AGRICULTURAL SITUATION IN INDIA

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CONTENTS

Editorial Desk

This edition of Agricultural Situation in India includes news from the agriculture sector, information on the production and purchase of foodgrains, price indexes, rates of inflation, average daily earnings of field labourers by state, etc. The journal includes two research articles, one on "Determinants in Adoption of DSR in Punjab State" and second on "Adoption of System of Rice Intensification and its Determinants in Telangana State". In addition to this, an Agro-Economic Research study titled "Castor Crop Cultivation in Gujarat: Problems, Prospects and Export Potential" conducted by the Agricultural Economics Research Centre, Sardar Patel University, Vallabh Vidyanagar, Gujarat under the Agro-Economic Research scheme of Economics, Statistics and Evaluation Division, DA&FW is part of this edition.

The farm sector news covers events on First Global Symposium on Farmers' Rights; National Conference for Rabi Campaign 2023-24; launch of UPAg portal; launch of KCC Ghar Ghar Abhiyaan, Kisan Rin Portal and WINDS manual; launch of AI Chatbot for PM-KISAN Scheme among other news.

The annual rate of inflation based on all-India WPI has decreased from 10.55% percent in September, 2022 to (-) 0.26 percent (provisional) in the month of September, 2023. The annual food inflation rate increased by 1.54 percent in the month September, 2023 (provisional) over September, 2022, whereas on month-on-month basis, the food inflation rate decreased by 4.46 percent in September, 2023 over August, 2023, provisionally. The cumulative monsoon season rainfall in the country during the period 1st June, 2023 to 27th September, 2023 has been 6 percent lower than the long period average (LPA). Current live storage in 150 major water reservoirs in the country is 129.67 BCM, as against the average storage of last 10 years, 140.47 BCM.

The article on "Determinants in Adoption of Direct Seeding of Rice (DSR) in Punjab State" provides insights into the challenges and factors influencing the adoption of this sustainable agricultural practice. The study aims to identify the determinants influencing DSR's wider adoption and the constraints faced by the DSR adopters. Key findings indicate that poor seed germination, inadequate crop establishment, and heavy rain immediately after sowing were the major reasons for reverting to conventional ploughing methods. Analysis revealed that factors such as the availability of direct seeding implements, extension contacts, and DSR training positively impacted DSR adoption. An increase in the availability of seeding implements, extension contacts, and DSR training corresponded to increase in adoption of DSR while the age of the farmer negatively affected its adoption. The study concludes that while DSR offers a viable alternative to traditional rice cultivation, its adoption in Punjab remains limited. To increase its uptake, the study suggests enhancing awareness about DSR practices, improving access to necessary implements, and expanding training programs. Additionally, government subsidies and continued research into effective agronomic practices and mechanization are recommended to address the challenges faced by farmers and promote wider adoption of DSR.

The article on "Adoption of System of Rice Intensification and its Determinants in Telangana State" aims to identify and analyze the problems faced by farmers in adopting SRI, focusing on socio-economic, land-related, and component-specific challenges. The study find that majority of the farmers have adopted modified SRI components. Adoption of SRI includes skilled labour demands for weeding, and land and nursery land preparation. Early adopters of this practice are found to face lower risks. Adoption is more common among farmers with larger irrigated areas and higher family sizes. Younger, literate farmers and those affiliated with self-help groups or NGOs are more likely to adopt SRI practices. The study concludes that while SRI offers numerous benefits, its adoption is constrained by labour challenges, risk perceptions, and socio-economic factors. To enhance adoption, targeted interventions such as improved extension services, better credit access, and support for overcoming labour shortages are essential. Addressing these challenges can facilitate broader adoption of SRI and its associated benefits.

The Agro-Economic Research study on "Castor Crop Cultivation in Gujarat: Problems, Prospects and Export Potential" aims to analyze trends in castor area and production growth across Gujarat, identify growth sources, assess price and non-price factors affecting castor seed supply and demand, estimate cultivation costs and identify constraints, and propose policies to enhance castor production and productivity in the selected districts. The findings highlight Gujarat's pivotal role in global castor production, as the state leads India in production, has the highest productivity globally, and has seen significant rise in area under the crop. The study concludes that improving castor cultivation in Gujarat requires promoting better hybrids, enhancing the seed replacement ratio, organizing seed systems, and enhancing seed quality through training. Awareness about modern farming practices and climate-specific technologies is crucial. Strengthening logistics, developing castor derivatives, and fostering international collaborations will sustain India's competitive edge in the global market.

Promodita Sathish

Farm Sector News

Meetings and Events

First Global Symposium on Farmers' Rights

The President of India, Smt. Droupadi Murmu inaugurated first 'Global Symposium on Farmers' Rights' (GSFR) on 12th September, 2023 in a ceremony held at ICAR Convention Centre, National Agricultural Science Centre, New Delhi. Organised by the Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture (International Treaty) of the Food and Agriculture Organization (FAO), Rome, the Global Symposium was hosted by Ministry of Agriculture and Farmers Welfare in collaboration with Protection of Plant Varieties and Farmers' Rights (PPVFR) Authority, Indian Council of Agricultural Research (ICAR), ICAR - Indian Agricultural Research Institute (IARI), and ICAR-National Bureau of Plant Genetic Resources (NBPGR).

President Murmu conferred the 'Plant Genome Saviour Communities' Award (6) and 'Plant Genome Saviour Farmers Reward' (16) and 'Plant Genome Saviour Farmers Recognition' (4) awards to the invited Indian farmers. She also inaugurated the newly constructed 'Plant Authority Bhawan', the office of the PPVFR Authority, and an online plant variety 'Registration Portal'. Union Minister of Agriculture & Farmers Welfare, Shri Narendra Singh Tomar, MoS Shri Kailash Chaudhury and Secretary, Shri Manoj Ahuja were also present on the occasion.

The event organised from 12th -15th September, 2023 was attended by more than 700 delegates from 59 countries including the National Focal Points of the International Treaty, farmer bodies from around the world, policy makers, scientists, research scholars, industry representatives, government officers, intergovernmental and non - governmental organizations, legal experts and civil society. This first of its kind symposium aimed to facilitate implementation of Farmers' Rights by Contracting Parties of the Treaty through discussions on innovative approaches, effective policies, best practices, knowledge, and experience sharing in implementing Farmers' Rights.

The technical sessions of 'First Global Symposium on Farmers' Rights (GSFR)' were held at the ICAR Convention Centre, National Agricultural Science Centre, New Delhi. Various issues pertaining to Farmers' Rights as set out in the Article 9 of the International Treaty were deliberated in five different technical sessions, two panel discussions and three special sessions. A special session on Farmers Forum was an important inclusion in the GSFR. The deliberations and suggestions emanating from the GSFR have been crystalized in a 'Delhi Framework on Farmers' Rights', as a proposal from India to the Treaty:

1. Accelerate efforts to implement multiple options as advocated by the Treaty for realization of farmers' rights. For this, Treaty Secretariat to create a handholding and capacity development mechanism.

2. Establish an institutional mechanism that is responsible for creation of awareness about the Farmers' Rights, capacity building of custodian farmers and farmers' seed systems, and facilitating equitable benefit sharing, and request Treaty Secretariat to coordinate such initiatives.

3. Advocate creation of functional synergy across different UN instruments (ITPGRFA, CBD, UNDROP, UNDRIP, etc.) to facilitate the realization of farmers' rights.

4. Strengthen the Benefit Sharing Fund for supporting farmers and farmers' seed systems to ensure conservation and sustainable use of PGRFA; and for the realization of farmers' rights through enabling environment by national governments, international organizations and incentivize participation of private sector in supporting conservation activities.

5. Create conducive condition for active participation of different stakeholders and building farmer-centric partnership opportunities including South-South, triangular and regional cooperation to accelerate implementation of Farmers' Rights.

6. A special package be packaged as part of climate change adaptation and mitigation funds to directly support on-farm conservation and custodian farmers, who are the most affected by extreme climatic events.

7. Establish/support farmer-managed seed system for traditional varieties and create self-sustaining production and marketing value chain, to enhance farm income of custodian farmers and strengthening of local food systems.

8. Join hands to systematically document traditional knowledge associated with PGRFA, adhering to prior informed consent and respecting the sensibilities of communities. Treaty Secretariat to facilitate the process under ongoing documentation programmes.

9. Application of new science and technologies aimed at conservation and sustainable use of PGRFA, taking necessary precautions to avoid negative impact on farmers' rights and ensuring enhanced benefit sharing opportunities.

10. Create legal and formal provisions in their existing system that recognize and protect farmers' rights as envisaged in the Plant Treaty.

National Conference for Rabi Campaign 2023-24

Secretary, Department of Agriculture and Farmers Welfare, Shri Manoj Ahuja on 26th September, 2023 inaugurated the National conference on Agriculture for Rabi Campaign 2023-24. In his address, Shri Manoj Ahuja highlighted that as per 3rd Advance Estimates (2022-23), production of foodgrains in the country is estimated at 3305 lakh tonnes which is higher by 149 lakh tonnes than the production of foodgrain during 2021-22. Record production is estimated of rice, maize, gram, pulses, rapeseed and mustard, oilseeds and sugarcane. Total pulses and oilseeds production during 2022-23 is estimated at record 275 and 410 lakh tonnes, respectively.

Secretary (DA&FW) said that total foodgrain production has increased by 31% in last 8 years from 251.54 to 330.54 million tonnes. Oilseeds and pulses have followed the same trend of exports of agricultural products (including marine and plantation products) for the year 2022-23 which have crossed USD 53.145 billion, highest level ever achieved for agricultural exports.

The objective of this conference was to review and assess the crop performance during the preceding crop seasons and fix crop-wise targets for Rabi season in consultation with State Governments, ensure supply of critical inputs and facilitate adoption of innovative technologies with a view to enhance production and productivity of the crops. The priority of government is agro-ecological based crop planning for diversion of land from excess commodities like rice and wheat to deficit commodities like oilseeds and pulses and high value export earning crops. 1st National Conference of Chief Secretaries at Dharmshala under the Chairmanship of Prime Minister has set the agenda for crop diversification and self sufficiency in pulses and oilseeds in consultation with states. This conference will take the agenda towards logical conclusion.

National targets for total foodgrains production has been set at 3320 lakh tonnes for the year 2023-24, and Rabi season will contribute 1612 lakh tonnes out of this. Similarly share of Rabi crops will be 181 out of 292 lakh tonnes for pulses and 145 out of 440 lakh tonnes for oilseeds. The strategy would be to increase area through inter - cropping and crop diversification and productivity enhancement through introduction of HYVs and adoption of suitable agronomic practices in low yielding regions.

All technical and input related issues concerning Rabi season were deliberated in details. Secretary, Fertilizers, Shri Rajat Kumar Mishra stressed on need of timely supply of fertilizers. He shared various steps taken by Fertilizer department to ensure timely supply of fertilizers. Secretary (DARE) and DG, ICAR, Dr. Himanshu Pathak highlighted need for adopting climate resilient practices. He presented global perspective of climate change and adaptation strategies being put in place. Indian experience of combating climate change was shared by NICRA team.

The conference raised concern at large yield gaps in crop production with farmers practice compared to improved technologies. JS (Crops & Oilseeds), Smt. Shubha Thakur gave vision for pulses and oilseeds for next 5 years to make country self sufficient in these commodities. For pulses, it is proposed to achieve the target of 325.47 lakh tonnes by 2025. Special projects like inter-cropping, targeting rice fallows, expansion in high potential districts and non-conventional regions will bring additional area under oilseeds. All this will increase domestic production of annual edible oilseeds

from current level of 362 to 541 lakh tonnes and edible oil production from 85 to 136 lakh tonnes by the end of 2025-26. The renewed focus will help in reducing the import dependency from 56% to 36% in next 5 years. Additional Secretary (Agriculture) and senior officers from DA&FW, ICAR and officers of different State Governments participated in the National Conference.

General Agricultural Sector News

Launch of Unified Portal for Agricultural Statistics

Member of NITI Aayog, Professor Ramesh Chand officially launched the Unified Portal for Agricultural Statistics (UPAg portal- www.upag.gov.in) on 15th September, 2023. The launch is a groundbreaking move to address the complex governance challenges India's agriculture sector is facing. This innovative platform, designed to streamline and enhance data management in the agricultural domain, marks a significant step towards a more efficient and responsive agricultural policy framework. It has been developed by Department of Agriculture and Farmers' Welfare in a bid to address data related governance challenges in agriculture such as lack of standardized and verified data, which makes it difficult for policymakers, researchers, and stakeholders to make informed decisions. The UPAg portal is set to change this landscape with its comprehensive approach to data integration and analysis.

The following are some of the key challenges addressed by UPAg portal:

1. Lack of standardized data: Currently, agricultural data is scattered across various sources and often presented in different formats and units. UPAg Portal aims to consolidate this data into a standardized format, making it easily accessible and understandable for users.

2. Lack of verified data: Reliable data is crucial for accurate policy decisions. UPAg portal ensures that data from sources like Agmarknet is vetted and updated in a timely manner, providing policymakers with accurate information on agricultural prices.

3. Dispersed data: To form a comprehensive view of any crop, multiple variables need to be considered, including production, trade, and prices. UPAg portal brings together data from various sources, providing a holistic assessment of agricultural commodities.

4. Different frequency variables: Data updates at different times, causing delays and inefficiencies. UPAg portal offers real-time connectivity with data sources, reducing the time and effort required for monitoring and analysis.

