMFBY; engaging only capable insurance companies in the work; reducing dependency on human assessment of yield in the light of the fact that satellite

imagery and robust satellite techniques(RST) provide the same with 90% accuracy; adopting the novel financial administration principle wherein insurance companies make normal profits and keep engaging in bidding process; and overcoming the demotivating problem of season-to-season bidding, a longer operational window for agency bidding may be insured to use moral hazards.

Distress Migration of Agricultural Labourers from South-West Tamil Nadu

To address the issues of labour migration in a female denominated group, with female labour population as high as 80%, and their engagement in cardamom, tea and coffee plantation, and the reality of having to work at wage rates as low as Rs. 200 per day against the actual wages of Rs. 600 per day – appropriate policy interventions are required. These include creation of alternative non agricultural development opportunities, such as cottage industries; curbing migration by better rural development; expansion of irrigation by watershed development and rain harvesting; increasing agricultural productivity and strictly curbing activities of commission agents; and providing financial and technical assistance to agricultural labour to ensure higher productivity, efficiency and employment.

Cotton Production

The total cotton production and consumption in the country during the current crop year, i.e., 2018-19 is not available. However, State-wise estimated production of cotton, as per the Third Advance Estimates for the year 2017-18, is as under:

State	Production (in lakh bales of 170 kgs. each)
Andhra Pradesh	20.38
Gujarat	126.37
Haryana	16.26
Karnataka	12.24
Madhya Pradesh	18.69
Maharashtra	65.46
Orissa	4.02
Punjab	12.83
Rajasthan	18.93
Tamilnadu	4.88
Telangana	47.54
Others	1.02
All-India	348.62

The total consumption of cotton in the country during 2017-18, as estimated by Cotton Advisory Board (CAB) in its meeting held on 16 June, 2018, is 315.50 lakh bales.

The Government has been implementing Cotton Development Programme with a focus on cropping system approach under National Food Security Mission (NFSM) in major cotton growing states since 2014-15 to enhance production and productivity. Thrust has been given on transfer of technology through frontline demonstrations and training in order to extend benefits to farmers. In addition, States can support Cotton Development Programme under Rashtriya Krishi Vikas Yojna.

Further, to provide remunerative prices to cotton cultivators in the country, Government has fixed the Minimum Support Price (MSP) of cotton for 2018-19 season at Rs. 5150/- per quintal for medium staple and at Rs. 5450/- per quintal for long staple. This provides margin of 50 percent over all India paid out cost including family labour.

As a result of various initiatives taken by the Government, India has become a major cotton producer in the world and is also a net cotton surplus country.

Setting Up of Vegetable Clusters

Mission for Integrated Development Horticulture (MIDH), a centrally sponsored scheme is implemented for the holistic development of horticulture sector in the country covering fruits, vegetables, roots and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo through various interventions.

Under MIDH, cluster-based approach is adopted for production and linking it with available infrastructure, or to be created, for post harvest management, processing, marketing and export. While selecting the cluster, preference is given to

those areas where natural resource base and water resources were developed. Special emphasis is also given for adoption of area based cluster approach towards developing regionally differentiated crops, which are agro-climatically most suitable for the State/region. However, the details of clusters including vegetables are not maintained at the Central level.

No such proposal is under consideration of this Ministry. However, under MIDH for the current financial year, States/UTs were requested to make sub-plan for development of crop clusters of major horticulture crops including vegetables and make provisions in their current years' Action Plan for development of these clusters.

Fertility of Soil

A dedicated scheme on "Soil Health Card" has been launched to take care of soil health for the first time in a uniform manner to evaluate the soil fertility across the country by the GOI in cooperation with State Governments. Soil Health Card contains the status of soils with respect to 12 parameters, namely, N, P, K (Macro-nutrients), S (Secondary-nutrients), Zn, Fe, Cu, Mn, B (Micro-nutrients) and pH, EC, OC (Physical Parameters). It also provides crop-wise fertiliser recommendations. Soil Health Card helps farmers to improve productivity by maintaining soil health. SHC also promotes the judicious use of the fertilisers thus reducing the cost of cultivation.

In all, 10.73 crore Soil Health Cards were distributed during Cycle-I (2015-17) whereas 4.71 crore Soil Health Cards were distributed to the farmers across the country during Cycle-II (2017-19).

A GPS based unified criteria for Collection of Soil Samples at a grid of 2.5 hectares in irrigated and 10 hectares in rainfed areas are being adopted throughout the country as per suggestion of ICAR. To evaluate the extent of nutrient deficiencies in the soils, Soil Fertility Assessment and Nutrient Mapping is being done by the NRSC, Hyderabad, using soil health card data. Besides, based on soil test results available, nutrient maps are also being generated by the NIC which can be drilled down to the block/village and farmer level. Moreover, the ICAR through Indian Institute of Soil Science and All India Coordinated Research Projects (AICRPs) on Soil Test Crop Response (STCR), Micro and Secondary Nutrients and Pollutant Elements (MSNP) in soils and Plants, Long Term Fertilizer Experiments (LTFE) and Network Project on Soil Biodiversity-Biofertilizers are providing technological backstopping to various schemes related to soil fertility and fertilizer use in the country including Maharashtra. The ICAR imparts training, organises Front Line Demonstrations (FLDs) to educate farmers on soil test based balanced and integrated nutrient management through conjunctive use of both inorganic and organic sources (FYM, compost, biofertilizers, etc.) of plant nutrients to improve soil fertility.

A new scheme, "Soil Health Card" for every farmer at an interval of 2 years has been launched by the Hon'ble Prime Minister on 19th February, 2015 with an aim to assist state government and union territory to provide Soil Health Cards for all farm holdings across the country.

Soil health card provides information to the farmers on fertility status of their soils to enable them to apply soil health card based recommended dosages of fertilizers including micro-nutrients, bio-fertilizers, manures as well as soil ameliorants so as to check the declining fertility of agricultural land and improve the fertility of soils to increase productivity across the country including Maharashtra besides enhancing farmers income.

GM Crops

According to a report of International Service for the Acquisition of Agri-biotech Applications, 2018, India ranked 5th in global cultivation of GM crops. Bt. cotton is the only GM crop approved for commercial cultivation in the Country.

The approval of any new genetically modified crop is given on a case to case basis after thorough scientific evaluation of health and environment safety as per applicable guidelines made under Environment (Protection) Act, 1986 and Rules, 1989.

State-wise area under Bt. cotton cultivation during last three years:

(Area in lakh hectare)

STATE	2015-16	2016-17	2017-18
Andhra Pradesh	6.50	4.59	6.41
Telangana	16.61	13.80	18.84
Madhya Pradesh	4.86	5.39	4.82
Gujarat	26.23	20.25	22.49
Maharashtra	34.40	32.35	37.86
Karnataka	4.87	3.03	4.50
Tamil Nadu	0.99	1.08	1.80
Punjab	3.33	2.43	2.86
Haryana	5.27	3.64	6.21
Rajasthan	3.56	2.87	4.96
Total Area	106.62	89.43	110.75

Fund for Agricultural Machinery

Ministry of Agriculture and Farmers Welfare, on 31st July, 2018, released Rs. 36.58 crore and Rs. 148.60 crore under Sub- Mission on Agricultural Mechanization (SMAM) for promotion of agricultural mechanization activities and under a new Central Sector Scheme on 'Promotion of Agricultural Mechanization for in Situ Management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi' for in situ management of crop residue activities during 2018-19 to Government of Uttar Pradesh, respectively.

Onion Price Volatility in Bihar

Onion price volatility in Bihar is posing challenges to the farmers which need expeditious policy interventions. First, the highlights of the issues include decline in the production by 87% during 2013-14 as compared to 2012-13 but much higher production during 2015-16, i.e., 1,53,403 metric tonnes, which is 11% higher than that of 2013-14, despite decline in the area under production. During 2017, significant quantities of onion were exported to Bangladesh and Nepal. The issues are related to huge per capita deficit in the supply and demand of onion; huge gap of onion storage capacity, to the extent of 96.92%; and concentration of 68% of onion producing area in 12 districts.

The policy interventions advised by the agro-economic research network, as coming from Centre for Management of Agriculture, IIM Ahmedabad, are as follows. Taking onion production to the remaining districts; and bridging supply gap of 17,433 metric tonnes by a special onion production drive; bridging the storage capacity gap by encouraging private sector storage capacity building initiatives; and by reinstituting Bihar APMC Act (Repeal) 2006.

General Survey of Agriculture

Trends in Foodgrain Prices

Based on Wholesale Price Index (WPI) (2011-12=100), foodgrains price decreased by (-) 1.74 percent in June, 2018 over June, 2017. During the same period, the WPI of pulses decreased by (-) 20.23 percent, whereas WPI of cereals, wheat and paddy increased by 2.59 percent, 5.14 percent and 3.71 percent, respectively.

The WPI of pulses and paddy showed a fall of (-) 1.92 percent and (-) 0.19 percent, respectively in June, 2018 over May, 2018. During this period the WPI of food grains, cereals and wheat increased by 0.14 percent, 0.48 percent, and 0.99 percent, respectively.

Rainfall Situation

- Cumulative South-West Monsoon Season, 2018 rainfall for the country as a whole during the period 1st June, 2018 to 25th July, 2018 has been 3% lower than the Long Period Average (LPA). Rainfall in the four broad geographical divisions of the country during the above period has been higher than LPA by 16% in Central India and 9% in South Peninsula but lower than LPA by 31% in East & North East India and 7% in North-West India.

- Out of total 36 meteorological Sub-divisions, 7 met subdivisions received Excess rainfall, 18 subdivisions received Normal rainfall and 11 Sub-divisions received Deficient rainfall.

- Out of 658 districts for which rainfall data available, 35(5%) districts received Large Excess rainfall, 131(20%) received Excess rainfall, 238(36%) received Normal rainfall, 198(30%) districts received Deficient rainfall and 56(9%) received Large Deficient rainfall.

Water Storage in Major Reservoirs

- Central Water Commission monitors 91 major reservoirs in the country which have total live capacity of 161.99 Billion Cubic Metre (BCM) at Full Reservoir Level (FRL). Current live storage in these reservoirs (as on 26th July, 2018) was 66.33 BCM as against 58.91 BCM on 26.07.2017 (last year) and 57.21 BCM of normal storage (average storage of last 10 years). Current year's storage is 113% of last year's storage and 116% of the normal storage.

Sowing Position during Kharif, 2018

- As per latest information available on sowing of Kharif crops upto 27.07.2018, area sown under Kharif crops taken together has been reported to be 737.96 lakh hectares at All India level which is lower by 59.73 lakh ha. than the area coverage of 797.69 lakh hectares during the corresponding period of last year.

- A statement indicating comparative position of area coverage under major crops as on 27.07.2018 during current Kharif season vis-à-vis the coverage during the corresponding period of last year is given in the following table :

All India Crop Situation- Kharif (2018-19) as on 27.07.2018

(In lakh hectares)

Crop Name	Normal Area for Whole Kharif Season	Normal Area as on date	Area sown reported			Absolute Change over(+/-)	
			This Year 2018	% of Normal for whole season	Last Year 2017	Normal as on date	Last Year
Rice	395.39	223.95	197.63	50.0	225.60	-26.3	-28.0
Jowar	22.34	15.14	14.28	63.9	13.63	-0.9	0.6
Bajra	74.03	54.91	49.71	67.2	61.28	-5.2	-11.6
Malze	74.22	67.83	66.91	90.2	67.92	-0.9	-1.0
Total Coarse Cereals	188.55	144.59	136.23	72.3	148.33	-8.4	-12.1

(In lakh hectares)

Crop Name	Normal Area for Whole Kharif Season	Normal Area as on date	Area sown reported			Absolute Change over(+/-)	
			This Year 2018	% of Normal for whole season	Last Year 2017	Normal as on date	Last Year
Total Cereals	583.94	368.54	333.86	57.2	373.93	-34.7	-40.1
Tur	41.90	32.07	35.05	83.6	36.66	3.0	-1.6
Urad	27.00	22.91	29.51	109.3	35.17	6.6	-5.7
Moong	24.93	21.46	27.45	110.1	26.47	6.0	1.0
Kulthi	2.27	0.26	0.63	27.8	0.37	0.4	0.3
Others	15.83	10.86	10.71	67.7	14.57	-0.1	-3.9
Total Pulses	111.93	87.56	103.35	92.3	113.24	15.8	-9.9
Total Foodgrains	695.87	456.10	437.21	62.8	487.17	-18.9	-50.0
Groundnut	42.01	32.37	28.96	68.9	33.05	-3.4	-4.1
Soyabeen	112.51	101.85	101.53	90.2	95.70	-0.3	5.8
Sunflower	2.24	1.10	0.70	31.2	1.12	-0.4	-0.4
Sesamum	17.50	10.20	8.07	46.1	9.67	-2.1	-1.6
Nlgerseed	2.70	0.37	0.41	15.1	0.44	0.0	0.0
Castorseed	10.51	1.88	1.07	10.2	2.41	-0.8	-1.3
Total Oilseeds	187.47	147.76	140.74	75.06	142.39	-7.0	-1.6
Cotton	119.75	103.80	102.52	85.6	111.38	-1.3	-8.9
Sugarcane	48.84	45.45	50.52	103.4	49.72	5.1	0.8
Jute & Mesta	8.11	7.60	6.98	86.1	7.04	-0.6	-0.1
All-Crops	1060.04	760.72	737.96	69.6	797.69	-22.8	-59.7

Source: Crops & TMOP Division, DAC&FW
Note: Area figures are as eye assessment of State Agiculture Departments.
Normal Area: 5 years average of the area during the period of 2012.13 to 2016-17.
Mormal Area as on date: 5 years average of the during the comesponding period of 2012-13 to 2016-17.

Economic Growth

- The provisional estimates (PE) of national income released by Central Statistics Office (CSO) on 31st May, 2018, estimated the growth of Gross Domestic Product (GDP) at constant market prices for the year 2017-18 to be 6.7 percent (Table 1).

- The growth rate of GDP at constant market prices was 7.1 percent (first revised estimate) in 2016-17 and 8.2 percent in 2015-16 (second revised estimate).

- The growth in Gross Value Added (GVA) at constant basic prices for the year 2017-18 is estimated to be 6.5 percent (PE). At the sectoral level, agriculture, industry and services sectors are estimated to grow at the rate of 3.4 percent, 5.5 percent and 7.9 percent, respectively in 2017-18.

- As per the quarterly estimates, the growth of GDP at constant prices for fourth quarter (January-March) of 2017-18 was 7.7 percent, as compared to the growth of 6.1 percent recorded in the corresponding quarter of the previous year.

- The upswing in the trend of quarterly growth, which started in the second quarter of 2017-18, sustained with an even higher growth in third and fourth quarters (Table 2).

The share of total final consumption in GDP at current prices in 2017-18 is estimated to be 70.5 percent, as compared to 69.9 percent in 2016-17. The fixed investment rate (ratio of gross fixed capital formation to GDP) is estimated to be 28.5 percent in 2017-18, which is the same as in previous two years.

- The saving rate (measured as a share of gross saving to GDP) for the year 2016-17 was 30.0 percent, as compared to 31.3 percent in 2015-16. The investment rate (measured as a share of gross capital formation to GDP) was 30.6 percent in 2016-17, as compared to 32.3 percent in 2015-16.

Agriculture and Food Management

Rainfall

There has been a deficiency of 4 percent in the cumulative rainfall received for the country as a whole during the period 1st June, 2018 to 19th July, 2018. The actual rainfall received during this period has been 326.1 mm as compared to the normal rainfall of 338.4 mm. Out of the total 36 meteorological subdivisions, no subdivision received large excess rainfall, 8 subdivisions received excess rainfall, 18 subdivisions received normal rainfall, 10 subdivisions received deficient rainfall. No subdivision received large deficient rainfall or remained without rainfall during the period.

All India Production of Foodgrains

As per the 3rdAdvance Estimates (AE) released by Ministry of Agriculture & Farmers Welfare on 16th May, 2018, the production of food-grains during 2017-18 is estimated at 279.5 million tonnes compared to 275.1 million tonnes in 2016-17 (Final Estimate) (Table 3).

Procurement

Procurement of Rice as on 29th June, 2018 during Kharif Marketing Season 2017-18 was 36.17 million tonnes, whereas procurement of wheat during Rabi Marketing Season 2018-19 was 35.51 million tonnes (Table 4).

Off-take

The offtake of rice all schemes during the month of May, 2018 has been 29.9 lakh tonnes. This comprises 28.4 lakh tonnes under TPDS/NFSA (offtake against the allocation for the month of June, 2018) and 1.5 lakh tonnes under other schemes. In respect of wheat, the total offtake has been 19.9 lakh tonnes comprising of 19.1 lakh tonnes under TPDS/NFSA (offtake against the allocation for the month of June, 2018) and 0.8 lakh tonnes under other schemes. The cumulative offtake of foodgrains during 2018-19 is 14 million tonnes (Table 5).

Stocks

The total stocks of rice and wheat held by FCI as on 1st July, 2018 was 69.4 million tonnes, as compared to 58.7 million tonnes as on 1st July, 2017 (Table 6).

TABLE 1 : Growth of GVA at Basic Prices by Economic Activity and GDP at Market Prices (per cent)

Sectors	Growth Rate at Constant (2011-12) Prices (%)			Share in GVA at Current Prices (%)		
	2015-16 2nd RE	2016-17 1st RE	2017-18 PE	2015-16 2nd RE	2016-17 1st RE	2017-18 PE
Agriculture, forestry & fishing	**0.6**	**6.3**	**3.4**	**17.7**	**17.9**	**17.1**
Industry	**9.8**	**6.8**	**5.5**	**29.8**	**29.3**	**29.1**
Mining & quarrying	13.8	13.0	2.9	2.4	2.4	2.5
Manufacturing	12.8	7.9	5.7	16.8	16.8	16.7
Electricity, gas, water supply & other utility services	4.7	9.2	7.2	2.7	2.6	2.6
Construction	3.7	1.3	5.7	7.9	7.4	7.4
Services	**9.6**	**7.5**	**7.9**	**52.5**	**52.8**	**53.9**
Trade, Hotel, Transport Storage	10.3	7.2	8.0	18.3	18.2	18.5

Sectors	Growth Rate at Constant (2011-12) Prices (%)			Share in GVA at Current Prices (%)		
	2015-16 2nd RE	2016-17 1st RE	2017-18 PE	2015-16 2nd RE	2016-17 1st RE	2017-18 PE
Financial , real estate & prof services	10.9	6.0	6.6	20.9	20.6	20.8
Public Administration, defence and other services	6.1	10.7	10.0	13.2	13.9	14.5
GVA at basic prices	**8.1**	**7.1**	**6.5**	**100.0**	**100.0**	**100.0**
GDP at market prices	8.2	7.1	6.7	---	---	---

Source: Central Statistics Office (CSO).
Notes: 2nd RE: Second Revised Estimates, 1st RE: First Revised Estimates, PE: Provisional Estimates..

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

Sectors	2016-17				2017-18			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Agriculture, forestry & fishing	**4.3**	**5.5**	**7.5**	**7.1**	**3.0**	**2.6**	**3.1**	**4.5**
Industry	**8.3**	**6.8**	**7.1**	**5.0**	**0.1**	**6.1**	**7.1**	**8.8**
Mining & quarrying	10.5	9.1	12.1	18.8	1.7	6.9	1.4	2.7
Manufacturing	9.9	7.7	8.1	6.1	-1.8	7.1	8.5	9.1
Electricity, gas ,water supply & other utility services	12.4	7.1	9.5	8.1	7.1	7.7	6.1	7.7
Construction	3.0	3.8	2.8	-3.9	1.8	3.1	6.6	11.5
Services	**9.4**	**7.9**	**6.5**	**6.3**	**9.5**	**6.8**	**7.7**	**7.7**
Trade, hotels, transport, communication and services related to broadcasting	8.9	7.2	7.5	5.5	8.4	8.5	8.5	6.8
Financial, real estate & professional **services**	10.5	8.3	2.8	1.0	8.4	6.1	6.9	5.0
Public administration, defence and Other Services	7.7	8.0	10.6	16.4	13.5	6.1	7.7	13.3
GVA at Basic Price	**8.3**	**7.2**	**6.9**	**6.0**	**5.6**	**6.1**	**6.6**	**7.6**
GDP at market prices	**8.1**	**7.6**	**6.8**	**6.1**	**5.6**	**6.3**	**7.0**	**7.7**

Source: (CSO).

TABLE 3 : Production of Major Agricultural Crops (3ND ADV. EST.)

