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From Editor's Desk

This issue of 'Agricultural Situation in India' gives an overview of current agricultural policy initiatives and schemes of the Government in the farm sector, recent agricultural scenario; two academic research articles, one on analysis of the impact of COVID-19 pandemic on agriculture and policy prescriptions by Prof. C.S.C. Sekhar of AER Unit IEG, Delhi; and, second, on relative resource use efficiency in maize cultivation: a study of Banor-Shiva limestone mining region in Himachal Pradesh and an agro-economic research study report on an economic analysis of protected cultivation under MIDH in Sikkim.

Important farm sector news covered in this issue are: inauguration and addresses of various dignitaries at Pusa Krishi Vigyan Mela-2020; initiatives to address the issues of debt ridden farmers; steps for doubling farmers' income; implementation of crop diversification program; cultivation of Genetically Modified Crops; decrease in agricultural holdings; the Indian Union Agriculture Minister's interaction with rural women of Self Help Groups (SHGs) on International Women's day; Cabinet's approval on minimum support price (MSP) of copra; call for retention of talent in agriculture by Union Minister of Agriculture; imparting various innovative technologies to farmers for the development of agriculture through electronic media; financial assistance initiatives of the government like PM KISAN Scheme and its implementation; increase in MSP; financial package to boost rural income, introduction of direct benefit transfer (DBT) in agriculture sector; various subsidies provided in agricultural sector, etc.; impact of organic foods on fertilizer industry; impact of climate change on farmers; development of agricultural marketing infrastructure; action-plan to tackle adverse impact of Global Warming on food crops; exemption of farming and allied activities from lockdown; extension of benefit to farmers on crop loan repayments due to covid-19 lockdown; and advisory issued by ICAR to farmers for rabi crops in wake of covid-19 spread.

So far as the agricultural scenario is concerned, the Wholesale Price Index (WPI) of foodgrains, pulses, cereals, wheat, paddy and vegetables increased by 9.94 percent, 10.80 percent, 9.76 percent, 12.29 percent, 3.37 percent and 6.58 percent, respectively, in February, 2020 as compared to that in February, 2019. The cumulative pre-monsoon season, 2020 rainfall in the country has been 46 percent high than the long period average during 1stMarch, 2020 to 1st April, 2020. Current live storage in 123 major water reservoirs in the country was 84.77 BCM as against 52.63 BCM of normal storage based on the average storage of last 10 years.

In academic column's first article, Prof. C.S.C. Sekhar analyses the likely disruptive impacts of COVID-19 pandemic on rural employment, income, current agricultural production and the expected output, agricultural growth and overall economic growth of the country and the international trade. Using secondary data, the article undertook both supply side and demand side analysis of agricultural sector. The overall assessment of the supply side aspects of production, procurement and stock suggests the situation to be satisfactory, despite constraints of labour and machinery. Not only foodgrains distribution to states is assessed to be on track; but international stock found is adequate. What is worrisome, however, according to him, is the demand side situation. According to the analysis farmers' income is likely to be hit by crop losses on account of harvesting, storage and transportation, and the likely depression of prices due to lack of demand. Worse, the slowdown in construction sector, which absorbs majority of agricultural labour in lean seasons, will certainly aggravate this crisis. This huge negative impact on rural income is likely to hit the economy. However, Prof. Sekhar suggests to take this crisis as an opportunity for ushering in the much required reforms in rural development sector. In addition, he stressed the need for ensuring other follow-up reforms immediately after lifting of lockdown. These include: strict adherence to social distancing, maintenance of hand hygiene and disinfecting the premises at the mandies; supply of inputs, labour and machinery for the upcoming kharif season with adequate health safeguards; facilities to sell and transport from approved warehouses; strengthening of FPOs; eNAM; ensuring continuation of free foodgrains under PMGKY for at least six months, in addition to the regular NFSA food provisions. The analysis also recommends that a system of direct cash transfers to all the vulnerable sections needs to be put in place and a robust system of food distribution needs to be evolved to meet any future recurrence of such crises.

The second article evaluates the influence of mining and mining related operations on the efficiency, productivity, returns to scale and resource use efficiency of agricultural inputs used in maize cultivation in the two regions, i.e., Banor-Shiva region (mining region) and Nagetha village (non-mining region) of Himachal Pradesh. Based on primary data, the findings reveal that input efficiency for maize cultivation in the limestone mining region is far less than that in the non quarry area. There is, therefore, clear manifestation that limestone mining has harmfully affected the maize cultivation in the quarry area. However, since minerals extraction occupies an important place in the economic development of a nation, therefore, it is suggested to protect the fragile environment of the village farming and traditional source of livelihood of indigenous people by allowing limestone mineral extraction only in areas which are far away from cultivable, pasture and grazing land and irrigation channels. The study also called for rehabilitation and reclamation of the abandoned mineral quarries, and promotion of small scale and village industries.

Agro-economic research shared in this issue is a summary report on an economic analysis of protected cultivation under MIDH scheme in Sikkim, prepared by Agro-Economic Research Centre, Visva-Bharati, Santiniketan, West Bengal. The major objectives of this report are: to study the progress in providing assistance for establishing the polyhouses under MIDH program; to study the economics and worth of protected cultivation venture; to analyze the system and its problems faced by farmers in the production and marketing of flowers and vegetables under protected conditions in the State. The findings of the study reveal that the cultivation of flowers and organic vegetables in a polyhouse has improved the quality of life of the growers by improving their income and employment. Policy suggestion of the study recommends for allocation of a higher budget for these states or implementation of similar schemes like MIDH in vegetables, floriculture and horticulture; there is a need to take steps to promote off-season vegetables cultivation under polyhouses so that the excess labour force can be optimally utilized in agriculture at large; and to encourage FPOs to address the hurdles in post-harvest management and marketing; etc.

P. C. Bodh

Farm Sector News*

Shri Kailash Choudhary addresses the Valedictory Function of Pusa Krishi Vigyan Mela

The Union Minister of State for Agriculture & Farmers Welfare, Shri Kailash Choudhary, has said that doubling the farmers' income by 2022 is a priority of the Government. A number of schemes have been launched by the Prime Minister Shri Narendra Modi towards fulfilling this goal, he said. Shri Choudhary was addressing the Valedictory function of the Pusa Krishi Vigyan Mela-2020 on 3rd March, 2020.

The Minister said, as per the National Sample Survey Office (NSSO) report for 2013-14, farmers' average monthly income stood at Rs. 6,426; while, as per the last survey available for 2016-17, it stands at Rs. 8,167. He assured confidence in achieving the target set by the Prime Minister for doubling the farmers' income.

Shri Choudhary said, before 2014, the budget for agriculture ranged between Rs. 25,000-30,000 crore, but the budget for agriculture in the next financial year has crossed Rs. 1,50,000 crore. "What was earlier being given to farmers in five years, our Government has earmarked more than that in a single year's budget," he said.

Lauding ICAR for organising the Farmers' Fair, Prof. Ramesh Chand, Member, NITI Ayog, expressed satisfaction that during the three-day fair, the sale of seeds has crossed Rs. 45 lakhs. India is exporting 6-7% of its produce, he added.

In his address, Dr.Trilochan Mohapatra, Secretary, Department of Agricultural Research and Education (DARE) & Director General, ICAR, said that more than 80,000 farmers have taken part in the Krishi Vigyan Mela this year. He informed that under the "Mera Gaon, Mera Gaurav" scheme 13,500 villages are being covered. Agriculture scientists go to these villages every month, talk to farmers and see what problems they are facing and also learn from their experience and give their feedback and suggestions to the ICAR. Krishi Vigyan Mela is also an opportunity for farmers to learn from each other.

Debt Ridden Farmers

As per the NSSO Report, about 52 percent of the agricultural households in the country were estimated to be indebted. The average per capita income is Rs. 77,112/- against the average amount of outstanding loan per agricultural household, *i.e.*, Rs. 47,000/- (approximately).

To reduce the debt burden of farmers and increase the availability of institutional credit to rural areas, the Government have taken the following major initiatives:

(i) To ease the burden of interest payment on farmers, the Government implements Interest Subvention Scheme (ISS) so as to make short-term crop loans upto Rs. 3 lakh including loans through Kisan Credit Card (KCC) for a period of one year available to farmers at the interest rate of 7% per annum and in case of timely repayment, the same gets reduced to 4%

(ii) Interest subvention of 2% and prompt repayment incentive of 3% on restructured crop loans is also given to farmers affected by severe natural calamities for a maximum period of 5 years on the basis of report of Inter-Ministerial Central Team (IMCT) for grant of NDRF assistance and Sub-Committee of National Executive Committee (SC-NEC) is also available.

(iii) The benefit of ISS has been extended to animal husbandry and fisheries farmers' upto loan limit of Rs. 2 lakh per farmer so as to reduce the burden of interest component and to provide hassle free short term working capital loans to them.

(vi) Collateral free loan limit for short term agri-credit has been raised from Rs. 1.00 lakh to Rs. 1.60 lakh.

(v) To facilitate the farmers for issue of KCC, processing fee, inspection, ledger folio charges and all other service charges for short term crop loans upto Rs. 3.00 lakh have been waived off.

*Source: www.pib.nic.in

(vi) To bring the maximum number of farmers under KCC in order to provide loan to them at a cheaper rate under the Interest Subvention Scheme (ISS), the Government has launched a special drive to cover all PM KISAN beneficiaries under KCC. A detailed strategy has been prepared and shared with the participating agencies to be adopted for making the campaign successful, which includes one page application from and KCC to be issued in a time-bound manner within 14 days from the date of receiving of completed form.

(vii) Under the Kisan Credit Card (KCC) Scheme, a flexible limit of Rs. 10,000 to Rs. 50,000 is provided to marginal farmers (as Flexi KCC) based on the land holding and crops grown including post-harvest warehouse storage related credit needs and other farm expenses, consumption needs, etc.,plus small term loan investments without relating it to the value of land.

(viii) NABARD finances Joint Liability Groups (JLGs) of 'Bhoomi Heen Kisan' for augmenting flow of credit to tenant/landless farmers, extending collateral free loans to them and building natural trust and confidence between banks and JLG members.

Steps for Doubling Farmers Income

Agriculture being a state subject, the State Governments undertake implementation of programmes/schemes for the development of the sector. Government of India supplements the efforts of the State Governments through various schemes/programmes. These schemes/programmes of the Government of India are meant for the welfare of farmers by increasing production, remunerative returns and income support to farmers.

Further, the Government constituted an Inter-ministerial Committee in April, 2016 to examine issues relating to "Doubling of Farmers Income" and recommend strategies to achieve the same. The Committee submitted its report to the Government in September, 2018 and thereafter, an empowered body was set up on 23.01.2019 to monitor and review the progress as per these recommendations. To achieve this, the Committee has identified seven sources of income growth, *viz.*, improvement in crop productivity; improvement in livestock productivity; resource use efficiency or savings in the cost of production; increase in the cropping intensity; diversification towards high value crops; improvement in real prices received by farmers; and shift from farm to non-farm occupations.

The Government is implementing schemes for imparting various training programmes and awareness campaigns for the benefit of farmers at panchayat and village level under Agriculture Technology Management Agency (ATMA) Scheme, four Farm Machinery Training & Testing Institutes (FMTTIs), Mission for Integrated Development of Horticulture (MIDH), National Food Security Mission (NFSM), etc., through its wide network of KrishiVigyan Kendras (KVKs) under Indian Council of Agricultural Research (ICAR) and agriculture universities, etc.

Awareness campaigns, advertisements, etc., are organised in print and electronic media to raise awareness among the farmers about the various initiatives taken by the Government of India for their welfare, on which an amount of Rs. 218.55 crore and Rs. 148.22 crore has been spent during the year 2018-19 and 2019-20, respectively.

Crop Diversification

Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) is already implementing a Crop Diversification Programme (CDP) for replacing paddy crop with less water consuming alternative crops to save water and protect the soil in the state of Punjab.

State-wise allocation (central share) under CDP for replacing paddy/tobacco crops during 2019-20 is given below:

(Rs. in lakh)

S. No.	State	Budget allocation (central share)
A.	**CDP for replacing paddy crop**	
1.	Punjab	705.76
2.	Haryana	301.73
3.	Uttar Pradesh	320.51
	Sub Total	**1328.00**

S. No.	State	Budget allocation (central share)
B.	**CDP for replacing tobacco crop**	
1	Andhra Pradesh	212.96
2	Bihar	17.80
3	Gujarat	201.23
4	Karnataka	160.08
5	Maharashtra	0.00
6	Odisha	2.45
7	Tamil Nadu	5.33
8	Telangana	10.47
9	Uttar Pradesh	38.21
10	West Bengal	18.47
	Sub Total	**667.00**
C.	Contingency	5.00
	Grand Total (A+B+C)	**2000.00**

Crop Diversification Programme (CDP), a sub scheme of Rashtriya Krishi Vikas Yojana (RKVY) is being implemented in Original Green Revolution states to divert the area of paddy crop to alternate crops and in tobacco growing states to encourage tobacco farmers to shift to alternate crops/cropping system. Under CDP for replacing paddy crop, assistance is provided for four major interventions, *viz.*, alternate crop demonstrations, farm mechanization & value addition, site-specific activities & contingency for awareness, training, monitoring, etc. However, for replacing tobacco crop, tobacco growing states have been given flexibility to take suitable activities/interventions for growing alternative agricultural/horticultural crops.

Government of India also provide flexibility to the states for state specificneeds/priorities under RKVY. The state can promote crop diversification under RKVY with the approval of State Level Sanctioning Committee (SLSC) headed by Chief Secretary of the State.

Cultivation of Genetically Modified (GM)Crops

Area, production and productivity of Bt cotton has increased steadily since its introduction in India, barring minor fluctuation in few years. Details of year-wise area under cotton, Bt cotton, production and yield of cotton during 2002-03 to 2019-20 are given below:

Years	Area under cotton* (in lakh hectare)	Area under Bt. cotton** (in lakh hectare)	Pro-duction (in lakh bales)	Yield (kg per hectare)
2002-03	86.24	0.29	86.21	191
2003-04	75.98	0.92	137.28	307
2004-05	87.87	4.85	164.29	318
2005-06	86.78	12.34	184.99	362
2006-07	91.44	33.53	226.32	421
2007-08	94.14	54.72	258.84	467
2008-09	90.07	66.69	222.76	403
2009-10	101.32	85.52	240.22	403
2010-11	111.23	96.32	330.00	499
2011-12	121.78	107.58	352.00	491
2012-13	119.77	105.43	342.20	486
2013-14	119.60	110.35	359.02	510
2014-15	128.19	119.40	348.05	462
2015-16	122.92	106.83	300.05	415
2016-17	108.28	89.43	325.77	511
2017-18	124.29	110.76	328.05	477
2018-19	126.58	117.81	287.08	386
2019-20***	125.84	117.47	322.67	436

**Source:* Directorate of Economics and Statistics
***Source:* DAC&FW, State Govenments and Directorate of Cotton Development, Nagpur
***First Advancement Estimate (Directorate of Economics and Statistics)

Most of the countries are signatory to the Cartagena Protocol on Bio-safety which has well defined mechanism for regulation of Genetically Modified (GM) crops including bio-safety evaluation and environmental release. Further, acceptance of GM crops has increased at the global level and the area under GM crops increased from 1.7 million hectares in 1996 to 191.7 million hectares in 2018.

The aim of the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW) is to achieve the goal of food security and nutritional requirements for a growing population by using the best available technology and scientific inputs that are beneficial to farmers and safe for the environment & human health.

Bt cotton is the only GM crop approved by the Genetic Engineering Appraisal Committee (GEAC) in 2002 for commercial cultivation in the country. Ministry of Environment, Forest & Climate Change informed that they have received feedback from multiple stakeholders for and against the release of GM brinjal and GM mustard. The feedback was suitably considered by the GEAC, which has advised additional studies to be conducted for assessment of impact on environment and health.

Decrease in Agricultural Holdings

The Department of Agriculture, Co-operation and Farmers Welfare conducts the agriculture census every five years to collect data on structural characteristics of agricultural sector including the size of agriculture land holdings in the country. As per the latest information available from agriculture census, the average size of operational holdings has decreased from 2.28 hectares in 1970-71 to 1.84 hectares in 1980-81, 1.41 hectares in 1995-96 and 1.08 hectares in 2015-16.

Considering the declining trends observed in the size of agricultural holdings in the past and the prospective increase in population over time, the fragmentation of holdings is likely to continue and the average size of operational holdings is expected to further decrease in the country including Kerala.

In order to make small holdings more viable and to assist augmentation of farm incomes, the Government has taken several measures including adoption of modern technologies and practices like multiple cropping, inter-cropping and integrated farming systems. The Indian Council of Agricultural Research (ICAR) is conducting research programmes to develop location specific varieties and technologies for enhancing the production and productivity of farm holdings. Support is also provided to farmers (including small and marginal farmers) through initiatives and programmes of the Government like Interest Subvention Scheme (ISS), Mission for Integrated Development of Horticulture (MIDH), National Food Security Mission (NFSM), Neem Coated Urea, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Pradhan Mantri Fasal Bima Yojana (PMFBY), National Mission for Sustainable Agriculture (NMSA), etc.

Except in the years of adverse weather, rainfall, temperature conditions, natural calamities, etc., the production and productivity (per hectare production) of agriculture crops in the country has been generally increasing, as observed in the table given below:

All-India production of Foodgrains

Sl.No.	Year	Production (Million Tonnes)
1	2000-01	196.81
2	2005-06	208.60
3	2010-11	244.49
4	2015-16	251.54
5	2016-17	275.11
6	2017-18	285.01
7	2018-19	285.21
8	2019-20	291.95*

** Second advance estimate*

Thus, there is no conclusive evidence to suggest that fragmentation of land holdings has resulted in adverse impact on agricultural production/yield.

Shri Narendra Singh Tomar interacts with rural women of Self Help Groups (SHGs) on DD Kisan Live TV programme to mark International Women's Day

The Union Minister for Agriculture & Farmers Welfare, Rural Development and Panchayati Raj, Shri Narendra Singh Tomar has said that India cannot emerge as a developed economy in the comity of nations without participation of women. Addressing a live TV programme on DD Kisan on Women's Empowerment to mark the International Women's Day on 8th March, 2020, he said that the Prime Minister Shri Narendra Modi's mission of a New India can become a reality only with the active participation of women, who constitute half of the population, in the economy. Women are now not

only toppers in academic Board and competitive exams, but handling key positions in various sectors ranging from industry, scientific and technical research, space research & nuclear programmes, police and armed forces and bureaucracy, he added.

Shri Tomar said the Women's Self Help Groups (SHGs) are backbone of poverty alleviation programmes and the entire focus of Department of Agriculture, Cooperation & Farmers Welfare and Departments of Rural Development and Panchayati Raj is oriented towards women's emancipation. "Since communities can be more influential than individuals, the role of SHGs as change makers is critical in the development process sweeping across the rural landscape," he said.

Shri Tomar said that there are 60.8 lakh SHGs across the country mobilizing more than 6 crore 73 lakh women. The Rural Development Ministry plans to create a total of 75 lakh SHGs by 2022 to enable more women to get livelihood.

Shri Tomar said that the Government is providing funds and training to SHGs for livelihood missions, linking them with banks for easy credit flow and the Rural Development Ministry has instituted awards for SHGs encouraging them to perform better. More than Rs. 2.75 lakh crores credit has been provided to SHGs during last six years to make women self-dependent. More than five crore people are annually employed under the Mahatma Gandhi National Rural Employment Guarantee Scheme and women constitute 55% of the workforce under the MGNREGA. Even under the Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) with 4.66 lakh women involved, the participation of women is more under the scheme, he said. Shri Tomar said the Swarna Jayanti Gram Swarozgar Yojana (SGSY) was restructured and subsumed into the Deen Dayal Upadhyaya Antyodaya Yojana (DAY) - National Rural Livelihood Mission (Ajeevika) (NRLM). Under the Mission, the Government aims to reach out to about 10 crore rural poor households. The Swachh Bharat Mission (SBM) has given dignity to women and enhanced their safety with the construction of 9.5 crore toilets across the country.

Shri Tomar said that Government is not only supporting women and rural population but also providing them with platforms like the Government e-Market place (GeM), for fetching better prices for their products. The Government has made it mandatory for its offices to first source their requirements from GeM and purchase from other sources only if unavailable here.