Some of the key features of UPAg portal are:

1. Data standardization: The portal standardizes data on prices, production, area, yield, and trade, making it accessible in one location, eliminating the need to compile data from multiple sources.

2. Data analysis: UPAg portal will perform advanced analytics, offering insights such as production trends, trade correlations, and consumption patterns, aiding policymakers in making informed decisions.

3. Granular production estimates: The portal will generate granular production estimates with increased frequency, enhancing the government's ability to respond to agricultural crises swiftly.

4. Commodity profile reports: Commodity profile reports will be produced using algorithms, minimizing subjectivity and providing users with comprehensive insights.

5. Plug and play: Users will have the flexibility to use the portal's data to prepare their own reports, promoting data-driven decision-making.

Launch of KCC Ghar Ghar Abhiyaan, Kisan Rin Portal and WINDS manual

Union Finance Minister, Smt. Nirmala Sitharaman and Union Agriculture Minister, Sh. Narendra Singh Tomar on 19th September, 2023 unveiled initiatives focused on agri-credit (KCC & MISS) and crop insurance (PMFBY/RWBCIS). The Ministry of Agriculture & Farmers Welfare launched three initiatives, namely the Kisan Rin Portal (KRP), KCC Ghar Ghar Abhiyaan, an ambitious campaign aiming to extend the benefits of the Kisan Credit Card (KCC) scheme to every farmer across the nation and a manual on Weather Information Network Data Systems (WINDS). These initiatives aim to revolutionize agriculture, enhance financial inclusion, optimize data utilization, and improve the lives of farmers across the nation.

1. Kisan Rin Portal (KRP)

Developed collaboratively by MoA&FW, the Department of Financial Services (DFS), Department of Animal Husbandry & Dairying (DAH&D), Department of Fisheries (DoF), RBI, and NABARD, KRP is poised to revolutionize access to credit services under the Kisan Credit Card (KCC). It will also assist farmers in availing subsidized agriculture credit through the Modified Interest Subvention Scheme (MISS). The KRP portal serves as an integrated hub, offering a comprehensive view of farmer data, loan disbursement specifics, interest subvention claims, and scheme utilization progress. By fostering seamless integration with banks, this pioneering portal enables proactive policy interventions, strategic guidance, and adaptive enhancements for more focused and efficient agriculture credit and optimum utilization of interest subvention.

2. Ghar-Ghar KCC Abhiyaan: Door to Door KCC Campaign

The event marks the beginning of the "Ghar Ghar KCC Abhiyaan," an ambitious campaign to extend the benefits of the Kisan Credit Card (KCC) scheme to every farmer across India. This campaign aims to achieve universal financial inclusion, ensuring that every farmer has unhindered access to credit facilities that drive their agricultural pursuits. This campaign will play a pivotal role in reaching out to non-KCC account holder PM KISAN beneficiaries and fostering the saturation of KCC Accounts among eligible PM Kisan beneficiary farmers. For KCC Ghar Ghar Abhiyaan, NABARD has been identified as the primary executing organization, vested with the responsibility of overall execution and monitoring of the programme. In this regard, NABARD has taken the initiative to develop a portal to facilitate in monitoring the conduct of saturation drive camps in the field as also processing and issuance of KCCs to all eligible PM Kisan beneficiaries by the respective banks.

3. Launch of WINDS Manual

The Weather Information Network Data Systems (WINDS) initiative stands as a pioneering effort to establish a network of Automatic Weather Stations & Rain Gauges at the taluk/block and gram panchayat levels. This initiative creates a robust database of hyper-local weather data, supporting various agricultural services. The comprehensive WINDS manual provides stakeholders with an in-depth understanding of the portal's functionalities, data interpretation, and effective utilization. It guides States and Union Territories in establishing and integrating with the WINDS platform, fostering transparent and objective data observation and transmission. It also offers practical insights into leveraging weather data for improved crop management, resource allocation, and risk mitigation.

AI Chatbot for PM-KISAN Scheme

Union Ministry of Agriculture & Farmers Welfare, Government of India on 21st September, 2023 launched AI Chatbot for the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme at New Delhi. The AI Chatbot launch marks a significant step towards enhancing the efficiency and reach of the PM-KISAN scheme, and also providing farmers prompt, clear, and accurate responses to their queries.

Launching the AI Chatbot, Union Minister of State for Agriculture and Farmers Welfare, Shri Kailash Choudhary the Chatbot will help in accessing scheme information and resolving grievances. He also called upon the need to widen the service to link it with other related issues like weather information, soil conditions and bank payments etc. During the virtual event, dignitaries from the Government of India and the State Government gathered to celebrate this significant milestone in the agricultural sector.

Shri Manoj Ahuja, Secretary, Department of Agriculture & Family Welfare noted that the AI Chatbot will also be implemented for other major schemes of the Ministry in coming months.

In its first phase of development, the AI chatbot will assist farmers in seeking information related to their application status, payment details, ineligibility status, and other scheme-related updates. The AI Chatbot, accessible through the PM KISAN mobile app, is integrated with Bhashini, which offers multilingual support, catering to the linguistic and regional diversity of the PM KISAN beneficiaries. This integration of advanced technology will not only enhance

transparency but will also empower farmers to make informed decisions. Currently, the Chatbot is available in English, Hindi, Bengali, Odia, and Tamil. In a short period, it will be available in all 22 languages of the country.

Mobile application and web portal for General Crop Estimation Survey (GCES)

Shri Manoj Ahuja, Secretary, Department of Agriculture and Farmers Welfare (DA&FW) launched the mobile application and the web portal for GCES (General Crop Estimation Survey) on 21st September, 2023. This revolutionary portal and mobile application have been designed to transform agricultural practices across the nation. Shri Ahuja emphasized on the need of real time estimates and technology in agriculture. He mentioned that the accuracy of the data is a very important component for truthful and reliable outcome generation and the responsibility of ensuring accuracy of the data lies with the data providers as well. Hence, he requested all the states to adopt GCES portal and application to ensure creditability.

The key challenges addressed by GCES web portal and mobile application are:

1. Delay in reporting- Till date, data collection, compilation and yield estimation is completely manual process which cause delay in reporting by states. In the new process, the field data will be collected using GPS enabled mobile application and will be stored in the server which ensures on time reporting of crop statistics.

2. Transparency- GPS enabled devices provide precise latitude and longitude coordinates for data collection points. This information ensures that data is linked to specific geographic locations, leaving no room for ambiguity or manipulation of data regarding where it was collected.

The key features of the GCES web portal and mobile application are:

1. Comprehensive information- The portal and the app provide a comprehensive repository of yield estimation including village-wise GCES plan and plot details where the crop cutting experiments are conducted, post-harvesting crop weight and driage weight of the crop.

2. Geo-referencing- Geo-referencing is one of the key features of the mobile application, which enables the primary worker to draw the boundary of the experimental plot and upload photos of the plot as well as of the crops through it. This feature will ensure transparency and accuracy of the data as well.

General Survey of Agriculture

Trend in Food Prices

The rate of inflation, based on all-India WPI, stood at -0.26% (Provisional) for the month of September, 2023 as compared to 10.55% during the corresponding period of last year.

WPI Food Index (Weight 24.38%): The Food Index consisting of 'Food Articles' from Primary Articles group and 'Food Product' from Manufactured Products group has decreased from 186.1 in August, 2023 to 177.8 in September, 2023. The year-over-year rate of inflation based on WPI Food Index decreased from 5.62% in August, 2023 to 1.54% in September, 2023.

Based on Wholesale Price Index (WPI) (2011-12=100), the WPI of pulses, cereals and fruits increased by 17.69 percent, 7.28 percent and 5.96 percent, respectively, and for vegetables it decreased by 15.00 percent and in September, 2023 over corresponding period of last year. Whereas, on month-on-month basis, the WPI for cereals, fruits and pulses increased by 1.10 percent, 4.95 percent and 6.02 percent and for vegetables it decreased by 37.06 percent, respectively, in September, 2023 over August, 2023.

Among cereals, the WPI based rate of inflation for wheat and paddy increased by 6.33 percent and 8.97 percent, respectively, in September, 2023 over September, 2022 while on month-on-month basis, the WPI for paddy and wheat increased by 1.52 percent and 1.15 percent, respectively, in September, 2023 over August, 2023.

Rainfall and Reservoir Situation, Water Storage in Major Reservoirs

Cumulative Monsoon Season (June-September), 2023 rainfall for the country as a whole during the period 1st June, 2023 to 27th September, 2023 has been 6% lower than the Long Period Average (LPA). Rainfall in the four broad geographical divisions of the country during the above period has been higher than LPA by 1% in North-West India, by 0% in Central India, but lower than LPA by 18% in East & North East India and by 9% in South Peninsula.

Out of 36 meteorological sub - divisions, 04 meteorological sub - divisions received large excess/ excess rainfall, 25meteorological sub-division received normal rainfall and 07meteorological sub-divisions received deficient/large deficient rainfall.

Out of 717districts for which rainfall data available, 21(3%) districts received large excess rainfall, 99(14%) districts received excess rainfall, 372(52%) districts received normal rainfall, 210(29%) districts received deficient rainfall and 11(2%) districts received large deficient rainfall.

Current live storage in 150 reservoirs (as on 29th September, 2023) monitored by Central Water Commission having Total Live Capacity of 178.78 BCM was 129.67 BCM as against 158.74 BCM on 29.09.2022 (last year) and 140.47 BCM of normal storage (average storage of last 10 years). Current year's storage is 82% of last year's storage and 92% of the normal storage.

As per progress of area coverage report, area sown in the current year 2023 is 1107.15 lakh ha (101% of Normal Area) as compared to 1104.79 lakh ha during the corresponding period of last year. Higher area under Rice (7.68 lakh ha), Coarse Cereals (3.25 lakh ha) and Sugarcane (4.25 lakh ha) as compared to corresponding period of last year.

A statement indicating comparative position of area coverage under major crops as on 29.09.2023 during current Kharif season vis-a-vis the coverage during the corresponding period of last year is given in the Annexure-I.

Annexure-I

All India Crop Situation - Kharif (2023-24) as on 01.09.2023

(in lakh ha.)

Crop Name	Normal area of whole kharif season	Area sown reported			Absolute change
		This year 2023	% of normal for whole season	Last year 2022	
Rice	399.45	398.08	99.7	383.79	14.30
Jowar	17.36	14.06	81.0	15.57	-1.51
Bajra	73.24	70.81	96.7	70.41	0.40
Maize	75.71	82.86	109.4	80.66	2.20
Ragi	10.94	8.13	74.3	7.73	0.40
Small Millets	4.66	5.21	111.7	4.77	0.44
Sri Anna cum Coarse Cereals	**181.91**	**181.06**	**99.5**	**179.13**	**1.93**
Tur	46.29	42.66	92.2	45.27	-2.61
Urad	39.23	31.68	80.8	36.65	-4.97
Moong	36.56	30.98	84.7	33.57	-2.59
Others Pulses	17.62	13.77	78.2	14.64	-0.87
Total pulses	**139.70**	**119.09**	**85.3**	**130.13**	**-11.04**
Total foodgrains	**721.05**	**698.24**	**96.8**	**693.05**	**5.19**
Groundnut	45.04	43.37	96.3	45.00	-1.63
Soybean	117.44	125.13	106.6	123.91	1.22
Sunflower	1.23	0.69	56.3	1.98	-1.29
Sesamum	15.94	11.83	74.2	12.80	-0.97
Niger seed	1.48	0.45	30.2	0.82	-0.37
Castor seed	8.68	8.53	98.3	7.26	1.27
Total oilseeds	**189.81**	**190.11**	**100.2**	**191.91**	**-1.80**
Cotton	128.67	122.99	95.6	125.63	-2.65
Sugarcane	48.85	59.91	122.6	55.65	4.26
Jute & Mesta	6.90	6.57	95.2	6.97	-0.40
All crops	**1095.29**	**1077.82**	**98.4**	**1073.22**	**4.60**

Source: Crops Division, DA&FW

Articles

Determinants in Adoption of Direct Seeding of Rice (DSR) in Punjab State

GURPREET SINGH[1] AND SANGEET RANGUWAL[2]

Abstract

Considering sustainable agriculture as the keystone of Punjab's social and economic prosperity, promotion of direct seeding of rice (DSR) has been one of the pioneer steps in this regard in the Punjab Government's 2023-24 Budget. Inspite of an incentive Rs. 1500 per acre, DSR has been adopted by only about 30000 famers covering 84.9 thousand hectares (only about 3 percent of the total area under paddy during 2021-22). With this consideration, the present study was carried out in Punjab state during 2021-22 to highlight the constraints faced by the DSR adopters and determinants of its speedy adoption. It was found that poor seed germination and pitiable crop establishment followed by heavy rain immediately after sowing were the main reasons of ploughing back the DSR. Data related to adoption of practices recommended by PAU revealed that most of the farmers followed the recommendation, i.e. seed treatment, recommended date of sowing and recommended machinery for sowing. Results of binomial regression analysis indicated that among 7 statistically significant factors affecting adoption of the DSR, one percent rise in the availability of direct seeding implements, extension contacts and DSR trainings increased the adoption level by 33, 23 and 20 percent, respectively, while with increase in age it declined by 2 percent. High transplanting cost for human labour, expert advice and non availability of required implements were the major hurdles in adopting DSR by the adopters while easily available labour for transplanting paddy, lack of technical knowledge, diffidence in adopting DSR and non-availability of required implements were the major reasons of non-adoption. Study suggested the need to generate more awareness of recommended DSR production practices; capacity building by educating/training; timely availability of required farm implements on custom hiring basis; auxiliary research and development efforts for large scale adoption of the DSR.