Crops	Production (Million Tonnes)					
	2012-13	2013-14	2014-15	2015-16	2016-17 (FINAL)	2017-18 (3nd AE)
Total Foodgrains	**257.1**	**265.0**	**252.0**	**251.6**	**275.1**	**279.5**
Rice	105.2	106.7	105.5	104.4	109.7	111.5
Wheat	93.5	95.9	86.5	92.3	98.5	98.6

TABLE 3 : Production of Major Agricultural Crops (3ND adv. est.)-*Contd.*

Crops	Production (Million Tonnes)					
	2012-13	2013-14	2014-15	2015-16	2016-17 (FINAL)	2017-18 (3nd AE)
Total Coarse Cereals	40.0	43.3	42.9	38.5	43.8	44.9
Total Pulses	18.3	19.3	17.2	16.4	23.1	24.5
Total Oilseeds	30.9	32.8	27.5	25.3	31.3	30.6
Sugarcane	341.2	352.1	362.3	348.4	306.1	355.1
Cotton#	34.2	35.9	34.8	30.0	32.6	34.9

Source: DES, DAC & FW, M/o Agriculture & Farmers Welfare.
Notes: 3nd AE: 3nd Advance Estimates, # Million bales of 170 kgs. each.

TABLE 4 : Procurement of Crops (Million Tonnes)

Crops	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Rice#	34.0	31.8	32.0	34.2	38.1	36.2	
Wheat@	38.2	25.1	28.0	28.1	23.0	30.8	35.5
Total	**72.2**	**56.9**	**60.2**	**62.3**	**61.1**	**67.0**	**34.2**

Source: FCI and DFPD, M/o Consumer Affairs, Food and Public Distribution.
Notes: Procurement of rice as on 29.06.2018.
 # : Kharif Marketing Season (October-September), @ : Rabi Marketing Season (April-March).

TABLE 5 : Off-take of Foodgrains (Million Tonnes)

Crops	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 *
Rice	29.2	30.7	31.8	32.8	34.4	8.4
Wheat	30.6	25.2	31.8	29.1	24.8	5.6
Total (Rice & Wheat)	**59.8**	**55.9**	**63.6**	**61.9**	**59.2**	**14.0**

Source: DFPD, M/o Consumer Affairs, Food and Public Distribution.
Note: upto May 2018.

TABLE 6 : Stocks of Foodgrains (Million Tonnes)

Crops	1st July 2017	1st July 2018
1. Rice	21.0	23.3
2. Unmilled Paddy#	8.1	6.4
3. Converted Unmilled Paddy in terms of Rice	**5.4**	**4.3**
4. Wheat	**32.3**	**41.8**
Total (Rice & Wheat)(1+3+4)	**58.7**	**69.4**

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

Articles

Total Factor Productivity and Agricultural Production in India

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Abstract

Relationships and channels are fundamentals for the sustenance of agricultural value chain units. In most cases, the information system augments such relationships. So, the provision of such information system and efficient gadgets is the urgent duties of technology providers, specifically of those who are really concerned with the welfare of the parties in the value chains. A policy level initiative requires a well balanced outlook on the empirical relation between the Total Factor Productivity (TFP) and the agricultural growth. This paper is an attempt in this direction. The paper empirically tries to study the impact of TFP on agricultural output. To overcome the shortcomings of the past models, which drew strong conclusions on limited information, we have used national level data covering a longer period. The findings reveal that the agricultural output growth has been historically associated with growth in TFP. Further, by using Finite Distributed Lag Model, we identified how long the output growth takes to respond to TFP.

Keywords: *Total Factor Productivity, Technology, Agricultural Finance, Distributed Lag Model.*

1. Introduction

In agriculture and related value chain activities, a significant shift of human resources is taking place. Urbanization, pulling the skill from rural side, generally acts as a multiplier of this phenomenon. This shift would seriously and adversely affect the productivity of value chains which are still predominantly depending on the first hand skills. Further, extreme and high volatile climate events negatively affect the functioning of the value chains. Apart from these two aspects, value chains are exposed to various risks that are related with market. Information services that involve short-term and long-term productivity enhancements, minimize the negative effects of crisis events, and improve field-based risk management, are important ICT-related categories for inclusive agricultural value chains (Miller, Saroja, & Linder, 2013). Countries must empower poor farmers with information and communication assets and services that will enhance their productivity and incomes as well as protect their food security and livelihoods, and harness ICTs effectively to compete in complex, rapidly changing global markets (World Bank, 2011). Digital Financial Services (DFS) can help to address specific chronic challenges in the value chain- especially those challenges that need financial services solutions, cost efficiency concerns and in situations where the traditional finance sector is not fully capable to address the requirements in rural markets (Babcock, 2014; USAID, 2015; Martin, 2016; Lesher, 2016). Understanding the needs of smallholder families, DFS need to be designed and it must be complimented with the financial inclusion efforts (Lauer & Tarazi, 2015). To Influence the governance structure of the respective value chains, different activities and devices of input and technology providers frame relationships and trade channels in value chains (Franz, Felix, & Trebbin, 2014). These relationships and channels are fundamentals of sustenance of value chain units. In most cases, the information system augments such relationships. So, the provision of such information system and efficient gadgets are the urgent duties of technology providers, specifically of those, who are really concerned with the welfare of the parties in the value chains. Mismatch between the design of Market Information System (MIS) and smallholder farmers' perceptions of their gadgets' communication capabilities impede the adoption of MIS (Wyche & Steinfield, 2015). In this context, it is the duty of the manufacturer to producce high value gadgets for the beneficiaries of value

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chains. Participation in Global Value Chains (GVCs) is heterogenous and uneven, across and within countries (OECD, 2015). This challenge the development of technology that is compatible to all parties in the value chain. Indigeniuos products, generally, would not win the cost affordability status of various parties. Parties are responsible to bear the costs upto a certain level because they could derive some indirect benefits from DFS. These benefits include an audit trail, reduction in cash handling costs and leakages (ITU, 2016). Value chains, in turn, contribute something towards the overall digitisation in certain areas. The agriculture-based transactions can facilitate DFS penetration in rural areas, by digitising transactions around major rural economic activities (Ogwal & Mugabi, 2015). Thus innovation is driven by this interaction and routines of producers and users in the exchange of codified and tacit knowledge (OECD, 1996; Cortright, 2001). Generally, the knowledge alone, along with a combination of labour force and machines, are not expected to explain the aggregate changes in total income of units. Behind the conventional factors of production (labour and capital), there are some elements which contribute towards the added value in production. In most cases, this element would be a function of technology. This residual factor can be termed as Total Factor Productivity (TFP). Thus,

$$OP = T\ f(K,L)$$

Where OP is the output, K is the stock of physical capital invested and L is the labour. Here T stands for Total Factor Productivity.

A complete measurement of productivity is possible using the non parametric Data Envelopment Analysis (DEA). Here the ratio of linear combination of outputs over a linear combination of inputs is compared across observations. The method is criticized on the ground of many reasons. The linear aggregation is poorly supported with theoretical justification. Further, the method is not stochastic, which is demanding on the data. By overcoming the theoretical considerations, Index Numbers provide a room to calculate the productivity more precisely. Work of Solow (1957) is the celebrated one in this context. Solow index of TFP is as follows;

$$\ln A = \ln Y - (1-\alpha) \ln L - \alpha \ln K$$

In Y is the growth rate of output, In L is the growth rate of labour input and In K is the growth rate of capital input. In A is the growth rate of total factor productivity. Although the method offers advantage of easyness in calculation, it is conditioned by the data quality and the assumptions related with firm behaviour and market structure. In Econometric approch, regression analysis is used to estimate a production function and get the rate of technological progress from the production function.

2. Technology in Agriculture: Some Methodological Issues

The decomposition analysis carried out by Xu (2012) indicated a declining growth in agricultural productivity during 1960s to 1980s in the US. But the components of technological change contributed over 75 % of the total productivity growth in each period of the four decades. The same methodology recognises a relatively slow growth in the agricultural productivity growth of China. During the period of 30 years, the average growth rate was 0.11 % in China. The growth of main agricultural product was 0.14%, far below 3.5% growth rate of the US agricultural productivity under the same developmental stage during 60s through 90s. Growth in technological progress resulted in economic growth in Uganda (Alani, 2012). The period 1971-2009 witnessed an increase in either capital productivity or labor productivity, which gave rise to reduction in economic growth. Sometimes technology could help in bringing additional inputs and investments in productivity-enhancing practices. Growth of Research and Development (R&D) in a number of major emerging market economies is making them competitive destinations for cross-border R&D (OECD, 2007). Major emerging market economies thus adding their weight to the creation and commercialisation of innovative products, processes and services. Contribution towards R&D thus adds value. The experiment, carried out by Emerick, Janvry, Sadoulet, & Dar (2016) over a period of two years in the eastern Indian state of Odisha showed that technological innovation in agriculture can itself create a factor deepening effect where improved practices and additional inputs are used in response to innovation. Specifically, they studied the dissemination of an innovative new rice variety that well suited to local conditions in flood-

[1]In contrast, Cardarelli & Lusinyan (2015) estimated TFP across U.S. states and revealed that the slowdown in TFP in the mid- 2000s was not particularly stronger in IT- producing or IT intensive regions.

prone areas. Its key feature was flood tolerance. But the nature of survey was incompatible due to two reasons. The two year period is insufficient to cast the power of general flood conditions in India. Further, the extra variant weather conditions in India at different regions do not recognise a perfect representation by Odisha state. Waggoner (2004) initiated to chart the contribution of landesque technologies[2] to national performance. In the direction of present need, national crop production has increased. By technology, it would be meant as the systematic application of scientific knowledge for practical purposes (Wilde, 2016). Deeply rooted incompatibility among policy environments, institutional arrangements, and micro conditions and behaviour in agricultural R&D will result in large unrealised potential of the agricultural science and technology (S&T) in promoting growth and poverty reduction (Omamo & Naseem, 2005). The incompatibility, in case of India, is incepted from the inefficient responsibility sharing between centre and states. The centre has a limited authority with the agricultural provisions for states. It is hardly effective or sometimes limited to a general institutional arrangement or mechanism for agricultural science and technology. Therefore, a policy level initiative, in this respect, is required for a well balanced outlook on the empirical relation between TFP and agricultural growth. This paper is an attempt in that direction. The paper empirically tries to study the impact of TFP on agricultural output. In this regard, to overcome the shortcomings of the past models, which drew strong conclusions based on limited information, we have used national level data covering a longer period. The finding is that the agricultural output growth has been historically associated with growth in TFP. Further, by using Finite Distributed Lag Model, we identified how long it takes output growth to respond to TFP.

The remainder of this paper is organised as follows. Section Ɛ of this paper deals with the conventional model of agricultural output. Here TFP is an added factor. This section further corroborates the significant role of TFP on output. Section 4 deals with a Linear Regression with one predictor variable- agricultural finance. Here, value Addition is a function of finance. Section 5 delves into the response of output to periodical TFP growth. Finally, section 6 concludes the paper.

3. Model Specification

$$AOPgr = \alpha + \beta_1 Tgr + \beta_2 Kgr + \beta_3 Lgr + \beta_4 Fgr + Ɛ$$

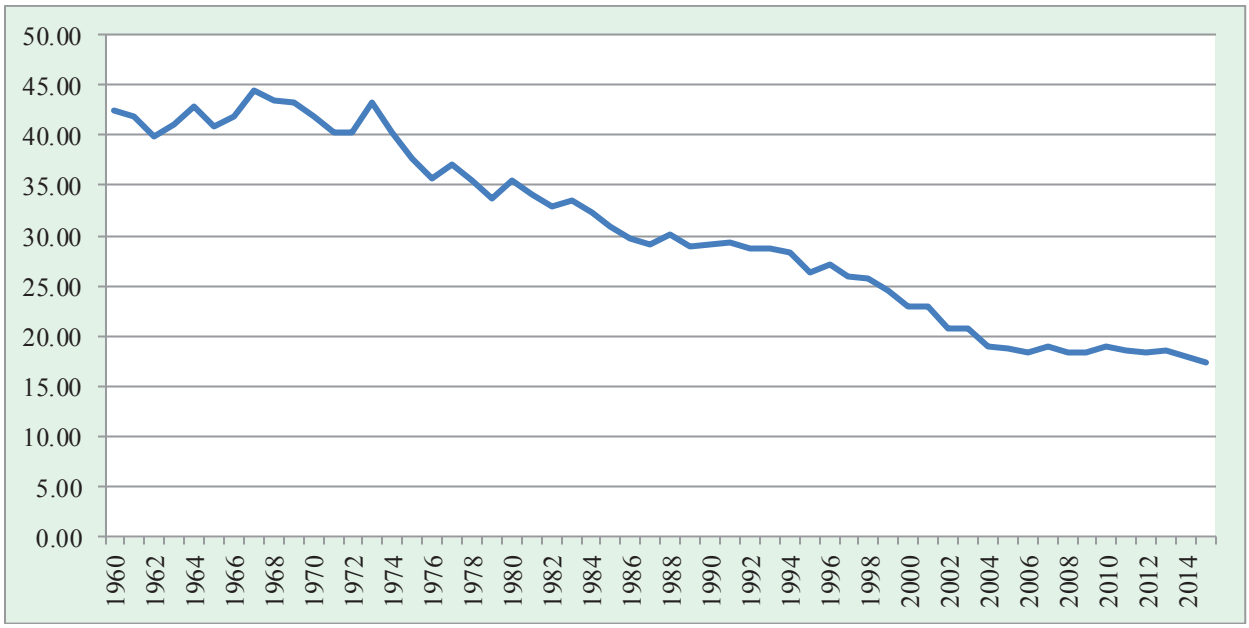
Where, *Tgr* is growth in Total Factor Productivity, *Kgr* is growth in machinery, *Lgr* is growth in labor and *Fgr* is growth in Fertilizers. The model is supported by the constant term α and an error term ε. Gross Agricultural Production growth (smoothed using Hodrick-Prescott filter [3], λ=6) is a function of growth in TFP, machinery, labor and fertilizers. Machinery Growth Rate is growth in number of 40 CV Tractor-Equivalents in Use Machinery Units (4w, 2w tractors, harvester -threshers, milking machines, aggregated by CV/machine weights). Labour Growth Rate is growth in number of persons economically active in agriculture, +15 yrs, male plus female. Fertilizer growth rate is growth rate in tonnes of N, P_2O_5, and K_2O nutrients of fertilizer consumption. The study period is from 1962 to 2015. Data gathered from the report of United States, Department of Agriculture (USDA), Economic Research Service[4] .

[2]Technology that saves land.

[3]A mathematical tool used in macroeconomics to remove cyclical component of a time series from raw data. This is especially used in real business cycle theory and obtain a smoothed –curve representation of a time series. This will be more sensitive to long-term than to short-term fluctuations. The adjustment of the sensitivity of the trend to short-term fluctuations is achieved by modifying a multiplier λ (Hodrick & Prescott, 1997).

[4] https://www.ers.usda.gov/webdocs/DataFiles/51270/AgTFPindividualcountries.xlsx?v=42650. Method for estimating average annual growth rates: The rate of growth in an economic series X between years t and t+1 is defined by Ln(Xt/Xt+1). The average rate of growth in series X over years t to t+n is the coefficient β from the regression Ln(Xt) = α+ βt. This is determined in Excel using the formula Ln(logest(Xt:Xt+n)), where (Xt:Xt+n) corresponds to the addresses of the cell range containing the series.

Figure 1 Agriculture, Value Added (% Of Gdp) In India



Source: World Bank national accounts data, and OECD National Accounts data files.
http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=IN
Note: Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. For VAB countries, gross value added at factor cost is used as the denominator.

TABLE 1 : CORRELATION MATRIX

	AOPgr	Tgr	Kgr	Lgr	Fgr
AOPgr	1.000	.742	-.128	-.049	-.197
Tgr	.742	1.000	-.300	-.270	-.540
Kgr	-.128	-.300	1.000	.259	.325
Lgr	-.049	-.270	.259	1.000	.222
Fgr	-.197	-.540	.325	.222	1.000

TABLE- 2 : REGRESSION RESULTS: AGRICULTURAL INPUTS ON OUTPUT GROWTH

Intercept	.008
Tgr	.930
Kgr	.030
Lgr	.135
Fgr	.266
t Value	
Tgr	8.578(.000)
Kgr	.305(.762)
Lgr	1.430(.159)
Fgr	2.458(.018)
F Value	19.766
R	.792
R Square	.627
Adjusted R Square	.595
Std. Error of the Estimate	.00627
Durbin-Watson	1.516

N= 52 (Number of Years). Figures in the parenthes is shows p-value

Output growth in agriculture has been historically associated with the growth in TFP. Contradicting the traditional views, the model specifies insignificant contribution of growth in machinery and labor towards agricultural output growth. Theoretically, machinery and labor substitute each other. Thus, an increase of one unit machinery would decrease the quantity of labor, ceteris paribus. Empirical data proves that the agricultural output is hardly associated with mechanization. The result suggests to eliminate blind mechanization but to adopt measures to enhance the factor productivity. So, value adding units must take efforts to identify

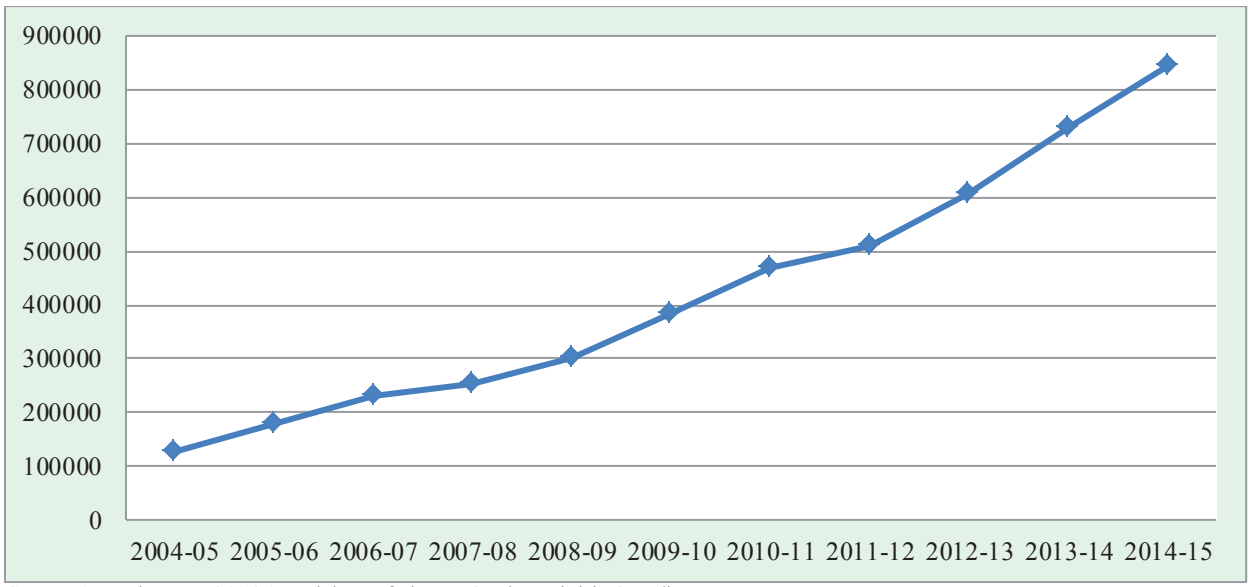
the Productivity Enhancement Facilities (PEF). In most circumstances, the units are compatible and limited by size, therefore, could only identify such facilities. Government is the dominant provider of PEF in India. The PEF, which is arbitrarily accommodated by the value adding units, does not need to be firm specific. Capital is the pervasive and more responsive factor in agricultural production. Further, land and labor are more distant and hence, more uncontrollable factors for state. So, a change in the productivity of capital is an easier task and would highly sensitize the agricultural growth. This ratifies the growth of digital financial services for agricultural value additions in India.

4. Agricultural finance on value addition in india

$AVA = \alpha + \beta AgrCr + \varepsilon$

Agricultural Value Added (AVA) is determined by the credit flow, the predictor. AVA is the natural logarithm of value added in agriculture in tonnage and AgrCr is the natural logarithm of agricultural credit flow in Rupees in Crore, Inflationary drawbacks and structural breaks in the economy after 1990s, which have significant impacts on the quantum of credit flow, limit the usage of a very long term data for this purpose and thus the observed period is from 2004 to 2015. Further, to ratify the association of AVA with DFS, it is better to focus on recent period. The period accommodates the amplified use of digital services for financial transactions in India. Developments of electronic gadgets and computers, fortified the extension of financial services to the agricultural value chains in India.

Figure-2: Agricultural Credit Flow (Rs. In Crore)



Source: Annual Report 2016-17, Ministry of Finance (Budget Division), India

TABLE 3 : REGRESSION RESULTS: CREDIT FLOW ON VALUE ADDITION

Intercept	19.97
Agr Cr	.967(0.00)
t Value	11.48
F	131.70
N (Number of Years)	11
R Square	.936
Adjusted R Square	.929
Std. Error of the Estimate	.08147
Durbin-Watson	1.034

Figures in the parenthes is shows p- value

High positive and significant explanatory power of finance to agriculture is the rationale of using vast modes. From the point of view of technology, there are sophisticated financial services which would definitely add to the momentum of flow and thus add value. Both direct and indirect finance, using different modes, are contributories towards

the agricultural value addition in India. Various modes specialize in various delivery mechanisms and thus, collectively contribute towards value addition. However, there exist stringent variations in achieving targets.

