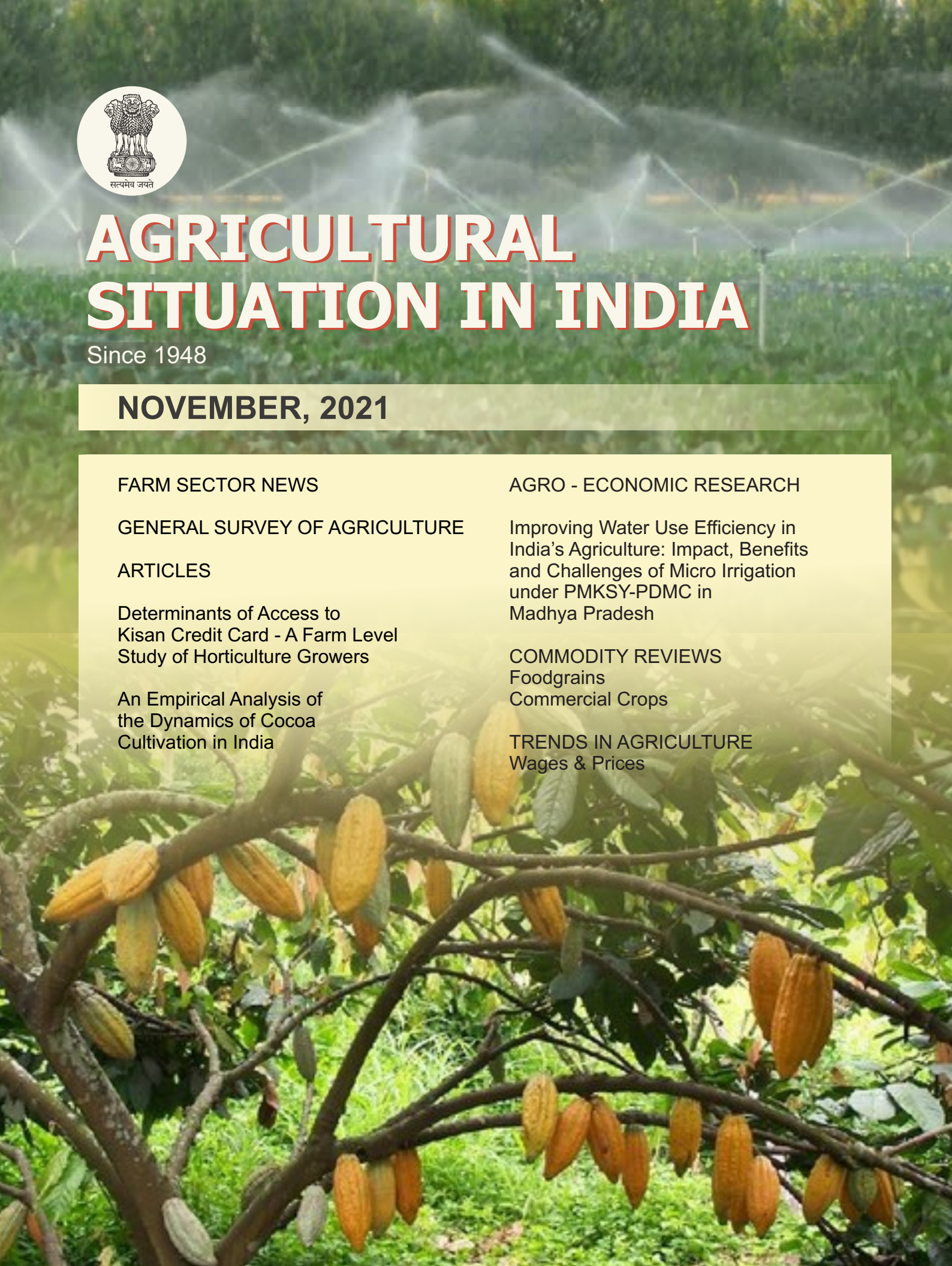

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From Editor's Desk

The current edition of Agricultural Situation in India covers main farm sector news of the month of November, inflation rate and price indices of food and non-food items among other statistical data. This issue includes two research articles titled "Determinants of Access to Kisan Credit Card - A Farm Level Study of Horticulture Growers" and "Empirical Analysis of the Dynamics of Cocoa Cultivation in India". Moreover, a summary of an Agro-Economic Research on "Improving Water Use Efficiency in India's Agriculture: Impact, Benefits and Challenges of Micro Irrigation (MI) under the PMKSY-PDMC in Madhya Pradesh" by Agro-Economic Research Centre, JNKVV, Jabalpur, Madhya Pradesh under the AER scheme of DES is included.

The major farm sector news for the month of November includes, Nutrition smart villages to strengthen India's campaign against malnutrition; Beekeeper Conference in Nagaland held; India International Trade Fair 2021; Soil Health Card scheme; share of states in crop insurance scheme among various other news.

For the month of November, 2021, annual inflation stood at 14.23 percent over November, 2020. Annual food inflation increased by 6.70 percent during November, 2021 over November, 2020 whereas on month-on-month basis, it increased by 3.40 percent in November, 2021 over October, 2021, provisionally. The Wholesale Price Index (WPI) of pulses, vegetables, fruits, cereals and wheat increased by 2.90 percent, 3.91 percent, 15.50 percent, 3.98 percent and 10.14 percent, respectively, whereas for paddy, it decreased by 0.18 percent in November, 2021 as compared to corresponding period of last year. The cumulative post-monsoon season rainfall in the country during the period 1st October, 2021 to 24th November, 2021 has been 47 percent higher than the long period average (LPA). Current live storage in 133 major water reservoirs in the country was 136.74 BCM as against 121.07 BCM of normal storage based on the average storage of last 10 years.

The first article on "Determinants of Access to Kisan Credit Card- A Farm Level Study of Horticulture Growers" tries to ascertain the impact of Kisan Credit Cards with major emphasis on horticulture crops in Uttar Pradesh. The study reveals that almost half of the growers still have no access to KCC and the marginal and small farmers among them are more vulnerable. The credit facility availed through this scheme has helped the growers to increase the input use resulting in better productivity and higher income returns. The scheme needs to be made more accessible to small and marginal farmers as they are the ones who are in need of credit and are vulnerable to be exploited by non-institutional sources of credit. This will no doubt help in all round development of the states' economy.

The article on "Empirical Analysis of the Dynamics of Cocoa Cultivation in India" analyses the area, production and productivity trends of cocoa crop for a period of 22 years. The analysis finds that though the cocoa production over the years has shown noticeable growth, still India is dependent on the import of cocoa to meet the rising domestic demand, as it is used in production of chocolates, beverages and confectionaries. The study recommends that currently southern states of India are dominant in the production of cocoa crop and promotion of cocoa in other regions especially the North-Eastern regions will help in increasing the production and reduce dependence on imports. Price stability is a major factor which needs to be controlled to encourage more farmers to take up cocoa plantation.

The Agro-Economic Research on "Improving Water Use Efficiency in India's Agriculture: Impact, Benefits and Challenges of Micro Irrigation under PMKSY-PDMC in Madhya Pradesh" tries to ascertain the efficacy of the scheme in the state. The study finds that Madhya Pradesh is one of the leading state which has successfully implemented PMKSY in most of its districts. Though the adoption of MI has resulted in increased input costs, but the per rupee return has also increased. This advocates for the more rigorous adoption of the scheme. Use of MI has resulted in high yield, better quality, higher output price, less use of water, labour and fertilizer. Proper activities may be initiated to facilitate its adoption across the state and country so that both water and environment can be conserved through this scheme.

Promodita Sathish

Farm Sector News

Meetings and Events

Beekeeper Conference in Nagaland

Hon'ble Union Minister of Agriculture and Farmers' Welfare, Shri Narendra Singh Tomar, virtually inaugurated the Kisan Bhawan and Beekeeper Conference at the Central Institute of Horticulture, Nagaland on 11th November, 2021. Shri Tomar, in his deliberation expressed that bringing a change in the lives of small and medium farmers is a major goal of the Central Government.

In this programme organized under the Amrit Mahotsav of Azadi, Shri Tomar said that the climate of the North-East region is favourable for agriculture and the area is ideal for the cultivation of horticultural crops especially fruits and vegetables, flowers and spices. Keeping in view the interests of the small and marginal farmers of the North Eastern Region in horticulture, the Central Institute of Horticulture, Nagaland was established under the Central Sector Scheme of the Union Ministry of Agriculture and Farmers' Welfare and this institute was established for the development of horticulture and upliftment of farmers. The state is working well with the Government, FPOs and other stakeholders. This brings a change in the living standards of the farmers with the aim that the farmers can contribute to the development of the country along with Nagaland.

Describing beekeeping as an auxiliary area for increasing the income of farmers, Shri Tomar said that Honey Mission has been started to bring Sweet Revolution and the Central Government has spent Rs. 500 crores on it. The provision has been made under the self-reliant India campaign. Under the Government of India's plan to form 10,000 new Farmer Producer Organizations (FPOs), FPOs of honey-producing farmers are also being created. To test honey properly, labs have been set up in many places in the country and processing facilities are also being increased.

The Union Minister said that due to the collective efforts of the beekeepers and the government, the production of honey in the country has increased from 76150 metric tonnes in the year 2013-14 to 1.25 lakh metric tonnes in 2020-21. At the same time, with the help of stakeholders associated with the beekeeping sector, the export of honey has increased from 28 thousand metric tonnes in the year 2013-14 to about 60 thousand metric tonnes in 2020-21. Shri Tomar expressed the expectation from the state governments that by taking advantage of all the facilities, beekeeper farmers should be provided good prices for their produce. He said that we all should have the same goal that small farmers should get the maximum price for their products.

An exhibition of farmers' products was organized in the programme and minikits were provided to the farmers for new experiments in farming. Products made by the trainee farmers were launched and Annual Report – Technical Bulletin was also released.

India International Trade Fair-2021

Ministry of Agriculture and Farmers' Welfare, Government of India is participating in India International Trade Fair-2021 being held at Pragati Maidan from 14-27 November, 2021. Glimpses of the main theme of the Indian International Trade Fair-2021, "AatmaNirbhar Bharat", have been displayed through the Ministry's stall.

Hon'ble Union Minister of State for Agriculture and Farmers' Welfare, Ms. Shobha Karandlaje, during her visit to the stalls of the Ministry of Agriculture and Farmers' Welfare appreciated the activities of all the Departments/institutions and autonomous establishments, etc. under the Ministry. The Minister said that the participation of all the Departments of the Ministry in such a fair is commendable. The Minister said that by exhibiting various schemes related to the agriculture sector, the Ministry has established a direct dialogue with the farmers. She added that such fairs are very helpful for the Ministry to connect with the farmers. Fairs and exhibitions provide an important platform for the promotion of agriculture schemes.

This year, the stalls of National Horticulture Board; Indian Council of Agricultural Research; National Centre of Organic Farming; Directorate of Marketing; Northern Region Farm Machinery Training and Testing Institute, Hisar; Directorate of Plant Protection, Quarantine and Storage, Faridabad; Mahalanobis National Crop Forecast Centre; Spices Board; Coconut Development Board and Directorate of Cashewnut & Cocoa Development were the center of attraction.

General Agricultural Sector News

Nutrition smart villages to strengthen India's campaign against malnutrition

As part of Azadi Ka Amrit Mahotsav to commemorate the 75th year of India's Independence, a programme on "Nutrition Smart Village" will be initiated to strengthen the Poshan Abhiyan. This new initiative aims to reach out to 75 villages across India through the network of All India Coordinated Research Project on Women in Agriculture (AICRP-WIA) which is in operation at 13 centres in 12 states of India, besides the coordinating institute located at Bhubaneswar. This was informed by the Hon'ble Union Agriculture Minister, Shri Narendra Singh Tomar, while addressing an event organized by Indian Council of Agriculture Research on 10th November, 2021 in New Delhi.

The initiative has been undertaken in line with the Prime Minister's call to all the academicians, agricultural scientists and all the institutions to adopt and transform 75 villages. Under the initiative, a total of 75 villages will be adopted by AICRP centres and ICAR-CIWA, for which the AICRP centres will adopt 5 villages each with the remaining to be adopted by ICAR-CIWA with an aim to develop 75 Nutri-Smart villages.

The objectives of the initiative are promoting nutritional awareness, education and behavioural change in rural areas involving farm women and school children, harnessing traditional knowledge through the local recipe to overcome malnutrition and implementing nutrition-sensitive agriculture through homestead agriculture and nutri-garden.

To achieve the goal of malnutrition free villages, intensive awareness campaigns and field activities will be undertaken for focusing on the concept of nutri-village/nutri-food/nutri-diet/ nutri-thali, etc. for strengthening the Poshan Abhiyan. Awareness among the women farmers will also be created about their legal rights in all walks of life. The products/tools/technologies developed by AICRP centres will be evaluated through multi-location trials.

During the event, Shri Narendra Singh Tomar released 3 publications on 'Technology profile of food products', 'Work participation and women in agriculture in India' and 'Gender Sensitive Agri-Horti Cropping System Model for addressing livelihood nutrition and entrepreneurship'.

Agri-Startups

Ministry of Agriculture and Farmers' Welfare launched a component called "Innovation and Agri-Entrepreneurship Development" under Rashtriya Krishi Vikas Yojana (RKVY-RAFTAAR) in 2018-19 with an objective to promote innovation and agri-entrepreneurship by providing financial support and nurturing the incubation ecosystem. The Ministry has appointed five Knowledge Partners (KPs) as Centre of Excellence and twenty four RKVY-RAFTAAR Agribusiness Incubators (R-ABIs) from across the country for implementation of this programme.

Anand Agricultural University, Anand, Gujarat is one of the R-ABIs under "Innovation and Agri-Entrepreneurship Development" to promote agriculture startups in Gujarat.

Number of startups selected during the last two years in Uttar Pradesh and Rajasthan and financial assistance provided to them under "Innovation and Agri-Entrepreneurship Development" programme is given below.

(amount in Rs. lakh)

State/Year	Number of agro-startups selected		Financial assistance given	
	2019-20	2020-21	2019-20	2020-21
Uttar Pradesh	13	19	69.00	85.80
Rajasthan	3	18	18.00	97.00

"Innovation and Agri-Entrepreneurship Development" programme of the Ministry is basically meant for promotion and support of startups of agriculture and allied sectors in areas such as agricultural logistics, value & supply chain management, online/virtual platform, organic farming & services, etc. Various provisions regarding startups are governed by norms laid down by Department for Promotion of Industry and Internal Trade (DPIIT). 646 startups in the agriculture and allied sectors have been selected under "Innovation and Agri-Entrepreneurship Development" for funding of a sum of Rs. 69.92 crores in installments and Rs. 33.94 crores has been released to respective KPs and RABIs for funding these start-ups.

Hybrid seed minikits

The Government has approved a pilot project for hybrid seed minikits distribution of mustard through National Seeds Corporation (NSC) during Rabi 2021-22 under National Food Security Mission-Oilseeds (NFSM-OS). Hybrid mustard seed minikits have been distributed to major mustard growing states such as Rajasthan, Madhya Pradesh, Uttar Pradesh, Haryana and Gujarat. The state of Andhra Pradesh has not been included for this pilot project since the climatic conditions in the state are not suitable for this crop.

The details of distribution of hybrid seed minikits of mustard is given below:

Sl No.	State	Allocation		Supply	
		Minikit (number)	Qty (in qtls.)	Minikit (number)	Qty (in qtls.)
1	Gujarat	20000	300	20000	300
2	Haryana	15000	225	15000	225
3	Madhya Pradesh	30000	350	30000	350
4	Rajasthan	20000	260	20000	260
5	Uttar Pradesh	35000	480	35000	480
	Total	**120000**	**1615**	**120000**	**1615**

Soil Health Card scheme

National Productivity Council (NPC) carried out a study on 'Soil Testing Infrastructure for Faster Delivery of Soil Health Card in India' in 2017. In the study, it was found that application of fertilizer and micronutrients based on Soil Health Card (SHC) recommendations resulted in 8-10% of savings and overall increase in the yield of crops to the tune of 5-6%.

National Institute of Agricultural Extension Management (MANAGE), Hyderabad conducted an impact study of Soil Health Card (SHC) scheme (November, 2017). The major findings were that there is some reduction in fertilizer use, especially

nitrogen and increase in bio-fertilizers and other micro-nutrients use. Overall, paddy farmers reduced use of urea by 9%, Di Ammonium Phosphate (DAP)/Single Super Phosphate (SSP) by 7%, but increased use of potassium by 20%. This is a healthy sign of moving towards balanced use of fertilizers. The states have not reported any challenges faced by them while implementing the scheme. Soil Health Card scheme has been implemented in all parts of the country including Tamil Nadu, Maharashtra, Telangana and Uttar Pradesh.

State/UT-wise Details of Total Number of Farm Holdings and Number of Soil Health Cards Issued

Sl. No.	States/UTs	Total no. of farm holding	Soil Health Cards issued		
			Cycle-I (2015-17)	Cycle-II (2017-19)	Model Village Programme (2019-20)
1	Andaman & Nicobar	11954	10000	9540	1007
2	Andhra Pradesh	8523910	7455204	6967162	226487
3	Arunachal Pradesh	113253	20532	22128	225
4	Assam	2741711	1300901	1300901	66218
5	Bihar	16412893	6469650	6277942	123866
6	Chhattisgarh	4010772	3890709	4746670	59302
7	Dadra and Nagar Haveli and Daman & Diu	23088	2222	12994	0
8	Goa	74563	25000	16743	2938
9	Gujarat	5320626	5108923	8694942	63591
10	Haryana	1628015	4227238	4143900	25235
11	Himachal Pradesh	996809	385011	960765	19671
12	J & K	1416509	692062	1018051	70246
13	Jharkhand	2802946	637507	641828	58572
14	Karnataka	8680739	7832189	7832189	65034
15	Kerala	7583496	763435	2209717	80045
16	Madhya Pradesh	10003135	8872377	8907385	127585
17	Maharashtra	15285439	13146000	13053000	201837
18	Manipur	150484	114522	114522	10010
19	Meghalaya	232397	209561	246879	3243
20	Mizoram	89774	11986	16458	2119
21	Nagaland	196532	184797	12000	27304
22	Odisha	4865850	2374233	2053734	162405
23	Puducherry	33840	19594	12089	2508

Sl. No.	States/UTs	Total no. of farm holding	Soil Health Cards issued		
			Cycle-I (2015-17)	Cycle-II (2017-19)	Model Village Programme (2019-20)
24	Punjab	1092713	1251726	1160568	17793
25	Rajasthan	7654616	6886000	11860699	86341
26	Sikkim	71532	46000	66000	2936
27	Tamil Nadu	7937947	6767000	7016654	58317
28	Telangana	5947735	5720737	4842509	110664
29	Tripura	573194	117723	117723	15602
30	Uttar Pradesh	23821625	17014573	20354551	255517
31	Uttarakhand	881305	750494	882797	13645
32	West Bengal	7242732	5040510	4200000	4520
	Total	**146422134**	**107348416**	**119773040**	**1964783**

Source: Total no. of farm holdings-Agriculture Census, 2015-16

Share of states in crop insurance scheme

Pradhan Mantri Fasal Bima Yojana (PMFBY) is a voluntary scheme the premium of which is determined through biding. However, farmers have to pay a maximum of 2% for kharif crops, 1.5% for rabi food crops and oilseed crops, and 5% for commercial/horticultural crops and the balance of actuarial/bidded premium is shared by the Central and State Government on 50:50 basis and 90:10 in case of North Eastern states from Kharif 2020 season as per provisions of the scheme. The premium rate of crops depends on the risk associated with them and total liability of the state depends on actuarial/bidden premium rate, sum insured of crops, area insured and number of crops notified by the states. Some states have not released their share of premium subsidies for certain seasons, however, any specific reasons for such default have not been communicated. Further, the sector-wise budget allocation by the State Governments falls within their domain.