Keywords: *Adoption, constraints, determinants, DSR, plough back*

1. Introduction

Rice is one of the most important food crops of India. About 70 percent Indians use rice as their primary food source, and it occupies 40 to 45 percent of all the land in India under cereal crops. The growing demand of rice has to be met by producing more rice with less agricultural input energy usages. Further, paddy is mostly cultivated by hand-transplanting in puddled field conditions (wet cultivation) in the country. Puddling damages soil structure and uses a lot of water and energy. During the past ten years, Indian economy has seen a significant transition as farm labour has been migrating throughout this time to industries with better pay and working conditions which has led to a sharp rise in farm labourer pay, which has affected the profitability of the rice production (Bhullar *et al.*, 2018). When the future of rice production is in jeopardy due to worldwide water constraint, direct seeded rice (DSR) presents a desirable alternative (Farooq *et al.*, 2011). The conventional puddled transplanting of rice (PTR) is water, capital, energy and labor-intensive practice (Bhatt *et al.*, 2019; Singh *et al.*, 2020; Bhatt *et al.*, 2021). There is an urgent need to switch from the traditional PTR to DSR because it is not only cost, input, energy and time saving but is also environment friendly (Bandumula *et al.*, 2018; Jat *et al.*, 2022). DSR as a conservation tillage practice also helps in reducing the energy consumption, carbon input and greenhouse gas (GHG) emission in comparison to PTR method (Basavalingaiah *et al.*, 2020).

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The state of Punjab has been playing a leading role in the agricultural transformation of the country (Mahajan *et al.,* 2015). A sustainable production of rice in the state is crucial for the food security of India. It contributed about 25 to 30 percent rice and 35 to 40 percent wheat to the central pool during the last one decade (PAU, 2022). In the state, timely rice establishment through PTR depends exclusively on migratory labour (50 million men days) (Dhillon and Vatta, 2020) and further, farmers' reliance on groundwater to irrigate paddy together with the supply of electricity and irrigation at concessions has fostered inefficient resource use, altered the inter-temporal resource allocation, and led to ecological imbalance. According to a study, if water is available and labour costs are low, transplanting is preferred; if labour costs are high and water is scarce, DSR is preferred (Kaur and Singh, 2017). Further, due to lack of past experience regarding component technologies related to DSR, some farmers have failed in targeting potential rice grain yield due to inefficient management of weeds, nutrient deficiencies, heavy mouse attack, poor germination owing to deep placement of seeds, rodent attack, etc. (Rohila *et al.,* 2018). For farms with lower efficiency levels, there is also enough room to increase production via good management and allocation of the available resources and technologies (Samarpitha *et al.,* 2016). The essence of agricultural development is to improve both individual farm household welfare and in the aggregate, achieve desirable economic and social impacts (Menale *et al.,* 2016). Considering sustainable agriculture as the keystone of Punjab's social and economic prosperity, promotion of direct seeding of rice (DSR) has been one of the pioneer steps in this regard in the Punjab Government's 2023-24 budget.

1.1 Objectives of the study

The present study was carried out to highlight the adoption status of recommended practices of DSR, constraints along with determinants of its speedy adoption in the state of Punjab.

2. Data sources and methodology

The present study has been undertaken in Punjab state during the agricultural year 2021-22. Primary data were collected using multi-stage random sampling technique through personal interview method. One district, namely Sri Mukatsar Sahib having highest area under the DSR technology for paddy cultivation was identified through consultation with officials of the Punjab State Department of Agriculture at the first stage. Keeping in view the concentration of DSR technology, two blocks namely Gidderbaha and Mukatsar were selected at the second stage (Table 1). From each block, two villages with widespread adoption of DSR were selected at the third stage. From Gidderbaha block, Kauni and Doda villages were selected and from Mukatsar block, Bhullar and Thandewala villages were chosen for the study.

TABLE 1: SAMPLING DESIGN OF THE STUDY

District	Block	Village	DSR Adopters	DSR Non-Adopters	Total
Sri Mukatsar Sahib	Gidderbaha	Kauni	20	10	30
		Doda	20	10	30
	Mukatsar	Bhullar	20	10	30
		Thandewala	20	10	30
Grand total			80	40	120

Source: Designed by author

Using simple random sampling technique, 20 DSR adopter farmers were chosen from each selected village for the study. In order to undertake impact assessment of the DSR technology, ten DSR non-adopter farmers from the same vicinity were also taken as a control group in the analysis. Thus, the total sample for the

study comprised of 120 farmers (80 adopters and 40 non-adopters) spreading over different farm size groups based on operational holding, *i.e.* small (5 acre or less), medium (5 to 15 acres) and large (more than 15 acres).

The data on general information about the respondents, *i.e.* age, education, farming experience, family size, operational holding, cropping pattern, sources of agricultural information, trainings related to DSR attended, adoption of practices recommended by Punjab Agricultural University (PAU), along with factors affecting DSR adoption, reasons for ploughing back of DSR area and farmers' perceptions regarding adoption and non-adoption of the DSR were obtained from them.

2.1 Binary logistic regression model

To study the factors affecting the adoption behavior of DSR, the logit model was used. The dependent binary variable for the logit model was $Y_i = 1$, if farmer i had adopted the direct seeded rice technology and 0, otherwise.

The probability of adoption (P) for a given set of values of variables can be expressed in the form of given logit model

$$\ln\left(\frac{P}{1-P}\right) = \beta_0 + \sum_{i=1}^{n} B_i X_i + \varepsilon$$

Where, β_is are logit coefficients for the n variables X_is, $\beta_0$intercept and ε is the error term. In both types of variables sign of coefficient reveals the direction of change. The set of regressors, comprising personal and other variables influencing DSR technology adoption, used in the model are listed in the Table 2 given below.

TABLE 2: DIFFERENT VARIABLES USED IN BINARY LOGISTIC REGRESSION MODEL

Dependent Variable	Description
Adoption Status (Y)	1 if the farmer adopts Direct Seeded Rice technology; 0 otherwise
	Independent Variables (X)
Age	Age of respondent (Years)
Education	Educational level of respondent (level)
Tractor HP	Capacity of the tractor in horse power (HP)
Implements required for direct seeding of rice	Availability of implements (Yes/No)
Trainings related to DSR	Trainings attended by respondent (Yes/No)
Farm Size	Farm size of the respondents (acres)
Extension contacts	Extension contacts of respondents (Number)
Source of irrigation	Particular source of irrigation (Canal or Tubewell or both)

Source: Designed by author

The model used to analyze the factors affecting the adoption of direct seeding of rice technology thus became:

$Y_i=\beta_0+\beta_1$ (Age_N)$+\beta_2$ (Edu_N)$+\beta_3$ (Tractor HP code) $+ \beta_4$ (Implements)$+\beta_5$ (Training DSR)$+\beta_6$ (Farm size code)$+\beta_7$ (Extension contacts)$+\beta_8$ (Irrigation source)$+ \varepsilon_i$.

3. Results and discussion

3.1 Initial sowing and ploughing back of DSR

During the initial stage of crop establishment, on account of certain reasons, DSR adopters resort to plough back the DSR partially or entirely. The analysis of data revealed that about 14 percent of the selected DSR respondents resorted to ploughing of their DSR and shifted to conventional PTR method of paddy cultivation (Table 3). It may be mentioned here that the farmers who ploughed back whole area under DSR were not included in the sample.

TABLE 3: DETAILS OF PLOUGH BACK AREA BY THE RESPONDENTS - 2021-22

Category		Small		Medium		Large		Overall	
		No.	Area (acres)	No.	Area (acres)	No.	Area (acres)	No.	Area (acres)
DSR	Initial (A)	10	45.50	25	215.44	45	1083.00	80	1343.94
	Ploughed back	1 (10.00)	2.00 (4.40)	4 (16.00)	17.94 (8.33)	6 (13.33)	31.00 (2.86)	11 (13.75)	50.94 (3.80)
	After plough back	10	43.50 (95.60)	25	197.50 (91.67)	45	1052.00 (97.14)	80	1293.00 (96.20)
Non -DSR		8	4.35* 29.70	11	7.90* 82.00	21	23.38* 552.80	40	16.16* 664.50

Note: Farmers who ploughed back whole DSR area under paddy were not included in the sample. Figures in parentheses indicate percentages to respective initial figures (A); *area in acres per farm

It was also observed that the plough back area accounted for about four percent (50.94 acres) of the initial area under DSR. The total area under DSR ploughed back in case of small, medium and large farmers worked out to be 2.00, 17.94 and 31.00 acres respectively which constituted about 4.40, 8.33 and 2.86 percent to the initial area, *i.e.* maximum proportion of plough back area was observed under medium farm category. After adjusting for the ploughed back area, the final area under DSR was 1293 acres and for the small, medium and large farm categories, it was 43.50, 197.50 and 1052 acres, respectively. Area under DSR was found to increase with the farm size as the area per farm for the large farmers was the maximum, *i.e.* 23.38 acres followed by the medium, *i.e.* 7.90 and small (4.35 acres/farm) farm category.

3.2 Reasons for ploughing back of DSR

Analysis of data relating to different reasons of ploughing back DSR by the respondents indicated that poor seed germination was the major reason as mentioned by about 45 percent of the respondents (Table 4). Other reasons behind the plough back were poor crop establishment (36.37%), high weed infestation and rodent attacks (27.27%).

TABLE 4: REASONS OF PLOUGHING BACK OF DSR BY THE RESPONDENTS

Reasons	Number	Percentage
Poor germination	5	45.45
Poor crop establishment	4	36.37
High weed infestation and rodent attack	3	27.27
Heavy rain immediate after sowing	2	18.18
Pressure from relative and friends	1	9.09

Source: Field survey

Only two farmers, *i.e.* 18.18 percent of the respondents were forced to plough DSR area due to heavy rain immediately after sowing. One farmer ploughed the DSR field due to pressure generated by the relatives and friends related to poor performance of DSR in their villages.

3.3 Adoption of recommended practices for Direct Seeding of Rice cultivation

Farmers' fields are intensively managed ecosystems (Singh and Benbi, 2020) where farmers adopt varied crop production practices and make arrangements at their own level to solve the location specific problems (Singh *et al.,* 2019). The status of adoption of different agronomic practices recommended by the PAU for paddy cultivation using DSR method was also studied (Table 5). As per recommendations, the field needs to be ploughed twice with a disc harrow followed by cultivation with cultivator and planking and laser levelling for seed bed and land preparation for sowing paddy. It was observed that among the DSR adopters, majority of the farmers, *i.e.* 97.50 percent followed this recommended practice for land preparation. Pre-sowing irrigation is applied after laser levelling and when the field reaches satisfactory soil moisture, it is cultivated and prepared, and paddy seeds are immediately sown. It was observed that all the farmers were applying rauni irrigation though only 96% of them had sown the seed in tar-wattar condition. Further, it was also evident from the data that most of the farmers, *i.e.* 91.25 percent used recommended machinery, *i.e.* lucky seed drill for sowing DSR and about 65 percent of them used it on custom hiring basis. It might be due to the reason that DSR drill was expensive to purchase and farmers preferred to hire it for sowing. Few farmers (8.75%) have made some modifications in the happy seeder and seed drills to enable them to directly sow the paddy crop. In a recent study for Punjab, it was found that about five percent farmers had sown DSR after modifying implements like happy seeder, drills available with them (Kamboj *et al.,* 2022). It was also observed that the farmers had grown more than one variety at their DSR farms. About 90 percent of the respondents had opted for the short duration and medium duration paddy varieties and among these about one-fourth had adopted most suitable variety PR-126 recommended by PAU for DSR. PR-126 is a short duration variety and advantageous for weed management. About 79 percent of the DSR adopters had grown only recommended varieties of paddy, while 16.25 percent had sown un-recommended ones and 5 percent used both the recommended and un-recommended varieties. Similarly, the proportion of the farmers following recommended date of sowing for DSR (1-15th June) and doing seed treatment worked out as 95 percent and 96.25 percent, respectively.

Only about 48 percent respondents were found to be using recommended quantity of seed (8 kg per acre), while rest were in practice of using lesser seed rate. The DSR adopters were found to be using much higher dose of urea than recommended by the PAU (130 kg per acre).

TABLE 5: ADOPTION OF AGRONOMIC PRACTICES BY THE RESPONDENTS USING DSR

S. No.	Particulars	Recommended practice	Recommended/following
1	Land Preparation	Plough the field twice with disc harrow followed by cultivation with cultivator and planking and laser leveling	78 (97.5%)
2	Pre-sowing irrigation (Rauni)	Number of respondents	80(100.0%)
3	Variety of paddy	SD and MD	72(90.0%)
4	Sowing implements	Lucky seed drill	73 (91.25%)

S. No.	Particulars	Recommended practice	Recommended/following
5	Sowing method	Tarr-wattar condition	77(96.25%)
6	Sowing Time	1-15 June (16-30 June in PR 126)	76 (95.0%)
7	Seed Rate (kg/acre)	8	38 (47.5%)
8	Seed Treatment	Treated	77 (96.25%)
9	Fertilizer application		
A	Urea (kg/acre)	130	36(45.0%)
B	Phosphorus	if recommended dose of phosphorus had been applied to the preceding wheat crop	12(15.0%)
10	Irrigation Scheduling of first irrigation in Tarr-wattar	21 days	58(72.5%)
11	Harvesting	Ears are nearly ripened and straw has turned yellow	80 (100%)

Source: Field survey
Note: Figures in parentheses indicate percentages from total number of respondents

It may be mentioned here that in the Punjab state, the average N fertilization rate (including both urea and DAP) was 36 percent higher than the recommended dose of N for rice (PAU, 2017). Even after application of phosphorus in wheat, 15 percent farmers were found to be applying phosphorus in paddy also. About 73 percent respondents were found to be scheduling first irrigation after 21 days of sowing in tar-wattar conditions. It was also observed that all the farmers were using recommended practices in the context of harvesting of the paddy crop.