TABLE 4 : GROWTHS IN VARIANCE OF TARGET AND ACHIEVEMENT OF AGRICULTURAL FINANCE IN INDIA

Year	Growth
2005-06	0.94
2006-07	0.38
2007-08	-0.45
2008-09	-0.26
2009-10	1.72
2010-11	0.57
2011-12	-0.61
2012-13	-0.10
2013-14	-0.07
2014-15	0.50
2015-16	-0.39
2016-17 (up to 30.9.2016)	-6.23

Source: Annual Report 2016-17, Ministry of Finance (Budget Division), Government of India

The period shows a negative (-0.33) growth in variance of target and achievement in agricultural finance in India. This negative figure justifies the need for a strong financial delivery mechanism in agriculture. This variance would surely affect value addition in India. The extreme change in the variance is not, generally, be a function of technological change. The impact of change in technology would affect the growth. But it would take sufficient time. The volatility of sign change in the growth in variance does not accommodate such a resultant change in technology. However, there are arguments regarding the distribution of such a change in technology.

5. Finite Distributed Lag Model

It is presumed that the growth, especially in agricultural sector, is not instantly associated with the volatility in technology and thus, with the TFP. But the aggregation over time in technology may have affected the growth. Since TFP itself is a strong determinant of value addition, the association shall be more visible in the case of agriculture. Aggregation or growth in the TFP at regular intervals would individually contribute towards the growth in output. Thus, agricultural output growth is a function of not only the current year's TFP but also the preceding years' TFP. This model is used to identify how long it takes output growth to respond to TFP.

$$AOPgr_t = \alpha + \beta_2 Tgr_t + \beta_3 Tgr_{t-1} + \beta_4 Tgr_{t-2} + \beta_5 Tgr_{t-3} + u_t$$

Tgr_t is current year's growth in TFP. Association of Agricultural Output Growth with the TFP growth for current and preceding three years' is empirically analyzed here. The logic behind selecting the preceding three years' confined to the idea related with a general cycle which mandates a shift in technology. However, the 52 years period does not, in any way, recommend such an average number of years for change.

A distributed lag model is a dynamic model in which the effect of a regressor x on y occurs over time rather than all at once. In the above specified model, the individual coefficients βs are called lag weights and collectively this make a lag distribution. They define the pattern of how x affects y over time. Anderson, (1974) applied distributed lag supply response models to Australian barely data for the period 1946-47 to 1968-69. He discussed a number of statistical problems associated with the adaptive expectations[5] model. Since rational expectations are based on broader and longer learning experience and data, the same is appropriate for more comprehensive and longer-term planning (Mlambo,2012).

TABLE 5 : CORRELATIONS

	$AOPgr_t$	Tgr_t	Tgr_{t-1}	Tgr_{t-2}	Tgr_{t-3}
$AOPgr_t$	1.000	.678	.706	.615	.477
Tgr_t	.678	1.000	.466	.436	.331
Tgr_{t-1}	.706	.466	1.000	.456	.429
Tgr_{t-2}	.615	.436	.456	1.000	.441
Tgr_{t-3}	.477	.331	.429	.441	1.000

TABLE 6 : GROWTHS IN TFP ON OUTPUT GROWTH

Intercept	.018
Tgr_t	.363(.000)
Tgr_{t-1}	.390(.000)

TABLE 6 : GROWTHS IN TFP ON OUTPUT GROWTH -*CONTD.*

Tgr_{t-2}	.243(.018)
Tgr_{t-3}	.083(.388)
t Values	
Tgr_t	3.780
Tgr_{t-1}	3.912
Tgr_{t-2}	2.457
Tgr_{t-3}	.872
Collinearity Statistics	
a. Tolerance	
Tgr_t	.714
Tgr_{t-1}	.661
Tgr_{t-2}	.674
Tgr_{t-3}	.735
b. VIF	
Tgr_t	1.400
Tgr_{t-1}	1.512
Tgr_{t-2}	1.484
Tgr_{t-3}	1.361
F Value	26.970
R Square	.710
Adjusted R Square	.684
Std. Error of the Estimate	.00467

N= 52 (NUMBER OF YEARS) FIGURES IN THE PARENTHESIS SHOWS P- VALUE

Marginal effect of independent variable (TFP) is estimated in the previous model and it has explained how much effect it has on output growth. The distributed lag model tells about when it has any effect. Is the effect immediate? In this model, the longest lag (Tgr_{t-3}) is insignificant. Previous year's TFP is highly significant and positively impacting the output growth. One year lag in technology (TFP) produce positive benefits to agricultural value addition. Present scenario demand developments in landesque technologies in India. But the recent developments show a tendency to laborsque technological growth. The models further assume a significant improvement in technology which bridged the gap in the demand and supply of capital. DFS, in that sense, minimizes the capital.

Concluding Remarks

Our empirical results accommodate positive and significant role of Total Factor Productivity (TFP) on the value addition in agriculture. There is a long term presence of effective TFP in agriculture. The former part of historical data on TFP is largely a function of Research & Development on High Yield Variety (HYV) seeds. The later part of the data, after 1980s, is largely a function of technology which is designed to target finance. Digital Financial Services (DFS), as a proxy of TFP, could address various challenges faced by agricultural value chain units. The improvements in technology and its applications in financial services would add value and the resultant addition would be effective in future also. The distributed lag model proves it. Significant positive contribution of TFP and capillarity of output to finance and to near past TFP suggest the mass implementation of DFS in agriculture and related value chains in India.

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[5] People form expectations about what will happen in future depends on what has happened in the past. This theory is often regarded as a deviation from rational expectation in which expectations are constructed on full available information.

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Appendix- Data

Year	Growth Rate in Aggregate Inputs	Agricultural Total Factor Productivity Growth	Machinery Growth Rate*	Labour Growth Rate**	Fertilizer Growth Rate***	Gross Agricultural Production****	Output Growth Rate
1962	0.010	-0.006	0.113	0.013	0.134	61080060.023	0.005
1963	0.009	-0.004	0.125	0.013	0.184	61401894.394	0.005
1964	0.012	-0.005	0.092	0.013	0.128	61782372.678	0.006
1965	0.007	0.002	0.084	0.014	0.149	62326026.829	0.009
1966	0.015	0.001	0.112	0.014	0.463	63315525.921	0.016
1967	0.021	0.004	0.187	0.014	0.334	64862268.581	0.024
1968	0.014	0.015	0.158	0.014	0.041	66775047.778	0.029
1969	0.007	0.023	0.137	0.014	-0.218	68792083.988	0.030
1970	0.018	0.010	0.102	0.014	0.254	70717979.799	0.028
1971	0.027	-0.003	0.339	0.017	0.273	72431185.079	0.024
1972	0.011	0.011	0.166	0.017	0.083	74028125.614	0.022
1973	0.015	0.009	0.079	0.017	-0.018	75812700.180	0.024
1974	0.011	0.015	0.096	0.017	0.047	77823405.550	0.026
1975	0.017	0.013	0.110	0.017	-0.059	80173376.114	0.030
1976	0.017	0.014	0.095	0.018	0.297	82636213.785	0.030
1977	0.028	0.002	0.155	0.018	0.188	85151518.363	0.030
1978	0.025	0.002	0.126	0.018	0.102	87511981.581	0.027
1979	0.014	0.012	0.124	0.018	0.104	89779440.333	0.026
1980	0.017	0.012	0.014	0.018	0.044	92384077.632	0.029
1981	0.026	0.007	0.087	0.016	0.090	95455203.662	0.033
1982	0.014	0.021	0.098	0.017	0.024	98868489.156	0.035
1983	0.029	0.008	0.084	0.016	0.123	102556510.752	0.037
1984	0.029	0.005	0.095	0.016	0.187	106105963.161	0.034
1985	0.020	0.011	0.092	0.016	0.080	109470639.190	0.031
1986	0.019	0.012	0.065	0.016	0.104	112841923.258	0.030
1987	0.003	0.030	0.072	0.016	-0.142	116565788.978	0.032
1988	0.038	-0.002	0.089	0.016	0.255	120858915.496	0.036
1989	0.022	0.014	0.214	0.015	0.050	125339559.405	0.036
1990	0.019	0.015	0.075	0.015	0.059	129690465.186	0.034
1991	0.023	0.010	0.081	0.015	0.059	133982904.016	0.033
1992	0.013	0.019	0.073	0.015	-0.046	138353751.351	0.032
1993	0.013	0.019	0.057	0.015	0.019	142773293.587	0.031
1994	0.021	0.010	0.057	0.015	0.091	147176156.473	0.030
1995	0.014	0.015	0.078	0.011	0.023	151473594.509	0.029
1996	0.018	0.009	0.103	0.011	0.033	155544635.365	0.027

Year	Growth Rate in Aggregate Inputs	Agricultural Total Factor Productivity Growth	Machinery Growth Rate*	Labour Growth Rate**	Fertilizer Growth Rate***	Gross Agricultural Production****	Output Growth Rate
1997	0.019	0.004	0.095	0.011	0.121	159198907.006	0.023
1998	0.017	0.003	0.087	0.011	0.037	162414523.614	0.020
1999	0.016	0.000	0.081	0.011	0.073	165094514.215	0.016
2000	0.006	0.007	0.075	0.011	-0.077	167209220.430	0.013
2001	0.016	-0.004	0.071	0.012	0.037	169247763.756	0.012
2002	0.002	0.013	0.067	0.012	-0.076	171803462.007	0.015
2003	0.023	0.001	0.064	0.012	0.043	175888995.289	0.024
2004	0.015	0.016	0.053	0.011	0.092	181389956.687	0.031
2005	0.022	0.017	0.053	0.013	0.101	188434765.472	0.038
2006	0.015	0.027	0.054	0.013	0.061	196630649.225	0.043
2007	0.019	0.025	0.054	0.007	0.042	205340882.740	0.043
2008	0.010	0.031	0.047	0.011	0.098	213939999.539	0.041
2009	0.017	0.023	0.111	0.010	0.062	222673605.258	0.040
2010	0.025	0.017	0.134	0.010	0.060	232102992.689	0.041
2011	0.011	0.030	0.087	0.010	-0.012	241819088.769	0.041
2012	0.008	0.031	0.064	0.010	-0.085	251400033.906	0.039
2013	0.007	0.030	0.089	0.010	-0.042	260908775.423	0.037

Source: Report of United States Department of Agriculture (USDA) Economic Research Service
**Number of 40 CV Tractor-Equivalents in Use Machinery Units*
***Persons economically active in agriculture, +15 yrs*
****Tonnes of N, P_2O_5, and K_2O nutrients of fertilizer consumption*
*****Smoothed using Hodrick-Prescott filter, λ=6*

Status of Marine Fisheries Sector in Gujarat

HEMANT SHARMA[1], M. SWAIN[2] AND S. S. KALAMKAR[3]

Abstract

The aim of the study is to examine the status of the marine fisheries sector in Gujarat and adequacy of infrastructure facilities for the same. The study is based on secondary data which is collected from published sources. Gujarat is the third highest fish producer in India (after West Bengal and Andhra Pradesh) and the largest producer of marine fish. The state has a long coastline extending to 1600 km, accounts for 19.70 per cent of the total coastline of the country and about 46 per cent of the western coastline of India. Out of the total production of 7.93 lakh MT in 2013-14 in Gujarat, about 88 percent was marine fish while remaining 12 per cent was inland fish production. So far, there exist 5 fish harbours in the state with a production capacity of 388000 metric tons and another 5 harbours have been proposed to be established in the state. The harbours like Porbandar and Veraval are overcrowded due to less space in the harbour region and a large number of boats parked there than its capacity. Because of this, fish catching exceeds the capacity of harbour. Therefore, there is a need of expansion of harbour regions as well as constructions of more number of jetties/landing platforms. The Government and development agencies should ensure that changes in post-harvest fisheries-related policy and practices take a stock of loss assessment tools, information generated and experience of the programmes under implementation. Fish loss assessments should be incorporated into national data collection systems and used regularly to devise policy.

Key words: *Fishery sector, production and conservation.*

1. Introduction

The fisheries sector plays an important role in the Indian economy. It contributes to the national income, exports, food and nutritional security and in employment generation. This sector is also a principal source of livelihood for a large section of economically underprivileged population of the country, especially in the coastal areas. This sector provides livelihood to approximately 14.49 million people in the country. It has been recognized as a powerful income and employment generator as it stimulates the growth of a number of subsidiary industries and is a source of cheap and nutritious food, besides being a source of foreign exchange earner. The fisheries sector is rarely a strategic sector for national economic development. Although it plays a prominent role in developing state's rich fishery resources relative to their populations, it is nonetheless an important economic activity, and very often a strategic one, in many coastal regions of India. The fisheries and aquaculture in India are vibrant economic activities and have been one of the fastest growing food production systems during the last three decades. Their significance and contribution towards agricultural (4.75 per cent GDP in 2012-13 at current prices) and national economies (0.83 percent to national GDP in 2012-13 at current prices), livelihood and nutritional security, employment generation (14.49 million people) and foreign exchange earnings (over Rs. 33441 crore in 2014-15) have been enormous. Out of the total fish production in India, about 65 percent production is from resources inland and remaining 35 percent from marine sources.

In India, fish is the major source of protein for over one-third of the population, especially for the rural poor in coastal areas. About 35 per cent of Indian population is fish eaters and the annual per capita consumption is 9.8 kg whereas the recommended intake is 13 kg (Srinath et al., 2008; GOI, 2011). The marine fish production has also been stagnating over recent years (CMFRI, 2004). Being a

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highly perishable commodity, fish requires proper landing facilities, processing, storage, transport and distribution facilities running through the entire supply chain from capture to consumer. Adequate provisions of such infrastructure may result in the utilization of fish in a cost-effective and efficient way and absence of such required infrastructure facilities result in considerable wastage and losses. As there is limited scope for horizontal expansion to cope with the public food demand, vertical intensification through the integration of different farm based enterprises and post-harvest loss reductions could help to meet expected increase in production demand and quality (Kevin, 2006). Thus, post-harvest fish losses are one of the immediate policy concerns as it happens in most of the fish distribution chains in India.

2. Data and Methodology

The present study examines the present status of marine fisheries in Gujarat and evaluates the adequacy of infrastructure facilities. The study is based on the secondary level data. The secondary data on growth, species composition, catch disposition, and processing infrastructure at the state level were collected from the publication of Commissionerate of Fisheries, Government of Gujarat, Gandhinagar.

3. Result and Discussion

3.1 Fish Production in Gujarat

Marine fisheries constitute a valuable source of food and employment and a net contributor to the balance of payment. Marine fisheries have progressively increased by nearly six times during the last five decades. The estimated marine resources potential of the Indian Exclusive Economic Zone (EEZ) is 4.24 million MT at the present exploitation rate. The country has a long coastline of 8118 km and equally large areas under estuaries, backwaters, lagoons, etc., conducive for developing capture as well as culture fisheries. With the declaration of the EEZ in 1977, an area of 2.02 million sq. km. (comprising of 0.86 million sq. km on the west coast, 0.56 million sq. km on the east coast and 0.60 sq. km around the Andaman & Nicobar Islands) was protected for fisheries. The East Coast covers four states and two Union Territories (West Bengal, Odisha, Andhra Pradesh, Tamil Nadu, Pondicherry and Andaman & Nicobar Islands) and the West Coast covers five states and two Union Territories (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Daman & Diu, and Lakshadweep). The maximum length of coastline (1912 km) is from Andaman & Nicobar Island followed by Gujarat (1600 km) (see, Table 1). Thus, Gujarat state accounts for about one fifth of the length of coastline of our country.

TABLE 1 : STATEWISE COAST LINE AND CONTINENTAL SHELF AREA (2012)

Sr. no.	State	Length of Coast line (Km)	Continental Shelf ('000 sq. km.)
1	Andhra Pradesh (Undivided)	974	33
2	Goa	104	10
3	Gujarat	1600	184
4	Karnataka	300	27
5	Kerala	590	40
6	Maharashtra	720	112
7	Odisha	480	26
8	Tamilnadu	1076	41
9	West Bengal	158	17
10	A& N Island	1912	35
11	Daman & Diu	27	NA
12	Lakshwadeep	132	4
13	Pondicherry	45	1
14	Total	8118	530

SOURCE: GOI (2011).

Fish production in India has shown an increasing trend from 0.75 million metric tonnes (MMT) in 1950-51 to reach 10.07 MMT in 2014-15 as depicted in Table 2. In case of marine fisheries, production has increased from 0.53 MMT in 1950-51 to 3.44 MMT in 2013-14. The annual growth rate of marine fish production has fluctuated sharply. It increased from 2.32 per cent in 1955-56 to 9.53 per cent in 1960-61 and stood at 25.21 per cent during 1989-90. The growth rate was negative during the 1965-66, 1981-83, 1986-88, 1997-99 and 2003-05. Since 2008-09, the growth rate has been positive except during 2012-13.

TABLE 2 : FISH PRODUCTION IN INDIA (1950-51 TO 2013-14)

Year	Fish Production ('000 tonnes)			Average Annual Growth Rate (%)		
	Marine	Inland	Total	Marine	Inland	Total
1950-51	534	218	752	-	-	-
1960-61	880	280	1160	9.53	3.05	7.65
1970-71	1086	670	1756	6.36	6.43	6.39
1980-81	1555	887	2442	4.22	4.6	4.36
1990-91	2300	1536	3836	1.1	9.56	4.32
2000-01	2811	2845	5656	-1.44	0.78	-0.33
2010-11	3250	4981	8231	4.7	1.78	2.91
2011-12	3372	5294	8666	3.75	6.28	5.28
2012-13	3321	5719	9040	-1.51	8.03	4.32
2013-14	3443	6136	9579	3.67	7.29	5.96

Source: GOI (2014), Handbook of Fisheries Statistics.

Among the states, Andhra Pradesh and West Bengal have emerged as the leading producers of inland fish during 2014-15 accounting 26 and 23 percent of total inland production, respectively, followed by Bihar (7.0 %). It can be seen from the Table 3 that these three states together accounted for more than 55 percent of inland fish production in India in 2013-14. In case of marine fish production, Gujarat has emerged as the leading producer (accounts 20.20 % in total) followed by Kerala (15.17 %), Maharashtra (13.58%), Andhra Pradesh (12.73%) and Tamil Nadu (12.55%). Thus, these five major states together accounted for about 74 percent of total marine fish production in India. However, there are appreciable losses during both harvest and post-harvest stages in fisheries. Therefore, it is important to know the nature and causes of losses in fish value.

Gujarat is the northern most maritime State on the west coast of India situated between 20.6 and 24.42 degrees latitude and 68.10 and 74.28 degrees east longitude. Gujarat has one of the richest fishing grounds in India and the most important commercial varieties of fish (such as Pomfret, Hilsa, Bombay duck, Ribbon fish, Catfish, Rays, Cuttle fish, Shrimps, etc.). Thus, Gujarat possesses a vast resource with favourable climates and environment condition for flourishing fish production through aquaculture.

TABLE 3 : STATE WISE INLAND AND MARINE FISH PRODUCTION IN INDIA (2013-14)

States/UTs	Production (in ' 000 Tonnes)			Share in total production (%)		
	Marine	Inland	Total	Marine	Inland	Total
A and Nicobar Islands	36.75	0.2	36.95	1.07	0.00	0.38
Andhra Pradesh	438.25	1580.17	2018.42	12.73	25.75	20.68
Arunachal Pradesh	0	0.55	0.55	0.00	0.01	0.01
Assam	0	266.7	266.7	0.00	4.35	2.73

States/UTs	Production (in ' 000 Tonnes)			Share in total production (%)		
	Marine	Inland	Total	Marine	Inland	Total
Bihar	0	432.3	432.3	0.00	7.05	4.43
Chandigarh	0	0.11	0.11	0.00	0.00	0.00
Chhattisgarh	0	284.96	284.96	0.00	4.64	2.92
Dadra and Nagar Haveli	0	0.05	0.05	0.00	0.00	0.00
Daman and Diu	18.78	0.23	19.01	0.55	0.00	0.19
Delhi	0	0.88	0.88	0.00	0.01	0.01
Goa	109.57	4.49	114.06	3.18	0.07	1.17
Gujarat	695.58	97.84	793.42	20.20	1.59	8.13
Haryana	0	116.9	116.9	0.00	1.91	1.20
Himachal Pradesh	0	9.83	9.83	0.00	0.16	0.10
Jammu and Kashmir	0	19.98	19.98	0.00	0.33	0.20
Jharkhand	0	104.82	104.82	0.00	1.71	1.07
Karnataka	357.36	197.95	555.31	10.38	3.23	5.69
Kerala	522.31	186.34	708.65	15.17	3.04	7.26
Lakshadweep	18.72	0	18.72	0.54	0.00	0.19
Madhya Pradesh	0	96.26	96.26	0.00	1.57	0.99
Maharashtra	467.46	135.22	602.68	13.58	2.20	6.18
Manipur	0	28.54	28.54	0.00	0.47	0.29
Meghalaya	0	5.75	5.75	0.00	0.09	0.06
Mizoram	0	5.94	5.94	0.00	0.10	0.06
Nagaland	0	7.47	7.47	0.00	0.12	0.08
Odisha	120.02	293.77	413.79	3.49	4.79	4.24
Puducherry	37.81	4.27	42.08	1.10	0.07	0.43
Punjab	0	104.02	104.02	0.00	1.70	1.07
Rajasthan	0	35.1	35.1	0.00	0.57	0.36
Sikkim	0	0.42	0.42	0.00	0.01	0.00
Tamil Nadu	432.27	192.03	624.3	12.55	3.13	6.40
Telangana	0	0	0	0.00	0.00	0.00
Tripura	0	61.95	61.95	0.00	1.01	0.63
Uttar Pradesh	0	464.48	464.48	0.00	7.57	4.76
Uttarakhand	0	3.89	3.89	0.00	0.06	0.04
West Bengal	188.24	1392.41	1580.65	5.47	22.69	16.20
India	3443.12	6135.79	9578.91	100.00	100.00	98.16

Source: www.indianstat.com

3.2 Fishing Resources in Gujarat

Gujarat is endowed with a wide range of marine and inland aquatic resources. The state has a long coastline extending to 1600 km accounts for 19.70 per cent of the total coastline of the country and about 46 per cent of the western coastline of India. It has a continental shelf area of 0.18 million km^2, Exclusive Economic Zone (EEZ) of 0.214 million km^2, which occupies 32 per cent of the continental

shelf area and 10 per cent of the total EEZ of India. The Gujarat coast, including the two Gulfs, is blessed with physical features congenial to the development of fisheries. The major fisheries resources of the state include Elasmobranches, Bombay ducks, Sciaenids, Shrimps, Seer fishes, Tunas, Threadfin Breams, Pomfrets, Catfishes, Lizard fishes, Bull's eyes, Carangids, Anchovies, Ribbon fishes, Croakers, Prawns, Lobsters and Cephalopods. Along the coastline of Gujarat, 851 fishing villages/towns and 286 marine landing centers are located. Gujarat has 123 fish landing centers located in 226 fishing village (Table 5). About 19 per cent of the landing centers are located in Valsad district followed by 15.45 per cent in Kutch district and 13.82 per cent each in Jamnagar and Junagarh and 8.13 per cent in Surat district. About 55062 fishermen families and 316972 fisher folk population are located in fishing villages.