STATE-WISE STATUS OF PENDING STATE SUBSIDY* UNDER PMFBY FROM KHARIF 2018 TILL RABI 2020-21 (AS ON 24.11.2021)

(Rs. in crores)

Season	State	Total State Subsidy	State Subsidy Paid	State Subsidy Pending
2018-19	Jharkhand	228.13	77.86	150.27
	Rajasthan	1,502.12	1,489.25	12.87
	Tamil Nadu	707.93	702.96	4.97
	Telangana	194.77	44.36	150.41
	Uttar Pradesh	509.50	495.99	13.51
2018-19 Total				**321.96**

Season	State	Total State Subsidy	State Subsidy Paid	State Subsidy Pending
2019-20	Assam	61.11	40.01	21.10
	Gujarat	1,573.51	714.79	858.72
	Jharkhand	212.23	-	212.23
	Madhya Pradesh	1,627.71	1,566.15	61.57
	Odisha	938.40	912.91	25.49
	Rajasthan	2,162.68	2,158.12	4.56
	Tamil Nadu	890.06	856.10	33.96
	Telangana	320.64	-	320.64
	Uttar Pradesh	469.42	450.63	18.79
2019-20	**Total**			**1,558.28**
2020-21	Assam	182.03	-	182.03
	Chhattisgarh	642.80	636.29	6.51
	Himachal Pradesh	42.89	13.92	28.97
	Kerala	38.31	26.79	11.51
	Madhya Pradesh	2,783.45	2,709.94	73.51
	Maharashtra	3,008.03	1,662.17	1,345.86
	Odisha	639.69	623.82	15.88
	Puducherry	2.23	0.98	1.26
	Rajasthan	2,822.67	2,576.14	246.53
	Tamil Nadu	1,824.24	945.23	879.01
	Tripura	4.84	2.70	2.14
	Uttar Pradesh	641.18	590.45	50.73
	Uttarakhand	65.56	47.30	18.27
2020-21	**Total**			**2,863.79**
	Grand Total			**4,744.04**

Note: *Cases of Pending State Subsidy of less than Rs.1 crore due to final reconciliation have not been reported.

National Edible Oil Mission-Oil Palm

During the year 2020-21, India imported 133.5 lakh tonnes of edible oil, out of which the share of palm oil was around 56 percent. The National Mission on Edible Oils-Oil Palm (NMEO-OP) has been launched with the aim to augment the availability of edible oil in the country by harnessing area expansion and increasing crude palm oil production with the aim to reduce the import burden. The salient features of NMEO-Oil Palm include assistance for planting material,

inputs for intercropping up to gestation period of 4 years and for maintenance, establishment of seed gardens, nurseries, micro irrigation, bore well/pumpset/water harvesting structure, vermicompost units, solar pumps, harvesting tools, custom hiring centre cum harvester groups, farmers and officers training, and for replanting of old oil palm gardens, etc.

The total approved cost of the NMEO (Oil Palm) scheme is Rs. 11,040 crores, out of which Rs. 8844 crores is central share and Rs. 2196 crores is the state share. For the year 2021-22, a total of Rs. 10422.69 lakh has been approved for various state annual action plans.

The Reassessment Committee of ICAR- Indian Institute of Oil Palm Research (IIOPR) 2020 has assessed around 28 lakh hectares potential for oil palm cultivation. While assessing the potential area, ICAR-IIOPR considered all the environmental and bio diversity parameters and recommended its cultivation in selected districts and states.

Annual edible oilseeds *viz.*, soybean, rapeseed and mustard, groundnut, sesame, sunflower, safflower and niger are also grown in the country. Potential districts for these crops have been identified on the basis of land suitability and average yield.

As per ICAR-IIOPR, oil palm requires less water compared to crops like rice, banana and sugarcane for its optimum cultivation. Under the Mission, emphasis has been given to promote micro irrigation and water conservation in oil palm for efficient water management and judicious use of water.

State-wise Potential Area Assessed by ICAR-IIOPR in 2020 in India

Sl. no.	State	Potential Area(ha)	No. of Districts
1	Andhra Pradesh	531379	10
2	Chhattisgarh	57149	15
3	Gujarat	62361	14
4	Goa	2000	
5	Karnataka	72642	15
6	Odisha	34291	17
7	Tamil Nadu	95719	17
8	Telangana	436325	27
9	Kerala	43676	8
10	Bihar	123148	35
11	Madhya Pradesh	118079	29
12	Maharashtra	162210	28
13	Uttar Pradesh	48663	9
14	West Bengal	45463	11
15	Arunachal Pradesh	133811	11
16	Andaman & Nicobar	3000	NA
17	Assam	375428	10

Sl. no.	State	Potential Area(ha)	No. of Districts
18	Manipur	66652	6
19	Meghalaya	122637	4
20	Mizoram	66792	8
21	Nagaland	51297	6
22	Tripura	146364	4
	Total	**2799086**	**284**

Production of fruits and vegetables

As reported by Food and Agriculture Organization (FAO) of the United Nations, India is the second largest producer of fruits and vegetables in the world in the year 2019.

The quantum of production of fruits and vegetables in the country during 2018-19, 2019-20 & 2020-21 (Third Advance Estimates), and the average quantum of production of these three years is as under:

PRODUCTION OF FRUITS AND VEGETABLES

(in Million tonnes)

Year	2018-19	2019-20	2020-21 (3rd Adv. Est.)	Average
Fruits	97.97	102.08	103.03	101.02
Vegetables	183.17	188.28	197.23	189.56

Source: Ministry of Agriculture and Farmers' Welfare, Govt. of India

Andhra Pradesh, Maharashtra, Uttar Pradesh, Madhya Pradesh, Gujarat, Karnataka and Tamil Nadu are the major fruits producing states, whereas Uttar Pradesh, West Bengal, Madhya Pradesh, Bihar, Gujarat, Maharashtra and Odisha are the major vegetables producing states of the country (in order of production, as per the Third Advance Estimates of 2020-21).

The Mission for Integrated Development of Horticulture (MIDH), a Centrally Sponsored Scheme is being implemented *w.e.f.* 2014-15, for holistic growth of the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew and cocoa. All states (including Assam) and UTs are covered under MIDH. The Mission envisages production and productivity improvement of horticulture crops including fruits and vegetables through various interventions. Under MIDH, assistance is provided for activities such as production of planting material, vegetable seed production, coverage of area with improved cultivars, rejuvenation of senile orchards, protected cultivation, creation of water resources, adoption of Integrated Pest Management (IPM), Integrated Nutrient Management (INM), organic farming including in-situ generation of organic inputs are taken up for development of fruits and vegetables. Capacity building of farmers and technicians is also provided for adopting improved technologies. The scheme also envisages creation of Post Harvest Management (PHM) and marketing for better price realization of produce.

Country-wise Export of Fresh Fruits from India

(Quantity in '000 tonnes)

Sl. No.	Country	2020-21	2021-22 Qty (up to September)
1	Bangladesh	270.65	55.17
2	Nepal	142.78	108.73
3	United Arab Emirates	134.92	71.49
4	Netherland	70.56	12.21
5	Iran	66.33	40.76
6	Oman	40.27	20.06
7	Saudi Arabia	32.41	10.31
8	United Kingdom	26.50	8.67
9	Russia	25.44	4.92
10	Iraq	25.07	11.22
11	Qatar	21.04	11.72
12	Afghanistan	17.05	18.42
13	Malaysia	11.57	2.05
14	Germany	9.35	1.82
15	Maldives	7.30	5.07
16	Bahrain	7.16	3.28
17	Kuwait	7.05	4.32
18	Sri Lanka	4.48	2.33
19	Canada	4.29	1.11
20	Hong Kong	3.48	1.00
21	Singapore	3.33	1.96
22	Thailand	3.29	1.06
23	Vietnam	3.16	0.94
24	Ukraine	2.63	1.06
25	United States of America	2.60	1.11
26	Turkey	2.11	0.39
27	Poland	1.87	0.57
28	China	1.71	0.67

Source: Ministry of Commerce and Industry, Govt. of India

Country-wise Export of Fresh Vegetables from India

(Quantity in '000 tonnes)

Sl. No.	Country	2020-21 Qty.	2021-22 Qty. (up to September)
1	Bangladesh	648.36	353.70
2	Nepal	448.57	286.13
3	United Arab Emirates	250.21	137.95
4	Malaysia	216.32	126.31
5	Sri Lanka	157.03	110.17
6	Saudi Arabia	84.88	28.04
7	Indonesia	82.57	36.80
8	Oman	75.73	35.51
9	Qatar	73.14	38.68
10	Kuwait	56.85	32.73
11	Singapore	30.46	15.60
12	Vietnam	29.52	11.07
13	Maldives	23.63	11.97
14	Bahrain	22.65	13.89
15	United Kingdom	20.87	11.36
16	Hong Kong	12.12	23.54
17	Russia	11.66	6.76
18	Mauritius	11.24	11.66
19	United States of America	9.06	4.07
20	Thailand	7.89	3.78
21	Philippines	7.10	3.65
22	Bhutan	7.09	6.61
23	Reunion	6.28	3.82
24	Canada	5.87	3.35
25	Iraq	4.26	0.00
26	Italy	4.12	0.25
27	Somalia	3.05	0.06
28	Australia	2.93	1.31
29	Brunei	2.78	1.74
30	Greece	2.43	0.39

Sl. No.	Country	2020-21 Qty.	2021-22 Qty. (up to September)
31	Seychelles	2.40	1.43
32	Mayotte	2.09	0.42
33	Germany	2.05	0.76
34	Spain	1.42	0.41
35	South Africa	1.18	0.23
36	Netherland	1.04	0.40
37	Japan	1.03	0.62

Source: Ministry of Commerce and Industry, Govt. of India

Export of agricultural and processed food products

In a major boost to the export prospects of agricultural produce, India registered a significant surge in export of agricultural and processed food products in April-October period of current Financial Year, 2021-22, in comparison to the corresponding seven month period of last fiscal, 2020-21.

According to the Quick Estimates released by the Directorate General of Commercial Intelligence and Statistics (DGCI&S), the overall export of Agricultural and Processed Food Products Export Development Authority (APEDA) products witnessed 14.7 percent growth during April-October 2021 over the same period of the previous year. The overall export of APEDA products increased from USD 10,157 million in April-October 2020 to USD 11,651million in April-October 2021. The significant jump in exports of agricultural and processed food products during the first seven months of current fiscal is in continuation of growth in exports witnessed in the financial year 2020-21.

The rise in export of agricultural and processed food products is because of APEDA's various initiatives taken for the export promotion of agricultural and processed food products such as organizing B2B exhibitions in different countries, exploring new potential markets through product specific and general marketing campaigns by active involvement of Indian Embassies. It has also taken several initiatives to promote products having registered geographical indications (GI) in India by organizing Virtual Buyer Seller Meets (VBSN) on agricultural and food products with UAE and on GI products, including handicrafts with USA. APEDA is continuing with the initiative of conducting VBSM with potential importing countries to popularize the GI products of major agricultural commodities exported.

INDIA'S EXPORT COMPARATIVE STATEMENT: APEDA PRODUCTS

Product Head	April-October, 2020-21		April-October, 2021-22		% Change (Apr-Oct,2021)
	Rs. (in crores)	USD (million)	Rs. (in crores)	USD (million)	USD
Fruits & Vegetables	10300.11	1374.59	11367.76	1534.05	11.6
Cereal preparations & Miscellaneous processed items	7262	972.71	9293.89	1254.71	29.0
Meat, dairy & poultry products	14748.51	1978.6	16933.47	2286.32	15.6
Rice	35753.96	4777.35	39096.62	5278.95	10.5

Product Head	April-October, 2020-21		April-October, 2021-22		% Change (Apr-Oct,2021)
	Rs. (in crores)	USD (million)	Rs. (in crores)	USD (million)	USD
Other cereals	2046.08	274.98	3773.07	509.77	85.4
Cashew	1535.23	205.29	1966.41	265.27	29.2
Oil Meals	4277.89	573.14	3867.43	522.31	-8.9
Total	75924	10157	86299	11651	14.7

Source: DGCIS, Quick Estimates for April-October, 2021

General Survey of Agriculture

Trend in Food Prices

The rate of inflation, based on monthly WPI, stood at 14.23% (provisional) for the month of November, 2021 as compared to 2.29% during the corresponding period of last year.

Based on Wholesale Price Index (WPI) (2011-12=100), WPI of pulses, vegetables, fruits and cereals increased by 2.90 percent, 3.91 percent, 15.50 percent and 3.98 percent, respectively, in November, 2021 over corresponding period of last year.

Among cereals, WPI for paddy decreased by 0.18 percent and for wheat, it increased by 10.14 percent in November, 2021 over November, 2020.

The WPI for cereals, fruits and vegetables increased by 0.87 percent, 4.36 percent and 24.51 percent, respectively, whereas for pulses, it decreased by 0.78 percent in November, 2021 over October, 2021.

Among cereals, WPI for wheat increased by 2.19 percent whereas for paddy, it remained constant in November, 2021 over October, 2021.

WPI food index (weight 24.38%)

The Food Index consisting of 'Food Articles' from Primary Articles group and 'Food Product' from Manufactured Products group have increased from 164.8 in October, 2021 to 170.4 in November, 2021. The rate of inflation based on WPI Food Index increased from 3.06% in October, 2021 to 6.70% in November, 2021.

Rainfall and Reservoir Situation, Water Storage in Major Reservoirs

Cumulative post-monsoon season (October-December), 2021 rainfall for the country as a whole during the period 1st October, 2021 to 24th November, 2021 has been 47% 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 125% in North-West India, by 63% in South Peninsula, by 7% in East & North East India and by 21% in Central India.

Out of 36 meteorological sub-divisions, 26 meteorological sub-divisions received large excess/excess rainfall, 05 meteorological sub-division received normal rainfall and 05 meteorological sub-divisions received deficient/large deficient rainfall.

Current live storage in 133 reservoirs (as on 26th November, 2021) monitored by Central Water Commission having Total Live Capacity of 172.46 BCM was 136.74 BCM as against 141.86 BCM on 26.11.2020 (last year) and 121.078 BCM of normal storage (average storage of last 10 years). Current year's storage is 96% of last year's storage and 113% of the normal storage.

During the current Rabi season 2021, (as on 26.11.2021), 346.13 lakh ha area has been sown as compared to 322.70 lakh ha during 2020-21 during the same period. A statement indicating comparative position of area coverage during the current Rabi season 2021 is given in the Annexure-I.

Annexure-I: All-India Crop Situation Rabi (2021-22) as on 26-11-2021

(in lakh ha.)

Crop Name	Normal Area for whole Rabi Season	Area sown reported			Absolute Change
		This Year 2021	% of Normal for whole season	Last Year 2020	
Wheat	303.06	138.35	45.7	133.84	4.51
Rice	42.51	7.78	18.3	7.89	-0.12

Crop Name	Normal Area for whole Rabi Season	Area sown reported			Absolute Change
		This Year 2021	% of Normal for whole season	Last Year 2020	
Jowar	31.75	17.15	54.0	18.34	-1.18
Maize	18.15	4.49	24.7	4.52	-0.04
Barley	6.14	3.92	63.7	3.57	0.35
Total Coarse Cereals	**56.05**	**25.87**	**46.2**	**26.80**	**-0.93**
Total Cereals	**401.62**	**172.00**	**42.8**	**168.53**	**3.46**
Gram	95.66	70.01	73.2	65.21	4.80
Lentil	13.90	10.94	78.7	11.07	-0.12
Peas	7.98	7.18	90.0	7.23	-0.05
Kulthi (Horse Gram)	2.00	2.26	112.6	2.87	-0.61
Urad	9.07	2.41	26.6	2.35	0.06
Moong	9.98	0.45	4.5	0.60	-0.15
Lathyrus	3.62	2.48	68.6	2.11	0.38
Others	4.44	1.80	40.5	2.58	-0.78
Total Pulses	**146.67**	**97.53**	**66.5**	**94.02**	**3.52**
Total Foodgrains	**548.29**	**269.53**	**49.2**	**262.55**	**6.98**
Rapeseed & Mustard	61.55	71.85	116.7	55.96	15.88
Groundnut	7.05	2.14	30.3	1.72	0.42
Safflower	0.90	0.43	48.0	0.33	0.10
Sunflower	1.86	0.69	37.1	0.46	0.24
Linseed	2.53	1.19	47.1	1.40	-0.21
Total Oilseeds (Nine)	**73.91**	**76.60**	**103.6**	**60.15**	**16.45**
All Crops	**622.20**	**346.13**	**55.6**	**322.70**	**23.43**

Source: AS Division, DES, DA&FW, Govt. of India.

Articles

Determinants of Access to Kisan Credit Card - A Farm Level Study of Horticulture Growers*

NOMITA P. KUMAR[1], KAVITA BALIYAN[2] AND SANDEEP KUMAR BALIYAN[3]

Abstract

The present paper examines the impact of different socio-economic indicators on the access to Kisan Credit Card (KCC) as a source of agricultural finance by the horticulture growers in the state of Uttar Pradesh. The study is confined to Uttar Pradesh and primary data has been collected from 900 households of 9 districts belonging to 9 agro-climatic zones. Logistic Regression Model has been used to analyse the socio-economic and farm characteristics that influence KCCs adaptation in the state. The study reveals that still half of the growers are unable to access KCC. Further, in terms of the amount of loan, the size of land-holding divulges the stark reality that amongst all the categories of farmers, it is the large farmers that are benefitting, and the marginal and small farmers experience the discrimination and vulnerability.

Keywords: *Agriculture credit, agro-climate, horticulture growers, farm-level.*

1. Introduction

The recent observed growth in horticulture, along with the underlying value of output from the sector, provides an edge over the food grains based agriculture sector. The higher remuneration from the sector attracts the farmers towards horticulture, especially cultivation of vegetables. This is a labour intensive job and generates a lot of employment opportunities for the rural populace. India's varied agro-climatic conditions provide an additional advantage in growing wide variety of horticultural crops such as fruits & vegetables, tuber crops, plantation crops, flowers, spices & condiments, etc. which are essential for human nutrition and help deliver nutritional security. Thus, commercial importance of horticulture crops has been gaining grounds as it has potential to raise farm income, provide livelihood security and earn foreign exchange through exports. Nevertheless, squabbling debate persists that farmers cultivating tiny pieces of land may not diversify towards these crops due to numerous constraints in production and marketing, as well as price risks associated with these crops. Besides, there are major constraints like lack of assured markets and a well-developed seed sector; lack of efficient marketing system and appropriate infrastructure which causes huge post-harvest losses (Mittal, 2007).

Researches and policies have majorly focused on macro-level data regarding the growth rate, trends and pattern of diversification (Das, 2021). This paper underlines some valid observations and highlights the importance of credit needs of horticulture farmer households and attempts to understand the underlying force among the farmers of different landholdings in utilizing KCCs.

*This paper is based on the Project "Benchmark Survey of Horticulture crops in Uttar Pradesh: Area and Production Estimation" sponsored by Directorate of Economics and Statistics, Planning Department, Govt. of Uttar Pradesh.