3.4 Factors affecting adoption of direct seeded rice by the respondents

The binomial regression analysis and marginal effects of different factors that influenced the adoption of DSR have been worked out and the results are presented in Table 6. Significance of regression coefficients shows the extent with which a variable contributes to the probability of adoption of DSR. The positive sign for an explanatory variable shows that when its value increases, it increases the probability of adoption of DSR while the negative sign for an explanatory variable shows decline in the probability of adoption of DSR. All the important variables that could influence the adoption level of DSR was included in the model, but only seven factors, namely age, education, HP of tractor, availability of required implements, training related to DSR, farm size and number of extension contacts were found to significantly contributing towards the adoption of DSR by the respondents. Among these, only the age of the respondents had an inverse relation with adoption of DSR technology, i.e. the probability to follow DSR technology would decline with increase in age of the respondents.

The marginal effects of the explanatory variables on the choice of the adoption of DSR have also been presented in the table. It was found that with one percent increase in age of the respondents, the likelihood of adoption for DSR declined by two percent. However, with one percent increase in all other explanatory variables such as education, tractor HP, availability of required implements, training of DSR, farm size and extension contacts, the adoption level of

DSR technology would increase by 4.0, 4.0, 33, 20.0, 1.0 and 23 percent among the sample farmers. Among these statistically significant factors for promoting adoption of DSR, direct seeding implements, trainings related to DSR and extension contacts maintained by the farmers emerged as the most positively influencing variables as one percent rise in the direct seeding implement, DSR trainings and extension contacts increased the adoption level by 33, 20 and 23 percent, respectively.

TABLE 6: RESULTS OF BINOMIAL REGRESSION AND MARGINAL EFFECTS FOR DIFFERENT FACTORS INFLUENCING THE ADOPTION OF DSR BY THE RESPONDENTS, 2021-22

Variable	Coefficient	Standard Error	Marginal effects
Age	-0.13*	0.06	-0.02
Education	0.33*	0.11	0.04
Tractor HP	0.33*	0.16	0.04
Availability of required implements	2.49*	0.75	0.33
Trainings related to DSR	2.53*	1.20	0.20
Farm size	0.08*	0.04	0.01
Extension contacts	1.76*	0.71	0.23
Intercept	0.025	0.013	

Source: Computed by author
Note: *indicates p<0.05; Pseudo R2: 0.6833; Log likelihood: -28.33

Hence, the study suggests need to increase the availability of seeding equipment along with more training of the farmers for the speedy adoption of DSR and spreading more awareness among the farmers by enhancing the extension contacts.

3.5 Perceptions of the respondents regarding adoption and non-adoption of DSR

Some reasons and perceptions of the respondents for 'adopting' and 'not adopting' DSR have been presented in Table 7. The major push factors behind the use of DSR for paddy cultivation included the burden of high transplanting cost for human labour used (Rs. 3500-4000 per acre) as mentioned by about 84 percent respondents followed by other reasons like expert advice (65%), easy availability of required machinery / implement (61.25%), fear of labour shortage (28.75%), timely sowing of paddy crop (21.25%), savings of irrigation water (15%), encouragement generated after attending the trainings related to DSR (13.75%).

TABLE 7: PERCEPTIONS REGARDING ADOPTING DSR METHOD OF CULTIVATING PADDY BY THE RESPONDENTS, 2021-22

(n=80) (multiple response)

Reasons/Perceptions	Number	Percent
High transplanting charges for the human labour	67	83.75
Followed expert advise	52	65.00
Easy availability of required machinery/implement for sowing	49	61.25
Fear of labour shortage	23	28.75

Reasons/Perceptions	Number	Percent
Timely sowing of paddy crop	17	21.25
Saving of irrigation water	12	15.00
Prompted by trainings related to DSR	11	13.75

Source: Field survey

A similar study conducted by Vatta *et al.,* 2020 during the COVID epidemic period, *i.e.* during 2020 found labour shortage as the major reason for adoption of DSR during the year 2020. During the study period 2021-22, the farmers still had a fear of facing such labour shortage which prompted them to adopt DSR. Also, an enquiry was made regarding the reasons for non-adoption of DSR by the non- adopter respondents as shown in Table 8.

TABLE 8: PERCEPTIONS FOR NOT ADOPTION OF DSR BY THE RESPONDENTS, 2021-22

(n=40)

Perceptions	Number	Percent
Easy availability of human labour	32	80.00
Lack of technical knowledge related to DSR	31	77.50
Diffidence in adopting DSR	29	72.50
Non -availability of required machinery/implements	22	55.00
High weed infestation and rodent attack	11	42.50
Experiences of fellow farmers	17	27.50

Source: Field survey

The results reveal that easy availability of labour for transplanting paddy emerged to be the major reason for not following the DSR by 80 percent respondents. Other perceptions like lack of technical knowledge of DSR (77.5%), diffidence in adopting DSR (72.50%) and non-availability of required machinery/implements (55%) for sowing were the major reasons of not adopting DSR. Other reasons such as high risk of weed infestation and rodent attack and experiences of fellow farmers were reported by about 43 and 28 percent, respectively. In a study by Kaur and Singh (2017) at Punjab Agricultural University, Ludhiana, several constraints associated with shift from PTR to DSR included, high weed infestation, evolution of weedy rice, increase in soil borne pathogens (nematodes), nutrient disorders, poor crop establishment, lodging, incidence of blast, brown leaf spot, etc.

4. Conclusions

Though, the DSR technology is a viable alternative to overcome the problems of rising cost of cultivation, labour and water shortages for sustainable rice production in the state, yet it has not been adopted at a very large scale. To accelerate the wider acceptance of DSR technology, there is a need to generate more awareness of recommended DSR production practices among the farmers especially judicious use of inputs like fertilizers, underground water and plant protection chemicals will optimize the energy use. Government initiatives like subsidizing the cost of direct seeding of rice per acre can help in its implementation by all the farmers and area under DSR may get extended. There is a need for auxiliary research and development efforts in developing suitable agronomic practices, varieties and

mechanized devices to overcome the problem of weeds. There is a need to focus more on capacity building by educating/training the young farmers for promotion of DSR.

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Adoption of System of Rice Intensification and its Determinants in the Dry-Land Region of the Telangana State

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Abstract

Given the higher economic and environment benefits, and flexibility in adoption, there is a need to find out the reasons for farmers not adopting the SRI practice. The scientific literature published on SRI adoption made an attempt to assess its overall adoption by farmers rather than specific problems while adopting the components of the SRI practice. Therefore, the paper studies the socio-economic problems in adopting (overall adoption) the SRI practice. More importantly, it addresses farm level and SRI components wise problems and challenges in adopting the SRI practice. In order to address questions, seven dryland villages from central Telangana have been selected where entire paddy is cultivated under lift irrigation (bore well irrigation). Household related, land related, risk related (component wise), labour issues related information have been asked through structural questionnaire. The study revealed that 95 percent of the farmers have adopted slightly modified components of the SRI practice. The study finds that risk and uncertainty are involved in adoption of the SRI components especially in weeding, spacing, transplanting operations.

Keywords: *Labour, Modified SRI, rice, SRI, weeding*

1. Introduction

India is one of the major producers of rice in the world. Rice is produced with huge amounts of water. Water conserving innovations and technologies should be adopted that have the potential for high productivity (Rao, 1991, Stewart *et al.*, 2006). Therefore, the potential water conserving innovations and technologies are crucial for sustainable agriculture in India. Paddy is the major crop in Telangana and mostly is cultivated through lift irrigation (wells and borewells) (Agriculture at a Glance 2016, Telangana). The present method of paddy cultivation has a devastating negative effect on land and water resources, and also, farmers have to bear extra charges like digging the bore well, maintenance of it, and use electricity for lifting water; therefore, it results in low net incomes in paddy cultivation (Reddy *et al.*, 2013). In this context, the System of Rice Intensification (SRI) is a production strategy which claims higher benefits by using lower inputs particularly water. According to the literature, water can be saved up to 50 percent if the system of rice intensification is followed. System of Rice Intensification involves practices like using younger seedling for early transformation, ensuring wider spacing between seedlings, preferring compost or farmyard manure, managing with lesser water (field should not be continuously flooded), weeding frequently and mulching the weeds into soil and turning the same into organic manure. According to the literature, the adoption of SRI practice is influenced by risk, uncertainty and difficulties in adoption of its components. Moreover, public policy and institutional support significantly influence the adoption of the SRI practice. The scientific literature published on SRI adoption made an attempt to assess its overall adoption by farmers rather than specific problems while adopting the components of the SRI practice. There is concluded evidence that SRI gives high productive, high incomes to the farmers through water conservation. Despite of all these well-known benefits, the farmers not adopting SRI practice. Therefore, this paper will address the problems in adopting the SRI practice.

1.1 Objectives of the study

The paper makes an attempt to address the problems faced in adoption of System of Rice Intensification (SRI) practices.

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2. Data sources and methodology

The system of rice intensification is cultivated in limited areas. The area for the study has been selected after an extensive discussion with the Directorate of Rice Research (DRR), Department of Agriculture, and NGOs promoting the SRI practice. Seven neighbouring villages of Warangal and Nalgonda have been selected where there is a high incidence of SRI practice. SRI is promoted through the NGO in these areas. Villages have been selected after discussing with NGO representatives. All villages have similar cropping patterns, with paddy being the major crop and cultivated through lift irrigation (bore well).

113 SRI households and 73 non-SRI farmers in kharif season were selected for the study and survey was conducted in July, August and September months in 2018. Household related, land related, risk related (component wise), labour issues related, and disease related information was collected through structural questionnaire. Case studies with the progressive farmers (SRI farmers) were conducted to know the institutional related problems and other issues. SRI farmer is a farmer who has adopted at least single component of the three SRI core components (age of the nursery, spacing and transplanting single plant at hill).

Farmers were categorized into three categories – marginal, small, and other farmers. Reasons for the not adopting the SRI practice as whole; land related and socio-economic factors of the SRI farmers have been analyzed through mean and percentages. Reasons for not adopting SRI components and also reasons for slightly modifying these components have been analysed.

3. Findings of the study

3.1 Adoption of SRI components

System of Rice Intensification (SRI) is comprised of five components: 1. Very young nursery age – at the 2 leaf stage, usually below 12 days old plant; 2. widely spaced in a square manner – usually 25x25 cm or more; 3. Single plant at a hill instead of clump of several seedlings; 4. alternative wet and dry conditions - should not flooded always; and 5. weeding should be done by the cono-weeder. Literature reveals that farmers have adopted modified components of the SRI practice based on their own agricultural conditions like access to water, family structure, and labour availability and so on. Moreover, it is also found that farmers have not adopted all the components of the SRI practice.

There is no single farmer who gave water as per recommendation. Moreover, none of the farmers used cono-weeder for weeding as recommended. Out of the other three components, described as core components of the SRI practice, only five farmers had adopted all three core components. A higher percent of the early-adopted farmers have adopted recommended components. Sixteen percent of the farmers adopted age of the seedling (A) component in which high percent of the early-adopted farmers have adopted this component than the late adopter farmers. About 25 percent of the farmers had adopted spacing (S) component. For this component also early-adopted farmers have high percentage than the late adopted farmers. About 43.6 percent of the farmers adopted plants at a hill (PH) component in which high percent of late adopted farmers had adopted this component compared to early adopted farmers. In this discussion it clear that more percent of farmers have adopted PH component than the A and S components. In the case of late adopters, there is no single household which practices at least three SRI practices. In the case of early adopters also, only 5 households (12.5 percent) adopted atleast three SRI practices.

3.2 Risks in adopting of SRI components

About 18.6 percent of the farmers found SRI adoption risky. High percentage of the late adopting farmers said the there is risk in land preparation compared to the early adopting farmers. As early adopting farmers had adopted SRI practice continuously, therefore, they perceived less risk in land preparation. About, 58.1 percent of the farmers said that growing nursery is risky in the SRI practice. Higher percent of late adopters felt it risky compared to early adopters in growing nursery operation. About 69.6 percent of the farmers said that there is a risk in marking with higher percent of the late adopting farmers finding it risky compared to the early adopting farmers. About 58.8 percent of the farmers said that there was risk in transplanting following SRI practice with high percent of early adopting farmers

feeling more risk compared to the late adopters. Only 12.3 percent of the farmers said that there is a risk in giving water to the field. The risk was felt to be high among the late adopters compared to the early adopters. About 91.7 percent of the farmers said that weeding is risky operation. High percent of the late adopters felt it to be risky compared to the early adopters. The difficulties in faced in weeding are as follows; physically hard work, aged feel that it is difficult, women cannot do weeding and hired labourers not willing/reluctant to take up weeding work. Therefore, there is a risk in the operations of the all SRI components. However, the data clearly indicates that farmers who started SRI cultivation early and are now cultivating perceive less risk compared to the farmers who started SRI in the later stage. The studies also reveal that the farmers who cultivated SRI continuously for some period, the risk become low. Therefore, it supports the argument that if SRI practice is followed continuously, the risk is minimized.