TABLE 4 : DISTRICT-WISE FISHERY RESOURCE STATUS IN GUJARAT (2012-13)

District	App. coast	Length of line (kms)	Number of landing centers		Number of fishery villages		No. of fisherman family		Fisher Folk Population	
Valsad	63	(3.9)	23	(18.7)	25	(11.1)	10673	(19.4)	55851	(17.6)
Navsari	27	(1.7)	9	(7.3)	11	(4.9)	5364	(9.7)	24748	(7.8)
Surat	83	(5.2)	10	(8.1)	19	(8.4)	2252	(4.1)	11863	(3.7)
Bharuch	127	(7.9)	9	(7.3)	19	(8.4)	1273	(2.3)	6419	(2.0)
Anand	51	(3.2)	1	(0.8)	1	(0.4)	312	(0.6)	1694	(0.5)
Rajkot	26	(1.6)	1	(0.8)	1	(0.4)	140	(0.3)	870	(0.3)
Kachchh	406	(25.4)	19	(15.4)	65	(28.8)	4122	(7.5)	19694	(6.2)
Jamnagar	342	(21.4)	17	(13.8)	26	(11.5)	5982	(10.9)	40900	(12.9)
Bhavnagar	152	(9.5)	9	(7.3)	23	(10.2)	1351	(2.5)	6862	(2.2)
Porbandar	105	(6.6)	5	(4.1)	23	(10.2)	6048	(11.0)	32639	(10.3)
Junagadh	156	(9.8)	17	(13.8)	6	(2.7)	14704	(26.7)	88274	(27.8)
Amreli	62	(3.9)	3	(2.4)	7	(3.1)	2841	(5.2)	27158	(8.6)
Total	**1600**	**(100.0)**	**123**	**(100.0)**	**226**	**(100.0)**	**55062**	**(100.0)**	**316972**	**(100.0)**

Note: The figures in parentheses are the percentage of respective total.

Source: GOG (2013), Gujarat Fisheries Statistics 2012-13.

Over the last five decades, fisheries sector of Gujarat has undergone radical changes. While marine resources of Gujarat are spread mainly in the Arabian sea, the inland waters in the form of rivers, canals, estuaries, ponds, reservoirs, brackish water impoundments, waterlogged areas, etc., constitute a bed rock of inland fisheries in the state. The total fish production in the State has increased by almost ten times during the last five decades period, i.e. from 0.79 lakh MT in 1960-61 to 7.93 lakh MT in 2013-14. The state has taken necessary steps in order to achieve the targets fixed for both inland and marine fish production in State. Out of the total production of 7.93 lakh MT in 2013-14, about 88 percent was marine fish while remaining 12 per cent was inland fish production. Thus, marine fish dominates the fish production in Gujarat. Gujarat is the third highest fish producer in India (after West Bengal and Andhra Pradesh) and the largest producer of marine fish.

However, Gujarat's share in the total fish production has been fluctuating in volume terms and has come down in value terms in the last decade. The main reason could be the declining fish catch and quality of catch. It is reported that 35 per cent of the catch in the marine sector is low value miscellaneous fish. As mentioned earlier, in total marine fish production in the state, small sciaenid accounts for around 27 per cent followed by Bombay duck (14.30%), ribbon fish (5.63 %), Cuttle fish (3.85%) and catfish (3.6 %) in the year 2012-13.

The data, on districtwise marine production in Gujarat during 2004-05 to 2014-15 presented in Table 6, indicates that Junagadh district contributes the bulk of the marine landings (40.79%), followed by Valsad (13.39%), Porbandar (13.28%), Kutch (10.12 %), Jamnagar (9.73%), Amreli (7.26%) and Navsari (4.0%). The remaining districts such as Bhavanagar, Rajkot, Surat, Baruch and Kheda accounts for less

than one percent share in total. The Saurashtra coast between the Gulf of Kutch and Gulf of Cambay presents unique oceanographic features and is endowed with a wide variety of highly relished table fishes. An incredible achievement of the state has been made in the foreign exchange earnings through export of fish and fish products.

TABLE 5 : DISTRICTWISE MARINE FISH PRODUCTION IN GUJARAT

District	Marine Fish Production in Gujarat ('000 tonnes)											% share in total 2014-15	CAGR (2004-05 to 2014-15)
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15		
Valsad	78.6	79.1	57.7	41.5	35.2	81.4	87.5	87.6	88.5	92.9	92.8	13.29	1.52
Navsari	33.6	34.7	30.0	15.5	8.7	11.3	19.4	20.2	26.6	28.6	28.4	4.06	-1.52
Surat	8.7	11.2	10.4	9.5	3.5	4.5	2.5	3.2	3.2	3.5	3.5	0.50	-7.91
Bharuch	1.5	1.6	3.8	6.4	6.9	6.1	5.8	6.4	4.8	4.0	3.5	0.49	7.87
Anand	2.6	3.0	2.3	0.3	0.4	0.5	0.3	0.5	0.4	0.3	0.3	0.04	-18.65
Rajkot	1.9	1.5	2.7	2.3	1.0	1.0	1.1	1.0	0.5	0.6	0.2	0.03	-17.46
Kachchh	64.7	62.4	59.4	58.7	53.3	60.4	73.0	72.9	72.8	70.3	70.7	10.12	0.81
Jamnagar	45.9	66.5	65.2	59.2	62.6	88.3	67.5	67.1	67.8	68.1	68.0	9.73	3.63
Amreli	59.3	66.8	77.8	161.5	200.8	101.9	60.7	60.6	57.6	50.6	50.7	7.26	-1.41
Junagadh	233.3	281.5	300.8	259.8	250.8	265.0	280.2	280.9	278.1	283.0	284.9	40.79	1.83
Porbandar	49.9	51.0	60.4	61.6	56.4	63.4	88.6	89.6	90.8	91.5	92.8	13.28	5.80
Bhavnagar	5.0	4.6	6.3	4.6	4.4	3.6	2.2	2.6	2.4	2.1	2.8	0.39	-5.16
Total	**585.0**	**663.9**	**676.8**	**680.8**	**683.9**	**687.4**	**688.9**	**692.5**	**693.6**	**695.6**	**698.5**	**100.0**	

Source: GOG (2015), Fishery Statistics 2014-15, Commissioner of Fisheries, Government of Gujarat, Gandhinagar.

There are 5 fish harbours existing in the state. They are located in Dholai, Jakhau, Veraval, Mangrol and Porbandar with a total fish production capacity of 388000 metric tons and another 5 harbours have been proposed to be established in the state (Table 7). Junagadh district has two major harbours, viz. Mangrol and Veraval are with the highest fish production capacity of 235000 MT. Out of 14200 fishing crafts, 6500 are in Veraval, 3500 are in Porbandar and 2800 are in Mangrol. As per 2007 Census, the state had 28706 boats; of which 18536 boats were mechanized and 10170 boats were non-mechanized. In the year 2012-13, total 36770 boats were in-operation near Gujarat coast, of these 24612 boats were mechanized and 12158 boats were non-mechanized. During the period from 2000-01 to 2012-13, an annual rate of growth of fishing boats was estimated to be 1.88 per cent, while same was 2.86 percent per annum for mechanized boast. However, the rate of growth was negative in case of non-mechanized during the same period.

TABLE 6 : DISTRICT WISE MAJOR FISH HARBOURS AND THEIR CAPACITY (2014)

District	No. of Harbours	Name of Harbours	Fish Production Capacity (Harbour-wise)	No .of Fish Landing centres	No. of Fishing crafts
Valsad	-	-	-	-	-
Navsari	1	Dholai	15000	10	400
Surat	-	-	-	-	-
Bharuch	-	-	-	-	-
Anand	-	-	-	-	-

District	No. of Harbours	Name of Harbours	Fish Production Capacity (Harbour-wise)	No .of Fish Landing centres	No. of Fishing crafts
Rajkot	-	-	-	-	-
Kachchh	1	Jakhau	53000	10	1000
Jamnagar	-	-	-	-	-
Amreli	-	-	-	-	-
Junagadh	2	Veraval, Mangrol	235000	12	6500, 2800
Porbandar	1	Porbandar	85000	10	3500
Bhavnagar	-	-	-	-	-
Gujarat	5		388000	42	14200

Source: GOG (2015).

3.3 Post Harvest Infrastructures for Marine Fishing in Gujarat:

The major post-harvest infrastructures required for marine fishing are ice plants, cold storages, freezing plants, frozen storage, pulveriser machine and fish meal plants, etc. It can be seen from Tables 8 and 9 that ice plants and cold storages are the major kinds of post harvest infrastructures available in required number in most of the coastal districts of Gujarat. The presence of other infrastructures is very less in various districts of the state.

Ice Plants

Ice is essential to preserve fish at the time of catch. There are a total of 518 ice plants operating in coastal districts with a total capacity of 9384.73 MT per day (Table 8). Junagadh district has 109 ice plants, the highest in the state having the capacity to produce 3246 MT of ice per day. Junagadh contributes about 46.65 per cent to the total ice production of the state.

TABLE 7 : DISTRICT-WISE INFRASTRUCTURE FACILITIES PER DAY FOR MARINE FISHING IN GUJARAT

(in Metric Ton (MT)

Sr. No	Districts	Ice Factory		Cold Storage		Freezing Plants		Frozen Storage	
		No	Capacity	No	Capacity	No	Capacity	No	Capacity
1	Valsad	14	212	0	0	0	0	0	0
2	Navsari	8	115	0	0	1	20	1	560
3	The Dangs	0	0	0	0	0	0	0	0
4	Surat	41	560	5	430	1	35	1	500
5	Tapi	5	50	0	0	0	0	0	0
6	Bharuch	8	127	0	0	0	0	0	0
7	Narmada	1	15	0	0	0	0	0	0
8	Vadodara	27	398	10	168	0	0	0	0
9	Panchmahal	20	139	4	25	0	0	0	0
10	Dahod	6	63	1	10	0	0	0	0
11	Anand	11	67.23	11	5113	0	0	0	0
12	Kheda	3	33	4	5415	0	0	0	0
13	Ahmedabad	20	0	32	0	0	0	0	0
14	Gandhinagar	10	150	2	1800	0	0	0	0
15	Mehsana	14	180	1	10	0	0	0	0

Sr. No	Districts	Ice Factory		Cold Storage		Freezing Plants		Frozen Storage	
		No	Capacity	No	Capacity	No	Capacity	No	Capacity
16	Patan	0	0	0	0	0	0	0	0
17	Sabarkantha	9	94.5	0	0	0	0	0	0
18	Banaskantha	2	34	0	0	0	0	0	0
19	Surendranagar	14	92	14	100	0	0	0	0
20	Rajkot	58	850	0	0	0	0	0	0
21	Bhavnagar	14	20	0	0	0	0	0	0
22	Kutch	13	124	2	110	0	0	0	0
23	Jamnagar	25	747	11	2000	5	87	5	1500
24	Porbandar	82	1968	82	2990	12	692	12	10764
25	Junagadh	109	3246	92	5914	76	2423	71	27788
26	Amreli	4	100	2	65	0	0	0	0
	Total	518	9384.73	273	24150	95	3257	90	41112

Source: GOG (2015).

Cold Storages

There are 273 cold storages operating in Gujarat with a total capacity of 24150 MT. Junagadh district with 92 cold storages has a capacity of 5914 MT which is the highest in the state. There are 82 cold storages in Porbandar district having 2990 MT of capacity and Kheda district has only 4 cold storages plants with a capacity of 5415 MT. Ahmedabad district has 32 cold storages but all of the cold storages do not store fish.

Freezing Plants

There are 95 freezing Plants operating in Gujarat with a total capacity of 3257 MT. Out of the 95 plants, 76 plants are located in Junagarh district and 12 Porbandar district, with the capacity 2426 MT and 692 MT, respectively.

Frozen Storage

There are 90 frozen storages operating in Gujarat with a total capacity of 41112 MT. Junagadh district with 71 frozen storages has 67.59 per cent capacity of the state. There are 12 frozen storages in Porbandar district having 10764 MT of capacity while Jamnagar district has only 5 cold storages plants with a capacity of 1500 MT.

Pulveriser and Fish Meal Plants

There are 62 pulverizers plant in the Gujarat state. The total installed capacity is 979 MT per day, of these plants 54 plants are located in Junagadh district with the capacity 804 MT per day followed by Porbandar district (7 plants) and Amreli (1 plant).

Boat Building Yard and Net Making Plants

The boat building yards are located in Junagadh, Ahmedabad and Navsari having capacity to produce 752 boats, 472 boats and 185 boats in a year respectively.

Fish Meal Plants

There are two fish meal plants in the state, with a capacity of 50 MT per day, one of the plants are located in Junagadh district and another one is located in Porbandar district.

Net Making Plants and service station

There are 11 net making plants having a capacity of 5.040 MT per day and 140 service stations for repair and maintenance of the boats. Out of 140 service stations, 97 are located in Junagadh, 27 are located in Porbandar, and 15 are located in Kutch and only one located in Valsad district.

TABLE 8 : DISTRICTWISE INFRASTRUCTURE FACILITIES FOR MARINE FISHING IN GUJARAT

(In MT)

Sr. No	Districts	Fish pulverser		Boat Building Yard		Fish meal Plant		Net Making Plant		Service Station
		No	Capacity	No	Capacity	No	Capacity	No	Capacity	
1	Valsad	0	0	0	0	0	0	0	0	1
2	Navsari	0	0	3	185	0	0	0	0	0
3	The Dangs	0	0	0	0	0	0	0	0	0
4	Surat	0	0	0	0	0	0	1	0.25	
5	Tapi	0	0	0	0	0	0	0	0	0
6	Bharuch	0	0	0	0	0	0	0	0	0
7	Narmada	0	0	0	0	0	0	0	0	0
8	Vadodara	0	0	0	0	0	0	0	0	0
9	Panchmahal	0	0	0	0	0	0	0	0	0
10	Dahod	0	0	0	0	0	0	1	0.45	0
11	Anand	0	0	0	0	0	0	0	0	0
12	Kheda	0	0	0	0	0	0	0	0	0
13	Ahmedabad	0	0	1	472	0	0	1	0.4	0
14	Gandhinagar	0	0	0	0	0	0	0	0	0
15	Mehsana	0	0	0	0	0	0	0	0	0
16	Patan	0	0	0	0	0	0	0	0	0
17	Sabarkantha	0	0	0	0	0	0	0	0	0
18	Banaskantha	0	0	0	0	0	0	0	0	0
19	Surendranagar	0	0	0	0	0	0	0	0	0
20	Rajkot	0	0	0	0	0	0	0	0	0
21	Bhavnagar	0	0	0	0	0	0	1	0.15	0
22	Kutch	0	0	0	0	0	0	0	0	15
23	Jamnagar	0	0	0	0	0	0	0	0	0
24	Porbandar	7	125	0	0	1	40	7	3.79	27
25	Junagadh	54	804	47	752	1	10	0	0	97
26	Amreli	1	50	0	0	0	0	0	0	0
	Total	**62**	**979**	**51**	**1409**	**2**	**50**	**11**	**5.04**	**140**

Source: GOG (2015).

Fish Catch Disposition

In Gujarat, the share of marketing of fresh fish in total fish disposition was 31.15 percent in 2014, followed by frozen fish (22.07 percent) and curing (18.71 %). Among various fish catch disposition activities, a relatively significant share of 20.07 per cent has been recorded in reduction activity (Table 10). Therefore, modern facilities set up for processing was mainly aimed at export market.

TABLE 9 : YEAR-WISE FISH CATCH DISPOSITION IN GUJARAT

Year	Fish Catch Disposition in Gujarat (Prod. in MT)				
	Marketing Fresh	Frozen	Curing	Reduction	Total
2005	228587	161733	137370	206129	733819
2006	234429	166354	141120	211680	753583
2007	236544	167588	142152	213344	759628
2008	238498	168973	143327	215104	765902
2009	240347	170313	144478	216378	771516
2010	241302	171060	145013	217527	774902
2011	244128	172967	146634	219990	783719
2012	245615	174020	147526	221329	788490
2013	248731	176227	149398	224137	798493
2014	252294	178752	151538	227348	809932
% share in total	31.15	22.07	18.71	28.07	100.00
Increase in 2014 over 2005 (%)	10.37	10.52	10.31	10.29	10.37

Source: GOG (2015).

4. Conclusions and Policy Suggestions

Fish production in India has shown an increasing trend from 0.75 million metric tonnes (MMT) in 1950-51 to reach 10.07 MMT in 2014-15. The fisheries sector plays an important role in Gujarat as well as Indian economy. The state has a long coastline extending to 1600 km accounts for 19.70 per cent of the total coastline of the country and about 46 per cent of the western coastline of India. It has a continental shelf area of 0.18 million km2, Exclusive Economic Zone (EEZ) of 0.214 million km^2, which occupies 32 per cent of the continental shelf area and 10 per cent of the total EEZ of India. Ice plants and cold storages are the major kinds of post harvest infrastructures available in required number in most of the coastal districts of Gujarat. There are 5 fish harbours existing in the state. They are located in Dholai, Jakhau, Veraval, Mangrol and Porbandar with a total fish production capacity of 388000 metric tons and another 5 harbours have been proposed to be established in the state. During the period from 2000-01 to 2012-13, an annual rate of growth of fishing boats was estimated to be 1.88 per cent, while same was 2.86 percent per annum for mechanized boast. However, the rate of growth was negative in the case of non- mechanized during the same period. Some of the suggestions for enhancing the growth of fishery sector are proposed as below.

Firstly, Fishing harbours are being developed at both major and minor ports. However, the condition of washing and cleaning facilities available at selected harbours was unsatisfactory at Porbandar and Mangrol while same was very poor at Veraval harbour. Also, the facilities like clear landing platform and cold storage/chill plants within the FH premises and availability of insulated storage boxes on board the fishing vessel need to be ensured.

Secondly, The dredging problem, i.e., loading and unloading of fish due to non-navigable depth near sea shore has been faced by fishermen and, therefore, harbours dredging needs to be carried out regularly.

Thirdly, The fish breeding places need to be protected from encroachment as well as fishing activity should be strictly prohibited during the ban period.

Fourthly, The dumping of hazardous chemical waste from industries located nearby sea shore (particularly at Veraval and Porbandar) not only affect the fish quality due to polluted water but also results in dying and moving away of good species of fish from the harbour area. That force the fishermen to go far way (till Pakistan border) to catch good fish. Therefore, dumping of industrial waste should be prohibited effectively.

Fifthly, The harbours like Porbandar and Veraval are overcrowded due to less space in harbour region and large number of boats parked there than its capacity. Because of same, fish catch exceeds the capacity of harbour. Therefore, there is a need of expansion of harbour regions as well as constructions of more number of jetting/landing platforms.

Sixhtly, The limited availability of funds and inadequate staff with fisheries department at harbour level hinder the overall supervision as well as progress in the development of infrastructure in harbour region. Therefore, level of administrative and financial autonomy at harbour should be increased with sufficient fund availability so that infrastructure and developmental activities at harbour regions can be stepped up.

Finally, Governments and development agencies should ensure that changes in post-harvest fisheries-related policy and practices take stock of the loss assessment tools, information generated and experience of the programmes under implementation. Fish loss assessments should be incorporated into national data collection systems and used regularly to inform policy.