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1.1 Objectives of the study

1. To understand the need of credit in agriculture and also illuminate different sources of credit.

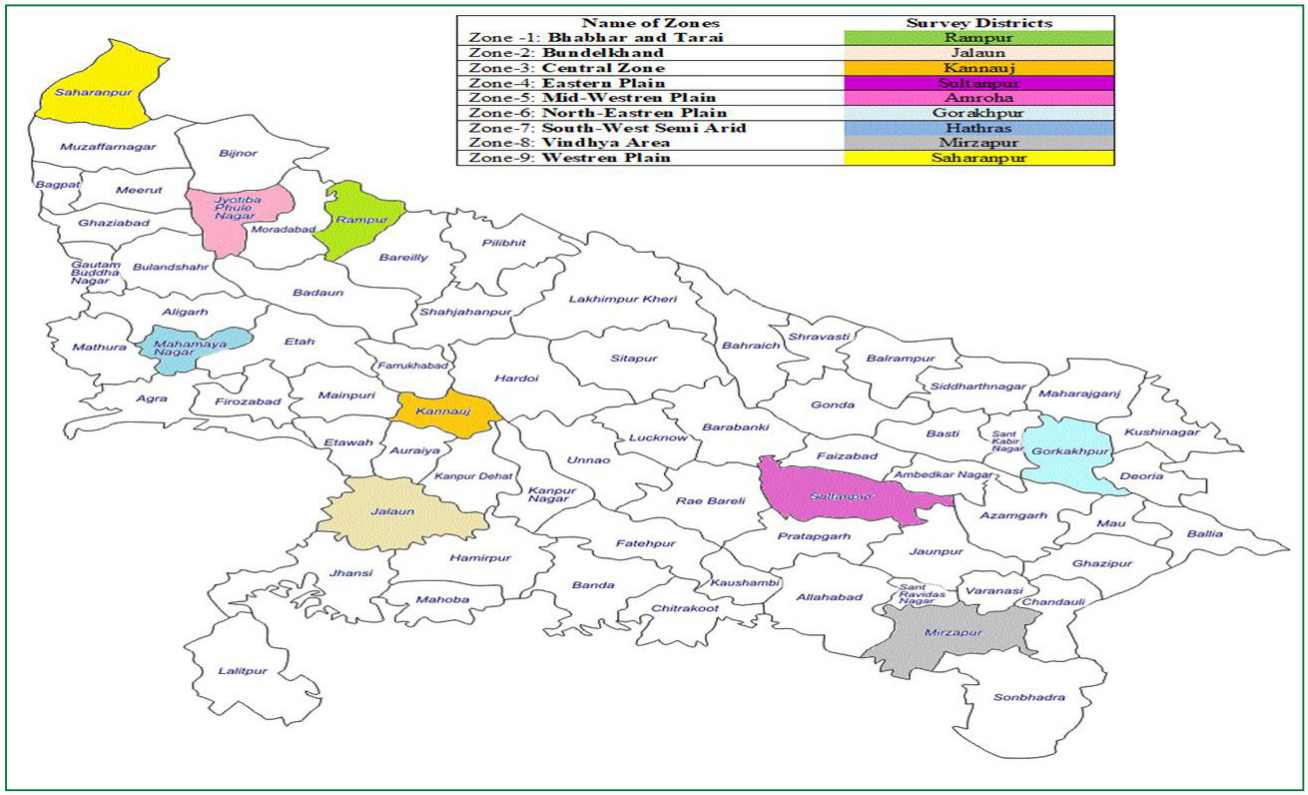
2. To study the importance of socio-economic factors in assessing KCC by horticulture growers and how it brings higher remuneration to them when compared to non-KCC holders.

3. To link horticultural cultivation to farmers' landholding size and also highlight how KCCs holders are benefitted in lieu of non-KCCs holders.

2. Data sources and methodology

The study is confined to the state of Uttar Pradesh for which the primary data has been collected to find the determinants of assessing KCC to farmers growing horticulture crops. Out of nine agro-climatic zones, one district from each zone on the basis of highest area under horticulture crops is selected for field survey. Four villages from the selected blocks in consultation with District Horticulture Officer (DHO) covering different horticulture crops *viz*., vegetables, fruits, flower and spices were selected from sampled districts for detailed study. Farmers were dichotomized on the basis of KCC beneficiaries (farmers who have taken credit under KCC scheme) and non-beneficiaries of KCC scheme, which were further divided into four groups *i.e*. marginal, small, medium and large farmers. Finally, 25 households from each village were selected who were growing different horticulture crops in land holdings of different sizes for field survey. Thus, total sample consisted of 9 districts, 22 blocks, 36 villages and 900 households.

Map 1: Uttar Pradesh Showing Selected Districts



The total households were divided into KCCs holders and non-KCCs holders and the economic indicators for horticulture crops were compared between the two groups. The economic impact of KCC scheme has been assessed by comparing the expenditure on input used under horticulture crops for KCC and non-KCC holders. Subsequently, independent two sample 't' test for testing the significant difference of expenditure between KCC and non-KCC holders has been applied. The economics of horticulture crops is also compared between use of credit by KCC beneficiaries and non-KCC farmers.

An empirical model is formulated to identify factors determining KCCs beneficiaries among farmer households. Kisan Credit Card acceptance of farmer households is considered as a dependent variable and in contrast, the factors related to socio-economic and farm characteristics *viz*., size of family, mean year of schooling of farmers, size of landholdings, per capita farm income of households, per hectare returns from crop sector, use of tractors, use of tube-wells are independent variables in the model formulation. The Logistic Regression Model analyses the socio-economic and farm characteristics that influence KCCs adaptation in the agro-climatic regions of Uttar Pradesh. The empirical model is

$$Yi = \beta o + \Sigma \beta i Xi + \mu i$$

where,

Yi is an unobserved response to increasing KCC acceptance,

Xi is a matrix of independent variables comprising socio-economic and farm characteristics,

βi is beta in regression model which shows coefficient of dependent variable and i denotes number of variable (1.....n) and

βo is the intercept and μ is the error term.

The present model has been estimated to predict the probability of the factors influencing KCC holders' acceptance.

3. Results and discussion

3.1 Need of credit in agriculture

Going by the theoretical understanding, we know that growth in agricultural production and income can be obtained via two sources *viz*., expansion of the land area under agricultural use or via utilizing existing cultivated land area more productively. Nevertheless, the possibility of expansion of land under agriculture stands replete due to high population pressure and an ever increasing demand of land for non-agricultural purposes. Accordingly, the possibility of utilizing existing cultivated land more exhaustively stands stoutly. Credit is one of the critical factors of production in farm operations. Also, credit is a powerful tool for promoting economic development thus bringing about equity and social justice.

3.2 Source of agricultural credit

Before the planning era, farmers usually relied on informal or non-institutional sources of credit *viz*., money lender, traders, relatives or friends. Not only the rates of interest were exorbitant but also the terms and conditions of the loan remained exploitative. After the nationalization of banks in 1969, the institutional credit for agriculture became the source of distribution of loans but majority of farmers were illiterate and mostly unaware about various sources of institutional provisions introduced by the government. Bringing about respite from the grasps of evil money lenders, different institutional agencies have been put forth to deliver credit to the needy farmers. This has helped in accelerating agricultural development as well as transforming traditional agriculture into modern agriculture. The institutional agencies consists of three wings: co-operatives structure, commercial banks including Regional Rural Banks (RRBs) and other institutions (Reddy, 1991).

It is well documented that total institutional credit grew fastest during 1970's and slowest during the 1990's (Mohan, 2006; Izhar & Tariq, 2009; Biradar, 2013; Anjani *et al*., 2010). The prime reason for financial unsustainability of the Rural Financing Institutions (RFIs) were stated to be

overwhelming overdues/non-performing assets, high transaction cost, low financial margins and regulated interest rates. Consequently, the RFIs failed to accumulate enough resources and were unable to mobilize speedy disbursement of credit in the rural areas (Gulati & Seema, 2002). Realizing the problems, Reserve Bank of India (RBI) constituted one man committee (Shri R.V. Gupta) in December, 1997 add in 1998 instructed all public sector banks, RRBs and co-operative banks to launch Kisan Credit Card scheme (KCCs) and which was then adopted by all (Agarwal *et al*., 2016).

This scheme aimed at delivering timely and adequate short term credit to the needy farmers in a cost effective manner by simplifying the procedure for availing loan from banks to a large extent. The KCCs thus emerged as an innovative and indispensable credit delivery mechanism (Bhatt, 2012). The number of farmers covered under KCC scheme has increased over the years but its feedback, utility and effectiveness remains a matter of discussion and research (Patel, 1999). By March 2020, about 652.8 lakh KCCs were operatives and the amount of agricultural credit outstanding against them was Rs. 697,017.6 crores at all-India level while in Uttar Pradesh, 106.49 lakh KCCs (16 percent) were operative and with Rs. 1,13,070 crores (22 percent) as outstanding amount.

3.3 Horticulture in Uttar Pradesh

In Uttar Pradesh, horticulture is one of the critical sectors in the economy. The horticulture crops are grown in around 30 lakh hectares area which accounts for 12 percent of the total cultivated area of the state (State Horticultural Mission Report, 2013). Horticulture crops incorporate wide variety of fruits, vegetables, floriculture, mushrooms, medicinal and aromatic plants, spices, etc. Uttar Pradesh is covered in 9 agro-climatic zones mainly, Bhabar and Terai, Bundelkhand, Central, Eastern plain, Mid-Western plain, North-Eastern plain, South-West semi-arid, Vindhya and Western plains. Uttar Pradesh's varied agro-climate conditions permits diversifying and horticulture has emerged as one of the major agricultural activities. There has been a substantial increase in both area and production of horticulture crops having inherent advantage of providing higher productivity per unit area of land as compared to other crops, resulting in higher income and employment generation in rural areas. It is understood that fruits and vegetables would help in procuring (earn) 20-30 times more foreign exchange per unit area than cereals due to higher yields and higher prices available in the national/ international markets (ASET, New Delhi, 2003i)

3.4 Results of farm level investigation

3.4.1 Distribution of households

Table 1 shows the distribution of sample households as per the size of landholding and ownership of Kisan Credit Card (KCC). Out of 900 sampled households, only 55 percent of households have Kisan Credit Card, which is not sufficient. This share is lower in the case of marginal land holders, about 51 percent, as against 77 percent in case of small and medium landholders. It is also surprising that out of total large farmers, some 70.6 percent are KCC holders. Perusal of Table 1 shows that the holding size has a direct relation with the coverage under KCC scheme. Overall 55.67 percent sampled farmers had KCC for their operations in horticulture cropping.

TABLE 1: DISTRIBUTION OF HOUSEHOLDS AS PER SIZE OF LAND HOLDING & KISAN CREDIT CARD (KCCs)

Size of Landholding	Marginal	Small	Medium	Large	Total
KCC holders	340	111	38	12	501
	(51.28)	(77.08)	(77.55)	(70.59)	(55.67)
Non-KCCs holders	323	33	11	5	399
	(48.72)	(22.92)	(22.45)	(29.41)	(44.33)

Source: Authors calculation based on field survey data at farm level during, 2019-2020.

Though at the macro level, the delivery of KCCs seems to be impressive, the constraints in smallholders' access to KCCs are explicitly reflected and the ground realities clearly suggest the need for paying special attention to ensure financial inclusion of the smallholders. However, the majority of KCC holders (88 percent-92 percent) are satisfied with the KCC scheme and the number did not vary much across different categories of farming households.

3.4.2 Socio-economic profile of the sampled households

Table 2 shows the district-wise distribution of sample households by caste, education, size of family, average size of holdings and per capita income of the households for both Kisan Credit Card (KCCs) and non-KCCs holders. Out of total 900 households, 73 percent households are from Other Backward Castes (OBC) and 14 percent belong to Scheduled Caste (SC). Only 13 percent growers from general category were engaged in horticulture cropping. Out of total sampled households, only around 8 percent were Muslims who were persistently engaged in cultivation of horticulture crops from last 40-50 years.

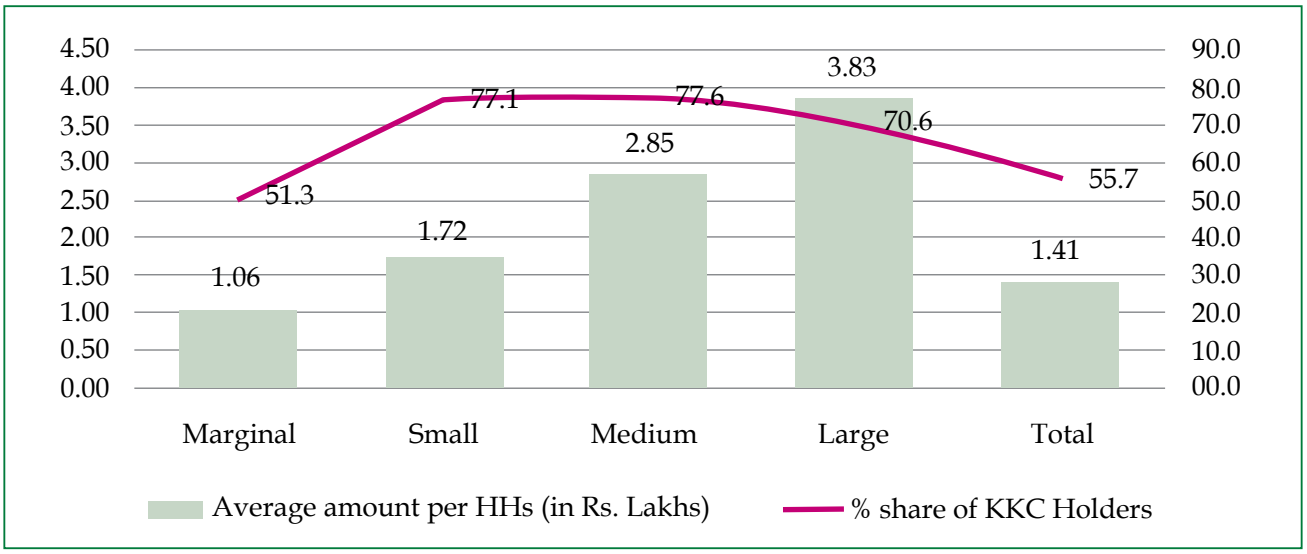
TABLE 2: SOCIO-ECONOMIC PROFILE OF RESPONDENTS (PERCENT)

Indicators		KCCs (501)	Non-KCCs (399)
Caste	General	64.6	35.4
	OBC	54.3	45.7
	SC	54.6	45.4
	Total	55.7	44.3
Level of Education	Illiterate	45.5	54.5
	Up to high school	59.7	40.3
	Above to high school	59.7	40.3
	Total	55.7	44.3
Average size of family		7.4	7.4
Average size of landholding (in hectares)		1.75	1.07
Per capita farm income (in Rs.)		**11469**	**5361**
Average farm income of per HH (in Rs.)		**84874**	**39668**

Source: Authors calculation based on field survey data at farm level during, 2019-2020.

Figure 1 elaborates the distribution of KCC holders amongst different land holding size in the sampled farms. The average amount of loan as per size of land holding divulges the stark reality that amongst all the categories of farmers, it is the large farmers who are benefitting the most with loan of Rs. 3.83 lakhs, which is highest reported, followed by medium farmers with Rs. 2.85 lakhs, small farmers with Rs. 1.72 lakhs and marginal farmers are on the last rung of the ladder with mere Rs. 1.06 lakhs. This situation reflects upon the deprivation that the marginal and small land owning farmers experience, thus making them vulnerable.

Figure 1: Percentage Share of KCCs Holders and Average Amount of Loan as per size of Land Holdings



Source: Field Survey Data at Farm Level, 2019-20

3.4.3 Cropping pattern in sampled districts

The cropping pattern (rotation) of a region depends on the soil, water availability, economic conditions and climatic factors. Table 3 shows district-wise area under various horticulture crops as percent to total Gross Cropped Area (1157 hectares). Paddy is the main kharif crop followed by wheat in rabi season. The food grains constitute nearly 49.1 percent of area, fruit crops covered about 19.3 percent of area followed by about 16.3 percent of area by vegetable crops in all the districts. It is important to note that total cash crops cover 10 percent of total gross cropped area whereas the area covered by spices, flowers and other crops is much less. This shows that food grains and fruits & vegetables dominate in selected districts as compared to flowers, spices and other crops.

TABLE 3: DISTRICT-WISE AREA UNDER DIFFERENT HORTICULTURE CROPS ON SAMPLED FARMS IN SELECTED DISTRICTS OF UTTAR PRADESH

(Area in hectares)

	Saharanpur	Gorakhpur	Sultanpur	Jalaun	Hathras	Mirzapur	Amroha	Kannauj	Rampur	Total
Food grains	105.20	48.40	64.40	84.80	49.60	86.00	46.40	25.60	58.00	568.00
	(42.8)	(51.7)	(64.1)	(45.5)	(46.5)	(63.6)	(43.6)	(42.5)	(47.0)	(49.1)
Fruits	114.40	12.40	5.20	6.80	22.40	21.20	22.40	0.00	18.00	222.80
	(46.6)	(13.4)	(5.3)	(3.6)	(21.0)	(15.7)	(21.1)	(0.0)	(14.5)	(19.3)
Vegetables	14.80	14.00	22.80	59.60	10.00	14.00	13.60	7.60	32.40	188.40
	(6.0)	(15.0)	(22.6)	(32.0)	(9.4)	(10.4)	(12.8)	(12.6)	(26.1)	(16.3)
Spices	0.08	0.16	0.80	3.32	0.48	2.32	0.16	0.60	9.36	17.28
	(0.0)	(0.2)	(0.8)	(1.8)	(0.5)	(1.7)	(0.1)	(1.0)	(7.6)	(1.5)
Flowers	0.00	0.00	0.00	7.72	0.00	5.76	0.00	9.08	0.00	22.56
	(0.0)	(0.0)	(0.0)	(4.2)	(0.0)	(4.3)	(0.0)	(14.9)	(0.0)	(1.9)

	Saharanpur	Gorakhpur	Sultanpur	Jalaun	Hathras	Mirzapur	Amroha	Kannauj	Rampur	Total
Cash Crops	8.92	16.52	6.32	20.76	23.76	1.68	19.40	17.16	3.32	117.84
	(3.6)	(17.7)	(6.3)	(11.2)	(22.4)	(1.3)	(18.3)	(28.3)	(2.7)	(10.2)
Other Crops	2.24	1.88	0.88	3.28	0.36	4.12	4.32	0.44	2.64	20.16
	(0.9)	(2.0)	(0.9)	(1.8)	(0.3)	(3.1)	(4.1)	(0.7)	(2.1)	(1.7)
Total Gross Cropped Area	**246**	**94**	**100**	**186**	**106**	**135**	**106**	**61**	**124**	**1157**
	(100)	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**

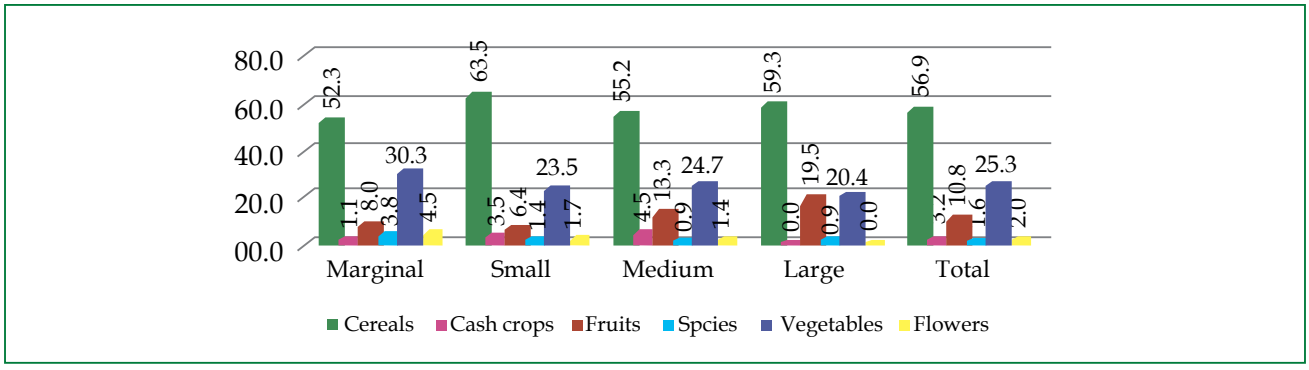
Source: Primary Survey, 2019.
Note: Figures in brackets shows percentages to total Gross Cropped Area in hectares

In Saharanpur district, out of total gross cropped area, the maximum area is covered by fruits (46.6 percent) followed by food grains (42.8 percent) This shows that Saharanpur is purely a fruit belt. It is worth noting that the area under spices crop is merely zero. Gorakhpur is producing food grains followed by cash crops, vegetables and fruit crops. In Kannauj, 28.3 percent of total area is under cash crops besides food grains. Rampur falls into vegetable belt after food grain cultivation.