TABLE 1: RISK PERCEPTION OF SRI FARMERS (%)

Sl. No.	Operation Wise Risks	Early adopters (N=40= 10 0)	Late adopters (N=73=100)	All adopters (N=113=100)
1	Risk in land preparation	12.5	24.7	18.6
2	Risk in raising nursery	50	66.2	58.1
3	Risk in marking	60	79.2	69.6
4	Risk in transplanting	47.5	70.1	58.8
5	Risk in giving water to field	2.5	22.1	12.3
6	Risk in weeding	90	93.5	91.75

Source: Field survey

3.3 Labour related issues in adoption of SRI components

Intensive care is required in the adoption of SRI practices. Skilled and energetic labour, especially for weeding, is required in the adoption of the System of Rice Intensification. Mostly, farmers have raised nursery on their own and could not hire labourers especially for it. Moreover, farmers said that preparation of nursery requires skilled person who prepares it with interest and care. However, majority of the farmers said that finding labour is easy for raising nursery and only few (2.5 percent) felt finding labour difficult for this operation. Mostly, farmers have not hired labour for raising nursery. Marking with thread is relatively easy compared to iron marker. Most of the farmers have used thread marker for marking. About 20 percent of the farmers found finding labour for marking to be difficult and rest of the farmers said it is easy. About 9 percent of the farmers said that there is labour scarcity and finding them for transplanting is difficult in paddy cultivation. High percentage (16.2 percent) of the SRI farmers felt difficulty in finding labour for transplantation. SRI requires alternative wet and dry conditions. Most of the farmers had irrigated their crop on their own, therefore, they did not use hired labour for this activity. About 93.2 percent of the farmers said that it was difficult to find labour for weeding by cono-weeder in SRI. Farmers weeded their fields manually as well in the system of rice intensification. There did not find any difficulty/problem in finding labour for manually weeding the SRI field.

TABLE 2: OPERATIONS OF SRI FOR WHICH FINDING LABOUR IS DIFFICULT (%)

Sl. No	Operations	Difficult
1	Finding labour for raising Nursery	2.5
2	Finding labour for marking	21.1
3	Finding labour for transplanting	16.2
4	Finding labour for giving water to the SRI field	1.7
5	Find labour for weeding by cono-weeder	93.2
6	Finding labour for manual weeding	1.7

Source: Field survey

3.4. Land related factors and adoption of SRI practice

The average cultivated area was found to be 4.3 acres in the SRI cultivation, which was high, compared to the 3.7 acres in the non-SRI practice. Among the farmer groups, SRI practice was high among other farmers while among marginal and small farmers, it was same in both the practices of the paddy cultivation.

The average paddy area was low (1.51 acres) in the SRI farmers compared to the non-SRI farmers (1.62 acres). Average irrigated area was high (2.1 acres) in the SRI practice compared to the non-SRI practice. Moreover, it is high across all categories of farmers in the SRI practice.

The percentage of irrigated land was high, i.e. 53 percent in the SRI practice compared to 49.3 percent in non-SRI practice. Moreover, it is 71.8 percent in the marginal farmers, 54.1 percent in the small farmers, and 33.3 percent in other farmers in the SRI practice which is high compared to the non-SRI practice. Within the SRI practice, its percentage is high among the marginal farmers, followed by small farmers and other farmers. There is no difference in the percentage of paddy area in the total cultivated area between SRI and non-SRI practice but its percentage is high among the marginal and small farmers of the SRI practice but its percentage is low among the other farmers. Within the SRI practice, its percentage is high in the marginal farmers followed by small and other farmers. The percentage of SRI area in the total paddy area is high, i.e. 53.5 percent in the marginal farmers, followed by 40.7 percent in the small farmers and 25.3 percent in the other farmers (Table 3). Therefore, the findings reveal out that those farmers who have more land in possession, more cultivated area, more irrigated land were adopting the SRI practice. In addition, the farmers those have high percentage of irrigated land in total cultivated land, and high percentage of paddy area in total paddy area were adopting the SRI practice.

TABLE 3: LAND RELATED FACTORS IN THE SRI ADOPTION

Sl. No.	Category of farmers	Average extent of land (in acre)	Average area cultivated (acre)	Average irrigated area (acre)	Total paddy area includes SRI (acre)	Average paddy area (acre)	Total SRI paddy area (acre)	Average SRI area(acre)	% of irrigated area (K) in total area (I)	% of paddy area in total cultivated area(J)	% of SRI area in total paddy area
1	Marginal	2.1	1.9	1.3	55.9	1.01	29.9	0.54	71.8	79.9	53.5
2	Small	3.7	3.2	2.0	60.5	1.59	24.6	0.64	54.1	62.2	40.7
3	Other	9.3	7.9	3.0	55.3	2.76	14	0.70	33.3	44.1	25.3
SRI farmers		**5.0**	**4.3**	**2.1**	**171.7**	**1.51**	**68.5**	**0.60**	**53.0**	**62.1**	**39.9**
1	Marginal	2.0	1.8	1.2	24.6	0.94	nil	nil	63.2	72.6	nil
2	Small	3.6	3.2	1.6	36.4	1.34	nil	nil	44.9	57.2	nil
3	Other	7.7	6.0	2.9	57.3	2.80	nil	nil	39.8	55.5	nil
Non- SRI farmers		**4.5**	**3.7**	**1.9**	**118.3**	**1.62**	**nil**	**nil**	**49.3**	**61.8**	**nil**

Source: Field survey

3.5 Non-economic factors and adoption of SRI practice

3.5.1 Age factor

The literature reveals that higher percent of younger farmers have preferred SRI cultivation compared to relatively old age farmers. In the case studies and focused group discussion, farmers also said that old age farmers could not go for the SRI farming mainly because of mechanical weeding. Therefore, it was found that average age among SRI farmers is less compared to non-SRI farmers. Average age of the SRI farmers is 45.8 years compared to the 49.6 years in the non-SRI farmers. Moreover, it is low (44.8 years) in the marginal farmers, 47.9 years in the small farmers and 44.6 years in the other farmers of the SRI practice. Therefore, younger farmer age positively determines the adoption of SRI practice.

3.5.2 Gender

On discussion about various issues related to SRI adoption with farmers, it came out that SRI cultivation is not suitable for female farmers because of mechanical weeder. About 99 percent of the SRI farmers are male farmers compared to 91.9 percent of the non-SRI farmers, which shows that female farmers were not in the SRI practice. In the SRI practice, female farmers were found to be under the marginal farmers' category only, while in case of non-SRI farmers, the female farmers were in all categories. Therefore, male farmers dominate adoption of the SRI practice.

3.5.3 Literacy

Literacy is the crucial factor and positively correlated with adoption of any technology/innovative practice. Therefore, literate farmers are likely to catch up/understand the technology and adopt it in the early stages. About 24.3 of the adopters are illiterate which is low compared to the non-SRI farmers (26.8). Lower percent of the marginal farmers in the SRI are illiterate compared to the same category farmers in the non-SRI farmers. Among the SRI adopters, illiteracy is high in the case of small farmers followed by marginal farmers and other farmers. Therefore, literacy positively affects the adoption of SRI practice.

3.5.4 Institutional factors

Self-help groups and NGOs are key for nurturing and understanding any technology/innovation in agriculture as they discuss and solve the challenges while adopting technology. Self Help Group (SHG) membership is high across all categories of farmers in the SRI practice compared to the all categories of the non-SRI practice. Within the SRI practice, all households of the small farmers, 98 percent of the marginal farmers, and 94.4 percent of the other farmers have membership in the SHGs. Therefore, SHGs membership positively affects the adoption of the SRI practice. About 8.7 percent of the SRI farmers are members of the NGOs, however, no farmer in the non-SRI practice is a member of a NGO. Within the SRI practice, high percent of the marginal farmers are in the NGOs followed by other farmers and small farmers. Therefore, membership in the NGO is positively influencing the adoption of the SRI practice. About 17.6 percent of the marginal farmers of the SRI practice are in the farmer association, which is high, compared to the marginal farmers of the non-SRI practice. Within the SRI practice, it is high in marginal farmers followed by small farmers and other farmers. Therefore, for the marginal farmers, it is encouraging factor for the adoption of SRI practice.

3.5.5 Dependency on multiple sources

Small farmers have to do multiple works because he/she cannot survive only depending on agriculture. Lower percent (65 percent) of the SRI adopter's main occupation is agriculture compared to the non-adopters (72.6 percent). Therefore, it indicates that the farmers who adopted SRI also doing other works. Within the SRI practice, 100 percent of the other farmer's main occupation is agriculture, followed by 76.5 percent in the small farmers, 45.1 percent in the marginal farmers. Therefore, it clearly indicates that the farmers adopting the SRI practice have agriculture as the main occupation.

3.5.6 Family size

Requirement of intensive care in System of Rice Intensification makes use of family labour crucial. The literature reveals that farmers who have higher family size have adopted the SRI. From the collected field data, it is also clear that farmers who have higher family size have adopted the SRI practice as they do not require hired labour. This is not possible in the case of farmers who have smaller family size as they cannot hire labour for SRI operations especially weeding and marking. The average family size is high (4.6) in the SRI practice compared to non-SRI (4.0). The family size is 4.3 among marginal, 4.8 among small and 4.8 among other farmers of SRI adopters compared to 4.0, 4.0 and 3.9, respectively, in the non-SRI farmers. Among the SRI adopters, family size is low among marginal farmers compared to the small and other farmers.

3.5.7 Credit

Credit is the main factor which influences the adoption of any innovation and technology in agriculture. As majority of the farmers are marginal, they do not have adequate land/proper title to avail institutional credit, and therefore, they take credit from non-institutional sources. Around 77.7 percent of the SRI adopters took credit which is high compared to the non-adopters (74.2 percent). However, institutional credit is low, *i.e.* 39.8 percent in the SRI adopters compared to the non-adopters. It is low among the marginal farmers and small farmers and high in the other farmers of the SRI practice compared to the non-SRI adopters. About 56.3 percent of the SRI farmers took credit from non-institutional sources, which is high compared to the non-SRI practisers. It is high among the marginal farmers and small farmers and low among the other farmers compared to the same farmers categories in the non-SRI practice. The data clearly reveals that high percent of the farmers have taken credit particularly non-institutional credit. It found that the non-institutional credit is positively correlated with the SRI adoption.

3.5.8 Supplementary sources – allied agricultural activities like animal husbandry

It is observed that farmers who have livestock are

adopting SRI practices. Farmers said that those who have livestock do agriculture and use organic inputs. Moreover, they spend a lot of time in the field because they oversee the livestock as well. Therefore, they adopt SRI kinds of practices because it requires care and timely monitoring. About 77.7 percent of the SRI farmers have livestock, which is high compared to the non-SRI practice. It is high across all categories of SRI farmers compared to the non-SRI farmers. Within the SRI practice, it is high among other farmers compared small and marginal farmers. More percent of the SRI farmers have big ruminants like cow, bullocks, and buffalos and it is high across all categories of SRI farmers. Within the SRI farmers, big ruminants are high among the other farmers followed by small farmers and marginal farmers. Therefore, it is found that a higher percent of the livestock holder's particularly big ruminants are adopting the SRI practice.

3.5.9 Extension services

All the SRI adopters got extension/technical support from the NGO representatives. Farmers have extension/technical support from different sources such as agriculture officers, NGO representatives, farmer's cooperatives, progressive farmers, and input traders. Among these, extension from input traders dominates; around 66 percent of the farmers get extension from the input trade. Very less percent of the farmer get extension from the agriculture officers. Higher percent (76 percent) of the adopters received extension support compared to the non-SRI farmers (72.6 percent). Moreover, about 80.4 percent of the marginal farmers in the SRI practice have taken extension support, which is high compared to the marginal farmers in the non-SRI practice. Within the SRI practice, high percent of the marginal farmers received extension followed by small and other farmers. Therefore, it found that extension/technical support is the positively related to the adoption of SRI practice.

TABLE 4: NON-ECONOMIC FACTORS IN THE SRI ADOPTION

Sl. No	Category of farmers	Average age in years	% of male farmers	% of illiterate farmers	% of farmers with SHG membership	% of membership in NGOs	% of member in farmer associations	% of farmers main occupation as agriculture	Average family size	% farmers taken institutional credit	% of farmers taken credit from non-institutions	% of farmers taken credit	% of farmers access big ruminants	% of farmers access livestock	% farmers received extension/technical support
1	Marginal	45	98	29	98	12	18	45	4.3	29	57	73	39	73	80
2	Small	48	100	32	100	2.9	12	77	4.8	41	59	79	59	77	74
3	Others	45	100	11	94	11	5.6	100	4.8	67	50	89	94	94	67
SRI Farmers		**46**	**99**	**24**	**97**	**8.7**	**14**	**65**	**4.6**	**40**	**56**	**78**	**55**	**78**	**76**
1	Marginal	49	86	48	86	0	4.8	57	4	33	43	57	24	48	57
2	Small	51	96	22	91	0	22	74	4	74	17	83	44	57	87
3	Other	49	94	11	89	0	22	89	3.9	50	61	83	61	89	72
Non-SRI		**50**	**92**	**27**	**89**	**0**	**16**	**73**	**4**	**53**	**39**	**74**	**42**	**63**	**73**

Source: Field survey
Note: Big Ruminant (Cow, bullock, buffalo and he buffalo)

4. Conclusion

The discussion concludes that higher percent of the marginal farmers have adopted the system of rice intensification practice. As land size increase, adoption of SRI practice becomes low. Majority of the SRI farmers have adopted modified SRI components as literature revealed. The farmers who have small landholding, low cultivated land, low irrigated land has adopted SRI practice. Moreover, the SRI farmers have higher percent of irrigated area in total area and high percent of paddy area in total area. The paper also discusses about the risks and difficulties in the finding labour for different operations in the system of rice intensification. It revealed that SRI is a risky practice especially in weeding followed by marking, transplanting and raising nursery. High percentage of late adopting farmers find SRI to be a risky operation compared to the early adopting farmers. Finding labour is difficult in the system of rice intensification practice especially in weeding by cano-weeder, followed by marking, transplanting, and raising nursery. Younger and literate farmers, those who have associated with self-help groups and NGOs, and those with bigger family size have been adopted this practice. The farmers who have taken credit from non-institutional sources rather than institutional sources are seen to have adopted the SRI practice. The farmers those have livestock particularly big ruminants also tend to adopt the SRI practice. It revealed that majority of the SRI farmers got extension/technical and equipment support from the non-government organizations.