Rural women participants sitting in Doordarshan studios in Bhopal, Bhubaneswar, Hyderabad, Jaipur, Patna and Ranchi, besides Delhi interacted with the Minister during the programme. They shared their stories of success and narrated how the SHGs have helped them become independent and contributed to raisetheir family income. Women participants included several Community Resource Persons (CRPs) including Pashu Sakhi, Krishi Sakhi, Bank Sakhi and Poshan Sakhi.

Cabinet approves Minimum Support Price of Copra for 2020 season

The Cabinet Committee on Economic Affairs, chaired by Prime Minister Shri Narendra Modi, has given its approval for the Minimum Support Prices (MSPs) of copra for 2020 season.

The MSP for Fair Average Quality (FAQ) of milling copra has been increased to Rs. 9,960/- per quintal for 2020 season from Rs. 9,521/- per quintal in 2019 and the MSP for ball copra has been increased to Rs. 10,300/- per quintal for 2020 season from Rs. 9,920/- per quintal in 2019. This will accrue a benefit of Rs. 439/- per quintal in the milling copra and Rs 380/- increase in the Ball Copra. This is to ensure a return of 50 percent for milling copra and 55 percent for ball copra over the all India weighted average cost of production.

The approval is based on recommendations of the Commission for Agricultural Costs and Prices (CACP). The increase in MSP of copra for 2020 season is in line with the principle of fixing the MSP at a level of at least 1.5 times the all India weighted average cost of production which was announced by the Government in the Budget 2018-19.

It assures a minimum of 50 percent as margin of profit as one of the important and progressive steps toward making doubling of farmers' incomes possibleby 2022.

The National Agricultural Cooperative Marketing Federation of India Limited (NAFED) and National Cooperative Consumer Federation of India Limited (NCCF) will continue to act as Central Nodal Agencies to undertake price support operations at

the MSP in the coconut growing states.

Last year when there was price crash in Tamil Nadu, the timely intervention by Government of India through purchase at MSP pushed the market sentiment upward, benefitting the copra farmers.

India is number one in production and productivity of Copra in the World.

Shri Tomar calls for retention of talent in Agriculture

The Union Minister for Agriculture & Farmers Welfare, Rural Development & Panchayati Raj, Shri Narendra Singh Tomar, has called for retention of talent in Agriculture. While inaugurating the Pusa Krishi Vigyan Mela-2020 on 1st March, 2020, he said that India has a vast pool of agricultural scientists and specialists graduating from universities every year. "Government can provide funds, subsidies and incentives, but there has to be an interest in farming. For this agriculture has to be made a profitable venture; it should fulfil the nation's needs, and its share in GDP and exports should rise," he added.

"Your purpose in career does not end with securing a cushy job or just remain engaged in education and research, but you should be a successful farmer in your area. Even those agriculturists retiring every year should remain involved in farming and inspire others. The farmer should remain alive in you. You may engage in farming in your kitchen garden in your spare time. It will keep you connected with agriculture as a profession," said Shri Tomar.

Shri Tomar said the Prime Minister Shri Narendra Modi has given priority to agriculture and set a target of doubling farmers' income by 2022. In this direction, the Government has ensured one-and-a-half times MSP of input costs to farmers, assured Rs. 6,000 annually to farmers covered under the PM-KISAN scheme and a loan of Rs. 1,60,000 under Kisan Credit Card. The Prime Minister has ensured transparency in disbursal of benefits to farmers and now there is no role for middlemen and brokers. Besides, there will be no shortage of funds and budgetary support for agriculture, he said.

Shri Tomar said that the Prime Minister Narendra Modi launched the registration of 10,000 new Farmer Producer Organisations (FPOs) in order to promote cooperative farming. Budgetary provision of Rs. 6,600 crore has been made to provide each FPO a sum of Rs. 15 lakh for all farming related activities ranging from sowing, harvesting to distribution and marketing. For this purpose, a Credit Guarantee Fund of Rs. 1,500 crore has been created jointly by NABARD and NCDC.

Shri Tomar said that geographic divisions and climate change pose a challenge to our agriculture community. The Ministry is in the process of organising a big conference in each of the eight zones. The Minister said that field exhibitions on the patterns of Pusa Krishi Vigyan Mela should also be organised simultaneously. The Prime Minister has directed that a study on pesticides be included as part of agriculture curriculum.

Speaking on the occasion, the Minister of State for Agriculture & Farmers Welfare, Shri Parshottam Rupala called for organising such farmers' fairs in every state. He urged the Agriculture Institutes and scientists to ensure that superior seeds are provided to farmers at reasonable rates.

In his address, Dr. Trilochan Mohapatra, Secretary, Department of Agricultural Research and Education (DARE) & Director General, ICAR, said a large number of farmers participate in the Kisan Vigyan Mela and buy the superior quality seeds developed by the ICAR institutes.

At a separate function, anMoU was signed between the ICAR and Patanjali Bio Research Institute (PBRI), Haridwar in the presence of the three Ministers. The MoU was signed by Dr. Trilochan Mohapatra on behalf of ICAR and Shri Acharya Balkrishna, Chief Executive Officer (CEO), Patanjali& Managing Director, PBRI. Speaking on the occasion, Shri Tomar said that the MoU will promote Organic Farming with R&D expertise of ICAR and the indigenization efforts of Patanjali in a wide range of products.

Imparting new technologies to farmers through electronic media

DAC&FW is educating farmers through following use of electronic media as follows:

(i) Kisan Suvidha mobile app facilitates dissemination of information to farmers on the critical parameters, viz., weather; market prices; plant protection; input dealers (seed, pesticide,

fertilizer) farm machinery; soil health card; cold storages & godowns; veterinary centres and diagnostic labs.

(ii) Crop related advisories are regularly sent to the registered farmers through SMSs on mKisan Portal *(www.mkisan.gov.in)*.

(iii) The Indian Council of Agriculture Research (ICAR) has compiled more than 100 mobile apps developed by ICAR, state agricultural universities and Krishi Vigyan Kendras (KVKs) in the areas of crops, horticulture, veterinary, dairy, poultry, fisheries, natural resources management and integrated subjects.

(iv) Awareness/ education is being created among farmers through various electronic mass media mediums like DD Kisan Channel, Doordarshan, All India Radio, etc.

(v) Apart from the above, social media platforms like Facebook, Twitter, YouTube are being used to educate farmers, across the country.

The Government is implementing the following schemes aimed at imparting training to farmers in the agriculture and allied sectors:

(i) A centrally sponsored scheme on 'support to state extension programmes for extension reforms' popularly known as Agriculture Technology Management Agency (ATMA) Scheme is under implementation in 691 districts of 28 States & 5 UTs of the country. The extension activities under ATMA, inter-alia, include Farmers' Training. During the year, 2018-19, 19.18 lakh farmers availed training benefits under ATMA.

(ii) Indian Council of Agricultural Research (ICAR) with its network of 717 Krishi Vigyan Kendras (KVKs) has mandate of technology assessment, demonstration and capacity development of farmers. KVKs are imparting training to farmers for getting higher agricultural production and income. During the year 2018-19, 13.51 lakh farmers were trained by KVKs in various thematic areas.

(iii) Four Farm Machinery Training & Testing Institutes (FMTTIs) located at Budni (MP), Hissar (Haryana), Ananthapur (AP) and Biswanath Chariali (Assam) are engaged in imparting training to various categories of trainees including farmers, in the field of farm mechanization. During the year 2018-19, these institutes have trained 9905 candidates.

(iv) National Food Security Mission (NFSM) is being implemented in identified districts of 28 States and 2 UTs, *viz.*, Ladakh and J&K of the country to increase the production and productivity of rice, wheat, pulses, coarse cereals and nutri-cereals (millets) through area expansion and productivity enhancement. During the year 2018-19, 3,42,188 number of farmers were trained.

(v) Mission for Integrated Development of Horticulture (MIDH), a centrally sponsored scheme is being implemented for holistic growth of the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo. All States and UTs are covered under MIDH. During 2018-19, 1,91,086 number of farmers were trained.

(vi) In addition to the above, training of farmers is an inbuilt component under Sub-Mission on Plant Protection & Plant Quarantine. Farmer Field Schools (FFSs) are conducted for promoting Integrated Pest Management among farmers. During the year 2018-19, 712 FFSs were organized under the scheme.

Financial Assistance under PM KISAN Scheme

The entire responsibility of identification of eligible beneficiary farmer families and uploading their correct details on the PM-KISAN portal rests with the concerned State/UT Governments. The data of beneficiaries uploaded by them undergoes a multi-level verification and validation by various concerned agencies, including the banks, which includes rejection of data for errors at various levels and re-uploading of error-free data by the State/UT Governments. Then only, the amount is successfully transferred into the bank accounts of the beneficiaries.

Though the PM-KISAN Scheme has been successfully implemented across the country with total coverage of 8,69,79,391 beneficiaries as on 11.3.2020, State Governments have been continuously

requested and vigorously pursued for expeditious registration, correction, and uploading the data of remaining beneficiaries, in mission mode and by organizing camps. A weekly meeting is held through video conferencing with State Governments and other concerned stakeholders so as to remove any obstacles coming in the way of smooth and seamless implementation of the scheme. On the advice of the Union Government, the States have been organizing publicity/awareness camps and saturation drives to achieve 100% saturation by enrolling every eligible farmer family of the country.

Further, a special facility has been provided to the farmers in the PM-Kisan portal, namely, 'Farmers Corner', through which, farmers can do their self-registration. Farmers can also edit their names in PM-Kisan database as per their Aadhaar card through the Farmers Corner. Farmers can also know the status of their payment through the Farmers Corner. Village-wise details of beneficiaries are also available on the Farmers Corner. The Common Service Centres (CSCs) have also been authorized to do registration of the farmers for the Scheme upon payment of minimal fees. The other facilities on Farmers Corner are also available through CSCs. A special Mobile App has also been launched on 24th February, 2020 on the 1st anniversary of completion of one year of successful implementation of scheme, which provides the facilities available through the Farmers Corner.

Government of West Bengal, which has not yet joined the scheme, thereby denying its benefit to around 69 lakh farmers of the State, has also been repeatedly requested to join the scheme.

Increase in MSP

The Union Government has increased the Minimum Support Price (MSP) for Kharif and Rabi crops of 2019-20 season including Paddy, wheat, pulses and oilseeds on the line of fixing the MSP at a level of 1.5 times of the cost of production as announced in Union Budget 2018-19.

Government fixes MSPs of 22 mandated crops including wheat, pulses and oilseeds on the basis of recommendations of Commission for Agricultural Costs & Prices (CACP), after considering the views of State Governments and Central Ministries/ Departments concerned & other relevant factors. In addition, MSP for Toria and De-Husked coconut is also fixed on the basis of MSPs of Rapeseed & Mustard and Copra, respectively.

While recommending MSP, CACP considers various factors, *viz.*, cost of production, overall demand-supply situations of various crops in domestic and world markets, domestic and international prices, inter-crop price parity, terms of trade between agriculture and non-agriculture sector, likely effect of price policy on rest of economy, rational utilization of land, water and other production resources and a minimum of 50 percent as the margin over cost of production. The views of the farmer and farmer's association are also considered by CACP before recommending MSP.

Government receives suggestions from state government regarding various aspect of increasing MSP. CACP seeks suggestions from different stakeholders including State Governments before recommending MSP. National Commission on Farmers (NCF) headed by Dr. M.S. Swaminathan had recommended that the MSP should be at least 50 percent more than the weighted average cost of production. The Union Budget for 2018-19 had announced the pre-determined principle to keep MSP at levels of one and half times of the cost of production. Accordingly, Government has increased the MSP for all mandated Kharif, Rabi and other commercial crops with a return of atleast 50 percent of all India weighted average cost of production for the agriculture year 2018-19 and 2019-20.

Financial Package to boost Rural Income

Agriculture and farmers are backbone of rural economy. With a view to provide income support to farmers' families across the country, to enable them to take care of expenses related to agriculture and allied activities as well as domestic needs, Government launched the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) on 24th February, 2019. Under the scheme, an amount of Rs. 6000/- is transferred directly into the bank accounts of farmers' families every year, in three instalments of Rs. 2000/- after each four month. Farmers falling within the purview of exclusion criteria relating to higher income status are not eligible to get the benefit. Land owning farmers practicing animal husbandry and fisheries may also avail the benefit of this scheme, subject to the exclusion criteria of the scheme.

Government has also been taking various other

long term sustainable measures to boost agriculture productivity and farmers' income and rural economy. For example:

(i) With a view to provide better insurance coverage to crops for risk mitigation, a crop insurance scheme namely, Pradhan Mantri Fasal BimaYojana (PMFBY) has been launched, which provides insurance cover for all stages of the crop cycle including post-harvest risks in specified instances, with low premium contribution by farmers.

(ii) Minimum Support Price (MSPs) are announced for various crops from time-to- time.

(iii) Scheme of Soil Health Cards (SHC) has been implemented so that the use of fertilizers can be rationalized.

(iv) "Per drop more crop" initiative has been undertaken under which drip/sprinkler irrigation is encouraged for optimal utilization of water, reducing cost of inputs and increasing productivity.

(v) Paramparagat Krishi Vikas Yojana (PKVY) has been implemented for promoting organic farming.

(vi) e-NAM initiative has been undertaken to provide farmers an electronic, transparent and competitive online trading platform.

(vii) Agro forestry has been promoted under "Har Medh Par Ped" for additional income.

(viii) An Umbrella Scheme 'Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PMAASHA) has been launched, aimed at ensuring remunerative prices to the farmers.

(ix) Bee keeping has been promoted under Mission for Integrated Development of Horticulture (MIDH) to increase the productivity of crops through pollination and increase the honey production as an additional source of income of farmers.

(x) The scheme of Kisan Credit Cards (KCC) has been implemented for easy availability of agricultural credit to farmers, including animal husbandry and fisheries farmers.

(xi) Institutional agricultural credit at affordable interests has been brought within the reach of more and more farmers. Government provides interest subvention of 2% on short-term crop loans up to Rs. 3.00 lakh. Presently, loan is available to farmers at an interest rate of 4% per annum on prompt repayment.

(xii) Further, under Interest Subvention Scheme 2018-19, in order to provide relief to the farmers on occurrence of natural calamities, the interest subvention of 2% has been made available for the first year on the restructured amount. In order to discourage distress sale by farmers and to encourage them to store their produce in warehouses against negotiable receipts, the benefit of interest subvention will be available to small and marginal farmers having Kisan Credit Cards for a further period of upto six months post harvest on the same rate as available to crop loan.

Further measures may be considered from time to time for enhancing the financial condition of farmers and to boost rural economy.

Impact of Organic Foods on Fertilizer Industry

Government of India has been promoting balanced and judicious use of fertiliser in conjunction with organic fertiliser, bio fertiliser on soil test based recommendations. All India Consumption of major fertilizers namely Urea, DAP, MOP, Complexes and SSP, during the years 2016-17, 2017-18 and 2018-19 was 536.11 LMT, 543.83 LMT and 562.09 LMT, respectively. The consumption of fertilizer depends on many factors namely, fertility of soil, availability of moisture in soil. Further, overall area under organic farming is very less in comparison to the gross cropped area in the country. Hence, bio fertilizer would not impact the chemical fertiliser industry though requirement of bio fertiliser would grow.

The demand of organic food is growing due to being chemical free and hence safer. In order to encourage the use of organic/bio fertilisers, the Government of India has been promoting organic farming under two dedicated schemes namely Mission Organic Value Chain Development North Eastern Region (MOVCDNER) and Parampragat Krishi Vikas Yojana (PKVY) since 2015 through State Governments.

Impact of Climate Change on Farmers

The country has initiated the action to address the problems likely to arise due to climate change. These efforts have provided valuable inputs in terms of the regional and national level impacts of climate variability and climate change on crops, horticulture, livestock and fishery. Through its programmes and schemes focus on climate resilient agriculture, appropriate adaptation strategies have been devised for ensuring food security, enhanced livelihood opportunities and economic stability.

National Mission for Sustainable Agriculture (NMSA), one of the Missions under National Action Plan for Climate Change (NAPCC), includes programmatic interventions like Soil Health Card (SHC), Paramparagat Krishi Vikas Yojana (PKVY), Mission Organic Value Chain Development for North Eastern Region (MOVCDNER), Rainfed Area Development (RAD), National Bamboo Mission (NBM) and Sub-mission on Agro Forestry (SMAF). These and other programmes including Prime Minister Krishi Sinchayee Yojana (PMKSY) are ensuring judicious use of natural resources. Assistance is provided under National Food Security Mission (NFSM) for, inter alia, stress tolerant/climate resilient varieties of foodgrains.

Under NMSA following ten deliverables are monitored:

(i) Area under organic farming,

(ii) Production of Bio-fertilizers,

(iii) Precision Irrigation,

(iv) SRI/ Direct Seeded Rice from Transplantation,

(v) Crop diversification,

(vi) Additional Area under plantation in Arable land,

(vii) Climate Resilient Varieties (CRV) Identified/ Released,

(viii) (a) Identification of genotypes of crops with enhanced CO_2 fixation potential and less water consumption & Nutrients,

(viii) (b) Climate Resilient genotypes with greater adaptation to drought, flood, salinity and high temperature,

(ix) Coverage of milch animals under ration balancing programme, and

(x) Establishment of bypass protein feed making unit.

Indian Council of Agricultural Research (ICAR) has developed 45 models for climate resilient Integrated Farming Systems (IFS) which are replicated in Krishi Vigyan Kendras (KVKs) for demonstration and extended through the Rainfed Area Development (RAD) programme. Climate resilient villages have been developed, one in each of 151 districts under the project National Innovations in Climate Resilient Agriculture (NICRA). This follows a multi-pronged strategy encompassing strategic research on adaptation, mitigation and demonstration of technologies on farmers' fields to create awareness, aiming mainly to evolve crop varieties tolerant to climatic stresses like floods, droughts, frost, inundation due to cyclones and heat waves. An atlas on vulnerability of Indian agriculture to climate change has been prepared by Central Research Institute of Dryland Agriculture (CRIDA), Hyderabad. District Agriculture Contingency Plans for 648 districts have been prepared for managing weather aberrations for sustainable agriculture.

Due to preparedness and introduction of climate resilient varieties, total foodgrain has increased from 208.60 million tonnes in 2005-06 to 284.95 million tonnes in 2018-19 (4th Adv. Est.) and horticulture production from 116.9 million tonnes in 2004- 05 to 313.85 million tonnes in 2018-19 (3rd Adv. Est.).

Introduction of DBT in Agriculture Sector

Assistance/benefit is provided to farmers under various schemes as follows:

(i) Mission for Integrated Development of Horticulture (MIDH)

(ii) Sub Mission on Agriculture Mechanization (SMAM)

(iii) Pradhan Mantri Krishi Sinchai Yojana (PMKSY)

(iv) Sub Mission on Seeds and Planting Material

(SMSP)

(v) Integrated Scheme on Agriculture Cooperation (ISAC)

(vi) Interest Subvention Scheme (ISS)

(vii) National Food Security Mission (NFSM)

(viii) Pradhan Mantri Fasal BimaYojana (PMFBY)

(ix) Agri Clinics and Agri Business Centres Schemes (ACABC)

(x) Agriculture Technology Management Agency (ATMA)

(xi) National Mission on Sustainable Agriculture-Rainfed Area and Development (NMSA-RAD)

(xii) Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)

(xiii) Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)

(xiv) Paramparagat Krishi Vikas Yojana (PKVY)

Direct Benefit Transfer in schemes like Pradhan Mantri Kisan Samman Nidhi (PM KISAN) has already been adopted by the Government.

As on 17.03.2020, financial benefit under the PM-KISAN scheme has been transferred to 8,71,54,788 beneficiaries.

Time to time, suggestions have been received from Confederation of India Industry for improvement of agriculture sector, on which views are taken after due-diligence.

Subsidies provided in Agricultural Sector

Some of the component/schemes through which the Government provides subsidies to farmers are as follows:

(i) Seeds

The Department is implementing Sub-Mission on Seeds & Planting Materials (SMSP) from the year 2014-15 to promote production and multiplication of quality seeds of agricultural crops, so that the required quantities of seeds could be made available to farmers in the country. To upgrade the quality of farmers' saved seeds, financial assistance for distribution of foundation/certified seeds at 50% cost of the seeds for cereal crops and 60% for pulses, oilseeds, fodder and green manure crops for production of quality seeds is available/provided for one acre per farmer under the component Seed Village Programme of SMSP. The objective of this scheme is to make available improved/high yielding varieties of seeds to farmers in time and to achieve self-sufficiency in respect of seeds at village level itself. The above scheme/component is demand driven and implemented by the concerned State/implementing agencies for welfare of all the categories of farmers which help in enhancing productivity/production of various crops and also improving profitability of the agriculture sector (farmers' income) in the country.