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Agro-Economic Research

AN ECONOMIC ANALYSIS OF PROTECTED CULTIVATION UNDER MIDH IN HIMALAYAN STATES*

MEENAKSHI AND KALI SANKAR CHATTOPADHYAY

The new and effective technology, which can continuously improve the productivity, profitability and sustainability of crops, is 'Protected Cultivation" and is generally called greenhouse technology. It is the technique of providing favourable conditions for plant growth and enhances the production level. It makes small holdings more viable by producing more high value crops like vegetables and flowers from limited land with the adoption of all weather technology. The greenhouse technology is still in its developing stage in the country and concerted efforts are required from all concerned agencies to bring it at par with the global standards. Leading states in protected cultivation in India are Maharashtra, Gujrat, Karnataka, Haryana, J&K, Himachal Pradesh, Uttarakhand and Sikkim.

The state and central governments are encouraging construction of poly-houses by giving subsidies to the farmers. Farmers are being motivated toward cultivation using the scheme of subsidies. Protected conditions for vegetables and flowers are created by using different type of structures as per the season and location, among them most commonly and widely used modern greenhouses are called poly-houses. The present study was planned with the following specific objectives:

Objectives

• To study the progress in providing assistance for establishing the poly-houses under MIDH programme and to examine the expenditure incurred in the establishment of poly-houses and means of financing.

• To study the economics of production of flowers and vegetables under protected conditions and to analyze the worth of protected cultivation venture.

• To analyze the systems adopted for marketing the produce under protected conditions.

• To examine the problems faced by the farmers in production and marketing of flowers and vegetables under protected conditions.

Methodology

To fulfill the above objectives, two districts in Himachal Pradesh viz., Mandi, Kangra have been purposely selected on the basis of highest number of poly-houses. From the selected districts two development blocks have been selected, again on the basis of highest number of poly-houses. From each of these development blocks, a cluster of villages having poly-houses was identified with the help of the local officials of the Department of Horticulture. All the registered poly-house was listed and a sample of 50 growers of vegetables and flowers was randomly selected. Thus a total sample of 100 vegetable growers (50 from each district) was selected for detailed study.

The State of J&K has three regions; namely, Jammu, Kashmir and Ladakh. The topography and climate of two regions, Kashmir and Ladakh is the same as that of other hilly states under the study like Himachal Pradesh. Therefore, these two regions, comprising twelve districts, were purposively selected for the study from Jammu and Kashmir and two districts were selected on the basis of highest number of poly-houses. A total sample of 100 vegetable growers (50 from each district) was selected for detailed study.

In Sikkim, two districts viz., East Sikkim & South were selected on the basis of highest number of poly-houses. Following the same criteria, two development blocks, i.e., Gangtok from East Sikkim and Namchi block from South Sikkim were selected. In the next stage, all the registered poly-houses and a sample of 25 vegetable growers and 25 farmers cultivating flowers were selected randomly from each block. Thus, the study is based on 100 farmers cultivating in poly-houses in two districts. The study

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refers to the agriculture year 2015-16.

Main Findings

Present Scenario of Poly house Development under MIDH

The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in Himachal Pradesh since 2003-04. From April 2014 onwards, HMNEH has been subsumed under MIDH and is being implemented in all the districts of the state covering important horticulture crops. The area under poly-houses has been increasing continuously in the State. Poly-house was also an important component of Macro Management Scheme and an area of 6.71 hectares was brought under poly-houses under this scheme.

The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in J&K since 2001-02. From April 2014 onwards, HMNEH has been subsumed under MIDH and is being implemented in the State covering important horticulture crops. Under the scheme, Centre had approved to cover 19.33 hectare area under protected cultivation with an assistance of 477 lakhs during the year 2015-16.

In case of poly-house development under MIDH in Sikkim, the Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) has been implemented in all the districts of Sikkim. An area of 415.96 hectare has been covered under protected cultivation, while 48835 farmers have been trained under various horticulture activities.

Socio-Economic Features among the Sampled Households

In Jammu & Kashmir, the average family size is comparatively larger than Himachal Pradesh and Sikkim, whereas literacy percentage among the sampled household in Sikkim is found to be higher than Himachal Pradesh and Jammu & Kashmir.

Average land holdings among the sampled households are comparatively high in Sikkim, i.e., 1.06 hectares as compared to Himachal (0.68 hectares) and Jammu & Kashmir (0.37 hectares). In Himachal Pradesh, the income from salary was maximum (32.98%) followed by pension (32.10%), wage labour (28.47%) and animal husbandry (6.45%), respectively. In Jammu & Kashmir, the income from wages was maximum (57.88%) followed by the income from animal husbandry, i.e., 32.98 percent. In Sikkim, the income from salary was maximum (71.60%) followed by animal husbandry (13.4%), business (12.6%) and other sources i.e. 2.5 percent.

Motivations/Hindrances and Costs Involved in Poly-house Construction

Out of total poly-houses, 54 percent poly-houses in Himachal Pradesh were simple and 46 percent Hi-Tech. Further, all the poly-houses were of single tier cultivation poly-houses. While in Jammu & Kashmir and Sikkim, all the poly-houses were simple and single tier cultivation poly-houses. The Department of Horticulture in these states plays a crucial role in disseminating the ideas of poly-house cultivation.

In Himachal Pradesh, among the poly-house farmers, the possibility of high income plays the largest motivating factor whereas in Jammu & Kashmir, demonstrations are considered to be the largest motivating factor. In Sikkim, the possibility of high income was the largest motivating factor followed by availability of subsidy, and availability of technology. There were many hindrances which farmers faced during the adoption process. In Himachal Pradesh, most of the respondents (93%) reported about the marketing problems. While in Jammu & Kashmir, most of the respondents (49%) reported that there was a long wait involved in getting clearance of loan and subsidy from the departments. In Sikkim, sixty eight percent of the respondents reported about the procrastinated process and delayed tactics by the contractors during execution.

In Himachal Pradesh, 76 percent of the poly-houses were supervised by the officials. While in Jammu & Kashmir, 75 percent of the poly-houses were supervised by the officials. It is encouraging to note that the attitude of the officials during the supervision, in addition to ensure the quality and design aspect, was supportive to the farmers. In Sikkim, the extension activities by the government officials in poly-house construction play a crucial role.

In Himachal Pradesh, majority of the farmers (76%) wanted the design of the poly-houses to be

according to the local conditions. Sixty percent respondents were in favour of organic farming to make the produce healthy and 58 percent said that training should be provided about product processing and packing. According to 57 percent respondents, the conditions would improve if costs saving techniques are applied or made available and 56 percent desired to have information on cropping practices under protected conditions. Fifty five percent of the respondents stated that storage facilities should be given and 52 percent suggested that some assistance in marketing should be provided to them.

In Jammu & Kashmir, majority of the farmers suggested that inputs used in the poly-houses to raise the nursery should be provided to them through the department on subsidized rates. They should be provided best quality seeds at cheaper rates. Forty five percent respondents said that organic farming should be introduced and promoted in the poly-houses for healthy crop. According to 38 percent of the respondents, information and training on cropping practices under protected conditions should be provided and forty three percent of them suggested that cost saving techniques should be applied or made available. Only 15 percent were of the view that crops should also be grown in the poly-houses.

In Sikkim, 80 percent of the respondents had some suggestions for the improvement of poly-houses that organic farming with more technical know-how could make a dent in horticultural production in this State. Sixty eight percent of them have responded for change or modification of existing cropping practices while 16 percent opined for better supply procedure or emphasized on availability of inputs in a more convenient way. All of the respondents stated that storage facilities should be enhanced.

Returns from Flower Crops

In Himachal Pradesh, the net returns from carnation cultivation was Rs. 1467278 per poly-house, whereas in Sikkim it was Rs. 46004.32 .In Himachal Pradesh, the average net return from cultivation of rose was Rs.1612012 per poly-house. In Sikkim, the average net returns from cultivation of gerbera was Rs. 39671.82 per poly-house.

Returns from Vegetable Crops

In Himachal Pradesh, the average net returns from cultivation of capsicum was Rs. 149686 per poly-house, whereas in Sikkim it was Rs. 23619.04, and for tomato, the corresponding figure for these two states is Rs. 227142, Rs. 17158.14, respectively.

Production and Utilization of Flower Crops

In Himachal Pradesh and Sikkim, total production of carnation is 467 boxes and 258 boxes (per poly-house in a year), respectively out of which 1.50 percent and 4.54 percent was found to be damaged at different stages.

In Himachal Pradesh, the total production of rose was 472 boxes, out of which 1.69 percent were treated as loss at different stages. In Sikkim, the total production of gerbera was estimated to be 454.80 boxes, out of which only 4.25 percent were found as loss at different stages. About 0.20 percent production kept for family uses and 0.32 percent given as gifts to friends and relatives.

Production and Utilization of Vegetable Crops

In Himachal Pradesh and Sikkim, total production of capsicum was 402 and 975.55 boxes (per poly-house in a year), out of which only 2.03 percent in Himachal Pradesh and 2.70 percent in Sikkim were treated as loss at different stages. Family consumption and gifts in Himachal Pradesh and Sikkim are accounted for 0.75, 0.50 and 1.46 percent, respectively. In Himachal Pradesh and Sikkim, total production of tomato was estimated to be 566 boxes and 513.08 boxes (per poly-house in a year) and out of which losses at different stages found to be only 1.41 percent and 2.55 percent. Family consumption and gifts accounted for 0.71 and 0.35 percent for Himachal Pradesh and family consumption for Sikkim accounted for 4.64 percent, respectively.

Marketing Pattern of Flower Crops

In Himachal Pradesh carnation, 95.65 percent were marketed in Delhi followed by neighbouring states and the local markets while in Sikkim, 64.63 percent were marketed in neighbouring states followed by the local markets and for rose, 95.91 percent of total production were marketed in Delhi and rest

4.09 percent in the other markets. In Sikkim, 61.24 percent of total gerbera production was marketed in neighbouring states followed by the local markets (38.75%).

Marketing Pattern of Vegetable Crops

In Himachal Pradesh, 88.69 percent of capsicum was marketed in Chandigarh market and 11.31 percent in the local markets. In case of tomato, 90 percent was marketed in Chandigarh and the rest 10 percent in the local markets. While in Sikkim, 71.12 percent of total capsicum production was marketed in neighbouring states and rest 28.88 percent in the local markets. 62.24 percent of tomato was marketed in the neighbouring states and rest 37.76 percent in the local markets.

Marketing Costs and Price Spread of Flowers in Delhi for Himachal Growers

For Himachal Growers, marketing cost for carnation incurred by producers was 19.53 percent of the consumer's price of Rs.1090 per 100 spikes and for rose, marketing cost incurred by producers was estimated to be as 19.26 percent of the consumer price.

Producers' Share in Consumers' Price

Net price received by the producer in the marketing of carnation in Delhi market was 35.50 percent of consumer price. In case of rose, the share of producer in consumers' rupee was 35.64 percent and net price received by the producer in Delhi market was Rs.422 per 100 spikes.

Marketing Costs and Margins of Intermediaries in Carnation and Rose Marketing

The gross price received by the grower was Rs.600 per 100 spikes which were 55.04 percent of the consumers' paid price. The costs paid by the farmers, wholesales, mashakhor and retailers were 19.53, 1.65, 1.28 and 8.80 percent, respectively and thus total marketing cost of intermediaries was 11.74 percent of the consumers' price. The total margins were found to be 33.21 percent of the consumers' price. In case of rose, the gross price received by the grower was Rs.650 per 100 spikes, which were 54.89 percent of the consumer price. The costs paid by the farmers, wholesalers, mashokhars and retailers were 19.25, 1.77, 1.26 and 8.95 percent, respectively, and thus total marketing cost of intermediaries was 12 percent of the consumer's paid price. The total margins were found to be 33.10 percent of the consumer's price.

Marketing Costs and Price Spread of Carnation Gerbera for Sikkim Growers

In case of marketing costs and price-spread of protected crops, it needs to be noted that as the marketing of crops is done either by the farmers themselves (directly to the consumers) and (or) through the FPOs in nearby towns, there is a complete absence of middlemen, commission agents, etc. The farmers have to bear no market fee and other such charges. The only costs involved in marketing are on the part of the farmers for assembling, packing, grading and transportation. It can be observed here that total expenses are borne by the farmers for marketing of carnation stands at 8.18 percent, while that for gerbera stands at 7.66 percent of net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.

Marketing Costs and Price spread of Vegetables in Chandigarh for Himachal Growers

On an average, the cost of marketing borne by the growers for selling capsicum was worked out to be 8.46 percent of the consumer's price of Rs.3935 per quintal and for tomato, marketing cost per quintal borne by the growers for selling tomato reported to be 9.12 percent of the consumers' price of Rs.3508 per quintal.

Producers' Share in Consumers' Price

The net price received by capsicum producers was Rs.2545 per quintal, i.e., about 65 percent of consumer price in Chandigarh market. For tomato, share of producer in consumers' rupee was 58.44 percent and the net price received by tomato producers was Rs.2050 per quintal.

Marketing Costs and Margins of Intermediaries in Capsicum and Tomato Marketing

The gross price received by the grower was Rs.28.73 per quintal in case of capsicum which was 73 percent of the consumer price. The costs paid by the farmers, wholesalers, mashakhor and retailers at different stages of marketing were found to be 8.46, 1.27, 0.64

and 6.20 percent, respectively, and thus the total cost of marketing of intermediaries was estimated as Rs.2319, i.e., 8.11 percent of the consumers' price. The total margin was found to be Rs.18.88 percent of the consumers' price. As far as tomato is concerned, the gross price received by the grower was Rs.2370 per quintal, i.e., 68 percent of the consumer paid price. The costs paid by the farmers, wholesalers, mashakhor and retailers were 9.12, 1.36, 0.71 and 8.75 percent, respectively, and thus total marketing cost of intermediaries was Rs.387, i.e., 11.03 percent of the consumer price. The total margin was found to be 21.41 percent of the consumer price.

Marketing Costs and Price Spread of Vegetables in the Market for Sikkim Growers

In case of capsicum, the total expenses borne by the grower on account of marketing were 7.82 percent, while that for tomato stands at 7.81 percent of net price received by the grower, which in turn equals to the consumer price. The price-spread of these protected crops does not arise in the absence of market intermediaries.

Production Losses in Flower Crops

In Himachal Pradesh, pre-harvest losses in carnation were found to be 0.42 percent. On the other hand, in Post-harvest losses, the losses during transportation were maximum followed by picking, assembling and grading/packing. In Sikkim pre-harvest losses in carnation were found to be 0.92 percent only. Losses during picking was maximum followed by grading & packing, transportation and assembling .In Himachal Pradesh, the pre-harvest losses in rose production were 0.84 percent. While in post-harvest losses, the losses during picking, assembling, grading & packing and transportation were 0.21 percent each. In Sikkim, pre-harvest losses in gerbera production were 0.69 percent. While in post-harvest losses, the losses during picking was maximum followed by grading & packing, transportation and assembling.

Production Losses in Vegetable Crops

In Himachal Pradesh, pre-harvest losses in capsicum production were found to be 0.72 percent but the losses during transportation were estimated to be maximum followed by losses during picking, assembling and grading & packing. In Sikkim, the pre-harvest losses in capsicum production were 0.71 percent. Losses during transportation were highest followed by losses during picking, assembling, grading & packing.

In Himachal Pradesh, pre-harvest losses in production of tomato were found to be 0.34 percent. Losses during transportation and grading & packing were found maximum followed by the losses of picking & assembling. In Sikkim, pre-harvest losses for production tomato were found to be 0.76 percent. Losses during transportation were reported to be highest followed by losses during picking, assembling and grading.

Problems in Cultivation of Protected Crops

In Himachal Pradesh, the problems during construction, like delays or use of inferior material, high construction cost were reported as the major problems faced by the respondents. In Jammu & Kashmir, most of them complained about the obscure nature of clearance procedure of subsidy and a long wait for sanctioning of the loan. Among other problems, unavailability of inputs including higher prices and low quality were reported to be important by the growers. In Jammu & Kashmir, seventy six percent respondents complained about the problem of higher prices of inputs required for rising of seedling in a poly-house. In Sikkim, seventy six percent poly-house grower farmers complained about the low quality of inputs.

In Himachal Pradesh, the problems related to cultural practices, i.e., raising nursery and crops, sowing time, etc., were also reported by the respondents. In Sikkim, 44 percent of the farmers reported that they had no knowledge about the proper time to irrigate the vegetables grown in poly-house and frequency of irrigation.

In Himachal Pradesh, about 30 percent of the growers faced problems in deciding the time & methods of harvesting and about storage of the produce. Most of the respondents faced the problems of marketing followed by the problems of packing/processing. In Sikkim, fifty two percent growers faced problems in deciding time of harvesting. Most of the respondents faced the problems of storage followed by the problem of marketing facilities and scientific way of packing and processing.

Perception of Farmers on Protected Cultivation

In Himachal Pradesh, about 90 percent of the respondents are of the opinion that poly-house cultivation has increased the production of vegetables and flowers. The protected cultivation has significantly increased the production on the farms located in cold regions. About 75 percent farmers believed that poly-house cultivation was able to increase the employment opportunities. Nearly 80 percent poly-house cultivators admitted that their income has been increased due to poly-house cultivation. In Sikkim, all the farmers are of the opinion that poly-house cultivation has increased the production of vegetables, flowers, employment opportunities, income and facilitated adoption of organic farming to a significant extent.

Besides the problems mentioned above, the farmers also reported that poly-houses are prone to damage by heavy rain and storms. Such farmers in the region suffered losses and they found difficulty in reconstructing these dilapidated poly-houses due to lack of funds.

Policy Implications

The growing of flowers and vegetables inside a poly-house has improved the quality of life of the growers by improving income and employment. However, the profitability of these crops still can be improved by taking the following steps.

Firstly, low cost technologies required on small holdings should be developed. There is a strong need for developing the required minimum infrastructure in major production zones to be used by growers on community/cooperative basis.

Secondly, keeping in view the perishable nature of vegetables and variations in market prices, adequate storage facilities should be developed.

Thirdly, arrangements should be made to provide latest information regarding prices and arrivals of the vegetables in the markets.

Fourthly, emphasis should be given to expand the market and develop infrastructure by improving packing and transportation facilities.

Fifthly, in the present marketing system of flowers and vegetables, most of the benefits are reaped by the middlemen. An attempt should be made to strengthen the marketing system by organizing cooperative societies, particularly for small growers. This will help in minimizing the margin of the intermediaries and will ultimately ensure better producers' share in consumer's rupee.

Sixthly, poly-house farming requires skill monitoring and care. Before poly-houses become operational, the growers should be given proper training related to cultural practices, i.e. raising nursery and crops, intensity of irrigation, the most appropriate sowing and harvesting time.

Seventhly, the poly-houses were prone to damage by heavy rain and storms. Such farmers found difficult to reconstruct these poly-houses due to lack of funds. Poly-houses should be insured at the time of construction.

Eighthly, inputs used in the poly-houses to raise the nursery should be provided to farmers through the department on subsidized rates. They should be provided best quality seeds at cheaper rates.

Ninthly, organic farming should be introduced and promoted in the poly-houses for healthy crop.

Finally, as in Sikkim, the formation of Farmer Producers' Organizations should be encouraged so that the hurdles in post-harvest management and marketing could be reduced to the minimum for the marginal and small vegetable producers.

STATUS AND UTILIZATION PATTERN OF INPUT SUBSIDIES IN PUNJAB AGRICULTURE*

D. K. GROVER, J. M. SINGH, SANJAY KUMAR AND JASDEV SINGH

Subsidy is a benefit given by the Government to groups or individuals usually in the form of cash payment or reduction in price of a service/ commodity. It is usually given to remove some types of burden and is often considered in the interest of the public. There are often considerable opportunities for raising productivity as well as reducing cost. One of the institutional supports to agriculture development in India has been that of fiscal incentives in the form of input subsidies. The reduced costs of subsidized inputs increase farmer's profitability and reduce the risks perceived by them with a limited knowledge of input benefits and of correct usage. Subsidies in Indian agriculture can be classified into two broad categories viz., direct and indirect subsidies. Direct subsidies are implemented through various schemes in the agriculture sector by the government and indirect subsidies confine itself to three major inputs viz., fertilizer, irrigation and power. Presently, the input subsidies are the most expensive instrument of India's food and agricultural policy regime, requiring a steadily larger budget share. The government pays fertilizer producers directly in exchange of selling fertilizer at lower than the market prices. Irrigation and electricity, on the other hand, are supplied directly to the farmers at prices that are below the production cost. The cost of agricultural input subsidies as a share of agricultural output almost doubled from 6.0 percent in 2003-04 to 11.6 percent in 2009-10, driven by large increase in the subsidies to fertilizer and electricity (Arora, 2013). However, farm subsidies are reported to be crowding out the public investment and are not sustainable beyond a limit and time-period. Other serious problems due to continued subsidies are, the degradation of land and water resources and its impact on sustainability of agricultural growth. As per reports, the subsidies prompt the end-users to overuse the services/ inputs resulting in soil degradation, soil nutrient imbalances, environmental pollution and ground water depletion, all of which result into decreased effectiveness of inputs and cause loss to the society as a whole. Though, subsidies as incentives are effective in pushing agricultural growth to a certain extent, but it is important to make its rational use and also it should be ensured that it do not become a permanent feature of the economy. It is right time to take a fresh look at the issue of farm input subsidies.