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Agro-Economic Research

Castor Crop Cultivation in Gujarat: Problems, Prospects and Export Potential

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1. Introduction

India is the leader in global castor seed production and dominates in the international castor oil trade. India supplies almost 85 to 90 percent of the world's requirement of castor oil and its derivatives. India has become the first choice for the major importing countries like China, France, USA, Germany, Netherland, Thailand, Japan, UK and Korea, whereas for Italy, India is the second choice. This indicates that India's position in world's castor oil market is very strong and there is a great opportunity to expand it. The major castor producing states in India are Andhra Pradesh, Gujarat, Karnataka, Odisha, Rajasthan, and Tamil Nadu. Though the area and production of castor as well as its export are on an increasing trend, the castor farmers are facing problems in the cultivation of crop with reports of production as well as marketing constraints. The input costs also have been reported risen, mostly on fertilizers, pesticides and water. Thus, there is a need to have insights into the problems, prospects and export potential of castor crop cultivation in Gujarat.

1.1 Objectives of the study

The specific objectives of the study are as follows:

(i) To examine trends and pattern of growth of castor area and production over time and across districts/regions and identify the sources of growth in castor output in Gujarat.

(ii) Determine the impact of price and non-price factors influencing the supply and demand for castor seeds in the state.

(iii) To estimate the cost of cultivation and cost of production of castor seed in selected districts of Gujarat.

(iv) To identify major constraints in cultivation and suggest policy options to increase castor production and productivity in the state.

2. Data sources and methodology

The present study is based on both secondary and primary data. The secondary data were compiled from published papers, reports, and related websites (e.g. FAOSTAT, Solvent Extractors' Association of India, APEDA, MoA&FW GOI, etc.). The data on arrival and market rates were collected from the selected five APMCs in Gujarat to study the trend in the same. The secondary data on district-wise area, production, and productivity of castor crop in Gujarat were compiled for the period of last five-decade period, i.e. from 1970-71 to 2020-21. For the purpose of analysis, the total study period was divided into four sub-periods. The reasons for studying these periods are the availability of reliable data from reliable sources (Table 1).

TABLE 1: STUDY PERIODS AND STUDY POINTS FOR THE STUDY

Sr. No.	Period	Years	Triennium endings
1	Period I	1970-71 to 1979-80	TE 1972-73
2	Period II	1980-81 to 1989-90	TE 1982-83
3	Period III	1990-91 to 1999-00	TE 1992-93
4	Period IV	2000-01 to 2020-21	TE 2002-03, TE 2020-21
5	Overall	1970-71 to 2020-21	TE 2020-21

Source: Designed by author

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Note: Detailed report is available on the website of respective Agro-Economic Research Centre

The primary data were collected from the selected castor growers from selected districts and villages in Gujarat. Multistage random sample method was used for selection of castor growers. The reference period for the primary data collection is the agriculture year 2020-21.

2.1 Sampling framework

Out of the castor growing states in India, the state having the highest area coverage under castor seed and its production was selected (proportion in production in total production at national level), *i.e.* state of Gujarat. Out of total 25 castor growing districts in Gujarat, top five major castor growing districts (on the basis of area under castor cultivation in 2020- 21), *viz.* Banaskantha, Kutch, Patan, Mehsana and Surendranagar districts were selected for the detailed study.

From each district, two taluks/tehsils were selected on the basis of area coverage as per method adopted for the selection of districts. From the selected taluka, two villages/cluster of villages (comprising 2-3 villages) were selected for conducting the survey, on the basis of the area under castor cultivation. A sample of 80 farmers was selected randomly from each district (40 from each tehsil - 20 from each village/village cluster). The total sample size was 400 respondents from five selected districts of Gujarat. The sample farmers were classified into different farm size groups post-survey as per the size of the net operated area. Two farmers were selected by SRSWOR method from each land holding class. If in any village/cluster, a particular size class did not have two holdings or nil holdings, more holdings were selected from the adjacent size-classes so as to select total 20 cultivators per village.

2.2 Analytical tools:

Simple tabular analysis was used for data analysis. SPSS 20 data analysis package was used for data analysis. The statistical tools like mean, standard deviation, standard error and 't' test were used for data analysis.

3. Findings and results

3.1 Findings from secondary data

I. Gujarat is India's largest producer of castor in India, accounting for about 85.60 percent of the total production of castor in the country (2020-21). The productivity of castor in the state is the highest not only in India but also in the world.

II. Castor growing is considered as a step forward towards diversification and commercialization of agriculture in Gujarat. The cropping pattern of Gujarat state has changed during the last five-decade period (1971-2021). Though the share of oilseed in total cropped area remained the same, around 20 percent during last five-decade period, share of castor crop in total cropped area has increased from 0.61 percent in TE 1972-73 to 5.62 percent in TE 2020-21.

III. In kharif season, castor is the dominant non-edible oilseed crop while some farmers are also growing it in rabi season. The castor varieties grown in the district are given in GCH-2, GCH-4, GCH-5, GCH-6, GCH-7, GC3, GNCH-1(rabi), and GCH-8.

IV. At present, the seed replacement ratio (SRR) of castor is reported to be 50 percent. Thus, the scope of SRR is ambient in the future to enhance the productivity of castor in the state, especially through the seed village concept and hybrid seed production programs.

V. Global castor oil and derivatives key players include Jayant Agro, NK Proteins, Adani Wilmar, etc. Globally, main three manufacturers hold a share over 50 percent. India is the largest market, with a share of over 90 percent, followed by China, and North America, both having a share of over 5 percent. In terms of product, hydrogenated castor oil is the largest segment, with a share of about 30 percent.

VI. Castor oil is a promising commodity that has a variety of applications, particularly as a renewable energy source. Castor seed is not exported but castor oil and meal are exported. India exported more than 7.34 lakh tons of castor oil worth of Rs. 6802 crore during the year 2020-21.

VII. The major trading centers of castor and its derivatives in India are Rajkot (Gujarat), Ahmedabad (Gujarat), Gondal (Gujarat), Gadwal (Gujarat), Bhabar (Gujarat), Disa (Gujarat), Kadi (Gujarat), Jedcherla (Andhra Pradesh) and Yemignoor (Andhra Pradesh). Also castor and its derivatives like castor seed, castor oil and castor oil cake are traded in Indian commodity exchanges.

VIII. The seasonal indices of market arrivals and prices of castor seed for different markets viz; Dasada (Patdi), Radhanpur, Bhabhar, Thara, Mehsana and Kadi shows the existence of seasonality in all the markets. Higher indices of market arrivals of castor seed were noticed immediately after harvest.

IX. The seasonal behavior of castor prices reveals the existence of seasonality in all the markets. Higher indices of market arrivals of castor seed were noticed immediately after harvest in the selected markets arrivals reached peak during April and relatively shot up in September and October. The different markets of castor in the state of Gujarat were closely linked with each other for the movement of castor seed prices.

3.2 Findings from primary data

I. The field survey results indicate that almost all the farmers had irrigated land which was put under castor cultivation. The average crop productivity of castor crop is estimated to be 26.5 qtls/ha.

II. The total cost of cultivation of castor seed per hectare was estimated to be Rs. 87528/-. On average, per quintal price for castor seed output realized by the sample households was Rs. 4872/- per quintal. Across the groups, 93.3 percent of marginal holders, 86 percent of smallholders and 76 percent of semi-medium holders had sold all output at first instance only. Marginal farmers sold their output within 20 days of harvest.

III. The net income realized by the farmer was estimated to be Rs. 42983/- per hectare. The benefit-cost ratio of 1.36 was found to be economically efficient in castor cultivation in all groups. The highest benefit cost ratio was estimated for large landholder group and the lowest was in case of small land holder group.

IV. The major technological constraints faced by the castor seed growers were the long duration of crop followed by lack of production technology and lack of resistant/tolerant varieties. Extreme variations in temperature followed by biotic stress and inadequate/ excessive rainfall were the three major agro-climatic factors faced by the sample farmers.

V. The major problems faced by commission agents were of storage, TDS issues and payment problems, while the major constraints faced by the processors were lack of support from the government, competition from large processing units, high cost of processing, and availability of credit. The exporters mentioned Germany, France, UK, US, and other European countries as the major countries for the export of castor seed oil in 2020-21.

VI. The major source of procurement of the produce - castor seed oil during 2020-21 was processor within the state and mostly from the wholesalers. The major three problems faced at domestic markets were lack of regular supply and GST refund issues and high price compared to the quality, while at the international level, lack of knowledge about the standard quality norms in the international markets, lack of pre-shipment agency for inspection during export and a lack of export subsidy or support from the Government.

4. Conclusions and policy implications

I. In view of low seed replacement ratio in Gujarat, there is a need to create awareness about the importance of improved hybrids / varieties through demonstrations, training, shibir, literature, etc. Establishing well-organized seed multiplication systems, seed supply chain and commercial market is very important for faster adoption of castor in India. Quality of seed should be given utmost importance. There is a need of providing training to progressive farmers for seed production at the local level.

II. The partial adoption of recommended production/ protection technologies affects the productivity of castor. Therefore, there is a need to create awareness among the castor growers about a package of

practices, and scientific crop management through demonstrations and trainings.

III. Low-input cost crop production technologies with higher input efficiencies based on climatic changes need to be developed to sustain castor production. Research on the region or location-specific production and protection technologies should be given priority.

IV. The long growing season of castor may be a constraint to adopt crop cultivation. The instability observed in various districts during the study period needs to be reduced and yield should be improved by developing wilt resistant, short duration, location-specific high yielding varieties of castor.

V. In view of a large variation in productivity of castor seed crop across the districts, there is a need to narrow the yield gap across districts as well as in irrigated and rainfed conditions without mining natural resources.

VI. It was observed that castor seed produced after harvesting is not properly cleaned and dried, packing material used is mostly gunny bags and also contain foreign materials like iron nails, dust, stone, etc.. Such poor quality product gets lower price. Therefore, there is a need to propagate improved technology for drying cleaning, grading and bulk packaging to improve the quality of raw material for industrial supply and increase the farmer's income.

VII. Extension services can encourage castor adoption in new areas through the dissemination of information on castor cultivation which would help generate interest in stakeholders. Interdisciplinary collaborations in research projects are needed to ensure the sustainability of castor adoption in newer areas. Physical logistics such as warehousing, scientific management of stocks, and transportation are also to be improved.

VIII. International collaborations will increase both the efficiency and speed of research in developing castor as a bio-energy crop. This would further enable castor farmers to realize the higher value of their produce.

IX. There is a large scope for improving India's earnings from castor by converting castor oil to various derivatives. With the world becoming more environmentally conscious and with the increasing replacement of synthetic products with naturally derived products, castor oil based derivatives could find increasingly attractive markets worldwide. Governments and private stakeholders should come forward to support castor cultivation by establishing industries related to castor processing and production of castor derivatives to realize the great economic potential of castor.

X. Lack of adequate infrastructure and value addition are a couple of factors that are also responsible for making India a weak player on the price front. This anomaly can be corrected if the industry expands the market by developing castor oil derivatives and investing in research and development. If the industry works as a more cohesive unit, India could soon be in a better situation.

XI. In view of the numerous and significant threats, it is critical for all concerned to determine a strategy for initially protecting India's position in castor and then chalking out a path to long-term sustainable growth. The current role of a commodity player supplying raw material (castor oil) to global consumers' needs to be upgraded and augmented into that of a value-added finished product (castor derivatives) supplier. The ability to achieve this will ensure a long-term and commercially profitable castor business for the country.

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Commodity Review

Foodgrains

Procurement of Rice

The total procurement of rice during kharif marketing season 2023-24 up to 24.10.2023 is 6820 thousand metric tonnes as against 56942 thousand metric tonnes in marketing season 2022-23. The details are given in Table 1. A comparative analysis of procurement of rice for the period of marketing season 2023-24 (up to 24.10.2023) and the corresponding period of last year is given in figure 1. The percentage share of different states in procurement of rice has been given in figure 2.