(ii) Mechanization & Technology

(A) A Sub Mission on Agricultural Mechanization (SMAM) is being implemented w.e.f. 2014-15. The SMAM provides 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 with the following objectives:

(1) Increasing the reach of farm mechanization to small and marginal farmers and to regions where availability of farm power is low;

(2) Promoting 'Custom Hiring Centres'to offset the adverse economies of scale arising due to small landholding and high cost of individual ownership;

(3) Creating hubs for hi-tech & high value farm equipments;

(4) Creating awareness among stakeholders through demonstration and capacity building activities;

(B) A special Scheme to support the efforts of the Governments of Haryana, Punjab, Uttar Pradesh and the NCT of Delhi to address air pollution due to stubble burning and to subsidize machinery for

farmers for in-situ management of crop residue, 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 the period 2018-19 to 2019-20 has been launched.

(iii) Irrigation

There are three components of the Pradhan Mantri Krishi Sinchai Yojana (PMKSY)

(1) PMKSY(Har Khet Ko Pani)

(2) PMKSY (Watershed) and

(3) PMKSY (Per Drop More Crop)

Subsidy component is only admissible for PMKSY (Per Drop More Crop). DAC&FW is implementing Per Drop More Crop component of PMKSY. The PMKSY- Per Drop More Crop mainly focuses on enhancing water use efficiency at farm level through precision/micro irrigation (Drip and Sprinkler Irrigation). Besides promoting precision irrigation and better on-farm water management practices to optimize the use of available water resources, this component also supports micro level water storage or water conservation/management activities to supplement Micro Irrigation.

(iv) Godowns

To promote creation of scientific storage capacity for storing farm produce, processed farm produce and agricultural inputs, etc., to reduce post-harvest & handling losses, promote pledge financing and market access including marketing infrastructure (other than storage), the DAC&FW is implementing a capital subsidy sub-scheme "Agricultural Marketing Infrastructure (AMI)" of Integrated Scheme for Agricultural Marketing (ISAM) across the country.

AMI is a demand driven, credit-linked, back ended subsidy scheme and no State/beneficiary-wise allocation has been made under the scheme. Beneficiaries, *viz.*, farmers, Agri-preneurs, FPOs, Individuals, Cooperatives, and state agencies, etc., are eligible for assistance. Under the scheme, the subsidy at the rate 25% for plain areas and 33.33% for North East Regions, hilly area, Women/SC/ST promoters & FPOs, etc., is available.

(v) Fertiliser

Urea is being provided to farmers at a statutory notified Maximum Retail Price (MRP). The MRP of a 45 kg bag of urea is Rs. 242 per bag (exclusive of charges towards neem-coating and taxes as applicable) and the MRP of a 50 kg bag of urea is Rs. 268 per bag (exclusive of charges towards neem coating and taxes as applicable). The difference between the delivered cost of fertilizers at farm gate and net market realization by the urea units is given as subsidy to the urea manufacture/importer by the Government of India. Accordingly, all farmers are getting urea at affordable subsidized price. With respect to Phosphatic and Potassic (P&K) fertilizers, the D/o Fertilizers is providing subsidy on P&K fertilizers. Further, as far as P&K is concerned, the Government has implemented Nutrient Based Subsidy Policy w.e.f. 1.4.2010 for Phosphatic and Potassic (P&K) fertilizers. Under the policy, a fixed amount of subsidy, decided on an annual basis, is provided on subsidised P&K fertilizers depending on their nutrient content. Under this policy, MRP is fixed by fertilizer companies as per market dynamics at reasonable level which is monitored by the Government. Accordingly, any farmer including a poor and marginal farmer who is buying these fertilizers is getting benefits of subsidy.

Subsidies to the farmers are also given as part of various other schemes such as National Food Security Mission (NFSM), Mission for Integrated Development of Horticulture (MIDH), Rashtriya Krishi Vikas Yojana (RKVY) and Paramparagat Krishi Vikas Yojana (PKVY), etc., for the benefits of the farmers.

Most of the schemes are targeted to benefit the small and marginal farmers, the classification of which is based on the size of their land holding. Keeping in view of the objectives of various schemes, which offer subsidies to farmers, periodic review of the same is an ongoing activity and whenever any change/modification is required in the scheme(s) for the overall benefit of the farmers, the same is carried out.

Development of Agricultural Marketing Infrastructure

In Budget 2018-19, the Government of India has announced to develop and upgrade existing 22,000

rural haats into Gramin Agricultural Markets (GrAMs). In these GrAMs, physical infrastructure will be strengthened using MGNREGS and other Government Schemes.

Further, the Government has announced to set up of an Agri-Market Infrastructure Fund with a corpus of Rs. 2000 crore for developing and upgrading agricultural marketing infrastructure in the 22000 Gramin Agricultural Markets (GrAMs) and 585 Agricultural Produce Market Committees (APMCs).

Ministry of Rural Development (MoRD), Government of India has been developing and up-grading physical infrastructure of rural haats under control of panchayat through States / Union Territories through Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) for development of GrAMs.

Further, in pursuant to the budget announcement, the Government has approved an Agri-Market Infrastructure Fund (AMIF) with a corpus of Rs. 2000 crore with National Bank for Agriculture and Rural Development (NABARD) for developing and upgrading agricultural marketing infrastructure in the GrAMs and Agriculture Produce Market Committee (APMC) Markets and circulated the scheme guidelines to the States/Union Territories (UTs). Since it is a demand driven scheme from the States/UTs, there is no state-wise and year-wise allocation of the fund. The Government of India has already requested States/UTs for submission of proposal for seeking assistance under AMIF.

Action-Plan to tackle Adverse Impact of Global Warming on Food Crops

Global Warming associated with the increase in concentration of greenhouse gases in the atmosphere is one of the reasons for the increase in extreme weather events. Due to global warming, agriculture sector is likely to be affected and climate change is expected to impact yields of agriculture crops in a business as usual scenario.

Simulation studies using integrated modelling framework showed that rainfed rice yields in India are projected to reduce marginally (<2.5%) in 2050 and 2080 scenarios while irrigated rice yields are projected to reduce by 7% in 2050 and 10% in 2080 scenarios. Climate change is projected to reduce wheat yield by 6-25% towards the end of the century with significant spatio-temporal variations. Climate change in 2050 and 2080 scenarios is projected to reduce the kharif maize yields by 18 to 23%. Kharif groundnut yields are projected to be increased by 4-7% in 2050 scenarios, where as in 2080 scenario, the yield is likely to decline by 5%. Future climates are likely to benefit chickpea with increase in productivity (23-54%).

During XII Plan (2012-2018), more than 400 climate resilient germplasm lines have been identified and 58 genotypes characterised with high water and nutrient use efficiency by Indian Council of Agricultural Research (ICAR).

National Mission for Sustainable Agriculture (NMSA) one of the missions under National Action Plan on Climate Change (NAPCC) aims to evolve and implement strategies to make Indian agriculture more resilient to the changing climate.

National Food Security Mission (NFSM) programme is implemented in the identified districts across the country with the objective of increasing foodgrain production through area expansion and productivity enhancement, restoring soil fertility and productivity at individual farm level and enhancing farm level economy.

ICAR has launched a flagship network project National Innovations in Climate Resilient Agriculture (NICRA).The NICRA aims at strategic research on adaptation and mitigation, demonstration of technologies on farmers' fields and creating awareness among farmers and other stakeholders to minimize the impacts of global warming on agriculture. Under this project, large number of indigenous genetic resources and improved crop varieties of pulses (black gram, green gram, pigeonpea, chickpea) and cereals (rice and wheat) are screened for major abiotic stresses like drought and heat to identify superior cultivars for large scale adoption in farmer's fields genetic materials for cultivation at farmers field. In the process, number of genetic materials including improved varieties were identified, some of which are already in the farmer's fields. Besides, location specific NRM technologies are being demonstrated under Technology Demonstration Component of NICRA in 151 climatically vulnerable districts to achieve climate resilient agriculture.

Agriculture-Farming and allied activities exempted from Lockdown

Government has granted relaxation in the nationwide lockdown for activities related to agriculture-farming and allied activities with a view to address problems being faced by the farming community. This will also ensure uninterrupted harvesting of crops. In this regard, the Union Minister for Agriculture & Farmers Welfare, Rural Development and Panchayati Raj, Shri Narendra Singh Tomar has expressed gratitude to the Prime Minister Shri Narendra Modi and the Union Home Minister Shri Amit Shah.

Shri Tomar has been constantly monitoring issues related to the farmers ever since the lockdown was enforced. He was apprised of the difficulties the farmers could face in the harvesting of their crops and transporting foodgrains to the mandis. Keeping in view, the demands of farmers and concerned organisations and at the directions of the Prime Minister, the Union Government urgently considered and sympathetically examined the issue, following which a practical solution was arrived at in the interest of farmers and related communities.

The Union Home Ministry has issued second addendum to the guidelines related to the nationwide lockdown issued vide its Order No.40-3/2020-DM-I(A) dated 24th & 25th March, 2020 in exercise of the powers conferred under Section 10(2)(I) of the Disaster Management Act with the Chairperson, National Executive Committee. Under this Addendum, activities related to agriculture and related products, services and such other activities have been brought under the exception categories from the 21 day lockdown. This will also allow unhindered harvesting of crops. The Agriculture Minister has complimented the Prime Minister and Union Home Minister for the exception granted to agriculture and allied activities.

Under the 2nd Addendum issued by the Union Home Ministry, the following categories have been exempted from the lockdown:

i. Agencies engaged in procurement of agriculture products, including MSP operations;

ii. 'Mandis' operated by the Agriculture Produce Market Committee or as notified by the State Government;

iii. Farming operations by farmers and farm workers in the field;

iv. Custom Hiring Centres (CHC) related to farm machinery;

v. Manufacturing and packaging units of fertilisers, pesticides and seed; &

vi. Intra and Inter-State movement of harvesting and sowing related machines like combined harvester and other agriculture/horticulture implements

This decision has been taken with a view to facilitate unhindered activities related to agriculture and farming so as to ensure essential supplies to the common man and that the farmers and common people do not face any difficulty during the lockdown. Government of India has issued necessary directions to the concerned Ministries/Departments and designated officials of the States and UTs.

Government gives benefits to farmers on crop loan repayments due to Covid-19 lockdown

In the wake of lockdown due to ongoing Covid-19 pandemic, the Government has extended the benefit of 2% Interest Subvention (IS) to Banks and 3% Prompt Repayment Incentive (PRI) to all farmers upto 31st May, 2020 for all crop loans upto Rs. 3 lakh given by banks which have become due or are becoming due between 1st March, 2020 and 31st May, 2020.

Due to restrictions imposed on movement of people, many farmers are not able to travel to bank branches for payment of their short term crop loan dues. Moreover, due to restrictions on movement of people and difficulty in timely sale and receipt of payment of their produce, farmers may be facing difficulties in repayment of their short term crop loans falling due during this period.

To address this problem being faced by farmers, extension of Interest Subvention (IS) and Prompt Repayment Incentive (PRI) benefit upto 31st May, 2020 on the short term crop loans upto Rs. 3 lakh which are due upto 31st May, 2020, shall help the farmers to repay such loans upto the extended period at 4% p.a. interest without attracting any penalty.

Government is providing concessional crop loans to farmers through banks with 2% p.a. interest subvention to banks and 3% additional benefit on timely repayment to farmers thus providing loans upto Rs. 3 lakh at 4% p.a. interest on timely repayment.

In wake of COVID-19 spread, ICAR issues Advisory to farmers for Rabi crops

The Indian Council of Agricultural Research (ICAR) has issued following advisory for harvesting and threshing of Rabi crops and post-harvest, storage and marketing of farm produce in the wake of COVID-19 threat:

Harvesting & threshing of crops

Amidst the threat of COVID-19 spread, the Rabi crops are approaching maturity. Harvesting and handling of the produce including its movement to the market are inevitable as the agricultural operations are time bound. However, famers are to follow precautions and safety measures to be taken to prevent the disease spread. Simple measures include social distancing, maintaining personal hygiene by washing of hands with soap, wearing of face mask, protective clothing and cleaning of implements and machinery. Workers to follow safety measures and social distancing at each and every step in the entire process of field operations.

i. Harvesting of wheat is approaching in several northern states through combine harvesters and their movement within state and between states has been permitted. Precautions and safety measures of workers engaged in repair, maintenance and harvesting operation is to be ensured.

ii. Mustard is the second important Rabi crop, manual harvesting is in progress and threshing is due wherever already harvested.

iii. Harvesting of lentil, maize and chillies is in progress and gram is fast approaching.

iv. Sugarcane harvesting is at peak and is also time for manual planting in the north.

v. Measures of personal hygiene and social distancing to be followed by those engaged in harvesting of all field crops, fruits, vegetables, eggs and fishes before, during and after executing the field operation.

vi. In case of manual field operations of harvesting/ picking, accomplish the operation in 4-5 feet spaced strips assigning one strip to one person. This will ensure adequate spacing between the engaged labours.

vii. All the persons engaged should use masks and ensure hand washing with shop at reasonable intervals.

viii. Maintain safe distance of 3-4 feet during rest, taking of meals, transfer of produce at collection point, loading/unloading.

ix. Stagger the field operations wherever possible and avoid engaging more number of persons on the same day.

x. Engage only familiar persons to the extent possible and after reasonable enquiry as to avoid the entry of any suspect or likely carrier during field activity.

xi. Prefer mechanized operations over the manual wherever feasible. Only the essential numbers of persons should be allowed to accompany the machine.

xii. All machines should be sanitized at entry point and at regular intervals. All transport vehicles, gunny bags or other packaging material should also be sanitized.

xiii. The collection of the produce may be done in small heaps spaced at 3-4 feet and field level processing should be assigned to 1-2 persons/ heap to avoid crowding.

xiv. Proper sanitation and cleanliness of threshers for harvested maize and groundnut is to be maintained especially when machines are shared and used by farmer groups. Copious washing of frequently touchedmachine parts with soap is advised.

Post-harvest, storage and Marketing of farm produce

i. While performing drying, threshing, winnowing, cleaning, grading, sorting and packaging

operations at the farm level, wearing of protective face mask may help against aerosols and dust particles to prevent respiratory difficulties.

ii. Ensure proper drying prior to storage of harvested grains, millets, pulses at farm/home and do not use reuse previous season's jute bags to prevent pest infestation. Use treated and dried gunnies after soaking in 5% neem solution.

iii. Adequate pre-cautions to be taken for storage of produce at the farm in jute bags that are made available in sufficient numbers to farmers or in nearby cold storages/godowns/ warehouses, if needed for better price realization.

iv. Adequate personal safety measures to be taken for loading and transporting of farm produce and while participating in sale at market yards/ auction platforms.

v. Seed producer farmers are permitted to transport to seed companies with supporting documents and follow precautions while receiving payments.

vi. Seed processing/packaging plants and transportation of seed from seed producing states to growing states (South to North) is essential to make available seed for ensuing kharif crops, e.g., SSG seed for green fodder for sowing in April in North comes from Southern states.

vii. Precautions to be followed for direct marketing/ supply of vegetables such as tomato, cauliflower, green leafy vegetables, cucumbers and other cucurbits from farms.

Standing field crops

i. The temperature in the most of wheat growing areas is still below long-term average and therefore, likely to delay wheat harvesting by at least 10-15 days beyond April 10, therefore, farmers can delay wheat harvesting till April 20 without incurring any significant loss, which gives enough time to manage logistics for procurement and announcement of dates.

ii. Rabi paddy in grain filling stage in southern states is widely affected due to neck blast incidence, adequate precautions to be taken while spraying of recommended fungicide by contract sprayers/ farmers.

iii. In case of any unseasonal rain at harvesting stage in paddy, spray 5% salt solution to prevent seed germination.

iv. In horticultural crops at fruiting stage such as mango, while carrying out field operations related to nutrient sprays and crop protection, adequate precautions in handling of inputs, mixing, delivery and washing of equipment is to be undertaken.

v. In summer, pulses in rice fallows, whitefly management with proper safety measures may be taken up to prevent yellow mosaic virus incidence.

As per Government of India guidelines applicable for farmers and farming sector during lockdown period due to COVID-19, the following Agricultural and allied activities have been exempted from the lockdown:

i. Veterinary hospitals

ii. Agencies engaged in procurement of agriculture products, including MSP operations

iii. 'Mandis' operated by the Agriculture Produce Market Committee or as notified by the State Government

iv. Farming operations by farmers and farm workers in the field

v. Custom hiring centres (CHC) related to farm machinery

vi. Manufacturing and packaging units of Fertilizers, Pesticides and Seeds

vii. Intra and inter-state movement of harvesting and sowing related machines like combined harvester and other agriculture/ horticulture implements

These exemptions will facilitate unhindered activities related to agriculture and farming so as to ensure essential supplies and farmers do not face any

difficulty during the lockdown. Necessary directions to the concerned Ministries/Department of States and UTs have been issued for implementation during lockdown as per guidelines of Ministry of Home Affairs, Government of India vide No.40-3/2020-DM-I(A) dated 24th, 25th and 27th March, 2020, additions to clauses 2, 4, 5 and 6 in exceptions based on request of the Ministry of Agriculture and Farmers Welfare, Government of India.

Based on the policy directions of Government of India, various Ministries/ Departments of State Governments have issued implementation guidelines to facilitate continuation of activities related to Agriculture and allied sectors.

General Survey of Agriculture

Trends in Foodgrain Prices

Based on Wholesale Price Index (WPI) (2011-12=100), WPI in case of foodgrains increased by 9.94 percent in February, 2020 over February, 2019.

Among foodgrains, WPI of pulses, cereals and vegetables increased by 10.80 percent, 9.76 percent, and 6.58 percent, respectively, in February, 2020 over February, 2019.

Among cereals, WPI for wheat and paddy increased by 12.29 percent and 3.37 percent, respectively, in February, 2020 over February, 2019.

Similarly, WPI in case of foodgrains increased by 6.24 percent in February, 2020 over January, 2020.

Among foodgrains, WPI of pulses, cereals and vegetables increased by 11.42 percent, 5.21 percent and 29.97 percent in February, 2020 over January, 2020.

Among cereals, WPI for wheat and paddy increased by 6.42 percent and 3.71 percent, respectively, in February, 2020 over January, 2020.

Rainfall and Reservoir Situation, Water Storage in Major Reservoirs

Cumulative pre-monsoon season, 2020 rainfall for the country as a whole during the period 1st March, 2020 to 1st April, 2020 has been 46% higher 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 211% in Central India, by 80 % in North-West India but lower than LPA by 31% in East & North East India and by 14% in South Peninsula.

Out of 36 meteorological sub-divisions, 25 meteorological sub-divisions received large excess/ excess rainfall, 02 meteorological sub-divisions received normal rainfall and 09 meteorological sub-divisions received deficient/large deficient rainfall.

Current live storage in 123 reservoirs (as on 2nd April, 2020) monitored by Central Water Commission having Total Live Capacity of 171.09 BCM was 84.77 BCM as against 52.07 BCM on 02.04.2019 (last year) and 52.63 BCM of normal storage (average storage of last 10 years). Current year's storage is 163% of last year's storage and 161% of the normal storage.

Economic Growth

Global Growth

The outbreak of Novel Coronavirus (COVID-19), first in China and spreading globally, has infected more than 20.34 lakh people and caused more than 1.35 lakh deaths as on 17th April, 2020 (World Health Organization). Several multilateral organizations have slashed their growth projections of world and individual countries output. The pandemic has emerged as a key risk to human health and is causing significant and rising human costs and economic turmoil through supply disruption, drop in domestic and external demand, reduction in trade, lower tourism and business travel and loss of consumer and investor confidence.

As per IMF's World Economic Outlook, April, 2020, the global economy is projected to contract sharply by –3 percent in 2020-21, much worse than during the 2008–09 financial crisis, as a result of the pandemic. The global economy is projected to grow by 5.8 percent in 2021 as economic activity normalizes, helped by policy support. These projections assume that the pandemic fades in the second half of 2020 and containment efforts can be gradually unwound.

India's Economic Growth in 2019-20

As per Second Advance Estimates of National Income released by NSO on 28th February, 2020, real GDP growth for 2019-20 is estimated at 5.0 percent (Table 1).