3.4.4. Landholding size and cultivation of horticulture crops

As per Agricultural Census 2015-16, 86.07 percent of holdings were less than or equal to 2 ha and had an average size of 0.59 ha. In other words, the small and marginal farmers comprise nearly 82 percent of the total land holdings and account for nearly 42 percent of the land area. Figure 2 demonstrates percentage share of various horticulture crops in gross sown area by the size of land holdings. The horticulture crop growers are engaged in the production of cereals (56.9 percent) followed by vegetables (25.3 percent) and fruits (10.8 percent) at the state level. Distribution of farmers across different land holding sizes *viz.,* marginal (52.3 percent), small (63.5 percent), medium (55.2 percent) and large (59.3 percent) shows the area under cereals to be highest. This reflects the dependence of these farmers on their farms for the daily requirements of cereals and hence production of food grains leads their production potential. Where agro-climatic conditions permits production of fruits and vegetables, the farmers do indulge in the production of horticulture crops too.

Figure 2: Percentage share of different Horticulture Crops in Gross Sown Area (GSA)



Source: Field survey data at farm level, 2019-20.

3.4.5 Total cost and net return of horticulture cultivation on sample farms

In this section, the value of output of the horticultural products of KCC holders and non-KCC holders in Uttar Pradesh is analysed. The rationale behind doing this exercise is to acquaint ourselves about the benefit of acquiring KCC for agricultural operations. The perusal of Table 4 shows that the cost as well as net return was higher for beneficiaries who had Kisan Credit Cards. It indicates that the credit available to the beneficiaries was used for purchasing quality inputs for their day to day activities. Average of net returns and total cost of the beneficiaries were 42.95 percent and 10.78 percent higher than the non-beneficiaries, indicating more efficiency of beneficiaries in spending funds on purchase of inputs because of availability of credit under KCC scheme.

TABLE 4: VALUE OF NET RETURNS AND PERCENT SHARE OF SALES AND COSTS IN TOTAL OUTPUT FROM FARM-LEVEL AS PER SIZE OF LAND HOLDINGS (AGRICULTURE & HORTICULTURE)

(Rs. per hectare)

Size of Land holding	KCCs		Non-KCCs		Total	
	Net Returns	Cost-Output Ratio	Net Returns	Cost-Output Ratio	Net Returns	Cost-Output Ratio
Landless	..	..	40051	36.6	44033	36.6
Marginal	51646	46.6	47365	47.7	49684	47.1
Small	58595	46.6	62511	39.1	59430	45.1
Medium	139315	28.3	66936	46.6	122321	31.3
Large	95312	35.5	28067	41.4	76398	36.2
Total	**72096**	**60.6**	**50432**	**54.7**	**67740**	**58.9**

Source: Authors calculation based on field survey data at farm level during, 2019-2020.

The cost and return analysis reveal that the cost of cultivation per hectare, and gross return and net return for horticulture crops was higher for beneficiary farmers due to application of highest amount of input facilities by the borrowed money. It is very true that the KCC scheme has facilitated the availability of credit on time and has simplified the procedure for availing loan from banks to a large extent (Nahatkar *et al*., 2002). It is due to Kisan Credit Card that hassle free access to institutional loans is possible to farmers. Such financing has helped farmers to obtain increasing productivity of their crops as compared to the corresponding yield of non-KCC holders. Adequate application of comparatively higher doses of inputs like fertilizers, manure, pesticide, labour, irrigation waters, etc. by KCC farmers are contributing factors for improvement of yield level (Patra, 2012).

TABLE 5: VALUE OF NET RETURNS AND PERCENT SHARE OF SALES AND COSTS IN TOTAL OUTPUT FROM FARM-LEVEL (AGRICULTURE & HORTICULTURE)

(Rs. per hectare)

District	KCCs		Non-KCCs		Total	
	Net Returns	Percent share of net returns in gross output	Net returns	Percent share of net returns in gross output	Net returns	Percent share of net returns in gross output
Saharanpur	116873	61.6	93486	57.7	107192	64.6
Gorakhpur	153644	62.4	20703	33.5	69690	58.2
Sultanpur	29580	51.8	39739	46.8	15846	51.7

District	KCCs		Non-KCCs		Total	
	Net Returns	Percent share of net returns in gross output	Net returns	Percent share of net returns in gross output	Net returns	Percent share of net returns in gross output
Jalaun	54946	56.1	49382	56.6	53203	56.2
Hathras	60658	49.5	70084	57.9	62090	51.6
Mirzapur	27001	58.8	31783	61.5	29975	60.5
Amroha	69975	59.1	63985	60.6	68924	59.4
Kannauj	74189	56.5	86398	58.1	79651	57.2
Rampur	58261	56.2	54898	55.7	56992	55.5
Total	72096	60.6	50432	54.7	67740	58.9

Source: Authors calculation based on field survey data at farm level during, 2019-2020.

The socio-economic characteristics of KCC and non-KCC farmers and significant differences are presented in Table 6. The educational level of KCC and non-KCC holder farmers was found to differ significantly, like KCC farmers were educated till 8 years of mean education and non-KCC had 6.64 years of mean education. The average sizes of families among KCC and non-KCC farmers were 5.16 and 5.14, respectively. The farm size and household income showed significant difference between KCC and non-KCC farmers which was 43.90 and 28.58, respectively. On the other hand, per hectare returns also showed significant difference between KCC and non-KCC farmers.

TABLE 6: DESCRIPTIVE STATISTICS OF SELECTED VARIABLES OF SAMPLE HOUSEHOLD

Parameters	Farmer KCCs (N= 501)		Farmer non-KCCs (N = 399)		Mean difference	t-test	Significance level
	Mean	Std. Deviation	Mean	Std. Deviation			
Education (in years)	8.00	5.25	6.64	5.55	1.36	3.74	***
Family size (Numbers)	5.16	1.98	5.14	2.04	0.02	0.11	NS
Farm size (Ha)	1.90	1.91	1.17	1.37	0.73	6.68	***
Per capita farm income (in Rs.)	43.90	70.896	28.58	28.502	15	4.41	***
Per hectare returns	62.43	72.450	41.91	48.940	21	5.06	***
Use of tractor	0.33	0.47	0.11	0.31	0.22	8.54	***
Use of tube-well	0.36	0.48	0.13	0.34	0.22	8.20	***

Source: Authors calculation based on field survey data at farm level during, 2019-2020.

Note: *** Significant at 1 percent level. NS – Not significant

The average farm income per farmer as well as per acre of KCC holders was compared with that of non-KCC farmers in order to arrive at the gain accrued from KCC financing. The farm income per household and per acre in case of KCC farmers was estimated at Rs. 43.90 per farmer which translated into Rs. 62.43 per acre on the KCC sample farms. The farm income per household and per acre in case of non-KCC farmers was estimated at Rs. 28.58 per farmer which translated into Rs. 41.91 per acre on the KCC sample farms.

TABLE 7: RESULTS OF LOGISTIC REGRESSION

Number of obs. = 900						
LR $chi^2(6)$ = 148.8						
Prob > chi^2 = 0.000						
Pseudo R^2 = 0.605						
Log likelihood = -54.63						
Dependent Variables = Household who has KCCs and non-KCCs Farmers						
Independent variables	**Coefficient**	**Std. Err.**	**z**	**P>|z|**	**[95 percent Confidence Interval]**	
Education level	0.049	0.034	1.430	0.153	-0.018	0.117
Use of tractor (YES)	0.728***	0.277	2.630	0.009	0.185	1.272
Use of tube-well (YES)	0.490**	0.223	2.200	0.028	0.054	0.927
Per capita farm income (in Rs.)	0.000***	0.000	2.350	0.019	0.000	0.000
Operational holdings (in hectare)	0.213**	0.102	2.090	0.037	0.013	0.413
Size of family (No.)	-0.048	0.039	-1.230	0.218	-0.125	0.029
Per hectare returns (in Rs.)	0.000***	0.000	6.640	0.000	0.000	0.000
Constant	-1.321***	0.212	-6.230	0.000	-1.737	-0.905

Source: Authors' calculation estimated from field survey data at farm level during, 2019-2020.
Note: *** Significant at 1 percent level. ** Significant at 5 percent level. Since logistic regression is used, the dependent variable is binary in nature (1 = KCC HHs and 0 = Non-KCC HHs)

3.4.6 Logistic model regression result

An empirical model has been formulated to identify KCC and non-KCC holders among the farmer households and what determines a farmer to own KCC option for facilitating their agricultural ventures. KCC farmer households is considered as a dependent variable whereas the independent variables were listed as factors related to socio-economic and farm characteristics *viz*., size of family, educational level of farmers, size of operational landholdings, per capita farm income, per hectare returns, use of tractor, use of tube well by the farmer's households. The results of the estimated parameters of the Logistic model at farm level are presented in Table 7. From the results of Logistic regression model, it is found that the adaptation of KCC holders is positively and statistically significantly influenced by education level (year of schooling of farmers), per capita farm income of farmer households, size of operational holdings, per hectare returns, use of tractor and use of tube wells. In contrast, the farmers' family size had negative but significant impact. The pseudo R value was found around 0.605, which implies that these explanatory variables explained at least 60 percent of KCC holders. The value of likelihood ratio test statistics was 54.63, which $\chi 2$ indicated that the explanatory variables used for predicting the KCC explained a fairly good-fit in the model. It is quite clear that farm size, per capita and per hectare income and use of tractor and use of tube wells are the main determinants. Further, level of education also positively affects KCC holders in Uttar Pradesh.

4. Conclusions and suggestions

The agricultural performance depends on factors of production and agricultural credit is one of them. The performance of institutional credit to agriculture and the determinants of institutional agricultural credit use at households' level have been analyzed in this study. The disbursement of credit and the source of credit deliverables to farming households have been found to be affected by a number of socio-demographic factors. The effect of education brings out the need for capacity building for farmers who want to borrow. Borrowers' needs training regarding procedural formalities to be conducted in financial institutions which could increase their access to institutional credit. Further, it is desirable that procedures for loan disbursement could be simplified so as to remove all hindrances for the less educated and illiterate households in accessing institutional financing agencies for credit. KCC scheme is no doubt an important umbrella policy initiative of the Government of India providing protection to the farmers from the clutches of private money lenders. If implemented in right perspective, it can contribute in the improvement of the rural economy through agricultural development in particular and the State economy in general.

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An Empirical Analysis of the Dynamics of Cocoa Cultivation in India

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Abstract

The study analyses the cocoa cultivation scenario in India, using secondary data for a period of 22 years from 1998-2020. An attempt has been made to evaluate the current performance of cocoa in terms of growth rate in area, production and productivity. The study revealed that there has been an increase in area (10.69 percent), production (6.84 percent) and productivity (0.94 percent) in terms of CAGR. Effort has been made to bring out the interstate variability in production of cocoa. The study employs linear supply response function to find out the past year price, previous year acreage and 4 year average price which have significant influence on the current acreage of the crop. Price instability has been calculated using the Cuddy Della Valle Instability index, giving a result of 20.028, indicating medium instability in domestic cocoa prices. Challenges faced by cocoa growers in India along with suggestions for improvement are included in the study.

Keywords: *Cocoa, price instability, supply response function, Cuddy Della Valle Instability index*

1. Introduction

Being a native of the Amazon Basin, Theobroma Cacao L., is one prospective crop that can offer a profitable yield to Indian farmers, if cultivated on scientific lines. The world cocoa economy currently dominated by the African economies, which account for more than 75 percent of the global cocoa supply, is facing a huge demand supply mismatch and is on the verge of an imminent cocoa shortage. India being endowed with the most congenial climate for the production of the crop has not been able to profitably tap the huge potential that "the chocolate tree"holds for its farmers. The abundant perennial gardens of coconut, oil palm and arecanut in India provide ample interspace for the growth and cultivation of cocoa plants which require only 40-50% of sunlight penetration.

Apart from global demand, clear indications of a steady rising demand for cocoa is expected to come from India's domestic chocolate market, which is characterised by rising growth rate in per capita chocolate consumption. India's per capita chocolate consumption is very miniscule (0.17 kg) when compared with other developed nations of the world like UK (8.61 kg), Germany (8.26 kg), Switzerland (8.59 kg), Russia (6.68 kg) and Austria (5.37 kg)[1]. The retail sale of chocolate products across India amounted to approximately 1.8 billion U.S. dollars in 2018, up from around 1.6 billion dollars in the year 2016 and the analysts estimate the figures to only grow over the next years[2]. India's real chocolate market is projected to grow at a CAGR of 19 percent until 2023[3].

Cocoa was introduced as an experimental crop in Kerala in the 1960's and thereafter owes its spread to the commercialisation strategy of Cadbury India. The rapid spread of the crop continued until the 1980s. A sudden drop in cocoa prices thereafter, and the sudden withdrawal of Cadbury from the bean procurement market made the desperate farmers of the country to cut down the tree on a massive scale. Though CAMPCO

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[1]Economic Times, May 21, 2017
[2]www.statista.com
[3]TechSci Research report, titled India Real Chocolate Market By Type, By End User, Competition, Forecast and Opportunities, 2013–2023
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came into existence in the 1990's to provide relief to the farmers, but the services rendered were far below the requirements. The four southern states of Andhra Pradesh, Kerala, Karnataka and Tamil Nadu currently dominate the cocoa cultivation scenario, with Andhra Pradesh leading the list in terms of area, production and productivity, closely followed by Kerala.

Cocoa has a significant commercial role as it is the primary raw material for confectioneries, beverages, chocolates and other edible products. It supports agro-based industrial sector of the country. However cocoa does not act as a major source of export earnings since majority of cocoa produced is consumed domestically[4]. India imports 85,276 MT of cocoa, which is valued at Rs. 1,833.974 crores and exports 28,259 MT, valued at Rs. 1,274.34 crores.

1.1 Objectives of the study

1. The study analyses area, production, and productivity of cocoa in India from 1998-2020.

2. Study inter-state variability in cocoa cultivation.

3. To study price instability in cocoa.

2. Materials and methods

Secondary data sourced from the DCCD-Directorate of Cashewnut and Cocoa Development, Ministry of Agriculture and Farmers' Welfare, Government of India and ICAR-Central Plantation Crops Research Institute, Kasaragod are used for analysis. Newspaper reports, publications and forecasts of various governmental and private agencies are also used for the study. Descriptive statistics like ratios and percentages, mean and trend are employed in the analysis of data.

(i) **Compound Annual Growth Rate (CAGR) analysis**

Compound Annual Growth rate analysis is carried out to determine the growth rate in area, production and productivity. Exponential growth function is of the form:

$$Y = a\, b^t\, e_t$$

where,

Y = cocoa area, production, productivity

unit value t = time variable

e_t = error term

'a' and 'b' are unknown constants to be estimated.

The unknown constants 'a' and 'b' were found by applying methods of least squares by transforming the equation into logarithmic form

$$\log Y = \log a + t \log b$$

Compound growth rate 'r' = [Antilog of (log b) – 1] × 100

(ii) **Linear Supply Response Function**

Responsiveness of area (acreage) under the crop to changes in prices of lagged year (long run supply response function) is estimated using the Nerlovian Partial Adjustment Mechanism. The functional form is: $\mathbf{A_t = f\ (P_{t-1}, A_{t-1}, P_{t4ma})}$ where,

A_t = Current year area under cocoa cultivation

A_{t-1} = Lagged year area under the crop

P_{t-1} = Lagged year price of the crop

P_{t4ma} = 4 year moving average of price of cocoa

(iii) **Price Instability Index (Cuddy Della Valle Index)**

Cuddy Della Valle Instability Index is used to analyse the instability in domestic prices. It is a modification of coefficient of

[4]dccd.gov.in

variation to accommodate trend present in the data, a feature of economic time series data. This method is superior over the scale dependent measures such as standard deviation. The Cuddy Della Valle Index (CDVI) is calculated as follows:

$$CDVI = CV \sqrt{X}$$

where,

$$X = 1 - \bar{R}^2,$$

CV is coefficient of variation, and $\bar{R}^2$ is adjusted coefficient of determination.

The ranges of CDVI are given as follows:

Low instability = between 0 and 15

Medium instability = greater than 15 and lower than 30

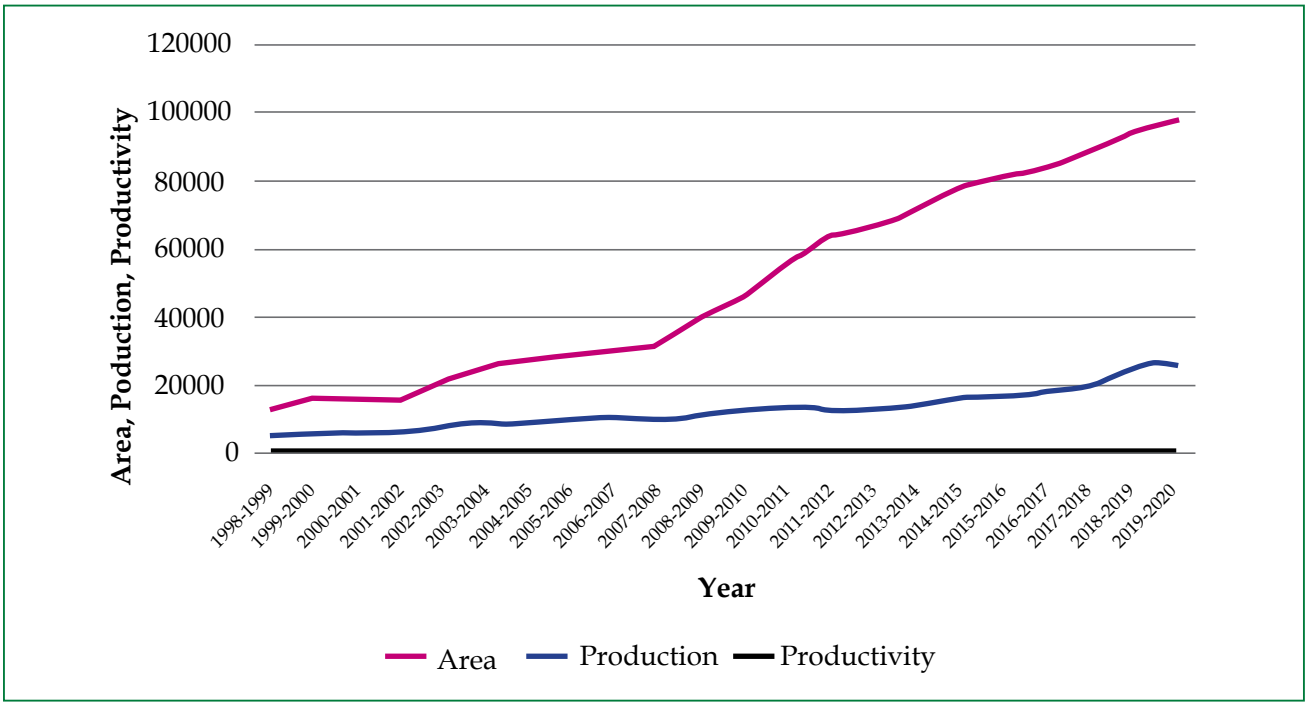
High instability = greater than 30

3. Results and discussion

3.1. Area, production and productivity of cocoa

An analysis of area under cocoa cultivation in India has shown an increasing trend. The current area under cultivation in India spans over 97,563 hectares. The CAGR of area under cocoa cultivation for a period of 22 years from 1998-99, is 10.69 percent. Domestic yield and productivity have also exhibited a rising trend, but not up to the rising demand. CAGR of production has recorded a growth rate of 6.84 percent over the analysis period. The country's current production of 25,783 MT, is far below the requirements. Productivity has clambered up with a mere CAGR of 0.94 percent during the period, indicating the failure of research institutions and governmental mechanisms to reach out to farmers. Average productivity of cocoa in India is 669 kg/ha as of 2019-20.