Objectives of the study

The study was taken up with the following objectives:

1. To study the trends and distribution pattern of various input subsidies provided by the Union and State Governments to farm sector in Punjab.
2. To examine the utilization pattern of subsidies by different categories of farmers.
3. To analyze the overall effect of differences in the level of input subsidy used by various categories of farmers on cropping pattern, cropping intensity, adoption of improved technology, input use, crop productivity and returns.
4. To suggest policy measures for rational use of such subsidies in the farm sector to further improve the farming lot in Punjab.

Methodology

The study covers both the direct and indirect agricultural input subsidies and is based on primary as well as secondary data. The secondary data on subsidies for supplying the selected inputs,i.e., seeds/ saplings, fertilizers, canal water and electricity to agricultural sector was collected from various published sources. To meet the specific objectives of the study, at first stage of sampling three districts of Punjab, viz. Hoshiarpur, Ludhiana and Bathinda representing each regions of the state were selected randomly. At second stage, two blocks from each of the selected district were selected. Thus, overall six blocks from the sample districts were selected. At next stage of sampling, a cluster comprising 2-3 villages from each of the selected blocks was selected randomly for the farm household survey. Finally, from each of the selected village cluster, 30 representative farm households, in proportion to their respective proportionate share in different categories, as per standard national level definition of operational holdings viz., marginal (< 1 ha), small (1.01 to 2 ha), semi-medium (2.01 to 4 ha), medium (4.01 to 10 ha) and large (> 10 ha) acres

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were selected randomly. Thus, overall from state total sample of 180 farmer households comprising 29 marginal, 33 small, 55 semi-medium, 48 medium and 15 large farmers forms the basis for the present enquiry Information on production of crops and use of inputs in physical as well as monetary terms, along with other socio-economic aspects of farm households was collected from the sample farmers, through the interview method using the specially designed schedules for the purpose. The information pertains to the crop year 2014-15 (Reference year).

Main Findings of the Study

Agro-economic profile of the selected farmers

The overall family size for sample household was 6.17 and the family size showed an increase with the increase in farm size. The family size varied between 7.8 on large farms to 5.41 for the marginal farm size category. Most of the heads of the household were in the age group of 36 to 50 years (about 47%). Overall, 16.67 percent household heads were illiterate, another 8.89 percent were basic literates (Primary). About 22 percent of the household heads had studied up to 8th standard (Middle). Most of the heads of the household (about 37%) were matriculate and only 6 percent were qualified up to graduation/post graduation. The average operational holding size of sample household was 4.71 hectare. The level of leased in land (2.14 hectare) was much higher than the leased out land (0.01 hectare) among the sample respondents. Almost all the area had the irrigation facilities, highlighting well developed irrigation infrastructure in the study region. The overall access to credit was Rs. 3.53 lakh/farm and access to credit improved with an increase in farm size. The proportion of institutional credit was about 90 percent with the rest coming from non-institutional sources. On per hectare basis, the overall access to credit was Rs. 69558 and access to credit decreased with an increase in farm size. The per hectare credit from commercial banks declined with increase in farm size varying from Rs 81656 on marginal farms to Rs 27150 on large farms, with an average Rs 45093 on the sample farm households. Paddy and wheat were the major kharif and rabi crops in the study area grown on about 29 and 40 percent of total cropped area during the season, respectively. The area under paddy was found to increase with the increase in farm size. Cotton, basmati-paddy and sugarcane occupied about 6, 3 and 1 percent of the total cropped area, respectively. Fodder was grown in the kharif, rabi and summer seasons in the state and the net cropped area under these crops was about 3, 3 and 1 percent during the different seasons, respectively. Wheat was the major rabi season crop in the study area. Potato was the other important crops of the season which occupied about 3 percent area of the total cropped area. Maize and summer moong were the important summer crops. On an average, the cropping intensity for different farm size categories was 210.83 percent, which increased with an increase in farm size. The average sample household was found to possess assets worth about Rs. 5 lakh and the asset value was found to increase with the increasing farm size. Machines and implements, livestock and farm buildings constituted about 60, 30 and 10 percent of the total value of assets. On an average, sample farms were found to possess tractors of Rs. 1.84 lakh per farm, submersible pumps/electric motors of Rs. 8222 and generator and diesel engine of Rs. 11731 per farm.

Economics of Production of Important Crops in Punjab

On per hectare basis, for paddy cultivation, about 352 hours were required for carrying out the various operations like sowing, transplanting, fertiliser/ insecticide application, irrigation, harvesting etc. Transplanting is the labour intensive operation in paddy crop. The paddy crop also required about 15 tractor hours particularly for field preparation. Harvesting of crop through combined harvester required about 2 hours. For irrigation, on per hectare basis, paddy required submersible pumps for 161 hours, electric motor for 26 hours along with canal irrigation for about 2 hours. Besides, for carrying out various operations, on an average on per hectare basis, the generator use was for about 9 hours, along with diesel consumption of 149.85 litres. It was found that they used about 17 Kg of seeds per hectare. Among different categories, on per hectare basis, the highest use of urea, DAP and MOP was by medium farms (326.9 kg), large farms (58.33 kg) and medium farms (3.53 kg), respectively. Being highly water intensive crop, about 29 irrigations are required at different stages of paddy production.

For the cultivation of basmati-paddy, about 386 hours per hectare were required for carrying out the various operations like sowing, transplanting, fertiliser/insecticide application, irrigation, harvesting etc. The labour requirement was more for

fine varieties of paddy because manual harvesting of crop was more popular in basmati-paddy. The basmati-paddy crop also required about 13 machine labour hours of tractor, particularly for field preparation and 1.06 hours of combine harvester. For irrigation, on per hectare basis, basmati-paddy required submersible pumps for 116 hours, electric motor for 17 hours and canal irrigation for less than one hour. Besides, for carrying out various operations, on an average, on per hectare basis, the generator use was for about 5 hours along with diesel consumption of 107.78 litres. The basmati-paddy growers were found to use about 16 Kg of seed per hectare, which is lower as compared to the recommended level of 20 Kg/hectare. Among different categories, on per hectare basis, the highest use of urea, DAP and MOP was by large farms (187.5 kg), marginal farms (75 kg) and semi-medium farms (15.63 kg), respectively. Basmati-paddy required about 20 irrigations at different stages of its production which is lower as compared to other varieties of paddy.

For cotton, about 535 hours per hectare were required for carrying out various farm operations like sowing, fertiliser/insecticide application, irrigation, harvesting etc. This shows that cotton is a highly labour intensive crop. Since the cotton crop is picked manually, therefore the requirement of labour was more as compared to other competing crops grown during kharif season. On per hectare basis, it required about 14 machine labour hours, 8.35 electric motor hours, 22.86 submersible pump hours and 81.58 hours of diesel engine plus generator particularly for field preparation. The total diesel used was about 75 litres per hectare. The cotton growers were found to use 4.62 Kg of seed per hectare. Among different size farms, on per hectare basis, use of urea was the highest (250 kg) for large farms, 118.06 kg of DAP for marginal farms, while the use of MOP was highest (12.50 kg) at large and medium farms. Overall, the cotton crop required 4.92 irrigations during its production which is sufficiently lower as compared to its requirement for paddy.

For maize, on per hectare basis, about 362 hours were required for carrying out various farm operations like sowing, fertiliser/insecticide application, irrigation, harvesting etc. On per hectare basis, the maize crop required about 18 hours of machine labour of tractor, harvester combine (0.35 hours), and electric motor (0.5 hours), submersible pump (40 hours) particularly for field preparation and for carrying out different inter-culture operations. Total diesel consumption was found to be about 89 litres per hectare. The maize growers used 20.56 Kg of seed per hectare, which is almost similar to the recommended level of 20 Kg/hectare. Amongst different categories, on per hectare basis, the highest amount of urea was used by semi medium farms (190.79 kg) in comparison to 156.25 kg used by marginal farms. DAP was used in lesser amount by semi-medium farms (118.42 kg) as compared to 125 kg for others. MOP and Zinc were also used by the growers for the production of maize. The maize crop generally, required about 4 irrigations at different stages of its production.

For the cultivation of sugarcane, on per hectare basis about 1110 hours were required for carrying out the various operations like sowing, fertiliser/insecticide application, irrigation, harvesting etc. It reveals that the labour requirement of this crop was more than other crops. It is due to the fact that more manual labour was required for harvesting of crop. The crop also required about 29.46 machine labour hours of tractor, 15.46 hours of electric motor and 126 hours of submersible pump, particularly for field preparation and sowing. Total diesel consumption was found to be 150 litres. The sugarcane growers used about 38 Kg of seed per hectare. On per hectare basis, Medium farms use 437.5 kg of urea which was very close to 416.67 kg used by large farms. The quantity of DAP (200 kg) used by either medium or large farms was also similar to that used on overall basis. However, large farms used 125kg of MOP which was almost double than an overall value of 62.5 kg. Medium farms used almost 4 kg less and large farms used 4 kg more zinc as compared overall value of 20.83 kg by the sugarcane growers. It was found that sulphur was not used for the production of sugarcane. The plant protection measures taken by medium farms for weedicides and insecticides were 1 and 3.67, respectively. The sugarcane crop required about 20 irrigations at different stages of its production, which were also lower as compared to paddy.

For wheat, about 116 hours per hectare were required for carrying out the various operations like sowing, fertiliser/insecticide application, irrigation, harvesting etc. On the per hectare basis, the crop required 19.92, 1.92, 4.47, 31.54, 1.41 and 0.79 hours for carrying out various farm operations by machine labour of tractor, combined harvester,

electric motor, submersible pump, diesel engine and generator, respectively. The total diesel used was 112.11 litres per hectare. The growers were found to use 101.49 Kg of seed per hectare. Amongst different farm sizes, on per hectare basis, the highest amount of urea (293.49 kg) was used by medium farms, while the semi-medium farms used the highest amount of DAP (152.50 kg). The crop required about 4 irrigations during its entire growth period at different stages of its production.

For raising potato crop on per hectare basis, about 534 hours were required for carrying out the various operations like sowing, fertiliser/insecticide application, irrigation, harvesting etc. This shows that potato is also highly labour intensive crop. The labour requirement was more because most of operations (earthing and digging) required for raising this are done manually. On per hectare basis, it required about 25, 0.68, 40.35and 41.03 hours of machine, electric motor, submersible pump and generator, respectively. The total diesel used was about 146 litres. The potato growers were found to use about 36 Kg of seed per hectare. On per hectare basis, semi medium farms used highest amount of urea (339.29 kg) as well as DAP (419.64 kg), while large farms used higher amounts of MOP (160.71 kg) as compared to its low (41.67 kg) use at small farms. The crop required about 4.46 irrigations for its production.

For paddy, the total variable cost, on per hectare basis was found to be Rs 35102. Among variable cost components, the share of human labour was about 40 percent. It shows that, paddy cultivation is highly labour intensive and the farmers have to incur highest expenses on it, which is particularly required during the transplanting of crop. Expenses on machine labour, fertilisers and seed were the other important components of the variable cost. Among different farm size categories, on per hectare basis, the large farms had to incur the lowest expenses on machine labour (Rs. 2278). The marginal farmers had to incur the highest expenses on use of diesel (Rs. 5078 per hectare). The average farm was found to incur Rs. 654 per hectare for seed, and there were not large variations amongst different farm size categories. Amongst different fertilisers, on per hectare basis, the highest expenses were incurred on urea (Rs. 1755) followed by DAP (Rs. 1276) and MOP (Rs. 33). The per hectare returns over variable cost were found to vary between Rs. 57574 for marginal farmers to Rs. 66305 for the large farms. Likewise, the benefit cost ratio was found to be the lowest (2.48) for marginal farmers and the highest for the large farms (2.98).

For basmati-paddy, the total variable cost on per hectare basis was found to be Rs. 31911. Human labour was found to take larger proportion of the cost as its share was about 49 percent. Most of the labour is required during the transplantation and harvesting of the crop. The marginal farmers had to incur the highest expenses on use of diesel (Rs. 7486 per hectare). Amongst different farm size categories, on per hectare basis, the marginal farms had to incur the highest expenses on machine labour (Rs. 7167) as they were mostly dependent upon the hired machinery. The expenses for urea on per hectare basis was found to vary between Rs 675 for marginal farms to Rs 1013 for the large farms, while the expense for DAP was the highest for marginal farms (Rs. 1800). Amongst different farm size categories, on per hectare basis, the marginal farms had to incur the highest expenses on seed (Rs. 1000). The per hectare returns over variable cost were found to vary between Rs. 46572 for marginal farmers to Rs. 77984 for the medium farms. Likewise, the benefit cost ratio was found to be the lowest (2.11) for marginal farmers and the highest for the medium farms (3.47).

For cotton, the total variable cost on per hectare basis was found to be Rs 39213. Amongst variable cost components, the share of human labour was about 46 percent. It shows that cotton cultivation is highly labour intensive and the farmers have to incur high expenses on it, which is required particularly during the harvesting of the crop. Expenses on seeds, plant protection measures, fertilisers and machine labour were the other important components of the variable cost. Among different farm size categories, on per hectare basis, the large farms had to incur the lowest expenses on hired machine labour (Rs. 41) while on urea (Rs. 1238) and DAP (Rs. 2400). The semi-medium farms had to incur the highest expenses on use of diesel (Rs. 3164). The average farm was found to incur Rs. 5213 per hectare basis for seed, and there was not large variations amongst different farm size categories. The per hectare returns over variable cost were found to vary between Rs. 16878 for marginal farmers to Rs. 41181 for the large farms. Likewise, the benefit cost ratio was found increasing with the farm size.

For maize, the total variable cost on per hectare basis was found to be Rs 32094. About 44 percent of

the operational cost was incurred on human labour, most of which is required during the inter culture and harvesting of the crop. Expenses on fertilisers, seed and machine labour were the other important components of the variable cost and the expenses on these were about 16, 14 and 12 percent of the total variable cost, respectively. Among different farm size categories, on per hectare basis, the marginal farms had to incur the highest expenses on hired machine labor (Rs. 5193) and DAP fertiliser (Rs. 3000). The expenses for use of diesel on per hectare basis were found to vary between Rs 3516 for marginal farms to Rs 5702 for the large farms. Among different farm size categories, on per hectare basis, the large farms had to incur the highest expenses on seed (Rs. 4625). The per hectare returns over variable cost were found to vary between Rs. 41117 for marginal farmers to Rs. 50000 for the large farms. Likewise, the benefit cost ratio was found to be the lowest (1.35) for marginal farmers and the highest for the large farms (1.70).

For sugarcane, the total variable cost on per hectare basis was found to be Rs 82780. About 54 percent of the operational cost was incurred on human labour, most of which is required during the inter culture and harvesting of the crop. Among different farm size categories, on per hectare basis, the medium farms had to incur the high expenses on seed (Rs. 12375), urea (Rs. 2363) and insecticides (Rs. 7083), while the large farms had to incur the high expenses on use of diesel (Rs. 11007) and weedicides (Rs. 1083). The per hectare returns over variable cost were found to be Rs. 124915 for medium farmers and Rs. 121561 for the large farms with the benefit cost ratio of 2.38 and 2.21, respectively.

For wheat, total variable cost on per hectare basis was found to be Rs 25651. Use of diesel was found to take larger proportion of the cost, as its share was about 22 percent. Expenses on machine labour, seed and plant protection measures were the other important components of the variable cost and the expenses on these were about 15, 11 and 11 percent of the total variable cost, respectively. Among different farm size categories, on per hectare basis, the marginal farms had to incur the highest expenses on machine labour (Rs. 7042) and urea (Rs. 1418). Among different farm size categories, on per hectare basis, the semi-medium farms had to incur the highest expenses on DAP fertiliser (Rs. 3660). The per hectare returns over variable cost were found to vary between Rs. 44610 for marginal farmers to Rs. 55076 for the large farms. Likewise, the benefit cost ratio was found to be the lowest (2.5) for marginal farmers and the highest for the large farms (3.2).

For potato, the total variable cost on per hectare basis was found to be Rs 68890. Human labour was found to take larger proportion of the cost as its share was about 31 percent. The large farmers had to incur the highest expenses on use of diesel (Rs. 7742 per hectare). Among different farm size categories, on per hectare basis, the small farms had to incur the highest expenses on machine labor (Rs. 4966) as they were mostly dependent upon the hired machinery. The expenses for urea on per hectare basis were found to vary between Rs. 1659 for medium farms to Rs 1832 for the semi-medium farms, while the expenses for DAP were the highest for semi-medium farms (Rs. 10071). Amongst different farm size categories, on per hectare basis, the large farms had to incur the highest expenses on seed (Rs. 23429). The per hectare returns over variable cost were found to vary between Rs. 14283 for large farmers to Rs. 26634 for the medium farms. Likewise, the benefit cost ratio was found to be the lowest (1.2) for large farmers and the highest for the medium farms (1.39).

Agricultural subsidies in Punjab

The per quintal subsidy provided by the Department of Agriculture in Punjab on wheat seed was found to be to the tune of Rs. 500 for the years 2012-13 and 2013-14, which increased to Rs. 700 during 2014-15. There was almost three-fold increase in the per hectare subsidy in 2014-15 (Rs. 102) from Rs. 37 in 2012-13, which was mainly due to the doubling of quantity of wheat seed supplied during this period. Ferozpur, Hoshiarpur and Muktsar were the leading districts in availing the subsidy during 2012-13, 2013-14 and 2014-15, respectively. The amount of subsidy provided for agricultural machinery by the department of Agriculture in Punjab increased from Rs. 7.4 million during 2002-03 to Rs. 627.41 million during 2014-15. The proportion of amount actually spent to provisional amount varied from about 77 percent during 2002-03 to as high 100 percent since 2013-14. The amount of subsidy disbursed by the Department of Horticulture in Punjab under NHMS amounted to Rs. 5.39 crore during 1990-91, peaked at Rs. 76.88 crore during 2012-13 and then declined to Rs. 44.24 crore during 2014-15. The proportion of amount actually spent to provisional amount varied from about 19 percent during 2005-06 to as high

about 168 percent during 2008-09. The subsidies under RKVY peaked at Rs. 12.95 crore during 2013-14 and then declined to Rs. 8 crore during 2014-15. The funds allocated were fully utilized for the scheme. The fertilizer subsidy in India as well as in Punjab has followed an decreasing trend from 2010-11 to 2014-15; it decreased from Rs. 68217 crore to Rs. 50700 crore and in Punjab from Rs. 4581 crore to Rs. 3492 crore. The share of Punjab state in total fertilizer subsidies in India increased continuously from 6.71 percent during 2010-11 to 7.74 percent during 2012-13 and then declined to 6.89 percent during 2014-15. The electricity consumption in Punjab agriculture increased from 5818 million KWH in 2002-03 to 10641 million KWH in 2014-15. The total cost of supply of electricity to agriculture increased from Rs. 900 crore to Rs. 4454 crore during this period. The electricity supply to agriculture sector is free. The per unit cost/subsidy in agriculture has also been continuously increasing from Rs. 1.55 in 2002-03 to Rs. 4.19 in 2014-15. The direct subsidy availed by sample farmers was found to vary between Rs. 804 for marginal farms to Rs. 20581 for the medium farms, which was mainly due to the high level of farm machinery subsidy availed by the medium farms (Rs. 18715). The level of subsidies availed by marginal, medium and large farms were the highest for farm machinery, while the small and medium farms availed highest subsidy on the wheat seed. On per hectare basis, the subsidy was found to vary between Rs. 209 for large farms to Rs. 1333 for medium farms, which was mainly due to the high level of farm machinery subsidy availed by the medium farms (Rs. 1212). The level of subsidies availed by large and medium farms were the highest for farm machinery, while the marginal, small and semi-medium farms availed highest subsidy on the wheat seed. The farmers also availed the subsidy on pesticides used for paddy and wheat crops.

Crop-wise and component-wise input subsidy

In case of paddy crop, there was increase in the cost of growing by Rs. 8486 per hectare without availing subsidies. The farm category wise analysis revealed that there was an increase in total cost of paddy growing by Rs.11268 per hectare on large farms followed by other farm categories. Per farm basis analysis revealed that without benefit of subsidies there was an overall increase in the cost of paddy growing by 24.18 percent, which was Rs. 24272 in value terms. In overall, net returns in paddy growing declined by 13.06 percent. Thus, subsidy benefit in paddy crop was realized more by large and medium category farmers.

In basmati-paddy also, without subsidies there was an increase in the cost of growing basmati by Rs. 5933 per hectare. The increase in total cost without subsidies worked out to be Rs.8392 per hectare on large farms, followed by other farm categories. Further, it was observed that without benefit of subsidies there was an overall increase in the cost of raising basmati crop by 18.60 percent or decline in net returns by 8.61 percent, which in monetary terms worked out at Rs. 1306 per farm. According to farm size, increase in cost of basmati production without any subsidy was 26.46 percent on large farms followed by other farm categories. Both per hectare and per farm analysis revealed higher quantum of subsidy benefit realized by farmers in upper hierarchy.