However, with the onset of COVID-19 pandemic, its intensity, spread and duration will now majorly determine whether India is able to realize its estimated and projected GDP growth. As per IMF's World Economic Outlook, India is projected to grow at 4.2 percent in 2019-20 with a 2 percent growth in Q4 2019-20. Downside risks to growth emerge from deepening of global slowdown and exacerbation of supply chain disruptions

following prolonged spread of COVID-19 and lockdowns across countries including India (since last week of March, 2020). Additional upside growth impulses emanate from the early containment of COVID-19 and the slew of monetary, fiscal and other policy measures undertaken by government to minimise the adverse macro economic impact of the pandemic.

The real Gross Value Added (GVA) is estimated to grow at 4.9 percent in 2019-20 (2nd Advance Estimates) as compared to 6.0 percent in 2018-19 (1st Revised Estimates) (Table 1). The growth of real GDP was 4.7 percent for the third quarter (Q3) of 2019-20, as compared to the growth of 5.6 percent and 5.1 percent in first quarter (Q1) and second quarter (Q2), respectively of 2019-20 (Table 2).

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

Sectors	Growth rate at constant (2011-12) prices (percent)			Share in GVA at current prices (percent)		
	2017-18 2nd RE	2018-19 1st RE	2019-20 2nd AE	2017-18 2nd RE	2018-19 1st RE	2019-20 2nd AE
Agriculture, forestry & fishing	**5.9**	**2.4**	**3.7**	**18.0**	**17.1**	**17.6**
Industry	**6.3**	**4.9**	**1.8**	**29.2**	**28.9**	**27.4**
Mining & quarrying	4.9	-5.8	2.8	2.3	2.3	2.1
Manufacturing	6.6	5.7	0.9	16.4	16.1	15.1
Electricity, gas, water supply & other utility services	11.2	8.2	4.6	2.7	2.7	2.6
Construction	5.0	6.1	3.0	7.7	7.8	7.6
Services	**6.9**	**7.7**	**7.0**	**52.8**	**54.0**	**55.0**
Trade, hotel, transport storage	7.6	7.7	5.6	18.1	18.3	18.3
Financial, real estate & prof. services	4.7	6.8	7.3	20.7	21.1	21.3
Public administration, defence and other services	9.9	9.4	8.8	14.0	14.6	15.4
GVA at basic prices	**6.6**	**6.0**	**4.9**	**100.0**	**100.0**	**100.0**
GDP at market prices	**7.0**	**6.1**	**5.0**	**–**	**–**	**–**

Source: National Statistical Office (NSO).
Notes: 2nd RE: Second Revised Estimates, 1st RE: First Revised Estimates, 2nd AE: Second Advance Estimates.

Agriculture and Food Management

All India production of foodgrains

As per the 2nd Advance Estimates for 2019-20, the total production of food-grains during 2019-20 is estimated at 292.0 million tonnes compared to 285.2 million tonnes in 2018-19 (Table 3).

Procurement

Procurement of rice as on 28th February, 2020 during Kharif Marketing Season (KMS) 2019-20 was 37.7 million tonnes while procurement in the previous marketing season (KMS 2018-19) during corresponding period was 44.4 million tonnes (Table 4). Procurement of wheat during Rabi Marketing

TABLE 2: Quarter-wise Growth of GVA and GDP at Constant (2011-12) Prices (Percent)

Sectors	2017-18			2018-19			2019-20		
	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
Agriculture, forestry & fishing	**5.9**	**6.2**	**5.7**	**3.8**	**2.5**	**2.0**	**2.8**	**3.1**	**3.5**
Industry	**0.5**	**6.7**	**7.7**	**7.5**	**4.8**	**5.0**	**3.8**	**0.8**	**0.1**
Mining & quarrying	2.6	11.9	5.2	-7.3	-7.0	-4.4	4.7	0.2	3.2
Manufacturing	-0.9	7.8	9.3	10.7	5.6	5.2	2.2	-0.4	-0.2
Electricity, gas, water supply & other utility services	11.2	11.8	10.1	7.9	9.9	9.5	8.8	3.9	-0.7
Construction	0.0	1.3	4.6	6.4	5.2	6.6	5.5	2.9	0.3
Services	**8.4**	**5.8**	**7.5**	**7.4**	**7.4**	**7.4**	**6.9**	**7.3**	**7.4**
Trade, hotel, transport, communication and services related to broadcasting	8.1	8.2	8.2	8.5	7.8	7.8	5.7	5.8	5.9
Financial, real estate & professional services	5.9	2.9	5.7	6.0	6.5	6.5	6.9	7.1	7.3
Public administration, defence and other services	14.5	8.7	9.1	8.8	8.9	8.1	8.7	10.1	9.7
GVA at basic price	**5.5**	**6.1**	**7.2**	**6.9**	**6.1**	**5.6**	**5.4**	**4.8**	**4.5**
GDP at market prices	**5.1**	**7.3**	**8.7**	**7.1**	**6.2**	**5.6**	**5.6**	**5.1**	**4.7**

Source: National Statistical Office (NSO).

TABLE 3: Production of Major Agricultural Crops (2nd Advance Estimates)

Crops	Production (Million Tonnes)					
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20 (2nd AE)
Total Food-grains	252.0	251.6	275.1	285.0	285.2	292.0
Rice	105.5	104.4	109.7	112.8	116.5	117.5
Wheat	86.5	92.3	98.5	99.9	103.6	106.2
Total Coarse Cereals	42.9	38.5	43.8	47.0	43.0	45.2
Total Pulses	17.2	16.4	23.1	25.4	22.1	23.0
Total Oilseeds	27.5	25.3	31.3	31.5	31.5	34.2
Sugarcane	362.3	348.4	306.1	379.9	405.4	353.9
Cotton#	34.8	30.0	32.6	32.8	28.0	34.9

Source: DES, DAC&FW, M/o Agriculture & Farmers Welfare.
Note: 2nd AE: 2nd Advance Estimates, # Million bales of 170 kgs. each as on 18.02.2020.

Season (RMS) 2019-20 was 34.1 million tonnes while procurement in the previous marketing season (RMS 2018-19) during corresponding period was 35.8 million tonnes.

TABLE 4: Procurement of Crops (Million Tonnes)

Crops	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20*
Rice#	31.8	32.0	34.2	38.1	38.2	44.4	37.7
Wheat@	25.1	28.0	28.1	23.0	30.8	35.8	34.1
Total	**56.9**	**60.2**	**62.3**	**61.1**	**69.0**	**80.2**	**71.8**

Source: FCI and DFPD, M/o Consumer Affairs, Food and Public Distribution.
*Procurement of rice as on 28.02.2020.
#Kharif Marketing Season (October-September), @ - Rabi Marketing Season (April-March).

Off-take

The off-take of rice under all schemes during the month of January, 2020 has been 29.0 lakh tonnes. This comprises 26.1 lakh tonnes under NFSA (off-take against the allocation for the month of February, 2020) and 3.0 lakh tonnes under other schemes. In respect of wheat, the total off-take has been 25.1 lakh tonnes comprising of 18.2 lakh tonnes under NFSA (off-take against the allocation for the month of February, 2020) and 6.9 lakh tonnes under other schemes. The cumulative off-take of food-grains during 2019-20 is 54.9 million tonnes (Table 5).

Stocks

The total stocks of rice and wheat held by FCI as on 1st March, 2020 was 77.7 million tonnes compared to 60.2 million tonnes as on 1st March, 2019 (Table 6).

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

Crops	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20*
Rice	30.7	31.8	32.8	35.0	34.4	31.4
Wheat	25.2	31.8	29.1	25.3	31.5	23.6
Total (Rice & Wheat)	**55.9**	**63.6**	**61.9**	**60.3**	**65.9**	**54.9**

Source: DFPD, M/o Consumer Affairs, Food and Public Distribution.
*upto February, 2020.

TABLE 6: Stocks of Foodgrains (Million Tonnes)

Crops	1st March, 2019	1st March, 2020
1. Rice	26.4	31.0
2. Unmilled Paddy#	20.5	28.7
3. Converted Unmilled Paddy in terms of Rice	13.7	19.2
4. Wheat	20.1	27.5
Total (Rice & Wheat) (1+3+4)	**60.2**	**77.7**

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

Articles

Agriculture during the COVID-19 Pandemic: Problems and Prospects

C.S.C. SEKHAR*

Abstract

The current COVID-19 pandemic sweeping across the globe is expected to have a disastrous impact on the world economy. Indian economy is also expected to face severe headwinds. Indian agriculture remains a bright spot though. The real gross domestic product (GDP) from agriculture & allied activities is expected to maintain a robust growth rate of 3% in 2020-21, which in turn can help the overall growth in GDP. The factors on supply side appear to be largely adequate with robust foodgrain production and sufficient stocks. The prices of most of the food commodities have shown a decline in the month of March both at wholesale and retail levels. However, major problem could arise on the demand side due to disruption of livelihoods during the lockdown period leading to lower incomes for farmers, agricultural labourers and seasonal migrants. This negative impact on rural income is likely to derail the economy, which was already reeling with demand contraction even before the crisis. Hence, several safety nets, such as direct cash payments, free distribution of grains, etc., are needed. These safety nets are needed for at least six months. Immediately after the lockdown period, the activities in agricultural market are likely to increase. The measures of social distancing and hygiene need to be strictly enforced at this time. The supply of inputs, labour and machinery for the upcoming kharif season needs to be ensured with adequate health safeguards. In the wake of fears of a second wave of COVID-19 around November, the recent initiative of selling and transporting directly from the warehouses and FPOs, without passing through the APMC mandies, needs to be strengthened. Also, a robust system of direct payments and grain distribution to the vulnerable sections needs to be continued. Given the satisfactory state of domestic food supplies, restrictions on exports need to be avoided as it could hamper our global food markets.

Keywords: *COVID-19, agriculture, GDP growth, supply, demand.*

1. Introduction

The COVID-19 pandemic will have a major adverse impact on global and Indian economies. The International Monetary Fund (IMF 2020) has forecasted a decline of 3 percent in the world GDP and a very modest growth rate of 1.9% for India. The forecast for India's GDP growth has been further downgraded to 0.2-0.5 percent by the various rating agencies in their recent assessments. There will be sectoral as well as general equilibrium effects. With close to 50 percent of the workforce engaged in agriculture, it is very likely that the effect on this sector will be substantial. One of the anticipated effects is the severe disruptions in supply due to due to vast reduction in agricultural activities in the current and upcoming agricultural season which will result in high income losses.

1.1. Objectives of the study

The present article attempts to address the following questions amid COVID-19 pandemic.

i. What are the likely impacts of COVID-19 on various components of the rural economy, i.e., on rural employment and income?

ii. What are the current production and the likely scenarios?

iii. What are the likely effects on agricultural growth and overall economic growth?

iv. How is the food supply going to be affected?

v. What are the implications for trade?

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NOTE: Views expressed in the article are of the author only.

vi. What are the needed safety nets to offset the adverse effects of this crisis?

2. Supply Side Analysis of Agricultural Sector

2.1 Production and procurement of staple grains

When the COVID-19 crisis struck the country, the rabi harvesting was about to begin. The second advance estimates (2nd A.E.) of the crop production had pegged wheat output at 106.21 million tons (MT) while, rabi rice to be 15.53 MT. However, with the onset of the crisis and the subsequent lockdown, there were genuine apprehensions that harvesting and procurement operations of the rabi crops would be severely hampered. But due to the efforts of the central and state governments, these operations have become smooth.

The government had targeted to procure 52 MT of the two staple cereals for the central pool during ongoing rabi marketing season including 40.7 MT of wheat and 11.3 MT of rice. Punjab is expected to contribute highest share to the wheat procurement (13.5 MT), followed by Haryana (9.5 MT), Madhya Pradesh (10 MT) and Uttar Pradesh (5.5 MT). In case of rabi rice, Telangana (6.2 MT), Andhra Pradesh (2.2 MT) and Odisha (0.95 MT) are the major contributors to the central pool. Procurement of wheat has begun in all the wheat producing states, except Gujarat, where it will start from May. Procurement of rice has also started in major producing states, like Telangana, Andhra Pradesh and Tamil Nadu. The procurement in other states, like Maharshtra, West Bengal and Odisha is likely to begin from May.

There were apprehensions that harvesting could be impacted due to the paucity of labour, machinery and procurement operations due to the closure of mandies. However, these operations appear to be largely on track. More than 80 percent wheat has been harvested by 26th April, 2020 and about 2,000 mandies have also become operational by this time. As per the latest estimates (as of 27th April, 2020), nearly 8.86 MT of wheat has been procured. This increased procurement has also led to revised estimates of production by the states. As per the latest projections by the states, the production of wheat is likely to be 118.4 MT while that of rabi rice is likely to be 16.68 MT, which is higher than the 2nd A.E. released earlier. Thus, the staple grain production is expected to be more than adequate.

The expectations of labour shortage were not entirely misplaced though. There was a shortage of labour for the ongoing wheat harvesting and marketing in Punjab. This was addressed by engaging the local workforce. Also, the wheat procurement has been staggered to maintain social distancing and tackle short supply of labour. The procurement period in Punjab has been extended to 40-45 days instead of usual 20-22 days to avoid rush in the mandies. In Madhya Pradesh, the spread of disease has affected mandi operations in districts of Bhopal, Indore and Ujjain as they fall in red zone. A temporary shortage of farm labour was also reported in a few pockets in Uttar Pradesh as low availability of combine harvesters has spiked demand for manual labour. However, with continued efforts of the central and state governments, the harvesting and procurement operations appear to be satisfactory so far. One of the important measures announced by the central government is allowing farmers to directly sell and transport their produce from selected warehouses or from the premises of farmer producer organizations (FPO) over eNAM, by completely bypassing the mandi. Also, an app-based aggregator service for transportation of harvest (Kisan Rath) has also been introduced. However, the effectiveness of these measures in improving marketing of agricultural produce is yet to be assessed.

2.2. Grain stocks

The foodgrain stock in the central pool as on 1st April, 2020 was 56.9 MT (24.7 MT wheat and 32.2 MT rice), which is above the norms for 1st April, 2020, *i.e.*, 21 MT (7.4 wheat and 13.6 MT rice). The requirement

TABLE 1: FOOD STOCKS

(IN MT)

Particulars	Wheat	Rice	Total
Current stock position	24.7	32.2	56.9
Expected requirements under PMGKY until 1st July, 2020		12	
Requirements for NFSA and OWS until 1st July, 2020	6.4	8.6	15.0
Expected Procurement in Rabi	40.7	11.3	52.0
Expected stock position as on 1st July, 2020			**81.9**

Source: MoF&PD, GoI (2020).

per month under the National Food Security Act (NFSA) and other welfare programs is about 5 MT and another 4 MT for Pradhan Mantri Garib Kalyan Yojana (PMGKY). Thus, the expected requirement for three months is 27 MT and expected procurement in the current season is about 52 MT. Thus, the stock position is likely to be a comfortable 82 MT at the beginning of July. Also, all the indicators point towards a normal monsoon and a brisk sowing is on the way for kharif crop in many states. Thus, the food availability is expected to be satisfactory.

For distribution purposes, Food Corporation of India (FCI) has already dispatched about 58 lakh tons of foodgrains from surplus to consuming regions in the country in 2087 rail rakes, out of which 54 lakh tons have already been unloaded despite severe restrictions on labour due to lockdown. Also, almost all the states have completed their off take of foodgrains for the month of April, while, 20 states are lifting the May month's quota and another 8 states are lifting even the June month's quota. Hence, it is clear that states are also showing the necessary urgency in dealing with the situation. However, intra-state distribution needs to be ensured too.

2.3. Fruits & vegetables and other non-cereal commodities

High value food commodities (HVFCs) such as fruits, vegetables and eggs, meat & fish (EMF) account for 56 percent of the total value of the output of agricultural and allied activities. Supply chain issues, which include storage & distribution, processing and marketing, are very important for this sector. Perishables, such as fruits and vegetables suffer due to stoppage of transportation networks and closure of cold storages and mandies. Non-perishables, such as sugar and spices are affected more by the lack of demand from bulk consumers, such as hotels, restaurants and hostels.

The situation of fruits, vegetables and other crops is very depressing. The prolonged lockdown coupled with rain and hailstorms in many regions has aggravated the rural distress. It is becoming difficult for farmers to sell vegetables and fruits, such as watermelons, muskmelons and mangoes that will continue to be harvested till May and June. Nearly, 55 percent of the Alphonso production in Maharashtra is sold through the wholesale markets of Mumbai, Pune and Kolhapur, all of which are closed now-a-days. Similarly, in Uttar Pradesh 70 percent of the mango output is held up due to lack of transportation to other states. Grape farmers in the Nashik district have been affected because of stoppage of exports and lack of purchases by wineries. Flower growers in Maharashtra, watermelon and muskmelon farmers in Andhra Pradesh are also severely affected. Demand for flowers has declined substantially due to closure of temples and postponement of marriages. Similar effect can be seen in case of other commodities as well. Sugar consumption has declined due to the closure of hotels and restaurants and demand from bulk consumers. This in turn has put pressure on the sugar mills, raising the cane arrears to be paid to the farmers. Poultry prices have plummeted due to the COVID-19 fears. The chilly prices are dropped by over 12 percent to Rs. 140 per kg with demand drying up completely and 95 percent of the production in the two major states, *i.e.,* Telangana and Andhra Pradesh being confined to cold storages. Urgent action is needed to help all these farmers.

2.4. Prices

The prices of food commodities remained sluggish in March. The year-on-year (Y-o-Y) inflation for almost all the important food commodities has declined at both wholesale and retail level in the month of March. The fall in wholesale prices is mainly due to distress sales by the farmers. However, the decline in retail prices across the board, despite severe disruptions in supply chains, could be due to the steep decline in demand from bulk consumers like hotels, restaurants and catering.

2.5. Global scenario: production, stocks and trade

The current global stock-to-use ratios, excluding China, are close to their median level of the last two decades, and substantially higher than that of during the 2008 food crisis (IFPRI, 2020). This is one of the major reasons for the relative stability of international prices of major staples, despite a complete disruption of transport networks. When we include China, the underlying situation is better than suggested, considering the fact that China's inventories of rice and wheat are adequate to meet their domestic consumption for more than 10 months. Harvests are also expected to be satisfactory. As per the projections of United States Department of Agriculture (USDA), global wheat production is expected to increase by 5 percent, while rice production is projected to remain the same as it was in 2019. Production of these key staples is unlikely to

suffer disruptions from the COVID-19 crisis at least in major producing countries.

However, the same cannot be said about the world exports. World exports are heavily concentrated. The United States, Canada, Russia, the European Union and Ukraine together account for nearly 75 percent of the world wheat exports in 2019-20. The rice market is equally concentrated, with 75 percent of exports coming from the largest five exporting countries, and nearly 25 percent from India alone. Vietnam's share is 16 percent. Thus, the stability of world markets depends to a large extent on the trade policies of these major exporting countries. Kazakhstan, which has a 3 percent share in global wheat exports, has already announced export restrictions. Russia is also reportedly considering a ban on wheat exports. Vietnam has suspended new rice export licenses and is reviewing its stock position. India's stock-to-use ratio for rice stands at a historic high of 34 percent and prospects for the 2020 harvest are good. Hence, India has little reasons to consider export restrictions. The present scenario for staple food markets is much brighter than that of during the 2008 food crisis. Hence, imposing trade restrictions now would be highly inappropriate. Even if few more countries follow Vietnam and Kazakhstan, this could trigger a major food price spike in international markets. Hence, there is a need for major exporters and importers of staple foodgrains to refrain from imposing trade barriers in response to the COVID-19 pandemic. Trade channels should be kept open so that international markets can play their much needed role in preventing food shortages and moderating the looming global economic downturn.

Summing up, an overall assessment of the supply side suggests that availability of foodgrains is adequate and not many problems are foreseen on this front. Production, procurement and stock appear to be satisfactory, despite constraints of labour and machinery. The available projections for the upcoming season also suggest decent performance on the production and stocks fronts. Pre-monsoon sowing of kharif crops has begun across the country and paddy acreage is 27 percent higher (at 32.58 lakh hectare) in comparison to the last season. The foodgrains distribution to states is also on track. The international stock position is also adequate. Thus, performance of agriculture on the supply side appears satisfactory.

3. Demand Side Analysis of Agricultural Sector

3.1. Rural income and demand

Farmers' income in the current rabi marketing season, particularly of those growing perishable crops, is likely to be much lower owing to the likely crop losses on account of harvesting, storage and transportation, and the likely depression of prices due to lack of demand. The farm labourers are certain to face much lower earnings because of movement restrictions and declined agricultural activities. These, combined with the lowered demand for animal products, such as chicken, on account of COVID-19 fears, the income of the rural population is likely to be hit very hard this year. Also, the major slowdown in construction sector, which absorbs majority of agricultural labour in lean seasons, even before the onset of COVID-19 crisis, and a complete halt after the lockdown will certainly aggravate this crisis. This huge negative impact on rural income is likely to hit the economy which is already reeling with demand contraction even before this crisis.