Figure 1. Area, Production and Productivity of Cocoa Cultivation in India from 1998-2020



Source: DCCD, Ministry of Agriculture and Farmers' Welfare, Government of India, Kochi, 2020

3.2. Interstate variability in cocoa cultivation

Cocoa cultivation in India is dominated by the four southern states of Andhra Pradesh, Kerala, Karnataka and Tamil Nadu. The states of Kerala and Andhra Pradesh have been the lead producers of cocoa in the country. Kerala remained to be the largest producer of cocoa till 2014. However after 2014, Andhra Pradesh became the leading cocoa producing state in the country with marked improvements in terms of production, productivity and area. This commendable result can be attributed to the concentrated efforts of the Andhra Government in promoting cocoa cultivation of the state. The states cocoa acreage which stood at a mere 670 ha as on 1998-99 reached 36,455 ha in 2019-20, with laudable progress made in yield, which increased from 150 MT to 10,384 MT over the same period. The state's productivity is also the highest at 950 kg/ha when compared with the national average of 669 kg/ha. Currently attempts are being made to promote cocoa cultivation in other regions of the country, especially the North-Eastern tract.

TABLE 1: STATE-WISE AREA, PRODUCTION & PRODUCTIVITY OF COCOA IN INDIA (2019-20)

State	Area (Ha)	Production (MT)	Productivity (Kg/Ha)
Kerala	16894	9188	850
Karnataka	14134	3542	525
Tamil Nadu	30080	2669	350
Andhra Pradesh	36455	10384	950
Total	**97563**	**25783**	**669**

Source: DCCD, Ministry of Agriculture and Farmers' Welfare, Government of India, 2020

Out of the total area under cocoa cultivation in India, close to 68 percent of area falls in the two southern states of Andhra Pradesh and Tamil Nadu while Kerala and Karnataka account for 17 percent and 15 percent of land area under cocoa cultivation, respectively. Highest productivity is noted in the states of Andhra Pradesh and Kerala, and together they account for a major share in the crop production (more than 75 percent). Efforts are to be made on a massive scale to promote the area under cocoa cultivation in states with high productivity. This could help ease the demand side pressure on cocoa. Bringing more states with congenial climatic conditions can also boost the supply side dynamics of cocoa, along with the augmentation of farmers' income.

3.3. Supply response of cocoa cultivation in India

The supply response of cocoa has been observed to be significantly affected by the past year price and acreage. The analysis of data on prices and area of cocoa for a twenty year period shows that the current year acreage is influenced by lagged year price and lagged year area under the crop. Since cocoa has a 4 year gestation period, the average of previous 4 year price is also tested and is found to have significant influence on the current acreage of the crop.

TABLE 2: REGRESSION RESULTS ON SUPPLY RESPONSE OF COCOA IN INDIA

Equation	Dependent Variable	Intercept (constant)	Independent Variables			R^2	Adjusted R^2	F-Ratio
			P_{t-1}	A_{t-1}	P_{t4ma}			
1	A_t	−2030.10 (−0.392)	422.485 (10.97)***			0.869	0.862	120.269

Equation	Dependent Variable	Intercept (constant)	Independent Variables			R^2	Adjusted R^2	F-Ratio
			P_{t-1}	A_{t-1}	P_{t4ma}			
2	A_t	1533.38 (1.113)	41.278 (1.563)	0.946 (15.63)***		0.992	0.990	994.567
3	A_t	91.579 (0.027)			115.480 (17.65)***	0.954	0.950	311.514
4	A_t	3672.21 (2.065)*		0.972 (6.761)***	4.821 (0.288)	0.989	0.987	642.868

Notes: 1. Figures in parentheses indicate t-statistic value
2. *, ***: Significant at 10% and 1% levels, respectively
3. Computed from figures on area and price for a period of 20 years (2000-2019)-DCCD

The regression results of the linear acreage response function show that the regression coefficient of the lagged price is significantly positive and is significant even at 1% level, with p value less than 0.0001. The R^2 and adjusted R^2 are 0.869 and 0.862, respectively, indicating that a high percentage of the response variable variation is explained by the linear model with lagged price as the explanatory variable. The 4 year average price (p value <0.0001) is also proved to be a significant factor affecting acreage, with R^2 and Adjusted R^2 values of 0.954 and 0.950, respectively. The multiple regression results show that the area under the crop in lagged year has a considerable positive effect on acreage. The coefficients obtained for lagged year area is positive and was found significant even at 1 percent level.

3.4. Price instability

Price instability continues to be a bane for most agricultural crops in India. Domestic prices of cocoa for a twenty year period (2000-2019) were examined to bring out the variability. The price data for the period exhibited a mean value of Rs. 127.51, with minimum and maximum price levels touching Rs. 54 and Rs. 225, respectively. Standard deviation of the data set was found to be 60.879, with Coefficient of Variation of 0.47746.

TABLE 3: SUMMARY STATISTICS OF DOMESTIC PRICE SERIES OF COCOA IN INDIA: 2000 -2019

Statistic	Value
Mean	127.51
Median	126.50
Minimum	54.00
Maximum	225.00
Standard deviation	60.879
C.V.	0.47746
Skewness	0.22592

Source: Computed from DCCD data

Price Instability Index was calculated using the Cuddy Della Valle Instability. It is a modification of coefficient of variation and is more reliable than scale dependent measures such as the standard deviation. The Cuddy Della Valle Index (CDVI) is calculated using the data on domestic price series of cocoa in India from 2000-2019 as follows:

$$CDVI = CV \sqrt{X} \text{ where, } X = (1\text{-adjusted } R^2).$$

TABLE 4: PRICE INSTABILITY INDEX

Adjusted R^2	CV	CDVI	Range
0.824	47.74	20.028	Medium instability

Source: Computed from DCCD data on domestic prices from 2000-2019

A CDVI value of 20.028 from the analysis refers to the presence of medium instability in domestic prices over the past two decades. It is an important factor that adversely affect cocoa cultivation in India. Price instability is a major hindrance preventing more farmers to take up cocoa cultivation. The area under cocoa cultivation is found to be significantly affected by the variations in prices. The domestic cocoa price variations, if smoothened out through apt policy interventions can help a long way in enhancing cocoa acreage in the country.

4. Challenges

Low profitability continues to be a pestering problem in cocoa cultivation. High input costs and shortage of skilled labour are the twin factors that diminish farmers' profits. When low profitability gets coupled with price instability, farmers feel discouraged to take up cocoa cultivation on large scale. Hence, many farmers assign only subsidiary role to cocoa cultivation and this acts as a major hindrance in increasing cocoa yields and acreage. Fragmented land holdings also take away the benefits of large scale cultivation. Pest and rodent attacks along with incidence of diseases like the black pod also results in the shrinkage of profit margins.

Cocoa is a crop whose yield is very much dependent upon continuous irrigation. India is largely a monsoon fed country and monsoon vagaries along with inadequate sources of irrigation act as a major impediment in increasing the acreage of cocoa. Inadequate yield can also be attributed to the ignorance of farmers about the advantages of using hybrid and clonal varieties, which are high yielding and disease resistant. Presence of other competing crops also pulls back cocoa from coming to the mainstream cultivation. Early plant care and post-harvest operations like fermenting and drying is very vital in enhancing the final flavour of cocoa. The erratic climatic conditions prevalent, along with insufficient storage facility, is sure to adversely affect the quality of the bean, which in turn impact farmers' profits.

Like any other agricultural crop, inadequate credit facilities and lack of crop insurance schemes provides breeding ground for intermediary exploitation in cocoa sector too. Lack of farm gate procurement facilities and inadequate storage facilities add to the problem of farmers getting exploited. Farmers' collectives are rarely seen in rural interiors and this results in lack of knowledge on the part of cocoa farmers on the correct price level for their produce. Marketing channels have to be smoothened out of all anomalies including intermediary exploitation for the farmers to obtain a better bargaining position in the cocoa value chain.

5. Conclusion

The data analysed shows marked improvements in cocoa cultivation in India as indicated by the positive growth rates in area, production and productivity. However, this increase is not keeping pace with the rising global and domestic demand. Enhancing cocoa productivity is of utmost importance. Smoothing out variability in domestic cocoa prices can help boost farmers' confidence in the cultivation of the crop. Appropriate demand analysis along with focus on quality is sure to place India as leader in the Asian cocoa market, which is now dominated by Indonesia and Malaysia. India can efficiently capitalise on the decline in production of cocoa in these South-East Asian economies owing to the popularity of oil palm cultivation there, to become the lead producer and exporter of the crop.

6. Policy suggestions

1. Quality enhancement along with new approaches towards marketing and certification can lead the future development of India's cocoa sector. Quality enhancement should begin at the seedling selection stage itself and should continue throughout the stages of early plant care, fermenting and drying of the bean. 'Single origin chocolates' are popular and if India can standardise its production, cultivation, post-harvest operations and packaging, then branding of Indian cocoa is a possibility and this

can create a better market for the Indian bean. Obtaining Fairtrade certification, though comes at a cost, can help Indian farmers enhance the global visibility for their produce, apart from augmenting their incomes. Certification helps in integrating our cultivation with quality international cocoa growing practices and in ensuring equality of women farmers who very often form vital yet unnoticeable part in the Indian agricultural scenario. By adhering to sustainable agricultural practices, certification also takes care of the environmental aspects in cocoa cultivation.

2. India, endowed with congenial climate for the tree, can efficiently improve upon its acreage and productivity through concentrated efforts from the part of government, chocolate manufacturing companies and farmers. National Horticulture Mission of the Central Government has undertaken the mission to improve the area under cocoa cultivation in India. More such endeavours are required to make India a global leader in the world cocoa market.

3. Government may look into the prospects of fixing floor level price for cocoa to promote cocoa cultivation in the context of massive cocoa imports. Provision of subsidies can help farmers to a great extend in meeting the rising cost of cocoa cultivation due to the high input and labour costs involved.

4. Localised bean collection and processing units will save farmers from intermediary exploitation. Installation of government procurement facilities in high cocoa yield generating areas can also help in this regard. Facilitating crop insurance and cheap and easy credit will also aid in enhancing farmers' confidence in cocoa cultivation.

5. Research institutes can contribute a lot towards solving the challenges faced by cocoa farmers through the dissemination of new knowledge emerging from their trials. Extension activities like distribution of high yielding clonal varieties and hybrids, regular training sessions and field visits will impart scientific farming practices to cocoa growers. Measures to address the challenges faced by domestic growers need to be addressed through apt policy formulation and implementation. Introducing scientific farming practices and promoting research and extension services in the sector by research institutes and governmental agencies will aid India's cocoa sector.

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Agro-Economic Research

Improving Water Use Efficiency in India's Agriculture: Impact, Benefits and Challenges of Micro Irrigation under PMKSY-PDMC in Madhya Pradesh

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1. Introduction

Water is considered to be a scarce resource in Indian agriculture. It is the largest water user, consuming about 83% of the total available water. Increasing demand for industrial and domestic water will result in reduction in water diversion to agriculture (Bhowmik *et al*., 2018). The surface methods of irrigation causes uneven distribution of water, water loss in the form of seepage and deep percolation, promotes excessive weed growth besides creating salinization, water logging and thus affecting the land and crop productivity (Shankar *et al*., 2015). In India, both surface and ground water are dependent on monsoon. More than 85% of the water used for irrigation is groundwater. Thus, agriculture irrigated by surface water and groundwater suffers from the vagaries of monsoon. In the world, India has the second largest net irrigated area after China. The irrigation efficiency under canal irrigation is not more than 40% and for ground water schemes, it is 69%. The net irrigated area in the country is about 61 Mha, which is about 43% of the total sown area (Ashoka *et al*., 2015). It is reported that in the next three decades, the global food systems will need 40-50 percent more fresh water than what is required today. Municipal and industrial demand for water will increase by 50-70 percent during this period, while demand for energy sector will increase by 85 percent. India faces high water stress and is amongst those countries with the most fragile and uncertain water resources in the world (Tripathi *et al*., 2019). It is projected that by 2020-25, availability of water for agricultural use in India may be reduced by 21%, resulting to reduction in productivity of irrigated crops thereby production, especially rice, thus resulting in price rise and non-accessibility of food for poor masses.

Irrigation is a major determinant of agricultural productivity. Indian agriculture has been constrained by limited irrigation with only about 40% of arable land under irrigation and the remaining 60% dependent on rainfall. The irrigation and rainfed cultivation cleavage is a major influence on agricultural productivity, earning opportunities, and welfare of the rural population (CAPE India, 2016). To cater to the alarming rise in population, efficient use of available irrigation water is essential for increasing the agricultural productivity. The only solution will be enhancing the micro irrigation facilitates for Indian agriculture.

Micro irrigation refers to the slow application of water on, above or below the soil by surface drip, subsurface drip, bubbler and micro-sprinkler systems. Water is applied as discrete or continuous drips, tiny streams, or miniature spray through emitters or applicators placed along a water delivery line adjacent to the plant row (Rao and Anitha, 2015). Micro irrigation has proved to be an efficient method in water saving. The projected additional returns from saved water should be considered as compared to conventional surface method of irrigation. It is necessary to further evaluate and confirm the best system for local producers that will result in the highest profits so that repayment of irrigation investment loans can be achieved (Suryavanshi and Buttar, 2016).

The Ministry of Agriculture and Farmers' Welfare, Government of India, launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) to

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address India's key agricultural challenges in the 21st century *i.e.,* to reduce poverty and ensure food security for the growing population in the face of climate change, scarce and limited water and land resources. This initiative proposes to provide irrigation to every farm in the country (Har Khet Ko Pani) and improve water use efficiency (Per Drop More Crop and income). It aims to bring together various schemes and programmes for water harvesting, conservation and efficient management in order to ensure enough water for agriculture (Anonymous, 2016).

PMKSY has been formulated to promote micro irrigation facilities at farmer's field by amalgamating ongoing schemes *viz*., Accelerated Irrigation Benefit Programme (AIBP) of the Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD&GR), Integrated Watershed Development Programme (IWMP) of Department of Land Resources (DoLR) and On Farm Water Management (OFWM) of Department of Agriculture and Cooperation (DAC).

The Per Drop More Crop component of PMKSY mainly focuses on water use efficiency at farm level through precision/micro irrigation (drip and sprinkler). An area of 690 Mha is proposed to be brought under micro irrigation in India for achieving the target of "Har Khet Ko Paani." But the scheme looks to have hit the roadblock due to poor response to such initiatives from small and marginal farmers, who constitute majority of workforce in agriculture (Spehia and Verma, 2019).

At present, area under micro irrigation is only 11.41 million hectares which is dismal when compared to area under rainfed in India. The major states having area under micro irrigation are Rajasthan (21.80%), Maharashtra (16.45%), Andhra Pradesh (15.05%), Karnataka (10.96%), Gujarat (10.73%), Haryana (7.42%), Madhya Pradesh (4.56%), Tamil Nadu (4.15%), Chattisgarh (3.12%), Bihar (1.32%) and Rest of India (4.25%).

During the period 2015-16 to 2019-20, the micro irrigated area under PMKSY increased from 0.55 Mha to 1.18 Mha, out of which, the area under drip and sprinkler increased from 0.35 Mha to 0.63 Mha and 0.20 Mha to 0.56 Mha, respectively. In Madhya Pradesh, micro irrigated area under PMKSY is found to be 0.21 Mha with 0.15 Mha and 0.06 Mha under drip and sprinkler irrigation, respectively, for the period 2015-20.

1.1 Objectives of study

The study has been conducted with the following objectives:

1. To examine the savings of various inputs such as water, fertilizers, power, pesticides and labour.

2. To examine the enhancement of productivity, quality and other benefits in selected agricultural horticulture crops.

3. To examine the adoption of MI including some or its determinants/features such as need/importance of subsidy, culture of water conservation, issues of fragmented land holdings, capital cost, maintenance cost and the distribution of subsidy across states.

4. To study overall impact of MI on farmer's income.

5. To identify any issues/problems in the benefit transfer work flow and monitoring by the implementing agency.

2. Data sources and methodology

Both primary and secondary data were used in the study. The primary data for the agriculture year 2019-20 were collected from the adopter and non-adopter farmers of micro irrigation on various aspects. The secondary data were collected from PMKSY website (https://pmksy.gov.in/), officers of the Farmer Welfare and Agriculture Development Department, Madhya Pradesh and Commissioner Land Record & Settlement, Government of Madhya Pradesh for the period from 2015 to 2018.

A multi-stage stratified random sampling method is used for selection of districts, blocks,

villages and respondents. In the first stage, districts were selected based on higher irrigated area under different systems of micro irrigation. Among all the districts of Madhya Pradesh, Dhar district (5792 ha.) was selected for drip irrigation system and Sagar district (856 ha.) for sprinkler irrigation system. In the second stage, two blocks having maximum area under micro irrigation, namely Badnawar and Manawar, were selected in Dhar district and Khurai and Deori blocks were selected from Sagar district. In third stage, 3 villages in each selected block were selected randomly from the list of micro irrigation villages. In the fourth stage, a list of all the adopters and non-adopters in the selected villages was prepared and out of which, 8 adopters and 2 non-adopters from each village were selected. Thus a total of 120 farmers constituting 96 adopters and 24 non-adopters from both districts (48 adopters and 12 non-adopters from each district) were selected for the study.

The selection of crops was done on the basis of one having higher area under micro irrigation. Hence chilli & ginger under drip system and wheat crop under sprinkler system have been selected for the study.

3. Results and discussion

The initial investment in micro irrigation; annual maintenance cost; cropping pattern with micro irrigation; change in area and yield; changes in production, income, input and cost of cultivation; and determinants affecting the adoption of micro-irrigation have been analysed in the study.

3.1 Initial investment in micro irrigation

An average adopter of drip and sprinkler were found to invest Rs. 199788.14 and Rs. 53074.87, respectively, in installment of drip and sprinkler irrigation system in their field for crop production.

TABLE 1: Initial Capital Cost/Investment in Micro Irrigation (Rs./kit)

Item	Amount Paid	Subsidy Amount	Total Cost
Drip irrigation Kit (n=48)			
Pipe, Micro tube & other DIE	74875.00 (41.91)	103770.83 (58.09)	178645.83 (100)
Pumps (Avg. 5 HP)	21142.31 (100)	0.00 (0.00)	21142.31 (100)
Total	**96017.31(48.06)**	**103770.83(51.94)**	**199788.14(100)**
Sprinkler irrigation (n=48)			
Pipe, nozzle & other SIE	19665.10 (61.58)	12267.46 (38.42)	31932.56 (100)
Pumps (Avg. 5 HP)	21142.31 (100)	0.00 (0.00)	21142.31 (100)
Total	**40807.41 (76.89)**	**12267.46 (23.11)**	**53074.87 (100)**

Source: Primary data

In the investment of total funds, the owned capital and subsidy was found to be 48.06 percent and 51.94 percent, respectively, in case of drip irrigation system/kit and 76.89 and 23.11 percent, respectively, in case of sprinkler irrigation system kit (Table 1). An average adopter was found to invest Rs. 21142.31 for purchase of pump for micro irrigation system under both the systems. Thus an average adopter was found to invest more in drip as compare to sprinkler micro irrigation system.

3.2 Annual maintenance cost of micro irrigation

The average annual maintenance cost of micro-irrigation as reported by an average respondent was found to be Rs. 6877.44. Out of

this, the items which incurred maximum cost were filter (35.41%), followed by pipes (24.17%), other maintenance charges (19.30%) and valves (9.49%). None of the farmer was found to report loan as a source of funds for annual replacement and maintenance cost of micro irrigation in the study area (Table 2).