In cotton cop, there was increase in cost of growing cotton by Rs. 4532 per hectare without subsidies. The increase in cost or decline in returns in cotton crop without subsidies was by Rs.5573 per hectare on large farms followed by other farm categories. On per farm basis, there was an overall increase in the cost of growing cotton by Rs. 2764 per farm which was 10.36 percent in relative terms, while on the contrary net returns in cotton growing declined by 14.37 percent. Increase in cost of growing cotton with no subsidy benefit was 13.45 percent on large farms which was highest followed by other farm categories. Thus, increase in cost of growing cotton without subsidy was highest on large and medium farms followed by other farm categories which shows the higher relative subsidy benefit realized by these farmers.

In maize, there was increase in cost of growing maize by Rs. 4514 per hectare without subsidies. It was seen that without subsidies increase in cost or decline in returns in maize crop was by Rs.5343 per hectare on large farms and lower on other farm categories. Per farm cost and returns analysis revealed that without subsidies there was an overall increase in the total cost or decline in returns of growing maize by Rs. 2618 per farm which was 14.06 percent increase in cost or 27.70 percent decline in net returns. Increase in cost of growing maize without subsidy was Rs. 3985 per farm in case of medium farms followed by semi-medium, large, small and marginal farms. However, relative increase in cost of growing maize without subsidy, was highest

at large farms. Per farm analysis revealed higher subsidy benefit realized by medium, semi-medium farmers as compared to other farm categories.

In sugarcane crop, without subsidies there was an increase in the cost of growing sugarcane by Rs. 9963 per hectare. According to farm category, there was increase in total cost of sugarcane growing without subsidy by Rs.14203 per hectare on large farms followed by Rs.11930 on medium farms. Again, it was seen that the benefit of subsidy was higher on large farm category. Per farm analysis revealed that without subsidies there was an increase in the cost of producing sugarcane by Rs. 598 per farm which was 12.04 percent increase in cost or decline in net returns by 9.60 percent. There was higher increase in cost of sugarcane growing on large farms as compared to other farm categories. Hence, large farmer's category enjoyed more benefit of subsidy in case of sugarcane crop also.

In case of wheat crop, without subsidies there was increase in the cost of growing wheat by Rs. 5763 per hectare. The increase in total cost without subsidies was to the tune of Rs.6213 per hectare in case of small farms followed by medium, large, semi-medium and marginal farms. Per farm analysis brought out that there was an overall increase in the cost of growing wheat by Rs. 22647 per farm, without subsidy benefit and it was 22.78 percent in relative terms. Decline in net returns of wheat cultivation was 11.13 percent. There was highest increase in the cost of wheat growing on medium farms by 24.96 percent followed by large, small, semi-medium and marginal farms. Therefore, in case of wheat crop also large, medium and semi-medium category farmers got higher per farm subsidy benefit due to more area under wheat cultivation. However, percent increase in total cost without subsidy was higher on medium, large, small and semi-medium farms and least on marginal farms.

In potato crop, there was increase in total cost of growing potato by Rs. 10031 per hectare without subsidies. Further, it was seen that without subsidies, increase in cost or decline in returns in potato was by Rs.10645 per hectare on large farms followed by other farm categories. Per farm results revealed that there was an overall increase in the cost of potato crop by 14.56 percent which was Rs. 4815 per farm in monetary terms. Net returns in potato growing declined by 52.44 percent without subsidies. According to farm size, there was 13.36 percent increase in potato growing due to withdrawal of subsidies on medium category farms followed by large, semi-medium and small farms. Thus, the quantum of subsidy benefit realized per farm was highest on large farm category due to more area under potato cultivation but relative increase in total cost was nearly equal as compared to other farm categories except small farms.

In overall crop production (including fodder), it was found that without subsidies there was an overall increase in the cost of crops by 19.24 percent which was Rs. 6410 per hectare and Rs.63653 per farm. Net returns in overall crop production were declined by 12.66 percent. On large farms, there was highest increase in total cost per hectare without availing the benefit of subsidy followed by other farm categories. The percent increase in cost or decline in returns without subsidy for growing all the crops was highest on large farms (24.38%) followed by medium, semi-medium, small and marginal farms. This shows the higher subsidy benefit accrued by the large, medium and semi-medium category farmers in crop cultivation as compared to small and marginal farmers.

Component wise subsidy revealed that per hectare subsidy on fertilizers worked out to be Rs.4384 on large farms followed by medium, semi-medium, small and marginal farms. Individual subsidy benefit on all the farm categories in overall scenario was found to be Rs.2667 on urea, Rs.1435 on DAP and Rs.83 per hectare on MOP. Per farm analysis revealed that the quantum of fertilizer subsidy realized by the large farmers was highest (Rs.139061) as compared to other farm categories. Per farm total subsidy benefit declined with decrease in the farm size and was lowest on marginal farms. Similar situation was observed in case of individual subsidy benefit realized by the farmers while using urea, DAP and MOP. Thus, larger share in fertilizer subsidy benefit was enjoyed by large farmers as compared to farmers from other farm categories.

Per hectare crop-wise fertilizer subsidy revealed that biggest chunk of fertilizer subsidy worked out in case of potato (Rs.8990) followed by sugarcane, wheat, paddy, cotton, maize and basmati crop. The crop-wise difference in fertilizer use attributed to higher fertilizer subsidy in case of potato and sugarcane crops. Farm category- wise analysis showed higher benefit realized by medium and large farmers in majority of the crops. The crop-

wise fertilizer subsidies on per farm basis revealed that the quantum of fertilizer subsidy was highest in case of wheat crop followed by other crops. Thus, nearly 70 percent of the total subsidy on fertilizers attributed to cultivation of wheat and paddy crops was due to higher area under these crops.

The crop-wise per hectare power subsidy revealed that power subsidy in case of paddy crop, worked out at Rs.4289 per hectare followed by sugarcane, basmati, potato, maize, wheat and cotton. Thus, the crops requiring higher number of irrigations accrued higher proportion of power subsidy realized by the agricultural sector. On per hectare basis, the maximum benefit of power subsidy was realized by large and medium category farmers as compared to other farmer categories. On per farm basis also, highest power subsidy was worked out for paddy crop i.e. Rs.12267 per farm followed by wheat, basmati, maize, potato and cotton. Due to higher area under paddy and wheat crops on the sample farms, the power subsidy quantum was higher for these crops as compared to other crops. Obviously, the proportion of power subsidy benefit was more on large farms as compared to other farm categories.

As far as diesel subsidy is concerned, it was Rs. 391 per hectare in sugarcane crop followed by paddy, basmati, maize and cotton. Farm category wise analysis revealed that diesel subsidy benefit was higher on semi-medium, medium and large farms as compared to marginal and small farms. The extent of diesel subsidy was higher for sugarcane and paddy crops due to higher generator/ diesel engine use for irrigating these crops particularly in hot summer months. The extent of diesel subsidy per farm worked out to be Rs.1114 per farm for paddy crop, which was also nearly 74 percent of the total diesel subsidy on various crops grown on the selected farms. Diesel subsidy per farm worked out to be Rs. 135 for maize, which was highest followed by cotton, basmati and sugarcane. In aggregate, diesel subsidy realized on large farms was Rs.4744 per farm, followed by other farm categories. Thus, higher benefit of diesel subsidy was enjoyed by large and medium farmers as compared to farmers from other farm categories due to higher area under crop cultivation.

The quantum of total direct subsidy received per hectare by the sample respondents in aggregate was highest on medium category farms followed by marginal, small, semi-medium and large farms. But, on per farm basis it was highest on medium farms followed by large, semi-medium, small and marginal farms. Thus, the higher benefit of direct subsidies was also realized by medium and large category farmers on per farm basis as compared to marginal and small farmers. This shows the disparity in disbursement of direct subsidies. The benefit of indirect subsidies availed by the farmers revealed that per hectare indirect subsidy realized by the large farmers was highest being Rs.8531 per hectare followed by medium, semi-medium, small and marginal farmers. Similar trend was observed on per farm basis also. Therefore, indirect subsidies benefits were largely accrued by large and medium category farmers as compared to small and marginal farmers.

Subsidy intensity and effect of subsidies on agriculture

The distribution of sample households on the basis of total agricultural subsidy availed per hectare revealed that 36.67 percent of the households fell in the low subsidy group of up to Rs. 5818 followed by 33.33 percent in Rs. 5819-7572 group and remaining 30 percent in > Rs.7572 group . It was seen that higher number of households fell in low subsidy group as compared to medium and high subsidy groups. Majority of the marginal and small farmers fell in low subsidy farm group while semi-medium farmers fell in both low and medium subsidy groups and large and medium category farmers in medium and high subsidy groups. Further, it was seen that total operational area of the farmers falling under low subsidy group was 2.27 hectare; under medium subsidy group was 5.33 hectare and nearly seven hectare in case of high subsidy group. Paddy, wheat, Bt cotton and maize dominated the cropping pattern of respondent households.

In paddy crop, subsidy intensity wise analysis revealed that there was increase in total cost of paddy growing by Rs.10307 per hectare on high subsidy intensity farms followed by medium and low intensity farms. Analysis on per farm basis revealed that without subsidy benefit there was an overall increase in the cost of paddy cultivation by 24.18 percent or decrease in net returns by 13.06 percent. According to subsidy intensity, there was highest increase in cost of paddy cultivation on high subsidy intensity farms by 28.61 percent followed by medium and low subsidy intensity farms. Thus,

subsidy benefits realized by farmers in paddy cultivation were higher on high subsidy intensity farms.

In basmati-paddy, it was seen that increase in total cost without subsidies was Rs.7422 per hectare on high intensity farms followed by medium and low subsidy intensity farms. Thus, increase in total cost of basmati cultivation on high intensity farms was nearly double, as that of low intensity farms. According to subsidy intensity, increase in total cost of basmati cultivation without any subsidy was 24.66 percent per farm on high intensity farms, followed by medium and low subsidy intensity farms.

In case of cotton crop, there was increase in total cost of cultivation by Rs. 4532 per hectare without subsidies. The increase in cost of cotton crop without subsidies was by Rs.5166 per hectare on medium subsidy intensity farms followed by high and low subsidy intensity farms. On per farm basis increase in total cost of cotton cultivation, without subsidy benefit, was Rs. 3099 per farm on medium followed by low and high subsidy intensity farms.

In case of maize crop, the increase in cost or decline in returns in maize crop was by Rs.4740 per hectare on medium subsidy intensity farms, followed by high and low subsidy intensity farms. Per farm cost and returns analysis revealed that there was increase in cost of growing maize without subsidy by Rs. 3175 per farm on medium subsidy intensity farms followed by other farms. Thus, in maize crop, subsidy intensity benefit was higher on medium intensity farms as compared to low and high subsidy intensity farms.

In case of sugarcane crop, there was increase in the cost of growing sugarcane by Rs. 9963 per hectare. According to category based on subsidy intensity, there was increase in total cost without subsidy in sugarcane growing by Rs.13371 per hectare on high subsidy intensity farms followed by other farms. Per farm analysis revealed that subsidy benefit realized on high subsidy intensity farms was Rs. 1337 and Rs. 1032 on medium intensity farms.

In wheat crop, the increase in total cost without subsidies was Rs.6370 per hectare on high subsidy intensity farms followed by medium and low subsidy intensity farms. Subsidy intensity per farm showed that there was higher increase in cost of wheat cultivation on high subsidy intensity farms by 25.29 percent followed by medium and low subsidy intensity farms. Thus, biggest chunk of subsidy in wheat crop was reaped by large farmers.

In potato, there was increase in cost of potato growing by Rs.11130 per hectare on high subsidy intensity farms followed by other farms. As far as per farm analysis is concerned, there was a 15.86 percent increase in potato growing due to withdrawal of subsidies on high subsidy intensity farms followed by medium and low subsidy intensity farms. Thus, the subsidy benefit realized by high subsidy intensity group was comparatively higher than medium and low subsidy intensity group.

As far as analysis on quantum of fertilizer usage is concerned, there was significantly higher use of fertilizers on high subsidy intensity farms as compared to medium and low categories. Thus, on high subsidy intensity farms, urea, DAP and MOP use was higher than medium and low subsidy intensity farms on both per hectare and per farm basis. Crop-wise per hectare fertilizer usage revealed that fertilizer usage was higher on high subsidy intensity farms in case of potato, sugarcane and wheat while on medium subsidy intensity farms it was higher for paddy, cotton, basmati and maize. Fertilizer usage per hectare was least for all the crops on low subsidy intensity farms. This clearly reveals that fertilizer usage was higher on high subsidy intensity farms which were reflected in terms of higher subsidy benefit realized by large farmers as compared to other farm categories.

Crop-wise per hectare analysis revealed that power usage was higher on high subsidy intensity farms in case of paddy, sugarcane, basmati, potato, maize and wheat, while on medium subsidy intensity farms it was higher for cotton crop only. Power usage in monetary terms revealed that total power usage per hectare in aggregate was Rs. 3078 per hectare on high subsidy intensity farms followed by medium and low subsidy intensity farms. Crop-wise per farm analysis revealed that paddy and wheat crops consumed nearly 80 percent of the total power subsidy on high and medium subsidy intensity farms, while it was about 58 percent on low subsidy intensity farms. Hence, power subsidy benefit was mostly enjoyed by large and medium farm category farmers with major chunk of share that of paddy and wheat crops.

Policy recommendations

Direct subsidy benefit should be target group-based, especially for small and marginal farmers since major chunk of direct subsidies are taken by medium and large category farmers and hence should be totally discontinued for this group. The resultant savings by way of withdrawal of direct subsidies, this benefit should be given to marginal and small farmers to improve their economic condition for the welfare of society. In case of indirect subsidies, especially fertilizer and power subsidies, these should be continued for marginal and small farmers in the present form and it should be given to the medium and large farmers with a rider. Nominal charges for power usage by medium and large category farmers in agricultural sector can be one of the options. These policy issues can be helpful in rational use of agricultural subsidies and bridge the farm category gap and disparity in agricultural sector.

COMMODITY REVIEWS

Foodgrains

During the month of June, 2018, the Wholesale Price Index (Base 2011-12=100) of Cereals and foodgrains increased by 0.48 percent and 0.14 percent, respectively, whereas the prices of pulses by decreased (-) 1.92 per cent compared to May, 2018 .

ALL INDIA INDEX NUMBER OF WHOLESALE PRICES

(Base Year 2011-2012=100)

Commodity	Weight (%)	WPI for the Month of June, 2018	WPI for the Month of May 2018	WPI A year ago	Percentage change during	
					A month	A year
1	2	3	4	5	6	7
Paddy	1.43	153.9	154.2	148.4	-0.19	3.71
Wheat	1.028	143.1	141.7	136.1	0.99	5.14
Jowar	0.067	119.3	117.0	126.9	1.97	-5.99
Bajra	0.086	129.5	128.1	149.7	1.09	-13.49
Maize	0.189	121.6	117.8	132.6	3.23	-8.30
Barley	0.014	141.7	139.8	138.1	1.36	2.61
Ragi	0.007	208.3	211.2	237.5	-1.37	-12.29
Cereals	2.824	146.3	145.6	142.6	0.48	2.59
Pulses	0.639	117.5	119.8	147.3	-1.92	-20.23
Foodgrains	3.465	141.0	140.8	143.5	0.14	-1.74

Source: Office of the Economic Adviser, DIPP.

The following Table indicates the State-wise trend of Wholesale Prices of Cereals during the month of June, 2018.

Commodity	Main Trend	Rising	Falling	Mixed	Steady
Rice	Falling	Karnataka	Uttar Pradesh		West Bengal
			Gujarat		
			Jharkhand		
Wheat	Rising	Madhya Pradesh	Maharastra		Jharkhand
		West Bengal	Gujarat		
		Uttar Pradesh			
		Rajasthan			
Jowar	Rising	Maharashtra		Karnataka	Madhya Pradesh
		Gujarat		Uttar Pradesh	
		Rajasthan			

Commodity	Main Trend	Rising	Falling	Mixed	Steady
Bajra	Falling		Uttar Pradesh		Karnataka
			Rajasthan		Maharashtra
			Gujarat		
Maize	Rising	Rajasthan	Uttar Pradesh		
		Madhya Pradesh	Gujarat		
		Karnataka			

Procurement of Rice

0.87 million tonnes of rice (including paddy converted into rice) was procured during June, 2018 as against 1.1 million tonnes of rice (including paddy converted into rice) procured during June, 2017. The total procurement of rice in the current marketing season, i.e., 2017-2018, up to 29th June, 2018 stood at 36.17 million tonnes, as against 37.87 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 2017-18 (upto 29.06.2018)		Corresponding Period of last Year 2016-17		Marketing Year (October-September) 2016-17		2015-16	
	Procurement	Percent to Total	Procurement	Percent to Total	Procurement	Percent to Total	Procurement	Percent to Total
1	2	3	4	5	6	7	8	9
Andhra Pradesh	3870	10.70	3699	9.77	3725	9.78	4326	12.65
Chhatisgarh	3206	8.86	4022	10.62	4022	10.56	3442	10.06
Haryana	3991	11.03	3583	9.46	3583	9.40	2861	8.36
Maharashtra	177	0.49	304	0.80	309	0.82	230	0.67
Punjab	11832	32.71	11052	29.18	11052	29.00	9350	27.33
Tamil Nadu	832	2.30	141	0.37	144	0.38	1191	3.48
Uttar Pradesh	2874	7.95	2354	6.22	2354	6.18	2910	8.50
Uttarakhand	38	0.11	705	1.86	706	1.85	598	1.75
Others	9352	25.85	12010	31.71	12210	32.04	9301	27.19
Total	36172	100.00	37870	100.00	38105	100.00	34209	100.00

Source: Department of Food & Public Distribution.

Procurement of Wheat

The total procurement of wheat in the current marketing season, i.e., 2018-2019 up to 29th June, 2018, is 35.51 million tonnes against 30.67 million tonnes of wheat procured, during the corresponding period of last year. The details are given in the following table:

PROCUREMENT OF WHEAT

(In Thousand Tonnes)

State	Marketing Season 2018-19 (upto 31.05.2018)		Corresponding Period of last Year 2017-18		Marketing Year (April-March) 2017-18		2016-17	
	Procurement	Percent to Total	Procurement	Percent to Total	Procurement	Percent to Total	Procurement	Percent to Total
1	2	3	4	5	6	7	8	9
Haryana	8739	24.61	7432	20.93	7432	24.11	6722	29.32
Madhya Pradesh	7286	20.52	6724	18.93	6725	21.82	3990	17.40
Punjab	12691	35.74	11706	32.96	11706	37.98	10645	46.42
Rajasthan	1531	4.31	1226	3.45	1245	4.04	762	3.32
Uttar Pradesh	5087	14.32	3562	10.03	3699	12.00	802	3.50
Others	178	0.50	18	0.05	18	0.06	9	0.04
Total	35512	100.00	30668	100.00	30825	100.00	22930	100.00

Source: Department of Food & Public Distribution.

Commercial Crops

Oilseeds

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 137.3 in June, 2018 showing a fall of 0.29 percent over the previous month. However, it increased by 8.80 percent over the previous year.

The Wholesale Price Index (WPI) of all individual oilseeds showed a mixed trend. The WPI of groundnut seed (2.05percent), rape and mustard seed (0.29 percent), cotton seed (2.02 percent), gingelly seed (sesamum) (1.03 percent), safflower (2.82 percent), sunflower (2.43 percent) increased over the previous month. However, the WPI of copra (1.72 percent), niger seed (7.35 percent) and soyabean (2.37 percent) decreased over the previous month.

Manufacture of Vegetable and Animal oils and Fats

The Wholesale Price Index (WPI) of vegetable and animal oils and fats as a group stood at 120.4 in june, 2018 showing an increase of 0.33 percent over the previous month. However, it decreased by 4.60 percent over the previous year. The WPI of mustard oil (1.33 percent), sunflower oil (1.02 percent), rapeseed oil (1 percent), cottonseed oil (0.18 percent) increased over the previous month. The WPI of soyabean oil (2.62 percent), groundnut oil (0.48 percent) and copra oil (0.92 percent) decreased over the previous month.

Fruits & Vegetable

The Wholesale Price Index (WPI) of fruits & vegetable as a group stood at 145.8 in June, 2018 showing an increase of 3.85 percent and 6.19 percent over the previous month and over the previous year.

Potato

The Wholesale Price Index (WPI) of potato stood at 223.9 in June, 2018 showing an increase of 12.91 percent over the previous month. However, it increased by 99.02 percent over the previous year.

Onion

The Wholesale Price Index (WPI) of onion stood 132.2 in June, 2018 showing an increase of 14.16 percent over the previous month and an increase of 18.25 percent over the previous year.

Condiments & Spices

The Wholesale Price Index (WPI) of condiments & spices (group) stood at 128.2 in June, 2018 showing an increase of 0.87 percent and 8.37 percent over the previous month and over the previous year, respectively.

The Wholesale Price Index of chillies (dry) increased by 3.42 percent over the previous month whereas the Wholesale Price Index(WPI) of black pepper decreased by 4.94 percent and turmeric decreased by 0.32 percent.