Therefore, a judicious mix of policies is urgently needed. The government has already announced front loading of Rs. 2000/- under PM-KISAN and payments have already been made to 7.47 crore beneficiaries (87 percent). The remaining farmers also need to be provided support at the earliest. Also, the payment may be increased to Rs. 6,000/- for current year. This hike in payment will result in an additional expenditure of Rs. 34,760 crores. Although several segments of the population have been provided support through Jandhan accounts and National Social Assistance Programme (NSAP) programs in the first stimulus package announced by the government, one segment that has been left out is the agricultural labour. There are an estimated 14.4 crore agricultural labour, which constitute nearly 55 percent of the total agricultural workers. Out of these, there are nearly 7.6 crore active job card holders under MGNREGA. This segment needs immediate support. A minimum payment of Rs. 2,000 should be made immediately to all these active job card holders. As per the revised MGNREGA wage rate (Rs. 202 per day), this is equivalent to wages for just 10 days to each worker. This entails an expenditure of Rs. 15200 crore (0.5 percent of the agricultural GDP and 0.1 percent of the total GDP). The third vulnerable section is the seasonal migrants. As per the available estimates, the number of temporary or seasonal migrants is about 1.36 crore (about 10

percent of the total number of migrants). A payment of Rs. 2,000/-, as in the case of agricultural labour, would imply an additional expenditure of Rs. 2,720 crore (0.08 percent of AGDP and 0.01 percent of GDP). All these payments to farmers, rural labour and migrant workers will result in a total expenditure of Rs. 70060 crore, which constitutes only 2.2 percent of agricultural GDP and 0.4 percent of the total GDP of the country.

These payments are extremely important because of the huge negative impact of COVID-19 on rural income, which will most likely hit the economy very hard which is already reeling with demand contraction even before the onset of this crisis. Also, these segments of population at the lower end of the economic spectrum have higher marginal propensity to consume (MPC), which is so crucial to kick start the economy.

In addition to the direct cash payments, foodgrains need to be distributed free of cost or at highly subsidized prices. This has already been addressed through the Pradhan Mantri Garib Kalyan Ann Yojana. Under this program, 5 kg grain per person per month is being provided free of cost. This needs to be continued for at least six more months. With an estimated number of beneficiaries of 80 crore this will require 4 MT of foodgrains per month. FCI has already supplied 4.23 MT of grains to the states by end of April for this program. As per the latest reports the government is in the process of releasing 12 MT of foodgrain during April-June, 2020.

This crisis should be seen as an opportunity to usher in the much needed reforms in our rural development paradigm. The first reform should be to gradually move away from price and input subsidy based approach to direct income based approach for non-staple crops. A direct income transfer is a better policy instrument to ensure basic minimum income to farmers and rural workers. The second important reform is to evolve integrated planning across the two ministries, *i.e.*, agriculture and rural development. Agriculture should be made the central plank of all rural development programs.

4. Conclusion and Policy Implications

4.1. Likely impact on growth

As per the latest estimates from the NITI Aayog, the GDP from agriculture & allied activities indicate robust growth of 3 percent in 2020-21. Coming -

TABLE 2: PROJECTED PAYMENTS TO RURAL LABOUR

S. No.	Source	Number	Rate	Total Amount (Rs. Crores)
1.	No of active job cards as per MGNREGS	7.6	@ Rs 2000 per worker	15200
2.	Number of PM-KISAN Farmers	8.69	@ Rs 2000 per family	17380
3.	Number of PM-KISAN Farmers	8.69	@ Rs 6000 per family	52140
4.	Seasonal /migrant labour	1.36	@ Rs 2000 per family	2720
GDP of Agriculture and allied activities or AGDP (current prices)				3,254,345
Total GDP (current prices)				18,493,686
Total I =(1)+(2)+(4)				35300
Total I as % of AGDP				1.08%
Total I as % of total GDP				0.19%
Total II=(1)+(3)+(4)				70060
Total II as % of AGDP				2.15%
Total II as % of total GDP				0.38%

Source: CSO (2020) and Keshri & Bhagat (2012).

back to a decent growth of 3.7 percent in 2019-20, this is a remarkable achievement when all the other sectors are reeling under the impact of the lockdown. The major reasons behind this expected positive performance are the bumper rabi harvest, projections of a good monsoon, normal kharif sowing across the country despite lockdown and large uptake of fertilizers & seeds during the lockdown period. All these factors augur well for a decent performance of the agriculture sector in 2020-21. NITI Aayog estimated that the better robust growth of agriculture could add 0.5 percent to the overall growth rate of GDP.

However, higher agricultural growth may not automatically transform into higher farm incomes, which in turn can have an adverse impact on the economy. The supply chain disruptions during the lockdown period could transform later into demand contraction (due to lowered income) in the rural economy, which could have a serious adverse impact on the overall economic growth. As has been explained in previous sections, the incomes of farmers and rural labour are likely to be severely affected due to the pandemic. Thus, the possible drag on the economy could emanate from the demand side.

4.2. Policy implications

Many policy initiatives are urgently needed to address the current crisis. The protection of lives, particularly of agricultural labour, should receive utmost attention. The unfortunate death of a vegetable trader in Delhi's Azadpur mandi is a grim reminder that the effect of pandemic cannot be under estimated. Protection of lives, livelihoods and economy should be the priorities, in that order.

The following are some of the suggestions for the short and medium term.

Short-term suggestions (one to six months)

i. Immediately upon lifting of lockdown, large scale arrivals are very likely in the markets. This sudden increase in economic activity could result in ignoring the much needed physical & social distancing, particularly by the poor laborers at the markets/mandies. This needs to be avoided and strict adherence to social distancing, maintenance of hand hygiene and disinfecting the premises needs to be enforced at the mandies.

ii. The supply of inputs, labour and machinery for the upcoming kharif season needs to be ensured with adequate health safeguards.

iii. The facilities to sell and transport from approved warehouses and FPOs should be strengthened and extended to all regions. The utility of Kisan Rath also needs to assessed and the needed improvements be made. eNAM should also be strengthened.

iv. Farmers, agricultural labourers and seasonal migrants need to be provided with direct cash payments for the next six months. This will help them deal with the income losses incurred during the lockdown. In the absence of these payments, this labour force may rush back into activities, which may defeat the purpose of the lockdown.

v. Provision of free foodgrains under PMGKY need to be continued for at least six months, in addition to the regular NFSA food provisions.

Medium term suggestions (six months to two years)

vi. A second wave of the pandemic is foreseen around November. Therefore, a system of direct cash transfers to all the vulnerable sections needs to be put in place. Also a robust system of food distribution needs to be evolved to meet any future recurrence of such crises.

vii. A system for the supply of agricultural inputs, labour and machinery needs to be evolved.

viii. A more holistic approach to reduce outmigration by making agriculture the major plank of rural development is needed. Existing agriculture programs, such as Rashtriya Krishi Vikas Yojana (RKVY) and National Food Security Mission (NFSM) should be dovetailed with major rural development programs, like MGNREGS and National Rural Livelihoods Mission (NRLM) to create the needed synergy between agriculture and rural employment. This will help reduce outmigration of rural population for livelihood.

ix. The current crisis is an opportunity to explore policy options other than the price and input

based support to agriculture. A partial direct income based support system is one alternative. Such a system will ensure some minimum basic income to farmers without distorting the markets. The PM-KISAN needs to be improved for this purpose, taking the cost of cultivation into consideration.

References

CSO (2020). Second Advance Estimates of GVA at Basic Prices by Economic Activity. Central Statistics Office (CSO), 28th February, 2020

Keshri, K. & Bhagat, R. B. (2012). Temporary and Seasonal Migration. Economic & Political Weekly, January 28, 2012, Vol. XLVII (4), pp. 81-88

MoF&PD, GoI (2020). Food grains Bulletin, Monthly Summary, March, 2020. Department of Food & Public Distribution, Ministry of Food, Consumer Affairs and Public Distribution, Government of India,

IMF (2020), World Economic Outlook, International Monetary Fund, April, 2020.

IFPRI (2020), COVID-19: Trade restrictions are worst possible response to safeguard food security by Joseph Glauber, David Laborde, Will Martin and Rob Vos, 27th March, 2020.

Relative Resource Use Efficiency in Maize Cultivation: A Study of Banor-Shiva Limestone Mining Region in Himachal Pradesh

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Abstract

Maize is an important food crop of Himachal Pradesh as it provides staple food and direct employment to its population. The present study evaluates the influence of limestone mining and mining related operations on the efficiency, productivity, returns to scale and resource use efficiency of agricultural inputs used in maize cultivation in the Banor-Shiva mining region of Himachal Pradesh. The Cobb-Douglas production function has been fitted to the data observed for two categories of farms to know the relative efficiency of the factors of production. The purposive cum random sampling technique was used for the selection of maize farmers in the limestone mining region and random sampling for the selection of maize cultivating farmers in the non quarry area. It was found that regression coefficients of all factors of production for farmers in mining area are less than that of farmers in non quarry area. The ratio of marginal value products of factors to their cost in mining area is also less than that of farmers in non quarry area. The fertility of land is also low due to the impacts of limestone mining. The marginal value products of labour in both the farms are less than their wages which is a normal phenomenon of Indian agriculture. The sum of regression coefficients for mining area farms is equivalent to one showing constant returns to scale while, it is more than unity for non quarry area farms showing increasing returns to scale. It appears that input efficiency for maize cultivation in the limestone mining region is far less than that in the non quarry area. The study has called for reclamation and rehabilitation of agricultural land, grazing land, restoration of irrigation channels and application of higher quantity of inputs excluding labour force to increase crop yield.

Keywords: *Cobb-Douglas production function, regression coefficients, returns to scale, resource use efficiency, maize.*

1. Introduction

Agriculture is the main occupation of the people of Himachal Pradesh (H.P.) and occupies an important place in the state economy. H.P. is the only state in India whose 89.16 percent population lives in rural areas and provides direct employment to 62 percent of the state work force and about 9 percent of state GSDP comes from agriculture and its allied sectors (Government of H.P., 2018-19). In view of the high dependency of population on agriculture, their economic upliftment is determined to a considerable extent by the growth of agriculture sector. Rice, wheat and maize are main cereal crops of the state and about 80 percent of the cultivated area is rainfed due to peculiar high altitude hostile topography. Therefore, the crop yield is related with the performance of monsoon and annual rainfall. The total food grains production in the state in 2016-17 was 1562.73 metric tons, of which 736.46 metric tons was accounted for by the maize crop followed by wheat (605.18 metric tons) and rice (135.48 metric tons) crops. The maize crop, thus, turns out to be the main food crop providing food and fodder supply to the human and livestock population.

The yield and productivity of maize crop in high altitude with absolute dependence on rainfed irrigation and adverse climatic conditions needs to be enquired and therefore, in this paper, an attempt has been made to assess the impact of limestone mining in the Banor-Shiva mining region in terms of the yield, resource use efficiency and factor productivity of maize crop farming in relation to the non quarry area, and to identify the misallocated factors of production which can be optimally used to enhance the maize production.

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NOTE: Views expressed in the article are of the authors only.

1.1. Description of the study areas

The present study is carried out among the maize crop farmers located in the two regions of District Sirmaur, H.P., first, in the limestone quarry region, namely Banor-Shiva mining region and second, in the non quarry region, namely Nagetha village called as control group. The purposes of this study are to evaluate any significant difference between efficiency and productivity of inputs used in the cultivation of the maize crop in the two regions, to study resource use efficiency of farms in two isolated regions and to estimate the returns to scale in maize crop cultivation. The Banor-Shiva limestone mining region is at a distance of 33 kilometers from Poanta Sahib on Poanta Sahib-Rajpur-Nageta-Shiva-Banor link road in the Trans-Giri region. Banor- Shiva mining region is located between 77°43'20" and 77°44'39" E longitude and 30°34'30" and 30°35'7" N latitude. The limestone quarries in this region are located in four revenue villages, namely Bharli, Shiva-Rudana, Banor and Bag, all constituents of Shiva-Rudana Patwar circle of Poanta Sahib tehsil, district Sirmaur, H.P. The total reported area, as per records, of these four revenue villages was 1412 hectares. In this mining area, 10 limestone mines covering an area of 60 hectares land leases have been sanctioned upto 2018, of which 4 mines during the reference year are in working mode, while 6 mines are temporarily not working due to various reasons.

The control sample, Nagetha is a distant village from the mining area and does not have any piece of land under mining operations either active or abandoned. It is approximately 10 kilometers away from the mining region. It is located between 77°45'42.3" and 77°45'52.6" E longitude and 30°32'36.4" and 30°33'09.3" N latitude. Total reported area, as per records, of revenue village Nagetha was 264 hectares.

1.2. Rationale for the research work

Hill farming is an extensive farming in upland area and high altitude areas are not traditionally favorable for agricultural practices due to relatively high dependence on rainfall, poor quality of the soil, less productivity, lower yield and higher cost of production and transportation cost. The wheat and maize continued to be the principal cereal crops and both are practiced under rainfed condition. But due to the scanty rainfall and lack of irrigation facility in high terrain, the maize crop happens to be the main cereal crop in the regions under study accomplishing the maximum food grain demand of the local farmers and assured fodder supply to the livestock population. The maize is a kharif crop, being sown in a monsoon season, and its yield and productivity is higher than that of wheat crop which is a winter crop. The local farmers also met their wheat consumption requirements from the public distribution supplies at subsidized rates, a state run food security programme and therefore, the maize maintains to be the main food crop cultivated extensively and intensively in the study area under reference. The present study evaluates the influence of mining and mining related operations on the efficiency, productivity, returns to scale and resource use efficiency of agricultural inputs used in the maize cultivation in the mining region from that of the Nagetha village (control sample) where agricultural land is not vulnerable to limestone mining.

Since the method of cultivation, altitude, topography and geography of both the regions are similar, relative efficiencies of the factors of production can be worked out and impact of limestone mining operations on the input efficiencies can be measured.

1.3. Objectives of the study

The following are the research objectives of this paper.

i. To study the resource use efficiency for the two farm samples (Banor-Shiva mining region and Nagetha village) separately.

ii. To study the relative resource use efficiency of the factors of production in the mining area and non-mining area.

iii. To examine the returns to scale.

iv. To identify the factors of production being used inefficiently.

2. Methodology

2.1. Sampling design

The present research work is based on the comparisons of two primary data samples of maize crop farmers collected from limestone quarry area and non quarry area called as control group during the year 2016-

17. The data has been collected through pre-tested schedules. The sample of maize farmers in the quarry area consists 45 sample households which are located in the vicinity of active limestone mining, all constituents of Shiva-Rudana Patwar circle covering four revenue villages, namely Bharli, Shiva-Rudana, Banor and Bag. The sampling procedure adopted for selection of sample in quarry area is purposive cum random sampling. A list of households who either leased out their land to the limestone mining or are being affected by the mining operations or are in the vicinity of quarries or mining contractors, according to size-wise distribution of land holdings, was prepared purposively. The number of households to be selected from each farm size group has been decided on the basis of total number of holdings in the respective farm size groups. The actual households to be included in the sample from each farm size group are then taken at random.

The sample of maize farmers, in non-quarry area, called as control group consists of 23 households taken from a distant village (not having quarrying activities), namely Nagetha, which is based on random sampling. A list of maize crop cultivator households was prepared as per the size-wise distribution of land holdings and sample was framed randomly from each size group of farmers depending upon the number of households in each farm size group. On the basis of operated area, the operational holdings and size class of farmers are: marginal farmers with operated area below 1 hectare, small farmers with operated area between 1- 2 hectares, semi-medium farmers with operated area between 2- 4 hectares, medium famers with operated area between 4-10 hectares and large farmers with operated area 10 hectares and above (Government of India, 2010-11).

2.2. Research methods

The use of Cobb-Douglas production function in agriculture to measure input efficiency is beyond doubt and is unquestionable. Its usefulness has even being tested in the manufacturing sector also. The chief merit of the Cobb-Douglas production function is the ease with which the technical coefficients of regression equation are estimated. It is more useful for the cross sectional studies at the micro farm level (Shahabuddin, 1985). This production function is also used to examine the returns to scale, relative contribution of factors of production and source of growth in output in large scale Indian industries (Mehta, 1976).

In this study, the Cobb-Douglas production function has been separately fitted to the data obtained from mining region and control group sample to measure the elasticity coefficients of the factors of production which in turn have been used to calculate their (inputs) marginal value products (at their geometric means) for the average farms.

The specification of this production function is given below.

$$Y = AX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}$$

The log linear form of the Cobb-Douglas production function after transformation is

$$\text{Log } Y = \text{Log } A + b_1\text{Log}X_1 + b_2\text{Log}X_2 + b_3\text{Log}X_3 + b_4\text{Log}X_4 + b_5\text{Log}X_5$$

Where,

Y = Physical output of maize (in kg.), a dependent variable,

X_i = i^{th} input (i= 1, 2, 3, 4, 5), independent variables,

X_1 = Land or farm size under cultivation (in hectares),

X_2 = Human labour (in man Days),

X_3 = Bullock team consisting of one pair of animal-labour day and one human labour day called one plough unit (in pair days),

X_4 = Manures and fertilizers (in kg.),

X_5 = Maize seed (in kg).

The technical coefficients of production have been estimated by applying multiple linear regressions to the log linear form of the Cobb-Douglas production function. Since, our functional analysis is concerned with only one crop, we measure both dependent and independent variables in physical units. This measurement rules out impact of fluctuating prices on resource efficiencies and productivities (Muraleedharan, 1987).

The contribution and relative importance of each factor in total output is indicated by marginal physical products of the respective inputs which

have been calculated as under:

$$\text{MPP of} = X_i = b_i \frac{\text{Geometric Mean of Y}}{\text{Geometric Mean of } X_i}$$

Where,

Y = Total Physical output,

$\mathbf{X_i}$ = input (i= 1, 2, 3, 4, 5)

$\mathbf{b_i}$ = Regression coefficient of input,

N = Sample Size which is 45 and 23.

Marginal value product of each input is obtained by multiplying their MPPs with the average farm level prices of the maize crop during the reference year.

The difference of sum of regression coefficients from unity for returns to scale has been tested using two-tailed t-test under standard normal distribution in the form given below.

$$t_{\sum b_i} = \frac{(b_1+b_2+b_3+b_4+b_5)-1}{\sqrt{\sum Var(b_i)+2\sum Covariance(b_i,b_j)}}$$, where i,j = 1,2,3,4,5.

3. Results and Discussion

The ordinary least square estimates of the parameters of Cobb-Douglas production function for two farm groups are presented in Table 1 and Table 2. The regression coefficients stipulated in both tables are all non-negative and less than unity which meet the Neo-Classical production function criteria (Klien *et al.*, 1961). The presence of zero or negative elasticity coefficients may suggest the existence of multicollinearity among the exogenous variables and may pose data limitation problems. But the multicollinearity or correlation among the explanatory variables have not been strongly detected which is testified by the collinearity statistics. Since the variance inflation factor for all regression coefficients is less than 10 and even less than 5 for most of the regressors, there is mild presence of multicollinearity which is desirable. The tolerance (reciprocal of variance inflation factor) is also more than 0.2. The VIF (variance inflation factor) is one in case of no correlation among regressors. Since the coefficients of multiple determination R^2 for regression equations of two farm groups are 0.93 and 0.99 for quarry and non quarry area, respectively, the Cobb-Douglas production function is well fitted to the observed data and independent variables explain 93 and 99 percent variation in maize output in two farms.

3.1. Interpretation of input elasticity coefficients

It is observed from empirical estimation that regression coefficients for factors of production, namely land, human labour, bullock labour, manure and fertilizer, and seed have worked out to be positive and statistically significant either at 1 percent or 5 percent or 10 percent probability level for both the regions except manure and fertilizer for mining region which comes out to be insignificant. This indicates that manure and fertilizer do not contribute significantly to the output of maize in Banor-Shiva mining region. The effectiveness of individual factor of production is explained by the magnitude of their regression coefficients. The magnitude of regression coefficients are partially interpreted in the sense that it indicates the percentage growth in output of maize crop for one percent increase in the input concerned, while keeping the other factors constant.