TABLE 2: ANNUAL REPLACEMENT/MAINTENANCE COST OF MICRO IRRIGATION (RS.) N=96

Item	Total Cost	% to total cost
Filters (Cyclone, disc, others)	2435.29	35.41
Pipes (Micro, distribution, drip, PVC, PE, others)	1662.28	24.17
Valves	652.73	9.49
Any other maintenance/replacement/repairs charges	1327.14	19.30
Any others	800.00	11.63
Total	**6877.44**	**100.00**

Source: Primary Data

3.3 Source of equipment

Jain Irrigation System Ltd. (26.04%), Pragati Irrigation System Pvt. Ltd. (16.67%) and Netafim Pvt. Ltd. (13.54%) were found to be major companies involved in installation of micro irrigation set/kit as reported by the adopters. In maintenance of micro irrigation systems, Jain Irrigation System Ltd. (39.58%), Netafim Pvt. Ltd. (33.33%) and Kasta Pipes Pvt. Ltd (18.75%) played an important role as reported by the maximum numbers of adopters in the area under study (Table 3).

TABLE 3: COMPANIES AS SOURCE OF EQUIPMENT/PARTS/SERVICE

Micro-irrigation Set/Kit/Initial Capital			Micro-irrigation Maintenance		
Company/Brand Name	**Number Reporting**	**Percent Reporting**	**Company/Brand Name**	**Number Reporting**	**Percent Reporting**
Jain Irrigation System Ltd.	25	26.04	Jain Irrigation System Ltd.	38	39.58
Pragati Irrigation Systems Private Limited	16	16.67	Netafim Pvt. Ltd.	32	33.33
Netafim Pvt. Ltd.	13	13.54	Kasta Pipes Pvt. Ltd.	18	18.75
Others (Apolo, Jaldeep and Shakti etc.)	42	43.75	Others (Nimbus, Pragati irrigation Pvt. Ltd. etc.)	8	8.33
Total	**96**	**100**	**Total**	**96**	**100**

Source: Primary data

3.4 Cropping pattern with micro irrigation

In kharif season, out of 96 adopters, maximum were found to cultivate soybean (72.92%) followed by urad (41.67%), cotton (26%) and paddy (15.63%), while 36.46 percent were found to cultivate ginger followed by chilli (34.38%) in the area under study. On an average, the maximum area was allocated under cotton (2.21 ha) followed by soybean (1.73 ha), urad (1.11ha) and paddy (0.94 ha), while among vegetables, the maximum area was allocated under chilli (0.66 ha) and ginger (0.54 ha) by the adopters of micro irrigation (Table 4). With regards to micro irrigation, the maximum area was found to be irrigated through drip irrigation in kharif season in case of chilli (0.57 ha) followed by ginger (0.52 ha) and cotton (0.51 ha). The sprinkler was found to be utilized in case of soybean on an average 0.05 ha of cultivated area. The irrigated area under non-micro irrigation sources among kharif crops was found to range between 0.02 ha (ginger) to 1.70 ha (cotton).

During the rabi season, 86.46%, 71.88% and 16.67% of the adopters were reported to cultivate wheat, chickpea and lentil, respectively, on their farms. On an average, the maximum area was found to be allocated by the adopters under wheat (1.53 ha.), chickpea (1.41 ha) and lentil (0.60 ha.). As regards to micro irrigation, an average adopter was found to allocate more under sprinkler system as compared to drip. An average area under non-micro irrigation was found to be vary between 0.03 ha (lentil) to 0.41 ha (wheat) and the un-irrigated area was found to vary between 0.01 ha (chickpea) and 0.04 hectare (lentil). In case of perennial crops, lemon was found to be major crop grown by 15.63 percent of adopters on an average area of 0.08 ha, out of which 50 percent was found to be under micro-irrigation (drip) and 50 percent under non-micro irrigation sources.

Maximum fertigation was found in area under ginger (96.29%), followed by chilli (86.36%) and cotton (23.08%). Overall fertigation in kharif crops was found to be 25.45 percent of total crop cultivated area. For rabi crops, fertigation was found to be practiced in 13.47 percent area of chickpea, 51.25 percent of area under lemon and 26.56 percent area of other crops.

TABLE 4: CROPPING PROFILE AND AREA WITH MICRO-IRRIGATION

Sr. No	Crop	No. of Adopters	% of Adopters	Area - average in ha. (based on reporting adopters)					
				Crop cultivation	Drip	Sprinkler	Irrigated non-micro	Un-irrigated	Fertigation (% to crop cultivation area)
Kharif season									
1	Soybean	70	72.92	1.73 (22.47)	0 (0)	0.05 (100)	1.67 (29.51)	0.01 (33.33)	0.00
2	Urad	40	41.67	1.11 (14.42)	0 (0)	0 (0)	1.09 (19.26)	0.02 (66.67)	0.00
3	Cotton	25	26.04	2.21 (28.7)	0.51 (26.02)	0(0)	1.70 (30.04)	0(0)	23.08
4	Paddy	15	15.63	0.94 (12.21)	0(0)	0(0)	0.94 (16.61)	0(0)	0.00
5	Chilli	33	34.38	0.66 (8.57)	0.57 (29.08)	0(0)	0.09 (1.59)	0(0)	86.36
6	Ginger	35	36.46	0.54 (7.01)	0.52 (26.53)	0(0)	0.02 (0.35)	0(0)	96.29

Sr. No	Crop	No. of Adopters	% of Adopters	Area - average in ha. (based on reporting adopters)					
				Crop cultivation	Drip	Sprinkler	Irrigated non-micro	Un-irrigated	Fertigation (% to crop cultivation area)
7	Other Kharif	60	62.50	0.51 (6.62)	0.36 (18.37)	0 (0)	0.15 (2.65)	0 (0)	70.58
	Total kharif	96	100	7.7 (100)	1.96 (100)	0.05 (100)	5.66 (100)	0.03 (100)	25.45
	Rabi season								
1	Wheat	83	86.46	1.53 (36.60)	0 (0)	1.12 (41.64)	0.41 (37.96)	0 (0)	0.00
2	Chick pea	69	71.88	1.41 (33.73)	0.19 (52.78)	0.82 (30.48)	0.39 (36.11)	0.01 (20.00)	13.47
3	Lentil	16	16.67	0.60 (14.35)	0 (0)	0.53 (19.70)	0.03 (2.78)	0.04 (80.00)	0.00
4	Other Rabi	32	33.33	0.64 (15.31)	0.17 (47.22)	0.22 (8.18)	0.25 (23.15)	0 (0)	26.56
	Total rabi	96	100	4.18 (100)	0.36 (100)	2.69 (100)	1.08 (100)	0.05 (100)	8.61
	Perennial crops								
1	Lemon	15	15.63	0.8 (40.2)	0.41 (25.63)	0 (0)	0.39 (100)	0 (0)	51.25
2	Other Perennial	12	12.50	1.19 (59.8)	1.19 (74.37)	0	0	0	100.00
	Total perennial			1.99 (100)	1.6 (100)	0 (0)	0.39 (100)	0 (0)	80.40

Source: Field survey.
Note: Figure in parenthesis show percentage to total.

3.5 Changes in area and yield due to micro irrigation

Various crops grown by the adopters in the area under study were found to observe a change in area and yield of due to introduction of micro irrigation. These changes were categorized into: large increase, increase, no change, decrease, large decrease (Table 5).

TABLE 5: CHANGE IN AREA AND YIELD DUE TO MICRO IRRIGATION (% HHs)

Sr. No.	Crop	No. of Adopters	% of Adopters	Large Increase	Increase	No change	Decrease	Large Decrease
				Area				
1	Soybean	1	1.04	0	0	100	0	0
2	Cotton	22	22.92	5	18	55	18	5
3	Chilli	33	34.38	9	45	45	0	0
4	Ginger	35	36.46	20	31	49	0	0

Sr. No.	Crop	No. of Adopters	% of Adopters	Large Increase	Increase	No change	Decrease	Large Decrease
5	Other kharif	64	66.67	8	56	36	0	0
6	Wheat	48	50.00	13	88	0	0	0
7	Chickpea	46	47.92	4	48	30	17	0
8	Other Rabi	23	23.96	4	13	83	0	0
9	Lemon	13	13.54	0	23	77	0	0
10	Other Perennial	13	13.54	0	62	38	0	0
				Yield				
1	Soybean	1	1.04	0	100	0	0	0
2	Cotton	22	22.92	5	59	36	0	0
3	Chilli	33	34.38	33	61	6	0	0
4	Ginger	35	36.46	63	34	3	0	0
5	Other kharif	64	66.67	33	61	6	0	0
6	Wheat	48	50.00	63	34	3	0	0
7	Chickpea	46	47.92	25	77	2	0	0
8	Other Rabi	23	23.96	17	33	50	0	0
9	Lemon	13	13.54	15	85	4	0	0
10	Other Perennial	13	13.54	46	46	8	0	0

It is clear from the data that 50 percent adopters were found to cultivate wheat followed by chickpea (48%), ginger (36.46%), chilli (34.38%), cotton (22.92%) and lemon (13.54%). It is also observed that more than 20 percent adopters of micro irrigation reported their area under cotton, chilli, ginger, wheat, chick pea, other kharif crops, other rabi crops and perennial crops (lemon) to increase (increase to large increase) after introduction of micro irrigation in their farms.

An increase in area was reported by majority of adopters growing wheat (88%) followed by chickpea (48%), chilli (45%), ginger (31%) and lemon (23%), while large increase in area was reported by adopters in ginger (20%), followed by wheat (13%) and chilli (9%). The cent percent adopters reported no change in area of soybean cultivation after the adoption of micro irrigation facilities on their farm.

More than 50 percent adopters reported that after of adoption of micro irrigation facilities on their farms, the yield of all the crops increased and varied between increase to large increase. None of adopters reported decrease or large decrease in yield across all the crops after adoption of micro irrigation facilities on their farms.

3.6 Changes in production, income, input and cost of cultivation

After adoption of MI facilities, the production of all major crops of an average farmer was found to have increased by 33.91 percent from 96 q/ha (without MI) to 129 q/ha (with MI) in the area under study. Total sale value of the product (Gross Return) was also found to increase by 98.96 percent, from Rs. 245664 (without MI) to 488781/ha (with MI), while price of the product increased by 48.03 percent after adoption of MI facilities.

The expenditures on cultivation of all major crops were found to increase like seeds/plants cost (129.44%), fertilizer cost (44.08%) FYM/organic manure (35.79%), pesticide cost (47.46%), other stacking cost (44.98%), farm power/equipment cost (59.37%), labour cost (36.41%) and marketing cost (44.31%) except the cost of irrigation which was found to decreased by 37.56% in an average beneficiary's farm. The increased costs may be due to adoption of improved production technologies for cultivation of crops, better variety of seeds, superior plant protection chemicals, etc. Assured irrigation during crop growth period encouraged adopters to invest in superior quality of input in cultivation of crops without any hesitation.

The per rupee return over the expenditure of Re. 1.00 was also found to have increased by 17.74 percent from Rs. 2.39 (without MI) to 2.82 (with MI). The cost of production was found to increased by 25.75 percent from Rs. 1068.81/q (without MI) to 1344.08/q (with MI) in the area under study.

TABLE 6: CHANGES IN PRODUCTION, INCOMES, INPUTS AND COST WITH MICRO IRRIGATION OF MAJOR CROPS

(in Rs./ha)

Particulars	Crop - Chilli		Crop - Ginger		Crop - Wheat		All Crop	
	n=33		n=31		n=48		n=112	
	With MI	Without MI	With MI	Without MI	With MI	Without MI	With MI	Without MI
Production (q)	182 (54.24)	118	163 (22.56)	133	42 (10.53)	38	129 (33.91)	96
Price	2352 (21.36)	1938	7166 (76.46)	4061	1848 (10.07)	1679	3789 (48.03)	2559
Total Sales Revenue	428064 (87.19)	228684	1168058 (116.26)	540113	77616 (21.65)	63802	488781 (98.96)	245664
Cost of Cultivation								
Seeds/ Plants cost	21866 (39.64)	15659	164821 (159.37)	63547	5240 (17.91)	4444	63976 (129.44)	27883
Fertilizer cost	28414 (46.97)	19333	18361 (53.49)	11962	5766 (11.48)	5172	17514 (44.08)	12156
Farm Yard Manure/ Organic cost	21269.97 (453.47)	3843	13647 (40.71)	9699	1752 (92.53)	910	6542 (35.79)	4817
Pesticides cost	32581 (38.45)	23532	16326 (84.85)	8832	811 (-40.01)	1352	16573 (47.46)	11239
Cost of Irrigation								
Electricity cost	2435 (37.03)	3867	1418 (-55.82)	3181	1838 (-11.08)	2067	1897 (-37.56)	3038
Water charge paid	0.00	0.00	0.00	0.00	37 (15.63)	32	12 (15.63)	11
Diesel cost	0.00	0.00	0.00	0.00	1330 (14.46)	1162	443 (14.46)	387
No of irrigations	55 (266.67)	15	70 (266.67)	15	6 (0.00)	6	44 (263.89)	12
Hours of pumping	412 (-32.68)	612	468 (-24.15)	617	92 (-67.49)	283	324 (-35.71)	504
Farm power & equipment cost	16502 (102.28)	8158	14095 (61.25)	8741	5581 (-3.79)	5801	12059 (59.37)	7567
Total mandays	317 (32.64)	239	246 (7.17)	265	40 (-6.98)	43	201 (10.24)	182

Particulars	Crop - Chilli		Crop - Ginger		Crop - Wheat		All Crop	
	n=33		n=31		n=48		n=112	
	With MI	Without MI	With MI	Without MI	With MI	Without MI	With MI	Without MI
Labour cost	51163 (56.19)	32756	38424 (23.66)	31072	7530 (2.24)	7365	32372 (36.41)	23731
Marketing cost	18200 (99.65)	9116	16300 (10.52	14749	888 (35.16)	657	11796 (44.31)	8174
Other Cost								
Mulching	(-) 14828	00	0.00	0.00	0.00	0.00	4943	0.00
Stacking	15672 (44.98)	10810	0.00	0.00	0.00	0.00	5224 (44.98)	3603
Total Cost	190812.44 (50.16)	127074	283432.71 (86.74)	151783	30865.53 (6.57)	28962	173386.81 (68.98)	102606
Net Profit/ Income	237251.56 (133.49)	101610	884625.29 (127.80)	388330.00	46750.47 (34.19)	34840	315394.19 (120.47)	143058
Cost of Production	1048.42 (-2.64)	1076.90	1738.85 (52.35)	1141.23	734.89 (-3.58)	762.16	1344.08 (25.75)	1068.81
Per Rupee Return	2.24 (24.66)	1.80	4.12 (15.81)	3.56	2.51 (14.15)	2.20	2.82 (17.74)	2.39

Source: Field survey.
Note: Figure in parenthesis show percentage change over without MI

3.7 Factors affecting adoption of MI

The opinions of the respondents were observed with respect to agronomical potential, agro-economic potential, effective demand, aggregate supply and distribution of micro-irrigation system and categorized into different categories; strongly agree, agree, partially agree, disagree (Table 7).

TABLE 7: DETERMINANTS/FACTORS AFFECTING THE ADOPTION OF MICRO IRRIGATION (%)

(N=96)

S. No.	Factors	Strongly Agree	Agree	Partially Agree/ Disagree	Disagree	Strongly Disagree
		5	4	3	2	1
	Agronomic Potential					
1	Micro irrigation increases yield/output	33.33	65.63	1.04	0.00	0.00
2	Micro irrigation saves water/ reduces water use	50.00	47.92	2.08	0.00	0.00
3	Micro irrigation reduces fertilizer use	13.54	36.46	36.46	11.46	2.08
4	Micro irrigation reduces pest problems/ pesticide use	0.00	19.79	63.54	15.63	1.04

S. No.	Factors	Strongly Agree	Agree	Partially Agree/ Disagree	Disagree	Strongly Disagree
		5	4	3	2	1
5	Micro irrigation reduces weed problem	12.50	59.38	25.00	3.13	0.00
6	Micro irrigation reduces labour use	21.88	38.54	36.46	2.08	1.04
	Agro- Economic Potential					
1	Capital cost of Micro irrigation is not high	5.21	16.67	29.17	27.08	21.88
2	Micro irrigation raises output quality/profit	15.63	57.29	27.08	0.00	0.00
3	Micro irrigation reduces input use/costs	10.42	32.29	46.88	9.38	1.04
4	Micro irrigation increases profitability/ incomes	14.58	63.54	21.88	0.00	0.00
5	Subsidy on Micro irrigation is substantial/ important	28.13	51.04	19.79	1.04	0.00
	Effective Demand					
1	Information on Micro irrigation is easily available	21.88	55.21	21.88	1.04	0.00
2	Micro irrigation technology is easy to understand and operate	17.71	64.58	17.71	0.00	0.00
3	Subsidy for Micro irrigation is easy to get	8.33	29.17	44.79	12.50	5.21
4	Finance for Micro irrigation is easy to get	5.21	41.67	25.00	28.13	0.00
5	Electricity supply for Micro irrigation is available/reliable	15.63	62.50	16.67	4.17	1.04
6	Water supply for Micro irrigation is sufficient	39.58	42.71	15.63	2.08	0.00
	Aggregate Supply					
1	There are a large number of companies supplying Micro irrigation equipment	14.58	54.17	30.21	1.04	0.00
2	The quality and reliability of the Micro irrigation equipment is good	9.38	51.04	38.54	1.04	0.00
	Distribution					
1	There are a number of Micro irrigation dealers located nearby	7.29	52.08	40.63	0.00	0.00
2	The dealers provide good quality products you can trust	14.58	54.17	29.17	2.08	0.00
3	The dealers charge a reasonable price	7.29	48.96	39.58	4.17	0.00
4	The dealers arrange for subsidy/credit	20.83	63.54	14.58	1.04	0.00
5	The dealers provides after-sales service	8.33	53.13	31.25	6.25	1.04

Source: Field survey

3.7.1 Agronomic potential

More than 60 percent of adopters were in agree and strongly agree category in expressing that there was an increase in output/yield of crops (98.96%), reduced use of water (97.92%) and reduction in fertigation and problem of weeds (71.88%) on their fields after introduction of micro irrigation facilities. The majority of respondents partially disagree with the statement that micro irrigation reduces pest problem/pesticide use (63.54%).

3.7.2 Agro-economic potential

More than 40 percent adopters agreed and strongly agreed with the fact that micro irrigation facilities raised output quality (72.92%), profitability/ income (78.12%) and reduces input use & cost of input (42.71%). They also expressed that the subsidy on MI is substantial/important (79.17%).

3.7.3 Effective demand

In the area under study, more than 45 percent adopters agreed and strongly agreed on the factors that information of micro irrigation is easily available (77.09%), technology of micro irrigation is understandable and operational (82.29%), proper financial facilities, supply of electricity is available and reliable and water supply is sufficient (78.13%) for adoption of micro irrigation facilities in their farm. 44.79 percent adopters partially agreed upon the fact that finance for micro irrigation was available easily, while 37.50 percent agreed and strongly agreed with easily availability of subsidy for micro irrigation.

3.7.4 Aggregate supply

In the area under study, more than 60 percent adopters agreed and strongly agreed in expressing that supply of micro irrigation equipment is sufficient as there were large number of companies for the supply of micro irrigation equipment (68.75%) and the quality of these equipment was also good (60.42%).

3.7.5 Distribution

In the area under study the majority of adopters were found to agree and partially agree with the distribution of micro irrigation facilities as there are large number of dealers located nearby (59.37%), dealer provide good quality products (68.75%), charge reasonable price (56.25%), arrange subsidy/credit (84.37%) and provide after sale services (61.46%) for distribution of micro irrigation equipment.