TABLE 1: PROCUREMENT OF RICE IN MAJOR STATES

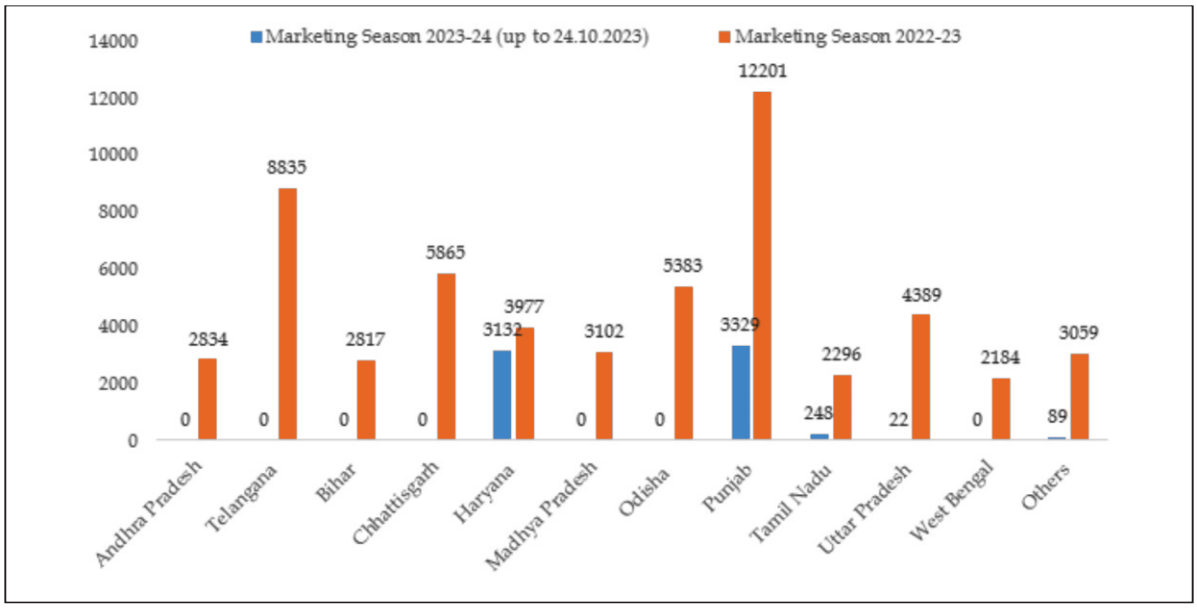
(In thousand metric tonnes)

State	Marketing Season 2023-24 (up to 24.10.2023)		Marketing Season 2022-23	
	Procurement	Percentage to total	Procurement	Percentage to total
1	2	3	4	5
Andhra Pradesh	0	0	2834	5.0
Telangana	0	0	8835	15.5
Bihar	0	0	2817	4.9
Chhattisgarh	0	0	5865	10.3
Haryana	3132	45.93	3977	7.0
Madhya Pradesh	0	0	3102	5.4
Odisha	0	0	5383	9.5
Punjab	3329	48.81	12201	21.4
Tamil Nadu	248	3.63	2296	4.0
Uttar Pradesh	22	0.32	4389	7.7
West Bengal	0	0	2184	3.8
Others	89	1.31	3059	5.4
All India Total	**6820**	**100.00**	**56942**	**100.0**

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

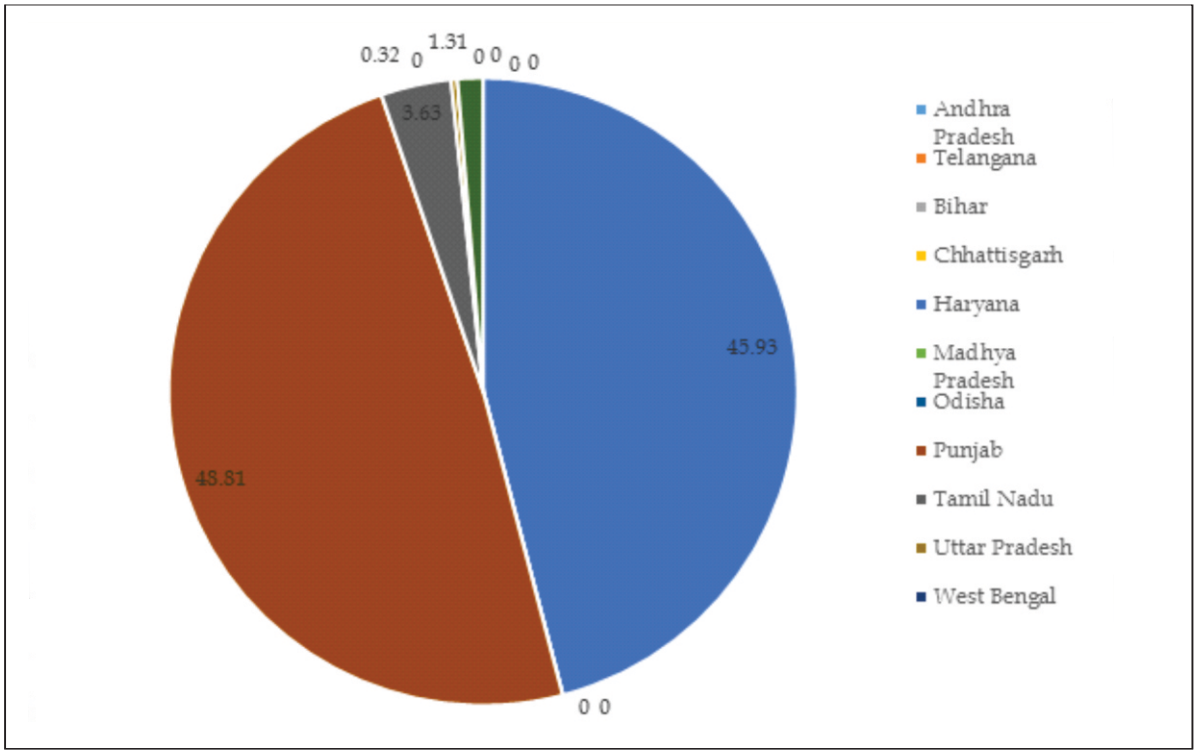
Figure 1: Procurement of Rice in Major States

(In thousand metric tonnes)



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

Figure 2: Percentage Share of Different States in Procurement of Rice during Marketing Season 2023-24(up to 28.09.2023)



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

Procurement of Wheat

The total procurement of wheat during Rabi marketing season 2023-24 up to 14.07.2023 is 26202 thousand metric tonnes as against 18792 thousand metric tonnes in marketing season 2022-23. The details are given in Table 2. The figure 3 depicts the comparison of procurement of wheat during the marketing season 2023-24 (up to 14.07.2023) with the corresponding period of last year. The percentage share of different states in procurement of wheat has been given in figure 4.

TABLE 2: PROCUREMENT OF WHEAT IN MAJOR STATES

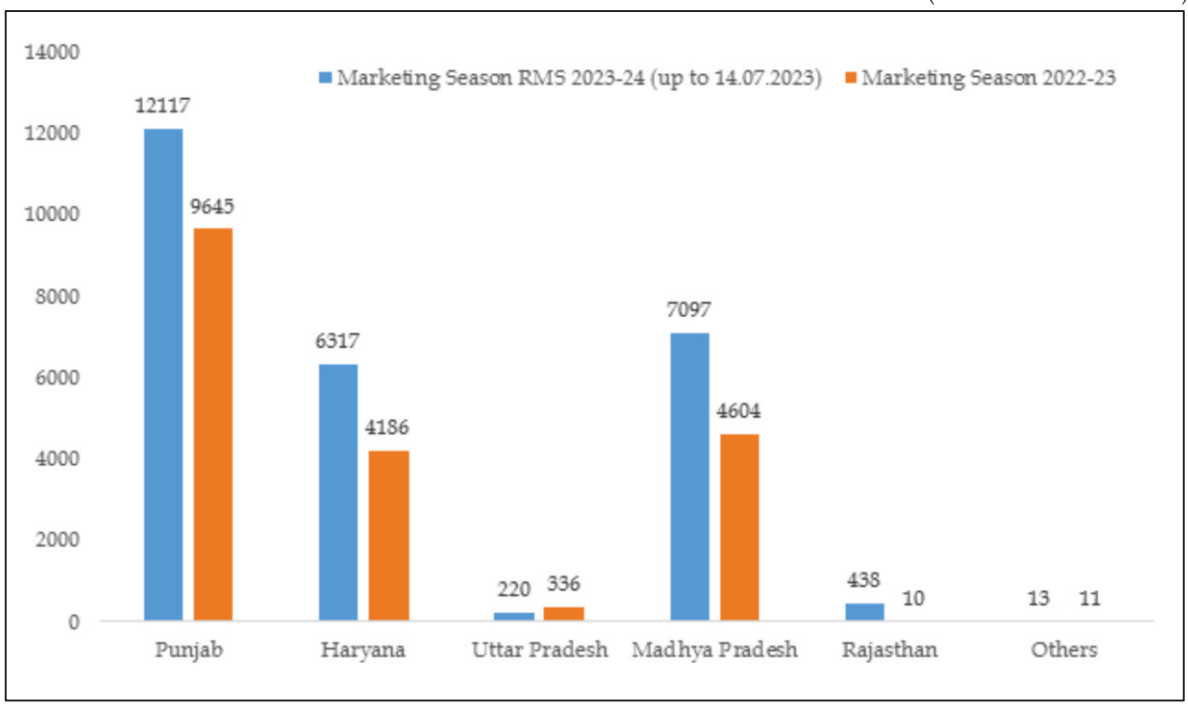
(In thousand metric tonnes)

State	Marketing Season RMS 2023 -24 (up to 14.07.2023)		Marketing Season 2022-23	
	Procurement	Percentage to total	Procurement	Percentage to total
1	2	3	4	5
Punjab	12117	46.2	9645	51.3
Haryana	6317	24.1	4186	22.3
Uttar Pradesh	220	0.8	336	1.8
Madhya Pradesh	7097	27.1	4604	24.5
Rajasthan	438	1.7	10	0.1
Others	13	0.1	11	0.1
All-India	**26202**	**100**	**18792**	**100**

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

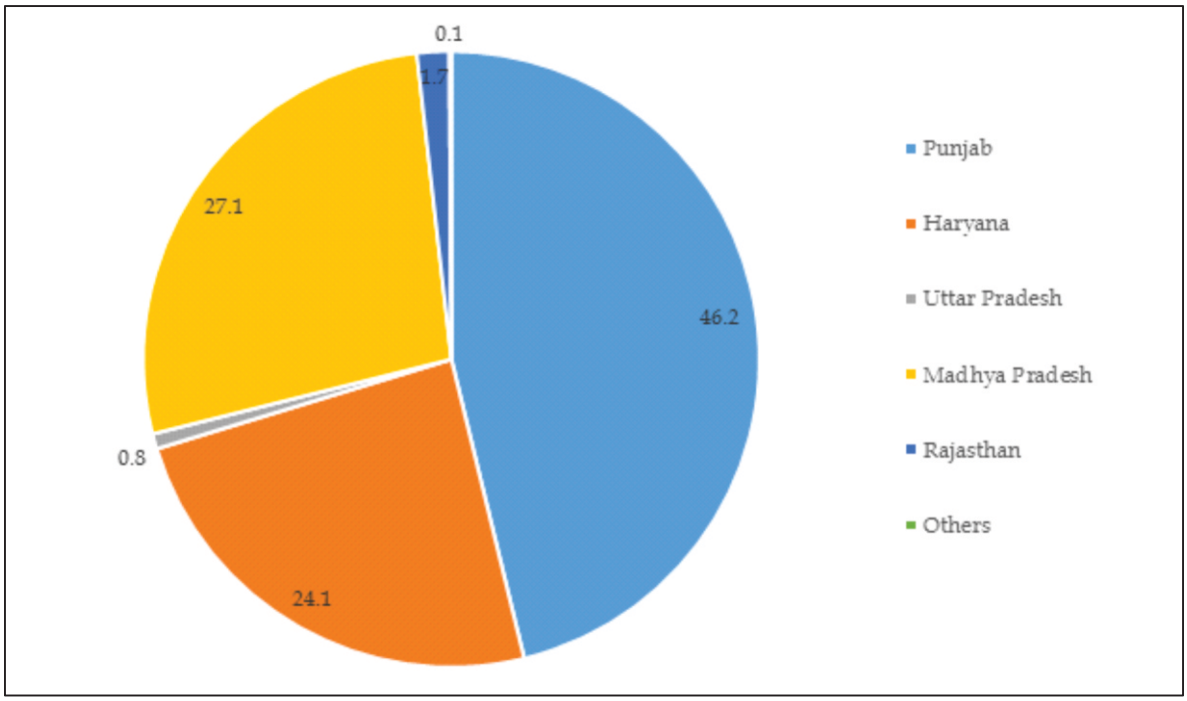
Figure 3: Procurement of Wheat in Major States

(In thousand metric tonnes)



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

Figure 4: Percentage Share of Different States in Procurement of Wheat during Marketing Season 2023-24 (up to 14.07.2023)



Source: Department of Food and Public distribution, Govt. of India

Commercial Crops

Oilseeds

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 185.8 in September, 2023, showing a decrease of 1.06 percent over the previous month and a decrease by 5.25 percent over the corresponding month of the previous year.

The WPI of all individual oilseeds showed a mixed trend. The WPI of cotton seed (1.03 percent), gingelly seed (sesamum) (0.39 percent) niger seed (4.36 percent), safflower (2.98 percent) increased over the previous month. However, the WPI of groundnut seed (0.99 percent), rape & mustard seed (0.48 percent), copra (coconut) (1.76 percent), sunflower (0.72percent) and soybean (1.43 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 143.3 in September, 2023, showing a decrease of 2.85 percent over the previous month. Moreover, it is decreased by 17.22 percent over the corresponding month of the previous year. The WPI of mustard oil (3.79 percent), soybean oil (4.39 percent), sunflower oil (2.51 percent) groundnut oil (0.66 percent), rapeseed oil (0.08 percent), copra oil (0.14 percent) and cotton seed oil (3.01 percent) decreased over the previous month.