Raw Cotton

The Wholesale Price Index (WPI) of raw cotton stood at 116.7 in June, 2018 showing an increase of 11.14 percent and 5.42 percent over the previous month and over the previous year, respectively.

Raw Jute

The Wholesale Price Index (WPI) of raw jute stood at 166.9 in June, 2018 showing an increase of 0.36 percent over the previous month and increased by 2.20 percent over the previous year.

Wholesale Price Index of Commercial Crops

(Base Year : 2011-12=100)

Commodity	June, 2018	May, 2018	June, 2017	% Variation over the Month	% Variation over the Year
Oilseeds	137.3	137.7	126.2	-0.29	8.80
Groundnut Seed	109.7	107.5	133.2	2.05	-17.64
Rape & Mustard Seed	137.1	136.7	129.9	0.29	5.54
Cotton Seed	136.6	133.9	145.4	2.02	-6.05
Copra (Coconut)	222.2	226.1	145.8	-1.72	52.40
Gingelly Seed (Sesamum)	128.1	126.8	114.3	1.03	12.07
Niger Seed	142.4	153.7	206.7	-7.35	-31.11
Safflower (Kardi Seed)	138.4	134.6	129.3	2.82	7.04
Sunflower	101.3	98.9	98.3	2.43	3.05
Soyabean	152.2	155.9	121.2	-2.37	25.58
Manufacture of vegetable and animal oils and fats	120.4	120	126.2	0.33	-4.60
Mustard Oil	122.3	120.7	115.9	1.33	5.52
Soyabean Oil	111.6	114.6	103.4	-2.62	7.93
Sunflower Oil	109.3	108.2	101.4	1.02	7.79
Groundnut Oil	103.3	103.8	111.6	-0.48	-7.44
Rapeseed Oil	111.6	110.5	110.8	1.00	0.72
Copra Oil	182.8	184.5	143.9	-0.92	27.03
Cotton Seed Oil	110.4	110.2	97.9	0.18	12.77
Fruits & Vegetables	145.8	140.4	137.3	3.85	6.19
Potato	223.9	198.3	112.5	12.91	99.02
Onion	132.2	115.8	111.8	14.16	18.25
Condiments & Spices	128.2	127.1	118.3	0.87	8.37
Black Pepper	132.9	139.8	165.4	-4.94	-19.65
Chillies (Dry)	130.1	125.8	100.1	3.42	29.97
Turmeric	124.2	124.6	108	-0.32	15.00
Raw Cotton	116.7	105	110.7	11.14	5.42
Raw Jute	166.9	166.3	163.3	0.36	2.20

Statistical Tables
Wages

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

(In Rs.)

State	District	Centre	Moth & Year	Daily Normal Working Hours	Field Labour		Other Agri. Labour		Herdsman		Skilled Labour		
											Carpenter	Black Smith	Cobbler
					M	W	M	W	M	W	M	M	M
Andhra Pradesh	Krishna	Ghantasala	Nov, 17	8	350	300	400	NA	250	NA	NA	NA	NA
	Guntur	Tadikonda	Nov, 17	8	305	275	325	NA	275	NA	NA	NA	NA
Telangana	Ranga Reddy	Arutala	Jan,18	8	600	258	435	NA	NA	NA	450	500	NA
Karnataka	Bangalore	Harisandra	Sep, 17	8	360	340	400	350	400	300	600	450	NA
	Tumkur	Gidlahali	Sep,17	8	250	200	250	200	250	NA	300	280	NA
Maharashtra	Bhandara	Adyal	Oct, 17	8	200	150	250	150	200	150	350	250	200
	Chandrapur	Ballarpur	March, 18	8	300	150	300	150	200	NA	250	200	150
Jharkhand	Ranchi	Gaitalsood	Nov, 17	8	230	230	230	230	230	230	317	317	NA

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

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily WorkingHours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Assam	Barpeta	Laharapara	Apr, 17	M	8	250	250	250	250	250	250	350	250	350
				W	8	NA	NA	200	200	200	NA	NA	NA	NA
Bihar	Muzaffarpur	Bhalui Rasul	June,17	M	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Shekhpura	Kutaut	June,17	M	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chhattisgarh	Dhamtari	Sihava	March, 18	M	8	NA	NA	NA	160	180	175	300	200	200
				W	8	NA	NA	NA	150	160	150	NA	100	NA
Gujarat*	Rajkot	Rajkot	Oct,17	M	8	248	254	235	223	203	197	488	475	463
				W	8	NA	200	229	216	197	178	NA	NA	NA
	Dahod	Dahod	Oct,17	M	8	293	293	164	164	164	NA	371	321	286
				W	8	NA	250	164	164	164	NA	NA	NA	NA

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

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily WorkingHours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Haryana	Panipat	Ugarakheri	Oct, 17	M	8	400	400	NA	NA	400	NA	550	400	NA
				W	8	NA	300	NA	NA	300	NA	NA	NA	NA
Himachal Pradesh	Mandi	Mandi	June,16	M	8	NA	182	182	182	182	182	300	300	NA
				W	8	NA	182	182	182	182	182	NA	NA	NA
Kerala	Kozhikode	Koduvally	Oct, 17	M	4-8	960	800	NA	800	968	NA	900	NA	NA
				W	4-8	NA	NA	650	650	650	NA	NA	NA	NA
	Palakkad	Elappally	Oct, 17	M	4-8	NA	500	NA	500	500	NA	650	NA	NA
				W	4-8	NA	NA	300	300	300	NA	NA	NA	NA
Madhya Pradesh	Hoshangabad	Sangarkhera	March, 18	M	8	250	NA	250	250	250	150	400	400	NA
				W	8	NA	NA	250	250	200	150	NA	NA	`
	Satna	Kotar	March, 18	M	8	200	200	200	200	200	200	350	350	350
				W	8	NA	200	200	200	200	200	NA	NA	NA
	Shyopurkala	Vijaypur	March, 18	M	8	NA	300	300	300	NA	300	300	300	NA
				W	8	NA	300	300	300	NA	300	NA	NA	NA
Odisha	Bhadrak	Chandbali	Feb, 18	M	8	300	250	300	200	300	250	450	400	350
				W	8	NA	200	250	180	250	200	NA	NA	NA
	Ganjam	Aska	Feb, 18	M	8	300	250	250	250	350	250	500	400	350
				W	8	NA	200	200	NA	200	200	NA	NA	NA
Punjab	Ludhiyana	Pakhowal	Aug, 17	M	8	480	480	NA	NA	400	NA	480	480	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rajasthan	Barmer	Kuseep	April, 18	M	8	NA	NA	NA	NA	NA	500	700	500	NA
				W	8	NA	NA	NA	NA	NA	300	NA	NA	NA
	Jalore	Sarnau	April, 18	M	8	300	NA	NA	NA	NA	NA	500	200	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tamil Nadu*	Thanjavur	Pulvarnatham	March, 18	M	8	NA	337	NA	354	366	NA	500	337	NA
				W	8	NA	NA	147	144	138	NA	NA	NA	NA
	Tirunelveli	Malayakulam	March, 18	M	8	NA	NA	NA	NA	544	NA	NA	NA	NA
				W	8	NA	175	185	171	NA	NA	NA	NA	NA
Tripura	State Average		Oct, 17	M	8	361	323	311	317	304	306	359	324	275
				W	8	NA	256	256	252	253	280	NA	NA	NA

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

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily WorkingHours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Uttar Pradesh*	Meerut	Ganeshpur	Oct, 17	M	8	300	277	255	255	266	NA	450	NA	NA
				W	8	NA	272	240	231	240	NA	NA	NA	NA
	Aurraiya	Aurraiya	Oct, 17	M	8	170	175	185	307	171	NA	500	NA	.NA
				W	8	NA	NA	185	307	171	NA	NA	NA	NA
	Chandauli	Chandauli	Oct, 17	M	8	200	200	200	NA	200	NA	400	NA	NA
				W	8	NA	200	200	NA	200	NA	NA	NA	NA

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

PRICES

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

Commodity	Variety	Unit	State	Centre	June-18	May-18	June-17
Wheat	PBW 343	Quintal	Punjab	Amritsar	1660	1735	1615
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	1675	1755	1640
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	2075	1830	1586
Jowar	-	Quintal	Maharashtra	Mumbai	2500	2400	2300
Gram	No III	Quintal	Madhya Pradesh	Sehore	3350	3480	4700
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1200	1380	1420
Gram Split	-	Quintal	Bihar	Patna	5000	5100	6600
Gram Split	-	Quintal	Maharashtra	Mumbai	4200	4800	7000
Arhar Split	-	Quintal	Bihar	Patna	5750	5750	7160
Arhar Split	-	Quintal	Maharashtra	Mumbai	5500	5800	5250
Arhar Split	-	Quintal	NCT of Delhi	Delhi	5750	5900	5250
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	5500	6000	5300
Gur	-	Quintal	Maharashtra	Mumbai	4000	4100	3750
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4800	4800	4200
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2500	2370	2980
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	3565	3430	3370
Mustard Seed	Black	Quintal	West Bengal	Raniganj	4700	4700	4200
Mustard Seed	-	Quintal	West Bengal	Kolkata	4300	4200	4000
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	4125	3950	5400
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	3950	4120	4600
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	1650	1450	1950
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	2560	2560	2750
Castor Seed	-	Quintal	Andhra Pradesh	Hyderabad	4050	3900	4100
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	7380	7300	6050
Copra	FAQ	Quintal	Kerala	Alleppey	11950	12800	8800
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	5600	5600	5000
Groundnut	-	Quintal	Maharashtra	Mumbai	5300	5150	5500
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1310	1310	1338
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1375	1425	1390
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	1270	1250	1400
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	1735	1730	1890

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

Commodity	Variety	Unit	State	Centre	June-18	May-18	June-17
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1425	1425	1365
Castor Oil	-	15 Kg.	Andhra Pradesh	Hyderabad	1320	1320	1395
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	1500	1550	1510
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2300	2250	2400
Coconut Oil	-	15 Kg.	Kerala	Cochin	2580	2685	1905
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	1750	1715	1825
Groundnut Cake	-	Quintal	Andhra Pradesh	Hyderabad	2536	2571	2857
Cotton/Kapas	NH 44	Quintal	Andhra Pradesh	Nandyal	5300	4450	5000
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	NT	NT	4500
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	3950	3925	3540
Jute Raw	W 5	Quintal	West Bengal	Kolkata	3950	3925	3590
Oranges	-	100 No	NCT of Delhi	Delhi	NA	750	667
Oranges	Big	100 No	Tamil Nadu	Chennai	600	700	NT
Banana	-	100 No.	NCT of Delhi	Delhi	375	375	333
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	677	677	570
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	88000	84000	90000
Almonds	-	Quintal	Maharashtra	Mumbai	75000	73000	60000
Walnuts	-	Quintal	Maharashtra	Mumbai	80000	72000	90000
Kishmish	-	Quintal	Maharashtra	Mumbai	16300	15500	11000
Peas Green	-	Quintal	Maharashtra	Mumbai	4700	4900	4000
Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	1600	525	2450
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	1650	1300	2500
Cauliflower	-	100 No.	Tamil Nadu	Chennai	3000	1500	1900
Potato	Red	Quintal	Bihar	Patna	1400	1270	860
Potato	Desi	Quintal	West Bengal	Kolkata	1420	1500	760
Potato	Sort I	Quintal	Tamil Nadu	Mettuppalayam	3373	3343	2210
Onion	Pole	Quintal	Maharashtra	Nashik	900	600	600
Turmeric	Nadan	Quintal	Kerala	Cochin	12000	12000	14000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	11500	11500	7700
Chillies	-	Quintal	Bihar	Patna	11000	11000	12000

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

Commodity	Variety	Unit	State	Centre	June-18	May-18	June-17
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	33500	36000	46000
Ginger	Dry	Quintal	Kerala	Cochin	16000	16000	11000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	81000	77500	122000
Cardamom	Small	Quintal	West Bengal	Kolkata	100000	100000	110000
Milk	Buffalo	100 Liters	West Bengal	Kolkata	5200	5200	3800
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	70035	76705	40020
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	46000	46200	46000
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	39700	39550	37700
Fish	Rohu	Quintal	NCT of Delhi	Delhi	13500	13500	13000
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	55000	50000	34000
Eggs	Madras	1000 No.	West Bengal	Kolkata	4660	4145	4000
Tea	-	Quintal	Bihar	Patna	21300	21300	21250
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	39000	39000	36000
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	23000	23000	35000
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	13500	13500	30000
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	3950	3850	3400
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	1860	1800	2500
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	14000	14200	12800
Rubber	-	Quintal	Kerala	Kottayam	11500	11800	11500
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	56500	56000	32700

3. WHOLESALE PRICES OF SOME IMPORTANT AGRICULTURAL COMMODITIES IN INTERNATIONAL MARKETS DURING YEAR 2018

Commodity	Variety	Country	Centre	Unit	JAN	FEB	MAR	APR	MAY	JUN
CARDAMOM	Guatmala Bold Green	U.K.	-	Dollar/MT	18500	19500	19500	19500	19500	19500
				Rs./Qtl	117642	126477	126887	130065	132483	133653
CASHEW KERNELS	Spot U.K. 320s	U.K.	-	Dollar/MT	11535	11346	11368	10823	10038	10252
				Rs./Qtl	73351	73593	73973	72187	68198	70265
CASTOR OIL	Any Origin ex tank Rotterdam	Netherlands	-	Dollar/MT	1612	1652	1602	1567	1566	1526
				Rs./Qtl	10251	10716	10427	10451	10638	10456
CHILLIES	Birds eye 2005 crop	Africa	-	Dollar/MT	5800	4800	4800	4800	4800	4800
				Rs./Qtl	36882	31133	31234	32016	32611	32899
CLOVES	Singapore	Madagascar	-	Dollar/MT	7900	8100	7750	7750	7900	8100
				Rs./Qtl	50236	52537	50429	51693	53673	55517
COCONUT OIL	Crude Phillipine/ Indonesia, cif Rotterdam	Netherlands	-	Dollar/MT	1365	1260	1095	1115	1080	910
				Rs./Qtl	8680	8172	7125	7437	7338	6237
COPRA	Phillipines cif Rotterdam	Phillipine	-	Dollar/MT	769	716	681	672	670	611
				Rs./Qtl	4890	4644	4431	4479	4552	4188
CORRIANDER		India	-	Dollar/MT	1650	1650	1650	1650	1650	1650
				Rs./Qtl	10492	10702	10737	11006	11210	11309
CUMMIN SEED		India	-	Dollar/MT	3300	3300	3000	3000	3000	3000
				Rs./Qtl	20985	21404	19521	20010	20382	20562
MAIZE		U.S.A.	Chicago	C/56 lbs	355	367	386	390	390	353
				Rs./Qtl	887	935	987	1022	1041	951
OATS		CANADA	Winnipeg	Dollar/MT	340	327	291	286	294	318
				Rs./Qtl	2164	2123	1895	1905	1995	2180
PALM KERNAL OIL	Crude Malaysia/ Indonesia, cif Rotterdam	Netherlands	-	Dollar/MT	1255	1140	1030	970	960	870
				Rs./Qtl	7981	7394	6702	6470	6522	5963
PALM OIL	Crude Malaysian/ Sumatra, cif Rotterdam	Netherlands	-	Dollar/MT	685	663	680	665	630	650
				Rs./Qtl	4356	4297	4425	4436	4280	4455
PEPPER (Black)	Sarawak Black lable	Malaysia	-	Dollar/MT	5000	5000	4800	4800	4800	4400
				Rs./Qtl	31795	32430	31234	32016	32611	30158
RAPESEED	Canola	CANADA	Winnipeg	Can Dollar/MT	485	511	516	533	532	524
				Rs./Qtl	2500	2610	2602	2765	2792	2719
	UK delivered rapeseed, delivered Erith(buyer)	U.K.	-	Pound/MT	275	276	272	288	289	290
				Rs./Qtl	2482	2500	2484	2657	2619	2614

3. WHOLESALE PRICES OF SOME IMPORTANT AGRICULTURAL COMMODITIES IN INTERNATIONAL MARKETS DURING YEAR 2018-*CONTD.*

Commodity	Variety	Country	Centre	Unit	JAN	FEB	MAR	APR	MAY	JUN
RAPESEED OIL	Refined bleached and deodorised ex-tanks,broker price	U.K.	-	Pound/MT	669	697	652	665	676	695
				Rs./Qtl	6039	6313	5954	6135	6127	6265
SOYABEAN MEAL	UK produced 49% oil & protein ('hi-pro') ex-mill seaforth UK bulk	U.K.	-	Pound/MT	305	337	339	363	355	321
				Rs./Qtl	2753	3053	3096	3349	3217	2893
SOYABEAN OIL		U.S.A.	-	C/lbs	33	32	32	30	31	29
				Rs./Qtl	4625	4574	4589	4410	4642	4381
SOYABEANS	Refined bleached and deodorised ex-tanks,broker price	U.K.	-	Pound/MT	651	657	647	630	640	635
				Rs./Qtl	5877	5951	5908	5812	5800	5724
		U.S.A.	-	C/60 lbs	941	1032	1041	1045	995	868
				Rs./Qtl	2196	2457	2486	2558	2481	2183
	US NO.2 yellow	Netherlands	Chicago	Dollar/MT	385	423	426	444	432	380
				Rs./Qtl	2451	2744	2772	2958	2932	2602
SUNFLOWER SEED OIL	Refined bleached and deodorised ex-tanks,broker price	U.K.	-	Pound/MT	724	727	723	735	747	722
				Rs./Qtl	6536	6585	6602	6780	6770	6508
Wheat		U.S.A.	Chicago	C/60 lbs	435	451	486	496	490	480
				Rs./Qtl	1015	1074	1161	1214	1222	1207

Source: - Public Ledger

FOREIAN EXCHANAE RATES

Currency	JAN	FEB	MAR	APR	MAY	JUN
CanDollar	51.57	51.11	50.48	51.84	52.51	51.92
UKPound	90.27	90.58	91.32	92.25	90.63	90.14
USDollar	63.59	64.86	65.07	66.7	67.94	68.54

Crop Production

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING SEPTEMBER, 2018

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Paddy, Jowar, Maize, Tobacco, Groundnut, Mesta And Linseed.	Paddy, Bajra, Ragi, Ground, Sesamum and Ginger.
Assam	Paddy, Gram, Pulses, Potato and Linseed.	Paddy and Mesta.
Bihar	Wheat, Barley, Gram, Rapeseed & Mustard, Linseed and Potato.	Paddy, Jowar, Bajra,Maize, Ragi and Sesamum.
Gujarat	Paddy, Gram, Pulses and Potato.	Paddy, Jowar, Groundnut, Bajra and Cotton.
Himachal Pradesh	Wheat, Barley, Gram, Rapeseed & Mustard.	Paddy, Bajra, Maize, Small Millets, Pulses, Potato and chillies.
Jammu & Kashmir	Wheat, Barley, Rapeseed & Mustard and Onion.	Paddy, Bajra, Maize, Small Millets, Pulses Potato and Chillies.
Karnataka	Jowar, Potato, Tobacco, Linseed, Sweet Potato and Onion.	Kharif Jowar, Ragi, Small Milets, Chillies and Groundnut.
Kerala	Paddy, Pulses and Sesamum.	Paddy, Sweet Potato and lemongrass
Madhya Pradesh	Wheat, Barley, Gram, Jowar, Rabi Pulses, Potato, Chillies, Rapeseed & Mustard and Onion.	Paddy, Ragi, Kharif Pulses, Potato, Ginger Chillies and Groundnut.
Maharashtra	Wheat, Gram, Jowar, Barley and Pulses.	Kharif Paddy, Jowar, Bajra, Maize, Groundnut and Seasamum.
Manipur	Wheat, Potato and Rapeseed & Mustard.	Surgacane and late Paddy.
Orissa	Wheat, Jowar, Gram, Rapeseed & Mustard and Linseed.	Paddy, Kharif, Jowar and Sesamum.
Punjab	Wheat and Gram.	Paddy, Cotton, Pulses and Early Sugarcane.
Rajasthan	Wheat, Barley, Rapeseed & Mustard and Linseed.	Jowar,Bajra, Maize, Cotton and Sannhemp.
Tamil Nadu	Paddy, Jowar, Groundnut, Smal Millets, Tobacco And Cotton.	Kharif Paddy, Jowar,Maize, Cotton, Tapioca, Mesta and Ginger.
Tripura	Pulses and Potato.	Til.

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING SEPTEMBER, 2018-*CONTD.*

State	Sowing	Harvesting
(1)	(2)	(3)
Uttar Pradesh	Wheat, Barely, Gram, Linseed and Rapeseed & Mustard.	Paddy, Jowar, Bajra, Sesamum and Groundnut.
West Bengal	Wheat,Barley, Rapeseed & Mustard, Tobacco, Chillies, Til, Potato and pulses.	Paddy, Jute and Red Chillies.
Delhi	Wheat, Barley and Pulses.	Paddy, Jowar, Bajra, Maize and Sugarcane.

(K)--Kharif (R)--- Rabi

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