3.8 Conclusions and policy implication

The following conclusions and policy implications could be drawn from the above findings:

1. Madhya Pradesh is one of the leading state which has successfully introduced micro irrigation facilities under PMKSY-PDMC in almost all the districts to ensure food security for the growing population in the face of climatic change, scare and limited water & land resources and to provide irrigation to every farm through improvement of water use efficiency. Government of Madhya Pradesh has put great efforts in creating MI facilities by providing subsidy, equipments, technical knowledge, etc. to beneficiaries under the programme. Efforts should be made to ensure that all the districts across the State will be benefitted by this programme of the Government of India.

2. After adoption on MI facilities in cultivation of crops, the expenditure on cost of irrigation (electricity) was found to have decreased by 37.56 percent. Although the expenditure of all the other items *viz.*, seed, fertilizer, manures, pesticides, labour, etc. were found to have increased, but the per rupee return on investment of Re. 1.00 increased by 17.77 percent from Rs. 2.40 to 2.82 after adoption of MI technology in the farms. It is also clear from the findings that introduction of MI facilities in adopters fields raised profitability and income of adopters.

3. MI facilities are easy to adopt as information on micro irrigation is easily available; it is easy to operate; proper financial facilities available and there is a reliable supply of

electricity and water. A large number of dealers are also located nearby and charge reasonable prices and also provide after sale services with quality MI equipment in the area under study.

4. MI facilities are advantageous as they result in higher yield; better quality of products; high output price; need less water, labour, fertilizer and there is easy marketing of output.

5. After adoption of micro irrigation, there was a change in cropping pattern of the area with adopters shifting from low value to high value crops. This calls for building a new market infrastructure including efficient supply and value chain management; farm get level processing and bringing institutional reform in place for establishing efficient economic environment in the area under study. This will not only ensure remunerative prices for farming communities but also provide non-farm employment avenues for youth in a big way.

Hence, overall impact of PMKSY-PDMC is found to be positive in case of water conservation and overall environment. Efforts should be made to promote MI in all the districts of the State with proper awareness programmes. Attempts should also be made to lower down the price of MI equipments in order to reduce the subsidy in a gradual manner for the horizontal expansion of the technology on large scale, provision/support for farm fencing should be provided, process of getting subsidy/Govt. assistance for latest and improved MI technology should be made easier, better training of farmers in MI is required for betterment of programme.

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Commodity Review

Foodgrains

Procurement of Rice

The total procurement of rice during kharif marketing season 2021-22 up to 30.11.2021 is 19.41 million tonnes as against 21.14 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 2021-22 (up to 30.11.2021) and the corresponding period of last year is given in figure 1.

TABLE 1: PROCUREMENT OF RICE IN MAJOR STATES

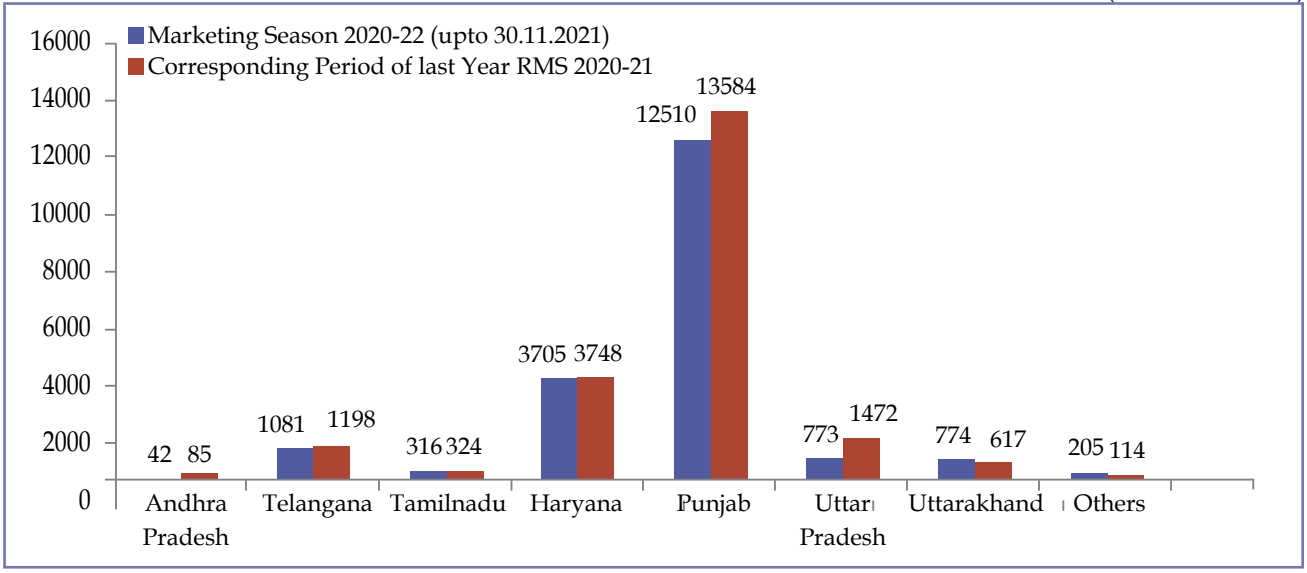
(In thousand tonnes)

State	Marketing Season 2021-22 (upto 30.11.2021)		Corresponding Period of last Year 2020-21	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	**2**	**3**	**4**	**5**
Andhra Pradesh	42	0.2	85	0.4
Telangana	1081	5.6	1198	5.7
Tamil Nadu	316	1.6	324	1.5
Haryana	3705	19.1	3748	17.7
Punjab	12510	64.5	13584	64.3
Uttar Pradesh	773	4.0	1472	7.0
Uttarakhand	774	4.0	617	2.9
Others	205	1.1	114	0.5
All India Total	**19406**	**100.0**	**21142**	**100.0**

Source: Department of Food & Public Distribution, Govt. of India

Figure 1: Procurement of Rice in Major States

(In thousand tonnes)



Source: Department of Food & Public Distribution, Govt. of India.

Procurement of Rice

The total procurement of rice during kharif marketing season 2020-21 up to 30.11.2021 is 60.07 million tonnes as against 51.61 million tonnes during the corresponding period of last year. The details are given in Table 2. A comparative analysis of procurement of rice for the period of marketing season 2020-21 (up to 30.11.2021) and the corresponding period of last year is given in figure 2.

TABLE 2: Procurement of Rice in Major States

(In thousand tonnes)

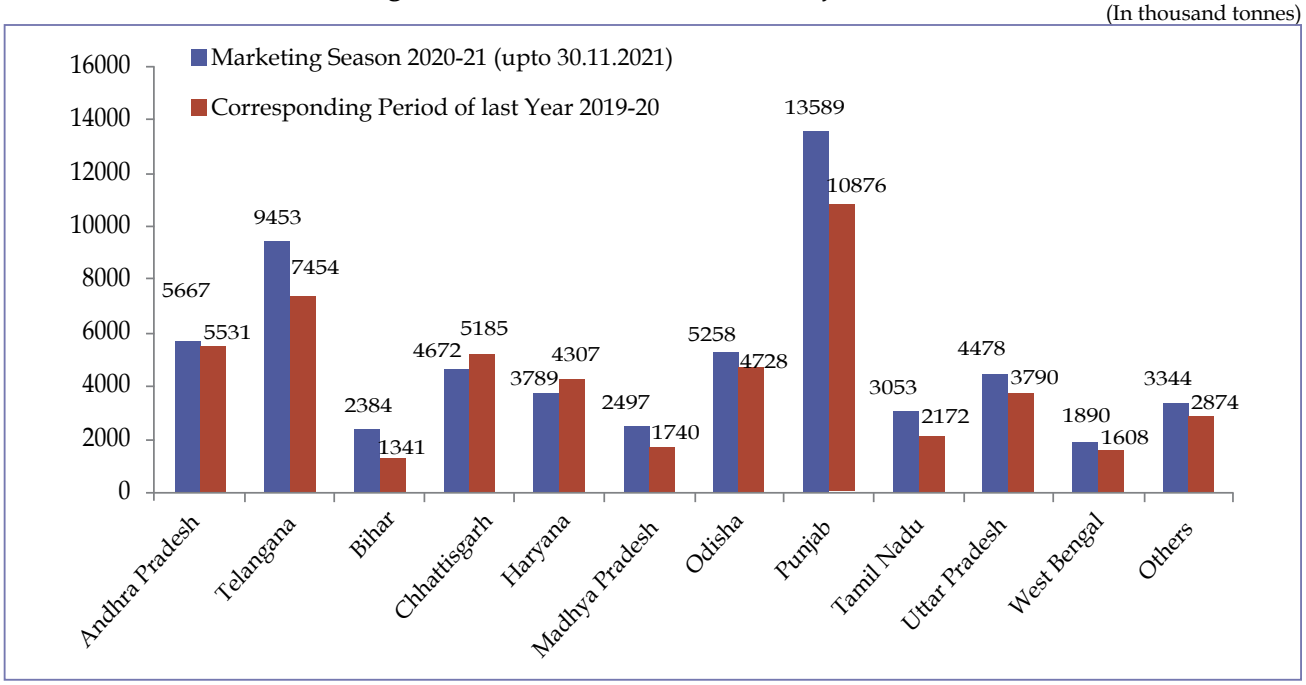
State	Marketing Season 2020-21 (upto 30.11.2021)		Corresponding Period of last Year 2019-20	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Andhra Pradesh	5667	9.4	5531	10.7
Telangana	9453	15.7	7454	14.4
Bihar	2384	4.0	1341	2.6
Chhattisgarh	4672	7.8	5185	10.0
Haryana	3789	6.3	4307	8.3
Madhya Pradesh	2497	4.2	1740	3.4
Odisha	5258	8.8	4728	9.2
Punjab	13589	22.6	10876	21.1
Tamil Nadu	3053	5.1	2172	4.2

State	Marketing Season 2020-21 (upto 30.11.2021)		Corresponding Period of last Year 2019-20	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	**2**	**3**	**4**	**5**
Uttar Pradesh	4478	7.5	3790	7.3
West Bengal	1890	3.1	1608	3.1
Others	3344	5.6	2874	5.6
All India Total	**60074**	**100.0**	**51606**	**100.0**

Source: Department of Food & Public Distribution, Govt. of India

Figure 2: Procurement of Rice in Major States

(In thousand tonnes)



Source: Department of Food & Public Distribution, Govt. of India

Procurement of Wheat

The total procurement of wheat during rabi marketing season 2021-22 up to 18.08.2021 is 43.34 million tonnes as against 38.99 million tonnes during the corresponding period of last year. The details are given in Table 3. The figure 3 depicts the comparison of procurement of wheat during the marketing season 2021-22 (up to 18.08.2021) with the corresponding period of last year.

TABLE 3: PROCUREMENT OF WHEAT IN MAJOR STATES

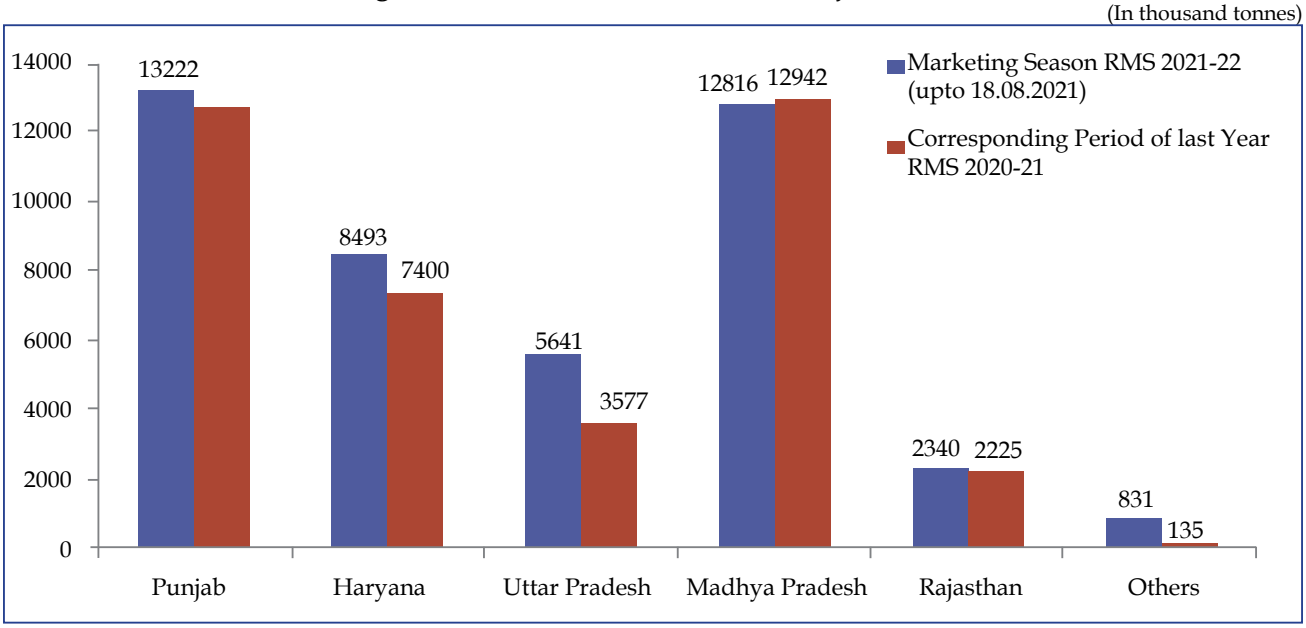
(In thousand tonnes)

State	Marketing Season RMS 2021-22 (upto 18.08.2021)		Corresponding Period of last Year RMS 2020-21	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Punjab	13222	30.5	12714	32.6
Haryana	8493	19.6	7400	19.0
Uttar Pradesh	5641	13.0	3577	9.2
Madhya Pradesh	12816	29.6	12942	33.2
Rajasthan	2340	5.4	2225	5.7
Others	831	1.9	135	0.3
All India	**43343**	**100.0**	**38993**	**100.0**

Source: Department of Food & Public Distribution, Govt. of India

Figure 3: Procurement of Wheat in Major States

(In thousand tonnes)



Source: Department of Food & Public Distribution, Govt. of India.

Commercial Crops

Oilseeds

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 202.3 in November, 2021 showing an increase of 1.3 percent over the previous month and increased by 24.9 percent over the corresponding month of the previous year.

The WPI of all individual oilseeds showed a mixed trend. The WPI of groundnut seed (2.1 percent), rape & mustard seed (0.49 percent), gingelly seed (sesamum) (1.4 percent), niger seed (0.40 percent), safflower (5.2 percent) and soyabean (1.7 percent) increased over the previous month. However, the WPI of cotton seed (0.66 percent), copra (0.39 percent) and sunflower (4.5 percent) decreased over the previous month.

Manufacture of Vegetable and Animal Oils and Fats

The WPI of vegetable and animal oils and fats as a group stood at 182.4 in November, 2021 which shows a decrease of 2.1 percent over the previous month. Moreover, it increased by 23.2 percent over the corresponding month of the previous year. The WPI of mustard oil (0.47 percent) and copra oil (1.1 percent) increased over the previous month. However, the WPI of soyabean oil (0.85 percent), sunflower oil (17.9 percent), groundnut oil (3.0 percent), rapeseed oil (1.1 percent) and cotton seed oil (5.0 percent) decreased over the previous month.

Fruits & Vegetable

The WPI of fruits & vegetable as a group stood at 235.1 in November, 2021 showing an increase of 17.1 percent over previous month and increase of 7.4 percent over the corresponding month of the previous year.

Potato

The WPI of potato stood at 247.8 in November, 2021 showing an increase of 24.1 percent over the previous month. Moreover, it decreased by 49.5 percent over the corresponding month of the previous year.

Onion

The WPI of onion stood at 309.0 in November, 2021 showing an increase of 6.4 percent over the previous month and a decrease of 30.1 percent over the corresponding month of the previous year.

Condiments & Spices

The WPI of condiments & spices (group) stood at 161.6 in November, 2021 showing an increase of 4.2 percent over the previous month and an increase of 3.3 percent over the corresponding months of the previous year. The WPI of black pepper increased by 10.4 percent and for chillies (dry) it increased by 0.8 percent while for turmeric, it decreased by 1.8 percent over the previous month.

Tea

The WPI of tea stood at 155.2 in November, 2021 showing an increase of 0.19 percent over the previous month and a decrease of 23.7 percent over the corresponding month of the previous year.

Coffee

The WPI of coffee stood at 124.6 in November, 2021 showing an increase of 5.4 percent over the previous month and an increase of 19.2 percent over the corresponding month of the previous year.

Sugarcane

The WPI of sugarcane stood at 196.3 in November, 2021 showing no change over the previous month and an increase of 3.6 percent over the corresponding month of the previous year.

Raw Cotton

The WPI of raw cotton stood at 152.8 in November, 2021 showing an increase of 8 percent over the previous month and an increase of 45 percent over the corresponding month of the previous year.

Raw Jute

The WPI of raw jute stood at 284 in November, 2021 showing an increase of 5 percent over the previous month and an increase of 12.5 percent over the corresponding month of the previous year.

Wholesale Price Index of Commercial Crops is given in Table 4. A graphical comparison of WPI for the period of November, 2021 and October, 2021 is shown in figure 4 and the comparison of WPI during November, 2021 with the corresponding month of last year has been shown in figure 5.

TABLE 4: Wholesale Price Index of Commercial Crops

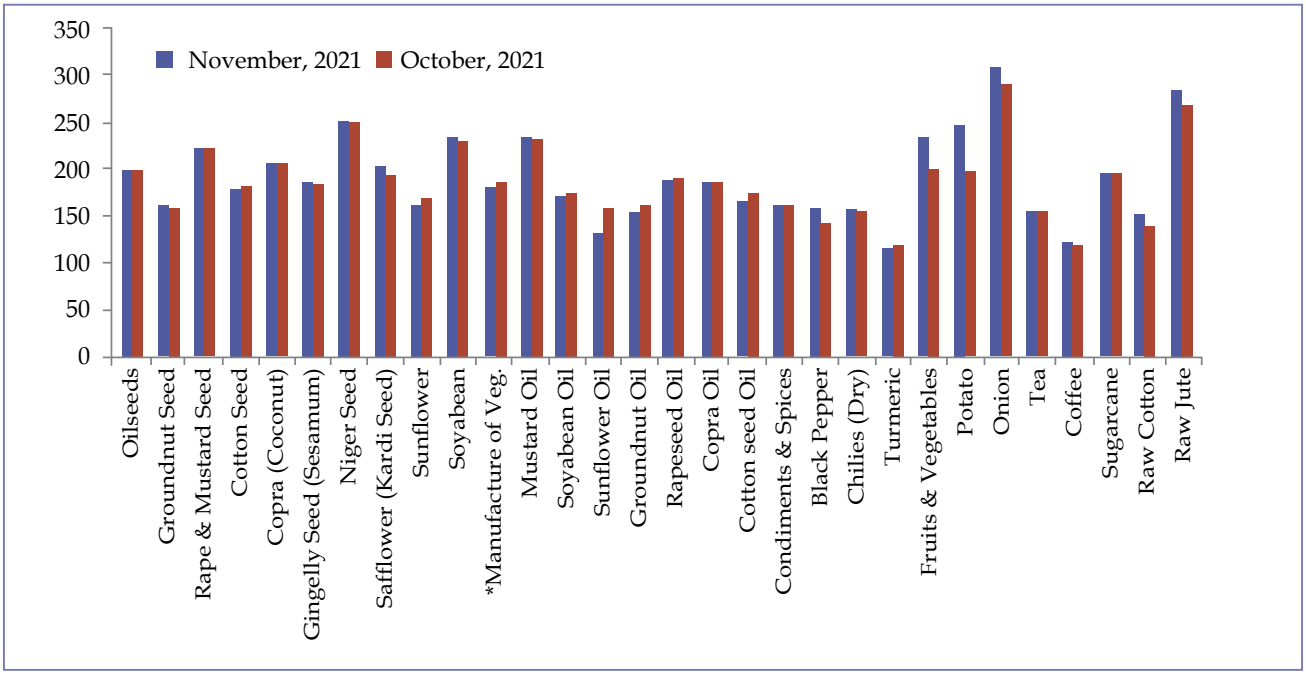
(Base year: 2011-12)

Commodity	Nov-21	Oct-21	Nov-20	Percentage variation over the	
				Month	Year
Oilseeds	202.3	199.7	162.0	1.3	24.9
Groundnut Seed	163.8	160.4	146.3	2.1	12.0
Rape & Mustard Seed	225.1	224.0	171.9	0.49	30.9
Cotton Seed	181.1	182.3	159.5	-0.66	13.5
Copra (Coconut)	206.5	207.3	195.9	-0.39	5.4
Gingelly Seed (Sesamum)	187.4	184.9	171.3	1.4	9.4
Niger Seed	252.9	251.9	216.6	0.40	16.8
Safflower (Kardi Seed)	203.9	193.9	163.4	5.2	24.8
Sunflower	163.8	171.5	125.7	-4.5	30.3
Soyabean	234.6	230.6	174.6	1.7	34.4
Manufacture of Vegetable and Animal Oils and Fats	182.4	186.4	148.1	-2.1	23.2
Mustard Oil	233.8	232.7	169.5	0.47	37.9
Soyabean Oil	175.2	176.7	137.7	-0.85	27.2
Sunflower Oil	131.7	160.5	138.0	-17.9	-4.6
Groundnut Oil	156.0	160.9	145.2	-3.0	7.4
Rapeseed Oil	190.1	192.3	143.1	-1.1	32.8
Copra Oil	188.5	186.5	186.8	1.1	0.91
Cotton Seed Oil	166.7	175.4	136.0	-5.0	22.6
Condiments & Spices	161.6	155.1	156.5	4.2	3.3

Commodity	Nov-21	Oct-21	Nov-20	Percentage variation over the	
				Month	Year
Black Pepper	159.7	144.7	124.3	10.4	28.5
Chillies (Dry)	157.6	156.4	168.6	0.8	-6.5
Turmeric	117.0	119.1	112.2	-1.8	4.3
Fruits & Vegetables	235.1	200.8	218.8	17.1	7.4
Potato	247.8	199.6	491.1	24.1	-49.5
Onion	309.0	290.3	442.3	6.4	-30.1
Tea	155.2	154.9	203.4	0.19	-23.7
Coffee	124.6	118.2	104.5	5.4	19.2
Sugarcane	196.3	196.3	189.4	0.0	3.6
Raw Cotton	152.8	141.5	105.4	8.0	45.0
Raw Jute	284.0	270.5	252.5	5.0	12.5

Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.