The magnitude of regression coefficients of production function fitted to the data observed from limestone mining region (see Table 1) are 0.178 for land, 0.399 for human labour, 0.205 for bullock labour, 0.025 for manure and fertilizer, and 0.155 for maize seed. The labour seems to be the most important factor of production followed by bullock labour, land, seed and manure and fertilizer. The land is playing relatively less important role in the crop production in the mining region which is inferred from the fact that if land input is increased by 10 percent, output is increased by 1.78 percent. The plausible reason for the degraded fertility of land can be outlined in the external intervention upon land on account of limestone mining and occupational change from traditional agricultural practices to the mining activities. The regression coefficient for labour implies 3.9 percent increase in output upon increasing labour by 10 percent which, thus, comes out to be the most important factor of production. The high coefficient for labour can be explained by the less pressure of population on land due to the availability of alternative multiple employment opportunities in the region related to the mining operations such as compensation to land owners, transportation of minerals, quarry workers, small and petty business.

TABLE 1: REGRESSION ELASTICITY COEFFICIENTS FOR MAIZE CROP IN LIMESTONE MINING REGION

Variable	Regression coefficient b_i	Standard error	t-value	Significance level	Collinearity statistics	
					Tolerance	Variance inflation factor
Intercept (A)	1.990	0.231	8.612	.000*		
Land *(X_1)*	0.178	0.103	1.737	.090**	.144	6.957
Human labour *(X_2)*	0.399	0.117	3.399	.002*	.132	7.558
Bullock labour *(X_3)*	0.205	0.090	2.271	.029**	.128	7.783
Manures & Fertilisers *(X_4)*	0.025	0.094	0.272	.78	.191	5.228
Seed *(X_5)*	0.155	0.090	1.723	.093***	.198	5.049
$\sum b_i$	0.962					

Source: Own Work, 2016-17.
*Significant at 1 %, **significant at 5 %, and ***significant at 10 % level of significance.

The size of the regression coefficients of the Cobb-Douglas production function fitted to the observed data collected from non quarry region (Table 2) are 0.359 for land, 0.314 for human labour, 0.271 for bullock labour, 0.154 for manure and fertilizer, and 0.167 for seed. The land is the most important factor in crop production which implies 3.6 percent increase in maize production consequent upon increasing land by 10 percent, if other factors remain constant. Similarly, if factors human labour, bullock labour, manure and fertliser and seed are increased by 10 percent, then the augmentation in total output of maize is 3.14 percent, 2.71 percent, 1.54 percent and 1.67 percent, respectively.

TABLE 2: REGRESSION ELASTICITY COEFFICIENTS FOR MAIZE CROP IN NON QUARRY REGION

Variable	Regression coefficient b_i	Standard error	t-value	Significance level	Collinearity Statistics	
					Tolerance	Variance inflation factor
Intercept (A)	2.002	0.118	16.973	.000*		
Land *(X_1)*	0.359	0.049	7.303	.000*	0.139	7.208
Human labour *(X_2)*	0.314	0.052	6.072	.000*	0.211	4.374
Bullock labour *(X_3)*	0.271	0.040	5.452	.000*	0.209	4.784
Manures & Fertilisers *(X_4)*	0.154	0.034	4.547	.000*	0.314	3.183
Seed *(X_5)*	0.167	0.042	16.973	.001*	0.351	2.847
$\sum b_i$	1.265					

Source: Own Work, 2016-17.
*Significant at 1 % level of significance.

The comparison of the magnitude of the regression coefficients for two farm groups reveals that size of regression coefficient for land is smaller for the quarry area farms than non quarry area farms. This difference can be attributed to the limestone mining affecting fertility of land. It has been observed in the previous studies that land use and cropping pattern undergo significant change in the vicinity of the limestone mining areas with substantial fall in the cultivable land, pasture and grazing land, and increase in barren land. The process of limestone quarrying emits pollution, dust and thus forming a layer of silt over the cultivable land. There is often intrusion of unwanted mines waste downhill into the agricultural land in the event of rainfall. The production and productivity of crops such as ginger, paddy, chillies, wheat, potato, and turmeric falls drastically due to erosive impact of mining (Government of India, 1999). This phenomenon has been supported by the field observation in the mining region.

The coefficient of human labour for mining area is higher than that for control group. This divergence is due to the differing pressure of population on land. There is high pressure of population on land in control farms relative to the mining region farms. The occupational change in the mining area has been noticed during field enquiry and there is high dependency of people on the mining and mining related activities for sustenance. The multifarious income generating activities are associated with the limestone mining and local people have either shifted from agricultural practices to alternative source of income or left the primary sector occupation. The indigenous people find daily and salaried jobs in the quarries and transportation, receive compensation and royalties for the loss caused to their land due to mining, and get self employment in small and petty business. This sort of income generation system is found absent in the control farms resulting in high dependency of population on land which is prevalent in the Indian agriculture.

The regression coefficient of bullock labour is high for farms in non quarry area than for farms in mining area. It signifies high population of bullocks and extensive use of bullocks in agricultural farming in farms under non quarry area. In the mining region, falling population of bullocks is observed during field investigation. The lack of assured fodder supply, substantial decrease in grazing and pasture land and availability of alternative employment opportunities can explain the declining animal population in the mining area. The elasticity coefficients for manure and fertilizers and seed for non quarry area are higher than that for quarry area. The effectiveness of these inputs on crop yield is related to the fertility of land which is relatively lower for mining region although the regression coefficient for manure and fertilizer in case of mining region is insignificant.

3.2. Returns to scale

The regression coefficients given in Table 1 and Table 2 are production elasticity coefficients of Cobb-Douglas production function and their sum indicates returns to scale. The returns to scale are increasing, constant or decreasing if the sum of regression coefficients is greater than, equal to or less than unity (Saini, 1969).

The null hypothesis is, $H_0 : \sum_1^5 b_i = 1$

which is tested against the alternative hypothesis, $H_1 : \sum_1^5 b_i \neq 1$

The calculated t-value for sum of regression coefficients for mining region is -0.19 which is less than -1.96 and therefore, t-value falls in the acceptance region under standard normal curve. The null hypothesis is accepted at 5 percent level of significance and the returns to scale for the maize crop in mining region are constant. The sum of regression coefficients is 0.962 (Table 1).

Whereas, for the non-quarry area farmers of maize crop, the calculated t-value is 4.68 which is greater than 1.96 and therefore, it falls in the rejection region under standard normal curve. The hypothesis that the sum of regression coefficients for non quarry area be unity is rejected at 5 percent level of significance. Therefore, maize crop in non quarry area farms is subjected to increasing returns to scale and sum of regression coefficients is 1.265 in this case (Table 2).

3.3. Resource use efficiency in maize crop cultivation

In order to evaluate the resource use and economic efficiency in factor use in both the farms, marginal value products of factors are compared with their acquisition or factor costs. The factor cost of land is the per hectare rental value of land and factor cost of bullock team consists of factor cost of one

pair of bullock team and one man day (8 hours) prevailed during the year 2016-17 in the regions under study. The prices of maize yield are average farm level prices and prices of seed that prevailed in the local market. The optimum economic efficiency in resource use is indicated by the equality between marginal value product and factor cost, *i.e.*, MVP= FC. If MVP Â Factor Cost, there is uneconomic efficiency in resource use and if MVP Ã Factor Cost, there is unexploited economic margins and farmers are not always efficient as allocators of resources in exploiting fully the economic opportunities available to them (Saini, 1969). The ratio of marginal value product to factor cost for farmers in mining region is less than one for all inputs except seed (Table 3).

TABLE 3: RATIO OF MARGINAL VALUE PRODUCTS TO FACTOR COST WITH LIMESTONE QUARRYING

Inputs	Marginal physical productivity (MPP)	Marginal value product (MVP) (Rs.)	Factor cost (FC) (Rs.)	Ratio (MVP/FC)
Land (X_1)	341.77	5810	15000/ha	0.39
Human labour (X_2)	14.97	254	350/man day	0.73
Bullock labour (X_3)	32.27	549	700/bullock team	0.78
Manures & Fertilizers (X_4)	0.398	7	8/kg	0.88
Seed (X_5)	2.45	42	20/kg	2.1

Source: Own Work, 2016-17.

This indicates the uneconomic nature of resource use in maize cultivation in the mining area. Among all inputs, this ratio is lowest for factor land which can be increased by improving the quality and fertility of land. There is adverse impact of limestone quarrying on agricultural land which has reduced significantly the productivity and fertility of crop land. The application of more and more inputs on land is uneconomical and it will further reduce the marginal physical productivity of factors. The reclamation and rehabilitation of affected land is needed and suggested to improve the MVP of factors in relation to their acquisition costs. In fact to reduce the cost of production and to have economically viable maize crop production, reduction in factors of production along with land rehabilitation is required.

The ratio of MVP to FC for farmers in the non quarry area is greater than one for all inputs except human labour (Table 4). There is therefore efficient allocation of resources in crop production. There is optimum use of land and bullock power, ratio being almost equal to unity. There must be enhanced application of fertilizer and seed to reap higher benefits.

TABLE 4: RATIO OF MARGINAL VALUE PRODUCTS TO FACTOR COST FOR NON QUARRY AREA

Input	Marginal physical productivity (MPP)	Marginal value product (MVP) (Rs.)	Factor Cost (FC) (Rs.)	Ratio (MVP/FC)
Land (X_1)	1173.98	19958	15000/ha	1.33
Human labour (X_2)	13.82	235	350/man day	0.67
Bullock labour (X_3)	50.16	853	700/bullock team	1.21
Manures & Fertilisers (X_4)	3.05	52	8/kg	6.5
Seed (X_5)	3.27	56	20/kg	2.8

Source: Own Work, 2016-17.

Factors are performing better in non quarry area farms as compared to quarry area farms in terms of economic efficiency and resource use. It underlines the inherent cause of decreased marginal efficiency of inputs in maize cultivation in the mining region which are human induced causing serious livelihood issues for the population dependent on agriculture.

The finding that marginal value product of labour is less than the wage rate for both the regions is in line with widely held belief that marginal product of labour in Indian agriculture is much less than wage rate if actually not zero or negative which is diagnosed as the disguised unemployment.

4. Conclusion and Suggestions

In this paper, effectiveness of the inputs and resource use efficiency in maize cultivation has been judged by inter-regional and intra-regional comparison of the input elasticity coefficients and ratio of marginal value products to factor cost of various inputs. It appears that input efficiency for maize cultivation in the limestone mining region is far less than that in the non quarry area and the worst performance for factor land has been observed in the mining region. This observation is in contradiction to the production function approach to the Indian agriculture, whereby, the efficiency of land is found highest among all factors of production. It does not underline the excessive use of land but inherent problem in its fertility and productivity accounted for by the limestone quarrying which is the sheer outcome and effects of the quarrying process on agrarian set of the village economy.

Another manifestation of the deleterious impact of limestone mining is reflected by the regression coefficient of bullock labour, which is high for farms in non quarry area than for farms in quarry area. It signifies higher population of bullocks and extensive use of bullocks in agricultural farming in farms under non-quarry area than quarry area. The pressure of population on agricultural land in quarry area is lesser, indicating economic gains from mining and change in occupational pattern. There is, therefore, clear manifestation that limestone mining has harmfully affected the maize cultivation in the quarry area.

Since minerals extraction occupies an important place in the economic development of a nation, the following preventive measures are, therefore, suggested to protect the fragile environment of the village farming and traditional source of livelihood of indigenous people.

i. The limestone mining must be practiced scientifically with no undesirable impacts on the village farming system.

ii. The limestone mineral extraction should be allowed in areas which are away from cultivable, pasture and grazing land and irrigation channels.

iii. Steps must be taken for rehabilitation and reclamation of the abandoned mineral quarries and degraded land consequent upon mining.

iv. Small scale and village industries must be promoted in the mining affected region with the help of limestone miners to meet the livelihood concerns after the closure of mines.

References

Government of Himachal Pradesh (2018-19). Economic Survey. Economics and Statistics Department.

Government of India (1999). Sustainable Development Planning Including Limestone Mining For Sirmour Region, Himachal Pradesh. Ministry of Environment and Forests, New Delhi.

Government of India (2010-11). Agriculture Census. Ministry of Agriculture and Farmers Welfare.

Klien L. R. & Kosobud, R.F. (1961). Some Econometrics of Growth: Great Ratios of Economics. Quarterly Journal of Economics, May, 1961.

Mehta, S.S. (1976). Returns to Scale and Sources of Growth of Output in Large-Scale Indian Industries. Indian Journal of Industrial Relations. Vol. II, No. 3, Jan. 1976.

Muraleedharan, P. K. (1987). Resource Use Efficiency in Kole Lands in Trichur District (Kerala). Indian Journal of Agricultural Economics. Vol. XLII, No.4, October-December, 1987.

Saini G.R. (1969). Resource Use Efficiency in Agriculture. Indian Journal of Agricultural Economics. Vol. XXIV, No.2, April-June, 1969.

Shah, D. (1982). Production Functions in Cooperative Diary Industry of Gujarat. Indian Journal of Industrial Relations. Vol. 17, No. 3, Jan. 1982.

Shahabuddin, Q. (1985). Testing of Cobb-Douglas Myths: An Analysis with Disaggregated Production Functions in Bangladesh Agriculture. The Bangladesh Development Studies. Vol. 13, No.1, March 1985.

Singh, J. P. (1975). Resource Use, Farm Size and Returns to Scale in a Backward Agriculture. Indian Journal of Agricultural Economics. Vol. XXX, No.2, April-June, 1975.

Agro-Economic Research

An Economic Analysis of Protected Cultivation under MIDH in Sikkim*

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1. Introduction

Sikkim is an agrarian state with 64 percent of people dependent on agriculture and allied activities. State Government has given emphasis on the horticulture sector to attain higher levels of rural prosperity by adopting the policy of 'growth with sustainability' for higher income generation to the farming community. The main objective lies in securing maximum production of horticulture crops and managing primary agro-resources like soil, water and bio-diversity. Large cardamom, ginger and turmeric are the major spice crops, while mandarin orange, guava, mango, banana are the principal fruits grown in the State. Sikkim is also a paradise for flowers. Gladioli, anthuria, lilies, primulas, rhododendrons, orchids as well as many other floral species thrive here. The Department of Horticulture and Cash Crop Development (HCCDD) is involved in motivating and providing technical guidance to local farmers and taking forward the mission of the government towards Horticulture Development in Sikkim. The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in Sikkim since 2001-02. From April 2014 onwards, HMNEH has been subsumed under Mission for Integrated Development of Horticulture (MIDH) for the holistic growth of horticulture sector covering fruits, vegetables, root & tuber crops.

Due to population growth coupled with increasing pressure on natural resources, *i.e.,* land & water, decreasing land holdings, climate change, rising income level, and fast increasing demand for quality horticultural fresh produce, people are forced to shift towards modern technologies of crop production like protected cultivation. In Sikkim, however, the climatic conditions and rich bio-diversity give ample opportunity for such cultivation under protected conditions. Protected cultivation leads to the conversion of some portion of the existing area under vegetable cultivation, towards high-value crops for higher income round the year. Activities like construction of greenhouses, shade net house, plastic mulching, and plastic tunnels, anti-bird/ hail-nets are promoted under the MIDH. National Horticulture Board (NHB) is also implementing the projects having an area above 2500 sq. m. wherein provisions were made for selecting a variety of construction material for greenhouses and shade net houses.

1.1. Objective

The present study is an attempt to assess the impact of MIDH with the following specific objectives:

i. To study the progress in providing assistance for establishing the polyhouses under MIDH program and to examine the expenditure incurred in the establishment of polyhouses and means of financing.

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

iii. To analyze the systems adopted for marketing the produce under protected conditions in the State.

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

2. Methodology

The study is based on a survey conducted in two districts, *viz.,* East Sikkim & South Sikkim. These two districts were selected on the basis of highest number of polyhouses. Following the same criteria, two development blocks, one from each district were selected purposively. Accordingly the Gangtok

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NOTE: Detailed report is available on the website of respective AERC.

block from East Sikkim and Namchi block from South Sikkim were selected. In the next stage, all the registered polyhouses 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 under polyhouses in two districts.

The sample is classified into three size classes based on the size of polyhouses. The polyhouses covering an area less than 250 square meters are considered small, while those between 250 square meters to 500 square meters are considered medium in size. Those with more than 500 square meters cover area to less than 1000 square meters of cover area are considered as large farms. In Sikkim, however, in both two districts, all 100 sampled polyhouse owners turned out to be small (less than 250 m^2).

3. Major Findings

i) In the case of polyhouse development under MIDH in Sikkim, it is found that Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in all the districts of Sikkim.

ii) An area of 415.96 ha. has been covered under protected cultivation, while 48835 farmers have been trained under various horticulture activities.

iii) An amount of Rs. 373.47 crore was released to the state till 2014-15 and the state government has reported an expenditure of 328.97crore.

iv) The average family size of the small farmers is 4.21 with high educational standards. The major primary occupation is farming, while the subsidiary occupation is self-employment in the non-farming sector.

v) Average net operated area is 1.05 ha, and 38 percent of total cultivated land is irrigated.

vi) A major portion of non-farm income for the farm households comes from salary, followed by animal husbandry and petty business.

vii) The sample polyhouses are simple in design with single-tier cultivation only. Information regarding polyhouses and scheme/subsidy has been obtained from the state department of agriculture itself, and from friends & relatives to a limited extent.

viii) Continuous efforts by the government officials, easy access to technologies, availability of subsidy, and the possibility of higher income acted as key motivating factors for protected cultivation in Sikkim.

ix) Besides the contractor's delay in the construction of polyhouses, adjustment with the new crop growing technology has been found to have acted as hindrances in the growth of protected cultivation. However, the implementing authority took a supportive/ neutral role in the supervision of polyhouse construction.

x) It comes out that the majority of the farmers are yet to adjust with the new cropping practices introduced, especially organic cultivation, while all the farmers suggested improvement of storage facilities.

xi) It was observed that equipments like heater, cooler, humidifier, and fogger are absent in all of the polyhouses. Only 60 percent of farms are provided with drip irrigation facilities. Fifty-two percent of farms have built vermi-composting pits.

xii) It is observed that 60 percent of the farmers received training from the government sources, while 39 percent of them are benefitted from the nearby Krishi Vigyan Kendra.

xiii) It is observed that in case of carnation and gerbera, the selected flower crops for the study grown under polyhouse, an overwhelming proportion of total costs are spent on purchasing sapling for producing carnation flower followed by costs of pesticides (organic), formation of beds and for application of fertilizer (organic).

xiv) It was observed that though the cost of cultivation for gerbera under protected condition is significantly higher in comparison to carnation, the percentage of net returns in gerbera over carnation is also higher and it is due to the higher value of output.

xv) In case of selected vegetable crops under polyhouses, *viz.,* capsicum and tomato, it has been observed that net returns in the case of tomato is marginally lower than in the case of capsicum cultivation.

xvi) Cultivation of paddy and maize in Kharif season and cabbage and cauliflower in Rabi season are the other significant crops grown by the sample farms in unprotected condition. Except for paddy, the cost for absorption of family labour in all other unprotected crops is higher in marginal farmers than the small farmers.

xvii) As far as the productivity of crops in unprotected conditions of farming is concerned, it is observed that apart from paddy, the productivity of all crops for marginal farms is marginally higher than the small farms.

xviii) The government of Sikkim has formed FPOs (Farmers Producers Organizations), who collect vendible commodities from the farmer and pay the price. For this purpose, one motor van (pick-up van) for each FPO has been provided to collect farmers' produce from the assemble point (mutually convenient place of the village cluster) and then to dispose it in the nearby market.

xix) Losses in the process of production of flowers like carnation and gerbera are quite high at 4.54 percent and 4.25 percent, respectively, as a proportion of their respective production. Payment of wages in flowers is not observed, while retention for family and gifts to others constitutes a very small proportion of the production of both these flowers.

xx) In the case of utilization of vegetable crops, it can be observed that losses in relation to production accounts for 2.70 percent of production for capsicum and 2.55 percent of production for tomato. Retention for family consumption is higher for tomato (4.64 percent) than capsicum (1.46 percent) of production.

xxi) In case of marketing pattern of the protected flower crops, it can be observed that both the flowers are sold only in the local markets, and not too far-off markets. In fact, it can be observed that more than 63.63 percent of carnation marketed and 61.24 percent of gerbera marketed has been sold directly to the consumers through FPOs in organic kiosks or road-side kiosks by the flower growers themselves.

xxii) In case of marketing pattern of the protected vegetable also, we can observe that 71.12 percent of total capsicum marketed and 62.24 percent of total tomato marketed is sold directly to the consumers in organic kiosks or road-side markets set up by the government, while the rest is sold in nearby towns through FPOs.

xxiii) The entire marketing process is set up by the state government, and hence the presence of middlemen and other intermediaries are not found. Market fees and other such costs are also not observed as the markets are set up and controlled by the government itself.

xxiv) It can be observed here that total expenses borne by the farmers for marketing of carnation stands at 8.18 percent, while that for gerbera stands at 7.66 percent of the net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.

xxv) In the case of capsicum, the total expenses borne by the grower on account of marketing stand at 7.82 percent, while that for tomato stands at 7.81 percent of the net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.

xxvi) Total production losses for the selected crops carnation, gerbera, capsicum and tomato are 4.54 percent, 4.25 percent, 2.70 percent and 2.55 percent, respectively.

xxvii) In the case of carnation and gerbera, loss of production occurs primarily in the picking of flowers, while the major source of production loss in the case of selected vegetables comes out to be pre-harvest losses and losses in transportation.