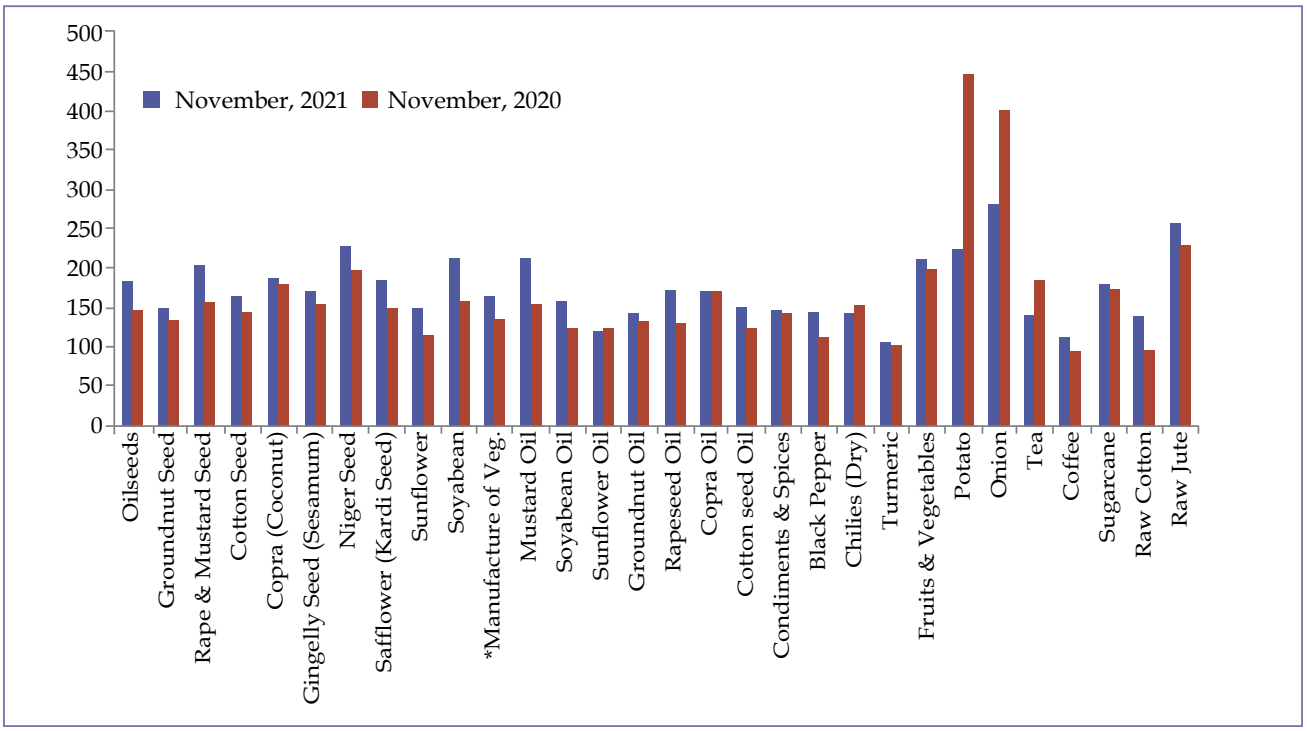
Figure 4: WPI of Commercial Crops during November, 2021 and October, 2021



Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.

Note: * Manufacture of Vegetable and Animal Oils and Fats

Figure 5: WPI of Commercial Crops during November, 2021 and November, 2020



Source: DPIIT, Ministry of Commerce and Industry, Govt. of India.
Note: *Manufacture of Vegetable and Animal Oils and Fats.

Statistical Tables
Wages

1. STATE-WISE AVERAGE DAILY WAGES OF FIELD LABOURERS

(Value in Rs.)

State	Month & Year	Normal Working Hours	Field Labour								Other Agri. Labour		Herdsman		* Field Labour		Skilled Rural		
			1. Ploughing		2. Sowing		3. Weeding		4. Reaping & Harvesting								Carpenter	Blacksmith	Cobbler
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	M	M
KARNATAKA	Mar, 20	8	NA	NA	NA	NA	NA	NA	NA	NA	362	334	383	325	364	332	404	363	389
HIMACHAL PRADESH	June,21	8	458	NR	334	334	330	330	334	334	330	330	330	330	NA	NA	516	510	514
GUJARAT	June,21	8	295	290	287	260	242	239	252	251	245	237	236	208	NA	NA	516	509	499
MAHARASHTRA (P*)	Dec,20	8	NA	NR	NA	NA	NA	NA	NA	NA	381	231	350	200	291	200	440	375	247
ASSAM(P*)	June,21	8	350	NR	350	250	350	250	NR	NR	350	250	NR	NR	NA	NA	NR	NR	NR
BIHAR	June,21	8	332	293	316	274	312	267	315	292	313	304	284	250	NA	NA	493	483	NR
KERALA	June, 21	8	886	NR	NR	539	NR	534	728	558	699	581	NR	NR	NA	NA	959	918	NR
TELANGANA	April, 21	8	NA	NA	NA	NA	NA	NA	NA	NA	456	363	325	-	386	293	437	426	317
UTTARAKHAND	June, 21	8	487	NR	326	313	379	250	367	345	382	348	300	300	NA	NA	625	624	NR
WEST BENGAL	June, 21	8	397	NR	316	282	300	271	317	281	305	279	277	270	NA	NA	NR	NR	NR
HARYANA	June, 21	8	535	NR	507	417	462	415	466	421	460	402	NR	NR	NA	NA	644	614	NR
JHARKHAND	June, 21	8	NA	NA	NA	NA	NA	NA	NA	NA	252	227	184	187	254	235	392	383	326
ODISHA	June, 21	8	363	350	341	297	327	285	341	296	371	310	302	264	NA	NA	513	463	431
UTTAR PRADESH	June, 21	8	308	NR	292	278	295	278	294	276	295	279	250	250	NA	NA	505	NR	NR
RAJASTHAN	June, 21	8	427	323	432	297	339	298	339	305	NR	NR	333	276	NA	NA	508	466	388
ANDHRA PRADESH	June, 21	8	NA	NA	NA	NA	NA	NA	NA	NA	491	223	343	200	470	314	478	390	350
CHHATTISGARH	June, 21	8	318	NR	195	171	175	157	189	165	229	188	203	185	NA	NA	388	309	283
MADHYA PRADESH	June, 21	8	267	NR	234	196	228	218	221	193	272	235	236	219	NA	NA	428	409	326
PUNJAB	June, 21	8	452	NR	443	369	419	361	444	376	423	365	NR	NR	NA	NA	532	523	NR
TAMIL NADU	June, 21	8	682	NR	425	201	402	198	430	207	467	214	NR	NR	NA	NA	620	517	NR
TRIPURA	Dec, 20	8	315	NR	263	180	338	243	263	180	233	173	400	300	NA	NA	340	NR	NR
GOA	March, 21	8	NR	NR	NR	NR	700	475	725	463	625	375	375	300	NA	NA	1025	650	650

Source: State Governments

Note: 1 Other agricultural labour include field waterping,carrying load, well diggers, cleaning silt from waterways and embankment, etc
2. * States of Andhra Pradesh, Jharkhand, Karnataka, Maharashtra and Telangana do not give operation–wise details as they furnish data for the group
3. P* - Provisional
4. NA: Not Applicable
5. NR: Not Reported

Prices

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

Commodity	Variety	Unit	State	Centre	Nov-21	Oct-21	Nov-20
Wheat	PBW 343	Quintal	Punjab	Amritsar	2180	2165	1750
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	1975	1925	1730
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	1933	2043	1751
Jowar	-	Quintal	Maharashtra	Mumbai	2600	3000	3200
Gram	No III	Quintal	Madhya Pradesh	Sehore	4500	4325	4370
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1750	1675	1650
Gram Split	-	Quintal	Bihar	Patna	6600	6670	6250
Gram Split	-	Quintal	Maharashtra	Mumbai	6400	6600	6300
Arhar Split	-	Quintal	Bihar	Patna	9410	9580	9440
Arhar Split	-	Quintal	Maharashtra	Mumbai	8850	9200	9000
Arhar Split	-	Quintal	NCT of Delhi	Delhi	9700	9500	8300
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	8600	9100	9200
Gur	-	Quintal	Maharashtra	Mumbai	4350	4500	4500
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	5000	4500	4500
Gur	Balti	Quintal	Uttar Pradesh	Hapur	3300	3600	2650
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	7600	7650	5300
Mustard Seed	Black	Quintal	West Bengal	Raniganj	6700	7200	NA
Mustard Seed	-	Quintal	West Bengal	Kolkata	8500	8600	6100
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	7500	7500	4950
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	7600	7750	5000
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	3400	3300	2200
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	3900	3900	3000
Castor Seed	-	Quintal	Telangana	Hyderabad	NT	NT	NA
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	9300	9300	8600
Copra	FAQ	Quintal	Kerala	Alleppey	10250	10150	12750
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	5000	4500	5100
Groundnut	-	Quintal	Maharashtra	Mumbai	9500	9000	8400

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

Commodity	Variety	Unit	State	Centre	Nov-21	Oct-21	Nov-20
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2430	2450	1585
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	2775	2800	2100
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	2000	2150	2150
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2500	2500	2300
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2300	2290	1575
Castor Oil	-	15 Kg.	Telangana	Hyderabad	2100	2100	1890
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	3050	3050	2000
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2900	3300	3400
Coconut Oil	-	15 Kg.	Kerala	Cochin	2460	2445	2700
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	2900	2950	2250
Groundnut Cake	-	Quintal	Telangana	Hyderabad	NT	NT	NA
Cotton/Kapas	NH 44	Quintal	Andhra pradesh	Nandyal	7650	8000	5300
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	NA	5800	4200
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	6500	6500	5750
Jute Raw	W 5	Quintal	West Bengal	Kolkata	6650	6650	6050
Oranges	Big	100 No	Tamil Nadu	Chennai	2400	2300	400
Oranges	Nagpuri	100 No	West Bengal	Kolkata	650	500	NT
Banana	-	100 No.	NCT of Delhi	Delhi	417	417	375
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	600	592	600
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	80000	90000	85000
Almonds	-	Quintal	Maharashtra	Mumbai	55000	55000	62000
Walnuts	-	Quintal	Maharashtra	Mumbai	70000	72500	65000
Kishmish	-	Quintal	Maharashtra	Mumbai	24500	23000	20000
Peas Green	-	Quintal	Maharashtra	Mumbai	8000	8000	8000
Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	4500	3800	2650
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	7000	2900	2000
Cauliflower	-	100 No.	Tamil Nadu	Chennai	4600	3200	3000
Potato	Red	Quintal	Bihar	Patna	1120	1220	3650
Potato	Desi	Quintal	West Bengal	Kolkata	1235	1700	3660

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

Commodity	Variety	Unit	State	Centre	Nov-21	Oct-21	Nov-20
Potato	Sort I	Quintal	Tamil Nadu	Mettuppa-layam	3751	2837	3943
Onion	Pole	Quintal	Maharashtra	Nashik	1700	2000	2900
Turmeric	Nadan	Quintal	Kerala	Cochin	11000	12000	11000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	12800	12000	9800
Chillies	-	Quintal	Bihar	Patna	15000	15500	15200
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	52500	43000	30000
Ginger	Dry	Quintal	Kerala	Cochin	18000	19000	27000
Cardamom	Major	Quintal	NCT of Delhi	Delhi	57200	57200	100000
Cardamom	Small	Quintal	West Bengal	Kolkata	150000	155000	200000
Milk	Buffalo	100 Liters	West Bengal	Kolkata	6000	6000	6000
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	59333	59333	60030
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	39500	40000	40000
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	41875	41600	40500
Fish	Rohu	Quintal	NCT of Delhi	Delhi	10000	10000	9000
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	43000	44000	NA
Eggs	Madras	1000 No.	West Bengal	Kolkata	5230	5000	5000
Tea	-	Quintal	Bihar	Patna	26500	26500	24800
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	11922	11235	NT
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	39000	37500	39500
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	21500	20600	28000
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	8950	8500	9850
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	4500	4250	4400
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	13200	13200	13200
Rubber	-	Quintal	Kerala	Kottayam	18000	16500	12300
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	82000	81000	66000

Source: DPIIT, Ministry of Commerce and Industry, Govt. of India

Crop Production

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING THE MONTH OF DECEMBER, 2021

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Summer Rice, Jowar (R), Maize, Ragi, Small Millets (R), Gram, Urad (R), Mung (R)	Winter Rice, Urad (K), Bajra, Ragi (K), Small Millets (K), Sugarcane, Ginger, Mesta, Sweet Potato, Groundnut, Nigerseed, Onion
Assam	Wheat	Winter Rice, Sugarcane, Castor seed, Sesamum
Bihar	Wheat, Barley, Gram, Winter Potato (Plains), Sugarcane, Linseed	Winter Rice, Jowar (K), Bajra, Winter Potato (Plains), Groundnut, Cotton
Gujarat	Winter Potato (Hills), Sugarcane, Onion	Winter Rice, Jowar (K), Sugarcane, Ginger, Chillies (Dry), Tobacco, Castor seed, Sesamum, Cotton, Turmeric
Himachal Pradesh	Onion	Sugarcane, Ginger, Cillies (Dry), Cotton, Turmeric
Jammu & Kashmir	Onion	Winter Potato (Plains), Sugarcane, Ginger, Chillies (Dry), Sesamum
Karnataka	Summer Rice, Gram, Urad (R), Mung (R), Winter Potato (Plains), Summer Potato (Plains), Sugarcane, Onion	Summer Rice, Gram, Urad (K), Mung (K), Ragi, Small Millets (K), Tur (K), other Kharif Pulses, Winter Potato (Plains), Summer Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Groundnut, Castor seed, Sesamum, Cotton, Mesta, Sweet Potato, Sannhemp, Nigerseed, Kardiseed, Tapioca
Kerala	Summer Rice, Sugarcane, Sesamum (3rd Crop), Sweet Potato (3rd Crop)	Winter Rice, Ragi, Small Millets (R), Tur (R), Other Kharif Pulses, Other Rabi Pulses, Sugarcane, Ginger, Pepper Black, Sesamum (2nd Crop), Sweet Potato (2nd Crop), Turmeric, Tapioca
Madhya Pradesh	Winter Potato (Hills), Sugarcane, Castorseed, Onion	Autumn Rice, Jowar (K), Bajra, Small Millets (K), Tur (K), Mung (R), Other Rabi Pulses, Summer Potato (Plains), Chillies (Dry), Tobacco, Ginger, Sugarcane, Castorseed, Sesamum, Cotton, Jute, Mesta, Sweet Potato, Turmeric, Sannhemp, Nigerseed

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING THE MONTH OF NOVEMBER, 2021
Contd.

State	Sowing	Harvesting
(1)	(2)	(3)
Maharashtra	Maize (R), Other Rabi Pulses, Sugarcane, Onion	Winter Rice, Jowar (K), Small Millets (K), Sugarcane, Chillies (Dry), Groundnut, Sesamum, Cotton, Sannhemp, Nigerseed
Manipur	_	Winter Rice, Sweet Potato
Orissa	Summer Rice, Bajra (R), Urad (R), Mung (R), Chillies (Dry), Rape & Mustard, Cotton (Late)	Winter Rice, Sugarcane, Chillies (Dry), Groundnut, Castorseed, Cotton (Early), Mesta, Nigerseed
Punjab and Haryana	Wheat, Barley, Winter Potato (Plains), Tobacco, Onion	Summer Potato, Sugarcane, Ginger, Chillies (Dry), Groundnut, Cotton, Sweet Potato, Turmeric, Sannhemp
Rajasthan	Wheat, Barley, Tobacco, (3rd Crop)	Autumn Rice, Jowar (K), Small Millets (K), Tur (K), Urad (K), Mung (K), other Kharif Pulses, Winter Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Groundnut, Sesamum, Cotton
Tamil Nadu	Winter Rice, Jowar (R), Bajra, Tur (R), other Rabi Pulses (Kulthi), Winter Potato (Hills), Sugarcane, Chillies (Dry), Tobacco, Onion	Autumn Rice, Jowar (K), Bajra, Ragi, Small Millets (K), Gram, Tur (K), Mung (K), Winter Potato (Hills), Sugarcane, Pepper Black, Chillies (Dry), Groundnut, Castor seed, Sesamum, Cotton, Onion, Tapioca
Tripura	Summer Rice, Urad (R), Mung (R), other Rabi Pulses, Winter Potato (Plains), Chillies (Dry), Tobacco	Winter Rice, Sugarcane, Cotton
Uttar Pradesh	Wheat, Winter Potato (Hills), Sugarcane, Tobacco, Onion	Winter Rice, Jowar (K), Tur (K), Winter Potato (Plains), Summer Potato, Sugarcane, Groundnut, Rape & Mustard, Cotton, Sweet Potato, Tapioca
West Bengal	Summer Rice, Wheat, Gram, Urad (R), Mung (R), other Rabi Pulses, Sugarcane, Tobacco, Chillies (Dry)	Winter Rice, Tur (K), Urad (K), Mung (R), other Rabi Pulses, Sugarcane, Ginger, Chillies (Dry), Sesamum, Mesta
Delhi	Tobacco	Sugarcane
Andaman & Nicobar Island	–	Winter Rice

(K) – Kharif (R) – Rabi

Note to Contributors

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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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