4. Suggestions

Based on research, following suggestions can be given:

i. As Sikkim has the favourable climatic conditions for growing vegetables, flowers and horticultural crops, policies like MIDH help in augmenting growth in agriculture, especially in vegetables, flowers and horticulture crops. Policy makers should consider allocating a higher budget for these states or implement similar schemes in vegetables, floriculture and horticulture.

ii. Cultivation of vegetables under polyhouses with organic cultivation technique seems to be a remunerative proposition for the resource-poor farmers also. Therefore, steps need to be taken to promote off-season vegetables cultivation under polyhouses so that the excess labour force can be optimally utilized in agriculture at large.

iii. In Sikkim, the formation of FPOs should be encouraged so that the hurdles in post-harvest management and marketing are reduced to the minimum for the marginal and small vegetable producers. Under active state supervision, marketing through FPOs/SHGs can reduce middlemen's commission and keep off other market intermediaries. As member participants, the farmers can themselves act as retailers in government regulated markets and organic kiosks.

Commodity Reviews

Foodgrains

Procurement of Rice

The total procurement of rice during kharif marketing season 2019-20 up to 27.02.2020 is 37.19 million tonnes as against 35.24 million tonnes during the corresponding period of last year. The details are given in Table 1. A comparative analysis of procurement of rice for the period of marketing season 2019-20 (up to 27.02.2020) and the corresponding period of last year is given in figure 1. The percentage share of different states in procurement of rice has been given in figure 2.

TABLE 1: PROCUREMENT OF RICE

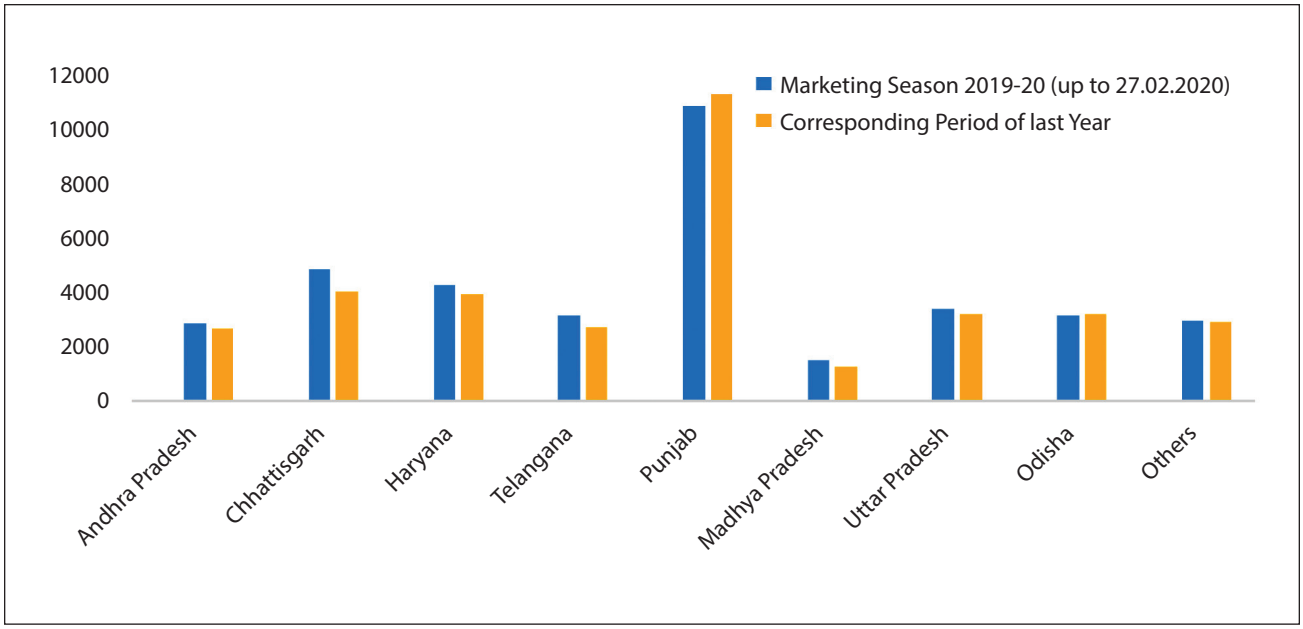
(In thousand tonnes)

State	Marketing Season 2019-20 (upto 27.02.2020)		Corresponding Period of last Year 2018-19	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Andhra Pradesh	2869	7.7	2680	7.6
Chhattisgarh	4872	13.1	4020	11.4
Haryana	4303	11.6	3942	11.2
Telangana	3157	8.5	2708	7.7
Punjab	10876	29.2	11334	32.2
Madhya Pradesh	1535	4.1	1275	3.6
Uttar Pradesh	3421	9.2	3190	9.1
Odisha	3163	8.5	3194	9.1
Others	2989	8.0	2900	8.2
Total	37185	100.0	35243	100.0

Source: Department of Food & Public Distribution.

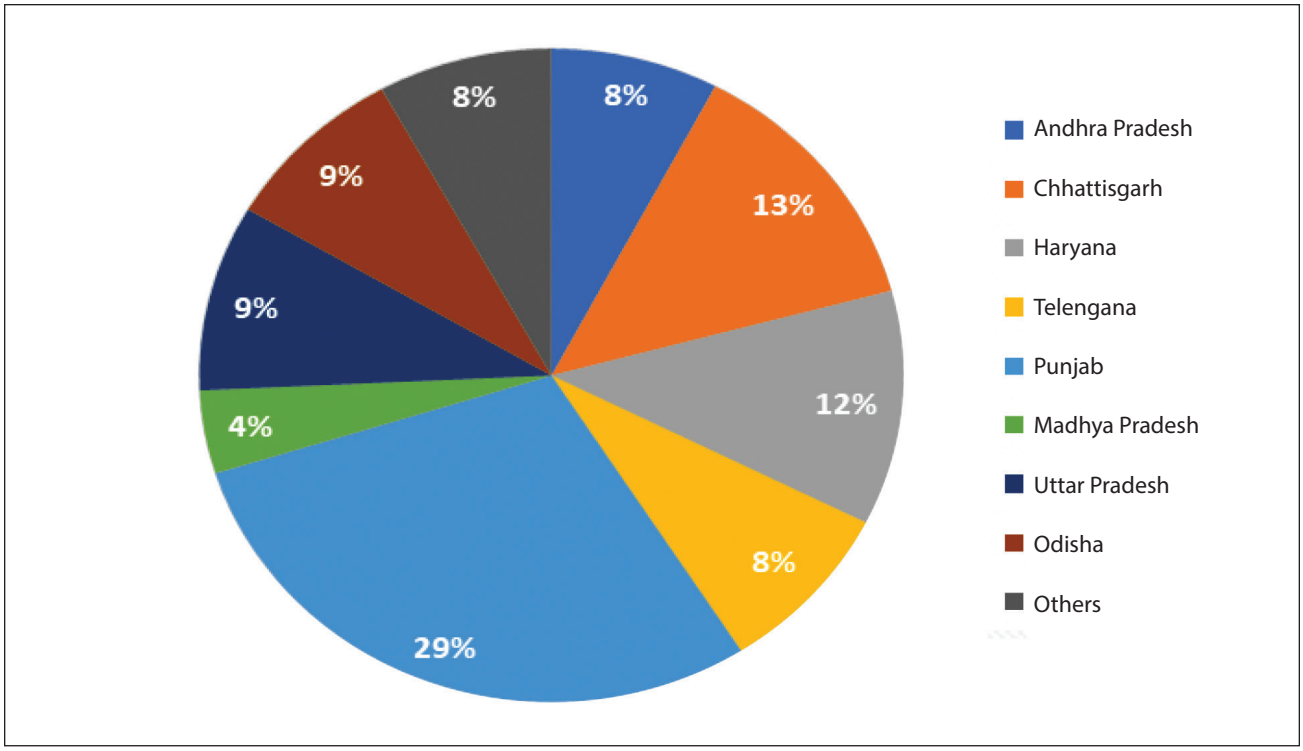
Figure 1: State-wise Procurement of Rice

(In thousand tonnes)



Source: Department of Food & Public Distribution.

Figure 2: Percentage Share of Different States in Procurement of Rice during Marketing Season 2018-19 (up to 27.02.2020).



Source: Department of Food & Public Distribution.

Procurement of Wheat

The total procurement of wheat during rabi marketing season 2019-20 up to 04.07.2019 is 34.13 million tonnes as against 35.37 million tonnes during the corresponding period of last year. The details are given in Table 2. The figure 3 depicts the comparison of procurement of wheat during the marketing season 2019-20 (up to 04.07.2019) with the corresponding period of last year. The percentage share of different states in procurement of wheat has been given in figure 4.

TABLE 2: PROCUREMENT OF WHEAT

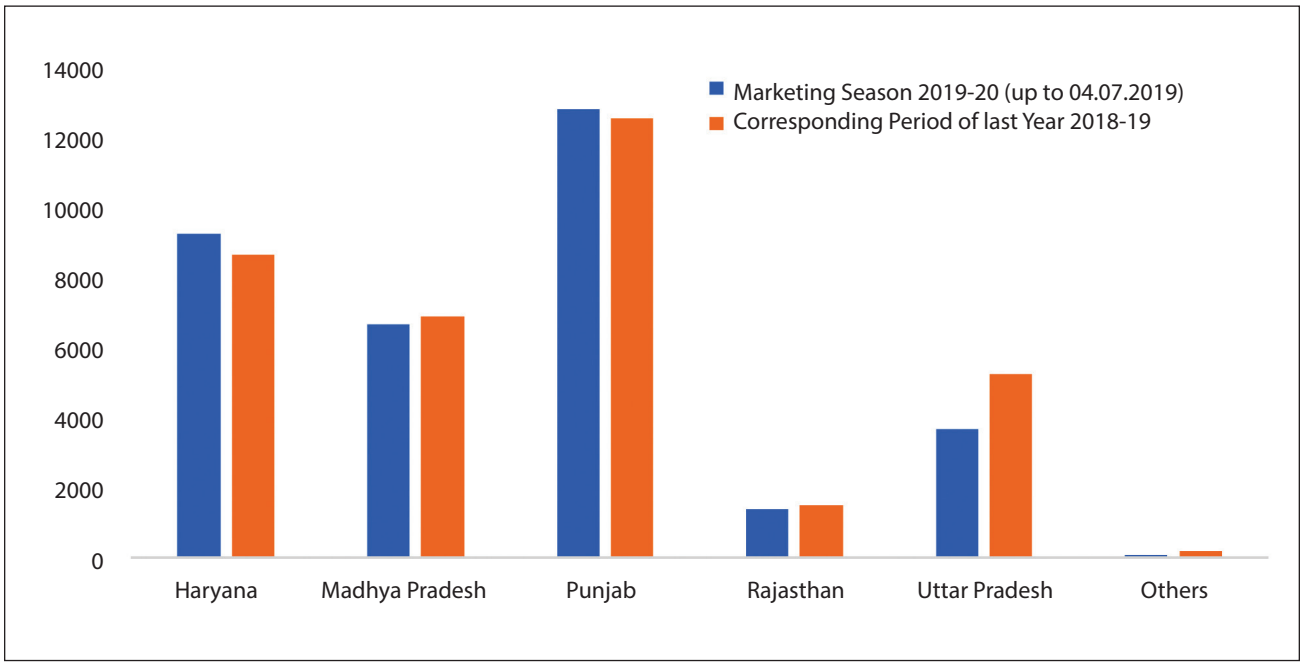
(In thousand tonnes)

State	Marketing Season 2019-20 (upto 04.07.2019)		Corresponding Period of last Year 2018-19	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Haryana	9320	27.3	8737	24.7
Madhya Pradesh	6725	19.7	6967	19.7
Punjab	12912	37.8	12662	35.8
Rajasthan	1411	4.1	1532	4.3
Uttar Pradesh	3700	10.8	5294	15.0
Others	65	0.2	176	0.5
Total	34133	100.0	35368	100.0

Source: Department of Food & Public Distribution.

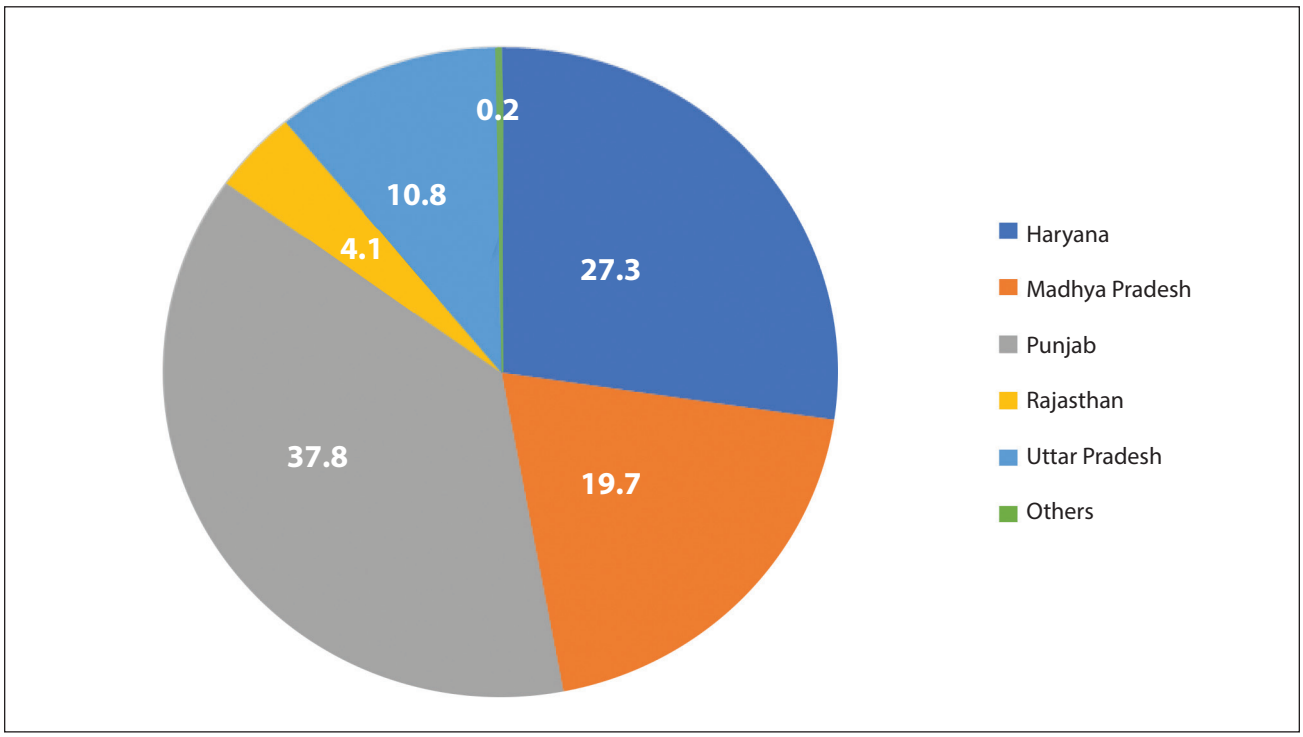
Figure 3: State-wise Procurement of Wheat

(In thousand tonnes)



Source: Department of Food & Public Distribution.

Figure 4: Percentage Share of Different States in Procurement of Wheat during Marketing Season 2019-20 (up to 04.07.2019).



Source: Department of Food & Public Distribution

Commercial Crops

Oilseeds

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 153.7 in February, 2020 showing a decrease of 2.2% and increase of 4.6% over the previous month and year, respectively. The WPI of safflower (kardi seed) decreased by 6.8%, soyabean by 5.6%, cotton seed by 3.7%, niger seed by 2.7%, rape & mustard seed by 1.6%, sunflower by 0.5% over the previous month. The WPI of groundnut seed increased by 2.7%, gingelly seed by 2.2% and copra (coconut) by 0.2% over the previous month.

Manufacture of Vegetable and Animal Oils and Fats

The WPI of manufacture of vegetable and animal oils and fats as a group stood at 129.1 in February, 2020 showing a decrease of 1.9% and increase of 11.8% over the previous month and year, respectively. The WPI of cotton seed oil decreased by 2.7%, rapeseed oil by 2.3%, mustard oil by 2.2%, copra oil by 2.2%, sunflower oil by 2.2%, soyabean oil by 0.5% over the previous month. The WPI of groundnut oil increased by 1.6% over the previous month.

Fruits & Vegetable

The WPI of fruits & vegetable as a group stood at 158.2 in February, 2020 showing a decrease of 12.5% and increase of 16.2% over the previous month and year, respectively.

Potato

The WPI of potato stood at 211.2 in February, 2020 showing a decrease of 19.5% and increase of 60.7% over the previous month and year, respectively.

Onion

The WPI of onion stood at 276.2 in February, 2020 showing a decrease of 41% and increase of 162.3% over the previous month and year, respectively.

Condiments & Spices

The WPI of condiments & spices (group) stood at 150 showing a decrease of 4.4% and increase of 17.5% over the previous month and year, respectively. The WPI of chillies (dry) decreased by 7.3%, black pepper by 0.8% and turmeric by 0.4% over the previous month.

Raw Cotton

The WPI of raw cotton stood at 107.5 in February, 2020 showing a decrease of 1.4% and 5% over the previous month and year, respectively.

Raw Jute

The WPI of raw jute stood at 212.4 in February, 2020 showing an increase of 2.6% and 5.5% over the previous month and year, respectively.

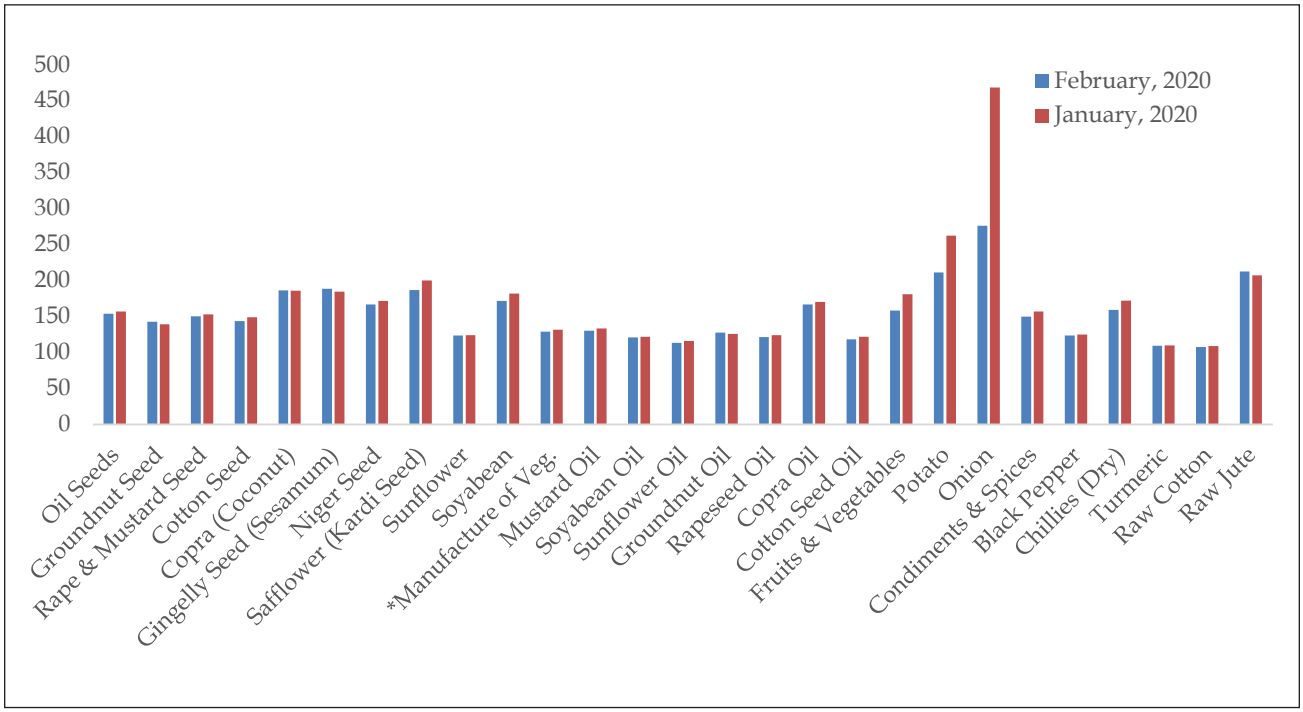
Wholesale Price Index of Commercial Crops is given in Table 3. A graphical comparison of WPI for the period of February, 2020 and January, 2020 is given in figure 5 and the comparison of WPI during the February, 2020 with the corresponding month of last year has been given in figure 6.

Table 3: Wholesale Price Index of Commercial Crops

(Base year: 2011-12=100)

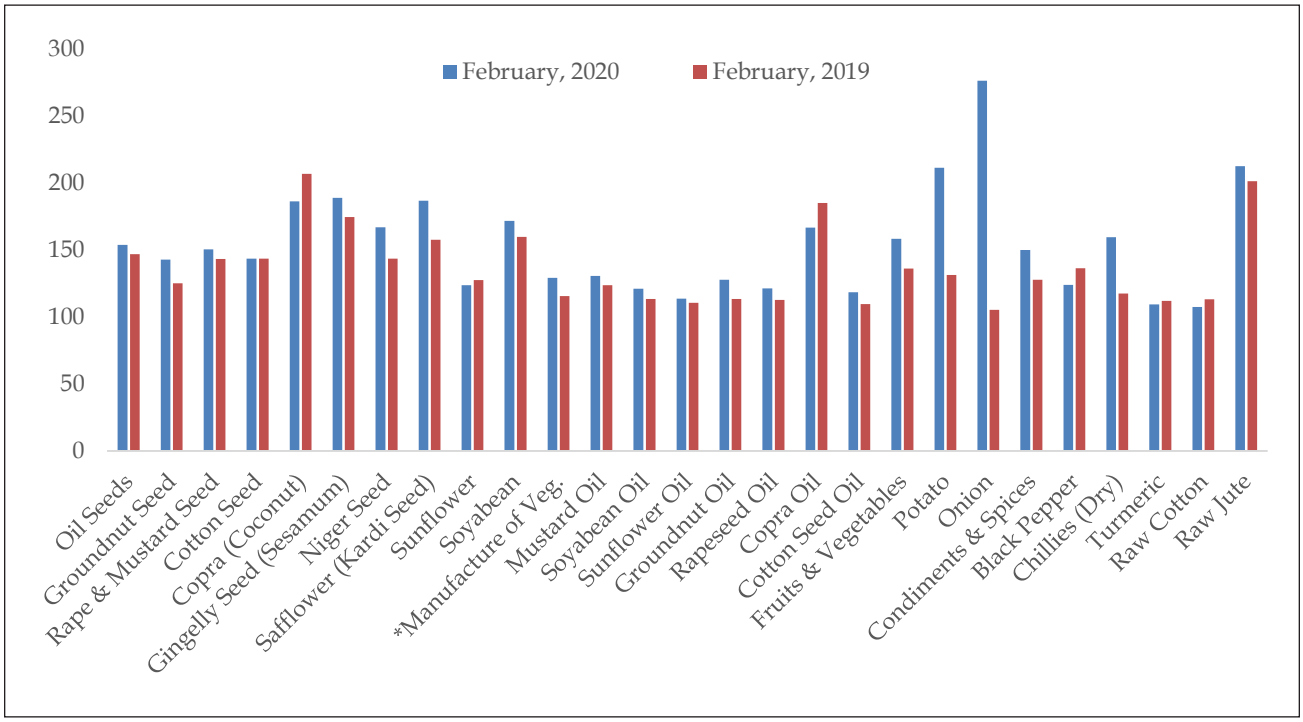
Commodity	Latest February, 2020	Month January, 2020	Year February, 2019	% Variation over the	
				Month	Year
Oil Seeds	153.7	157.1	146.9	-2.2	4.6
Groundnut Seed	142.7	139	125.2	2.7	14.0
Rape & Mustard Seed	150.5	152.9	143.3	-1.6	5.0
Cotton Seed	143.5	149	143.4	-3.7	0.1
Copra (Coconut)	186.3	186	206.7	0.2	-9.9
Gingelly Seed (Sesamum)	188.7	184.7	174.4	2.2	8.2
Niger Seed	166.9	171.5	143.5	-2.7	16.3
Safflower (Kardi Seed)	186.7	200.3	157.5	-6.8	18.5
Sunflower	123.6	124.2	127.4	-0.5	-3.0
Soyabean	171.6	181.8	159.8	-5.6	7.4
Manufacture of Veg and Animal Oils & Fats	129.1	131.6	115.5	-1.9	11.8
Mustard Oil	130.5	133.4	123.6	-2.2	5.6
Soyabean Oil	121.1	121.7	113.5	-0.5	6.7
Sunflower Oil	113.6	116.2	110.5	-2.2	2.8
Groundnut Oil	127.7	125.7	113.5	1.6	12.5
Rapeseed Oil	121.3	124.2	112.7	-2.3	7.6
Copra Oil	166.6	170.4	185.1	-2.2	-10.0
Cotton Seed Oil	118.4	121.7	109.7	-2.7	7.9
Fruits & Vegetables	158.2	180.9	136.1	-12.5	16.2
Potato	211.2	262.3	131.4	-19.5	60.7
Onion	276.2	468.5	105.3	-41.0	162.3
Condiments & Spices	150	156.9	127.7	-4.4	17.5
Black Pepper	123.8	124.8	136.4	-0.8	-9.2
Chillies (Dry)	159.4	171.9	117.4	-7.3	35.8
Turmeric	109.3	109.7	111.9	-0.4	-2.3
Raw Cotton	107.5	109	113.1	-1.4	-5.0
Raw Jute	212.4	207.1	201.3	2.6	5.5

Figure 5: WPI of Commercial Crops during February, 2020 and January, 2020



* Manufacture of Vegetable, Animal Oils and Fats

Figure 6: WPI of Commercial Crops during February, 2020 and February, 2019



* Manufacture of Vegetable, Animal Oils and Fats

Statistical Tables

Wages

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

(In Rs.)

State	District	Centre	Month & 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, 2019	8	425	283	NA	NA	300	NA	NA	NA	NA
	Guntur	Tadikonda	Nov, 2019	8	381	350	400	NA	325	NA	NA	500	NA
Telangana	Ranga Reddy	Arutala	Jan, 20	8	396	396	500	NA	NA	NA	400	400	NA
Karnataka	Bangalore	Harisandra	Dec, 19	8	360	340	300	300	340	330	500	400	NA
	Tumkur	Gidlahali	Nov, 19	8	350	320	350	350	350	320	400	360	NA
Maharashtra	Bhandara	Adyal	Dec, 19	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chandrapur	Ballarpur	Dec, 19	8	300	200	300	200	300	NA	500	400	250
Jharkhand	Ranchi	Gaitalsood	June, 19	8	239	239	239	239	239	239	330	330	NA

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

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Assam	Barpeta	Howly	May,19	M	8	300	NA	250	250	200	NA	275	280	NA
				W	8	NA	NA	170	170	150	NA	NA	NA	NA
Bihar	Muzaffarpur	Bhalui Rasul	June, 19	M	8	300	300	300	300	300	300	450	450	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Shekhpura	Kutaut	June, 19	M	8	NA	NA	NA	NA	NA	NA	500	500	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chhattisgarh	Dhamtari	Sihava	Nov,19	M	8	250	200	NA	180	180	200	300	200	200
				W	8	NA	175	NA	150	150	170	NA	150	NA

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

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Gujarat*	Rajkot	Rajkot	Jan,20	M	8	263	263	266	260	238	200	481	481	469
				W	8	350	325	263	253	238	196	NA	NA	NA
	Dahod	Dahod	Jan,20	M	8	294	294	163	163	163	NA	400	350	300
				W	8	NA	250	163	163	163	NA	NA	NA	NA
Haryana	Panipat	Ugarakheri	May, 19	M	8	400	400	400	400	400	NA	550	400	NA
				W	8	NA	300	300	350	300	NA	NA	NA	NA
Himachal Pradesh	Mandi	Mandi	Jan,20	M	8	450	330	330	330	330	330	430	430	300
				W	8	NA	330	330	330	330	330	NA	NA	NA
Kerala	Kozhikode	Koduvally	Aug, 19	M	4-8	960	850	NA	800	980	NA	900	NA	NA
				W	4-8	NA	NA	650	650	700	NA	NA	NA	NA
	Palakkad	Elappally	Aug, 19	M	4-8	NA	600	NA	600	700	NA	750	NA	NA
				W	4-8	NA	NA	300	300	300	NA	NA	NA	NA
Madhya Pradesh	Hoshangabad	Sangarkhera	Nov, 19	M	8	250	NA	200	200	250	150	400	400	NA
				W	8	NA	NA	200	200	200	NA	NA	NA	NA
	Satna	Kotar	Nov, 19	M	8	300	300	300	300	300	300	500	500	500
				W	8	NA	300	300	300	300	300	NA	NA	NA
	Shyopurkala	Vijaypur	Nov, 19	M	8	NA	300	NA	NA	NA	300	400	400	NA
				W	8	NA	300	NA	NA	NA	300	NA	NA	NA
Odisha	Bhadrak	Chandbali	June, 19	M	8	350	350	350	350	383	300	500	400	400
				W	8	NA	300	300	300	308	250	NA	NA	NA
	Ganjam	Aska	June, 19	M	8	300	250	250	300	325	250	500	500	500
				W	8	NA	220	220	250	267	220	NA	NA	NA
Punjab	Ludhiyana	Pakhowal	Jan,20	M	8	450	500	NA	NA	400	NA	480	480	NA
				W	8	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rajasthan	Barmer	Kuseep	Dec, 19	M	8	500	500	400	NA	NA	500	700	500	NA
				W	8	NA	NA	NA	NA	NA	300	NA	300	NA
	Jalore	Sarnau	Dec, 19	M	8	400	NA	300	300	NA	NA	600	400	NA
				W	8	NA	NA	250	300	NA	NA	NA	350	NA

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

(In Rs.)

State	District	Centre	Month & Year	Type of Labour	Normal Daily Working Hours	Ploughing	Sowing	Weeding	Harvesting	Other Agri Labour	Herdsman	Skilled Labours		
												Carpenter	Black Smith	Cobbler
Tamil Nadu*	Thanjavur	Pulvarnatham	Oct, 19	M	8	NA	346	NA	350	397	NA	540	450	NA
				W	8	NA	NA	158	150	126	NA	NA	NA	NA
	Tirunelveli	Malayakulam	Oct, 19	M	8	NA	NA	NA	500	610	NA	400	400	NA
				W	8	NA	200	200	187	NA	NA	NA	NA	NA
Tripura	State Average		Aug, 19	M	8	331	331	297	276	275	275	350	319	NA
				W	8	NA	331	250	229	225	241	NA	NA	NA
Uttar Pradesh*	Meerut	Ganeshpur	Nov, 19	M	8	300	300	300	300	300	NA	500	NA	NA
				W	8	NA	250	250	250	250	NA	NA	NA	NA
	Aurraiya	Aurraiya	Nov, 19	M	8	NA	300	NA	300	300	NA	500	NA	.NA
				W	8	NA	300	NA	NA	300	NA	NA	NA	NA
	Chandauli	Chandauli	Nov, 19	M	8	NA	NA	NA	NA	300	NA	500	NA	NA
				W	8	NA	NA	NA	NA	300	NA	NA	NA	NA

M - Man

W - Woman

NA - Not Available

NR – Not Reported

* The State reported district average daily wage 3

Prices

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

Commodity	Variety	Unit	State	Centre	Feb-20	Jan-20	Feb-19
Wheat	PBW 343	Quintal	Punjab	Amritsar	2200	2200	2000
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	2040	2090	1890
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	2010	2300	1880
Jowar	-	Quintal	Maharashtra	Mumbai	4100	4000	3400
Gram	No III	Quintal	Madhya Pradesh	Sehore	3750	3726	3750
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1975	2060	1950
Gram Split	-	Quintal	Bihar	Patna	6200	6200	5820
Gram Split	-	Quintal	Maharashtra	Mumbai	5500	5600	5800
Arhar Split	-	Quintal	Bihar	Patna	8360	8360	7025
Arhar Split	-	Quintal	Maharashtra	Mumbai	8000	8400	6400
Arhar Split	-	Quintal	NCT of Delhi	Delhi	7900	8000	5650
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	7300	8200	7200
Gur	-	Quintal	Maharashtra	Mumbai	4900	5050	4000
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4500	4500	4500
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2400	2550	2300
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	4125	4100	3900
Mustard Seed	Black	Quintal	West Bengal	Raniganj	4400	4350	4350
Mustard Seed	-	Quintal	West Bengal	Kolkata	4350	4600	4200
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	5250	5160	4300
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	4650	4880	4200
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	1700	1800	1850
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	3000	3000	2700
Castor Seed	-	Quintal	Telangana	Hyderabad	3900	3800	5000
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	9875	9750	11250
Copra	FAQ	Quintal	Kerala	Alleppey	10800	10900	11250
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	6000	6000	5200
Groundnut	-	Quintal	Maharashtra	Mumbai	8000	8200	6100
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1370	1370	1370
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1395	1475	1400

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

Commodity	Variety	Unit	State	Centre	Feb-20	Jan-20	Feb-19
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	1800	1700	1480
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2000	2190	1850
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1440	1430	1415
Castor Oil	-	15 Kg.	Telangana	Hyderabad	1245	1245	1650
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	1830	1830	1760
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2935	2800	3300
Coconut Oil	-	15 Kg.	Kerala	Cochin	2280	2295	2355
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	2125	2165	1870
Groundnut Cake	-	Quintal	Telangana	Hyderabad	3642	3572	3286
Cotton/Kapas	NH 44	Quintal	Andhra pradesh	Nandyal	5000	5200	5250
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	4700	4700	5150
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	4900	4950	4600
Jute Raw	W 5	Quintal	West Bengal	Kolkata	4950	5000	4650
Oranges	-	100 No	NCT of Delhi	Delhi	667	708	583
Oranges	Big	100 No	Tamil Nadu	Chennai	400	500	600
Banana	-	100 No.	NCT of Delhi	Delhi	458	458	417
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	700	700	530
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	85000	85000	85000
Almonds	-	Quintal	Maharashtra	Mumbai	73000	72000	61000
Walnuts	-	Quintal	Maharashtra	Mumbai	60000	62000	64000
Kishmish	-	Quintal	Maharashtra	Mumbai	20000	19000	26000
Peas Green	-	Quintal	Maharashtra	Mumbai	5000	6700	6200
Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	1050	1050	650
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	1500	2500	2000
Cauliflower	-	100 No.	Tamil Nadu	Chennai	2000	2500	1430
Potato	Red	Quintal	Bihar	Patna	1640	1700	920
Potato	Desi	Quintal	West Bengal	Kolkata	1100	1700	400
Potato	Sort I	Quintal	Tamil Nadu	Mettuppalayam	2630	2963	1847
Onion	Pole	Quintal	Maharashtra	Nashik	1800	2100	400

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

Commodity	Variety	Unit	State	Centre	Feb-20	Jan-20	Feb-19
Turmeric	Nadan	Quintal	Kerala	Cochin	11500	11500	12000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	11000	10000	11000
Chillies	-	Quintal	Bihar	Patna	12650	12650	9850
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	29000	28500	30000
Ginger	Dry	Quintal	Kerala	Cochin	27000	27500	25000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	143500	142000	118000
Cardamom	Small	Quintal	West Bengal	Kolkata	365000	425000	150000
Milk	Buffalo	100 Liters	West Bengal	Kolkata	5200	5200	5200
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	69035	68000	78706
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	42000	40000	42000
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	39200	38870	39800
Fish	Rohu	Quintal	NCT of Delhi	Delhi	16000	17000	16500
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	50000	42000	40000
Eggs	Madras	1000 No.	West Bengal	Kolkata	4286	5000	5142
Tea	-	Quintal	Bihar	Patna	21950	21950	21350
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	NT	NT	39000
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	40000	40000	27500
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	29500	29500	19280
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	7750	7750	7000
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	4800	4750	3850
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	13200	13400	13200
Rubber	-	Quintal	Kerala	Kottayam	11700	11500	11000
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	61500	61000	59000

Crop Production

SOWING AND HARVESTING OPERATIONSNORMALLY IN PROGRESS DURING THE MONTH OF MAY, 2020

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Autumn Rice, Sugarcane, Groundnut	Summer Rice, Onion.
Assam	Winter Rice, Maize, Tur (R), Cotton.	Summer Potato (Hills).
Bihar	Autumn Rice, Jute, Mesta, Castoresed.	Summer Rice, Wheat, Barley, Gram, Linseed.
Gujarat	Sugarcane, Ginger, Turmeric.	Onion
Himachal Pradesh	Maize, Ragi, Small Millets (K), Summer Potato (Hills), Sugarcane, Ginger, Chillies (Dry), Tobacco, Sesamum, Cotton, Turmeric.	Wheat, Barley, Gram, Other Rabi Pulses, Linseed, Onion.
Jammu & Kashmir	Autumn Rice, Jowar (K), Maize, Ragi, Small, Millets (K), Mung (K), Tur (K), Other Tobacco, Sannhemp.	Wheat, Barley, Small Millets (R) Tur (K), Sesamum, Rapeseed and Mustard, Linseed. Onion.
Karnataka	Autumn Rice, Jowar (K), Maize, Ragi, Urad (K), Mung (K), Summer Potato (Hills), Tobacco, Castorseed, Sesamum, Cotton, Sweet Potato, Turmeric, Sannhemp, Onion, Tapioca.	Summer Rice, Ragi (R), Winter Potato (Plain), Tapioca.
Kerala	Autumn Rice, Ragi, Small Millets (K), Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Ginger, Turmeric, Tapioca (Early).	Summer Rice, Other Rabi Pulses, Tapioca (Late).
Madhya Pradesh	Sugarcane, Ginger, Chillies (Dry), Turmeric.	Winter Potato (Plains), Onion.
Maharashtra	Termeric.	–
Manipur	Autumn Rice, Groundnut, Castorseed, Cotton, Turmeric.	–
Orissa	Autumn Rice, Sugarcane, Chillies	Summer Rice, Cotton, Chillies (Dry).
	(Dry), Jute.	
Punjab and Haryana	Autumn Rice, Summer Rice, Ragi, Small Millets (K), Tur (K), Summer Potato (Hills) Chillies (Dry), Cotton, Sweet Potato.	Wheat, Barley, Winter Potato (Plains), Summer Potato, Tabacco, Onion.
Rajsthan	Sugarcane	Wheat, Small Millets (R), Tabacco.

SOWING AND HARVESTING OPERATIONSNORMALLY IN PROGRESS DURING THE MONTH OF MAY, 2020-*CONTD.*

State	Sowing	Harvesting
(1)	(2)	(3)
Tamil Nadu	Autumn Rice, Bajra, Summer Potato, Sugarcane, Chillies (Dry), Groundnut, Turmeric, Sannhemp. Tapioca	Summer Rice, Jowar (R), Winter Potato (Hills), Sugarcane, Chillies (Dry), Sesamum, Onion.
Tripura	Autumn Rice, Maize, Sugarcane, Ginger, Chillies (Dry), Seasmum, Cotton, Jute, Mesta.	–
Uttar Pradesh	Autumn Rice, Tur (K), Chillies (Dry), Groundnut, Cotton, Jute, Mesta, Linseed.	Summer Rice, Wheat, Barley, Sugarcane, Tabacco, Rapeseed and Mustard, Sannhemp, Onion.
West Bengal	Autumn Rice, Winter Rice, Tur (K), Ginger, Chillies (Dry), Jute, Mesta.	Summer Rice, Chillies (Dry), Sesamum.
Delhi	Jowar (K), Onion.	

(K) – Kharif (R) – Rabi

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N.T. — No Transactions.
N.S.—No Supply/No Stock.
R. — Revised.
M.C. — Market Closed.
N.R.—Not Reported.
Neg. — Negligible.
Kg. — Kilogram.
Q. — Quintal.
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