Fruits & Vegetable

The WPI of Fruits & Vegetable as a group stood at 200.3 in September 2023, showing a decrease of 24.01 percent over previous month and a decrease of 7.10 percent over the corresponding month of the previous year.

Potato

The WPI of potato stood at 213 in September, 2023, showing a decrease of 3.79 percent over the previous month. Moreover, it decreased by 25.24 percent over the corresponding month of the previous year.

Onion

The WPI of onion stood at 270.1 in September, 2023, showing an increase of 17.84 percent over the previous month and an increase of 55.05 percent over the corresponding month of the previous year.

Condiments & Spices

The WPI of Condiments & Spices (Group) stood at 253.6 in September, 2023, showing an increase of 0.96 percent over the previous month and an increase of 32.64 percent over the corresponding month of the previous year. The Wholesale Price Index of black pepper increased by 4.26 percent over the previous month and of turmeric, WPI increased by 4.09 percent over the previous month. However, the WPI of chillies (dry) decreased by 0.65 percent.

Tea

The WPI of tea stood at 158 in September, 2023, showing a decrease of 0.69 percent over the previous month and a decrease of 10.84 percent over the corresponding month of the previous year.

Coffee

The WPI of coffee stood at 149.8 in September, 2023 showing no change over the previous month. Moreover, there is a decrease of 4.40 percent over the corresponding month of the previous year.

Sugarcane

The WPI of sugarcane stood at 210.1 in September, 2023, showing no change over the previous month. However, there is an increase of 5.16 percent over the corresponding month of the previous year.

Raw Cotton

The WPI of raw cotton stood at 164 in September, 2023, showing an increase of 1.11 percent over the previous month and but a decrease of 18.61 percent over the corresponding month of the previous year.

Raw Jute

The WPI of raw jute stood at 235.9 in September, 2023, showing a decrease of 5.03 percent over the previous month and a decrease of 14.71 percent over the corresponding month of the previous year.

Wholesale Price Index of commercial crops is given in Table 3. A graphical comparison of WPI for the period of September, 2023 and August, 2023 is given in figure 5 and the comparison of WPI during September, 2023 with the corresponding month of last year has been given in figure 6.

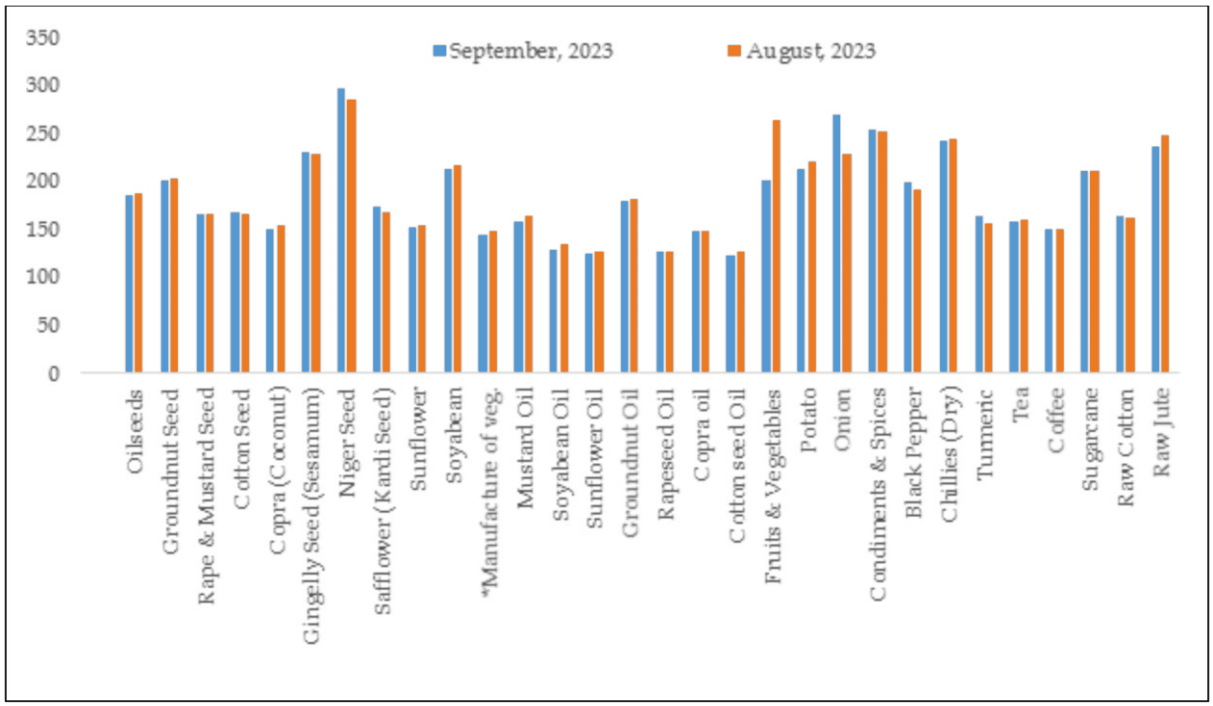
TABLE 3: WHOLESALE PRICE INDEX OF COMMERCIAL CROPS

(Base Year: 2011-12)

Commodity	September, 2023	August, 2023	September, 2022	Percentage variation over the	
				Month	Year
Oilseeds	185.8	187.8	196.1	-1.06	-5.25
Groundnut Seed	201.0	203.0	175.2	-0.99	14.73
Rape & Mustard Seed	165.4	166.2	198.2	-0.48	-16.55
Cotton Seed	167.0	165.3	180.3	1.03	-7.38
Copra (Coconut)	150.6	153.3	185.2	-1.76	-18.68
Gingelly Seed (Sesamum)	229.7	228.8	181.9	0.39	26.28
Niger Seed	296.8	284.4	240.8	4.36	23.26
Safflower (Kardi Seed)	172.8	167.8	208.2	2.98	-17.00
Sunflower	152.1	153.2	180.0	-0.72	-15.50
Soyabean	213.1	216.2	226.9	-1.43	-6.08
Manufacture of vegetable and animal oils and fats	143.3	147.5	173.1	-2.85	-17.22
Mustard Oil	157.2	163.4	189.3	-3.79	-16.96
Soyabean Oil	128.6	134.5	168.1	-4.39	-23.50
Sunflower Oil	124.1	127.3	162.9	-2.51	-23.82
Groundnut Oil	180.2	181.4	173.6	-0.66	3.80
Rapeseed Oil	125.8	125.9	156.4	-0.08	-19.57
Copra oil	147.6	147.8	167.2	-0.14	-11.72
Cotton seed Oil	122.4	126.2	175.1	-3.01	-30.10
Fruits & Vegetables	200.3	263.6	215.6	-24.01	-7.10
Potato	213.0	221.4	284.9	-3.79	-25.24
Onion	270.1	229.2	174.2	17.84	55.05
Condiments & Spices	253.6	251.2	191.2	0.96	32.64
Black Pepper	198.3	190.2	165.7	4.26	19.67
Chillies (Dry)	242.9	244.5	249.8	-0.65	-2.76
Turmeric	163.0	156.6	114.9	4.09	41.86
Tea	158.0	159.1	177.2	-0.69	-10.84
Coffee	149.8	149.8	156.7	0.00	-4.40
Sugarcane	210.1	210.1	199.8	0.00	5.16
Raw Cotton	164.0	162.2	201.5	1.11	-18.61
Raw Jute	235.9	248.4	276.6	-5.03	-14.71

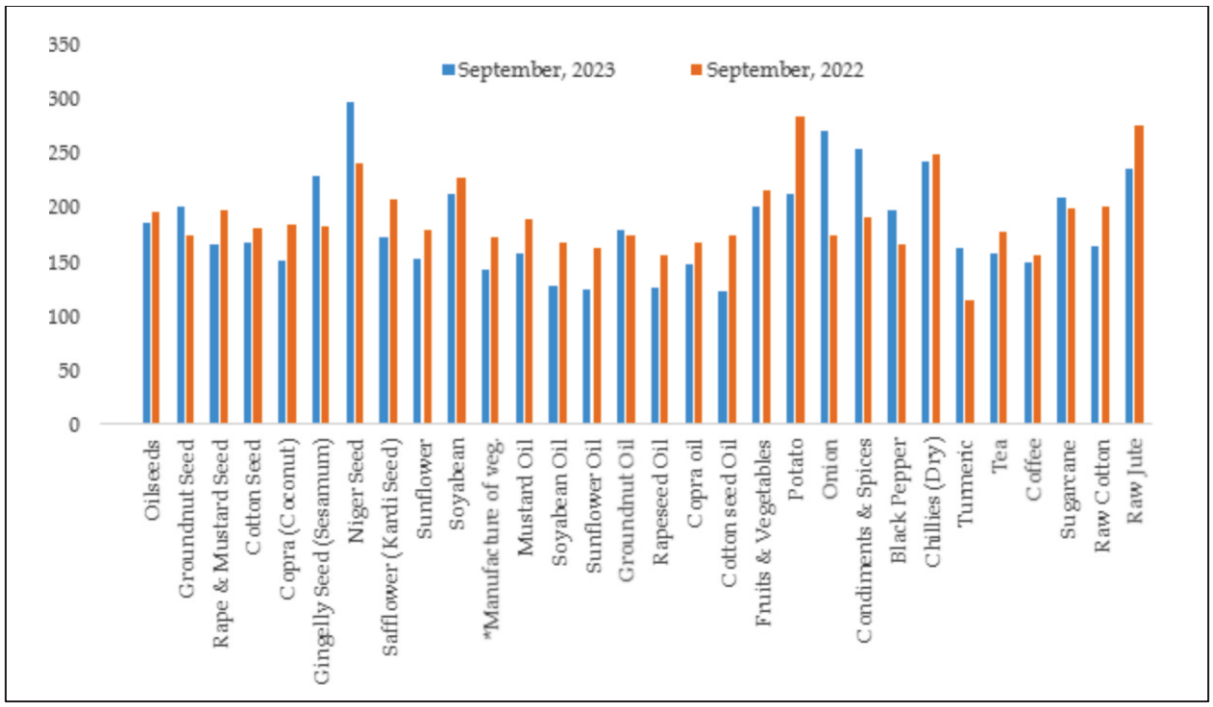
Source: Office of the Economic Advisor, DPIIT, Ministry of Commerce, Govt. of India.

Figure 5: WPI of Commercial Crops during September, 2023 and August, 2023



*Manufacture of Vegetable, Animal Oils and Fats.
Source: Office of the Economic Advisor, DPIIT, Ministry of Commerce, Govt. of India.

Figure 6: WPI of Commercial Crops during September, 2023 and September, 2022



*Manufacture of Vegetable, Animal Oils and Fats.
Source: Office of the Economic Advisor, DPIIT, Ministry of Commerce, Govt. of India.

Statistical Tables

Wages

STATE-WISE PREVAILING AVERAGE DAILY WAGES

(Value in Rs)

Sr. No.	State	Month & Year	Normal Working Hours	Field Labour								Other Agri. Labour		Tractor Driver		* Field Labour		Non-Agri. Occupation		
				Ploughing		Sowing		Weeding		Reaping & Harvesting								Carpenter	Blacksmith	Mason
				M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	M	M
1	Andhra Pradesh	May, 23	8	596	-	520	378	425	316	513	397	528	366	670	-	Not Required		687	594	721
2	Assam	May, 23	8	464	436	455	411	450	412	462	411	451	422	530	-			546	490	530
3	Bihar	May, 23	8	390	340	354	313	358	315	375	-	370	340	465	-			559	537	545
4	Chhattisgarh	May, 23	8	365	250	243	211	230	200	238	206	253	217	411	-			429	335	419
5	Goa	May, 23	8	834	750	550	438	725	500	680	503	680	488	1292	-			1079	800	967
6	Gujarat	May, 23	8	313	NR	275	253	252	252	253	250	160	158	387	-			499	499	499
7	Haryana	May, 23	8	613	-	557	481	527	464	534	491	520	473	627	-			732	683	787
8	Himachal Pradesh	May, 23	8	575	-	497	480	486	482	490	500	462	438	644	-			660	647	648
9	Jharkhand	May, 23	8	311	285	304	271	306	267	313	283	301	263	402				459	450	482
10	Karnataka	May, 23	8	628	-	401	292	363	275	393	291	445	311	605	-			568	519	706
11	Kerala	May, 23	8	1031	NR	NR	659	NR	649	841	694	796	700	NR				1035	973	1043
12	Madhya Pradesh	May, 23	8	371	276	326	269	292	261	325	284	350	296	446	-			492	478	504
13	Maharashtra (P*)	June, 22	8	406	283	381	256	356	244	490	NR	378	244	607	-			500	450	472
14	Odisha	March, 23	8	410	281	370	305	364	316	373	257	387	322	534	-			593	538	591
15	Punjab	May, 23	8	501	410	485	433	467	409	499	NR	480	400	504	-			613	593	610
16	Rajasthan	May, 23	8	465	356	451	340	383	344	395	352	425	297	523	-			543	502	600
17	Tamil Nadu	May, 23	8	661	-	620	322	638	320	710	331	650	338	852	-			797	711	852
18	Telangana	May, 23	8	Not Required								434	343	NR		437	319	461	444	NR
19	Tripura	May, 23	8	419	NR	369	319	364	313	357	300	303	251	491	NR	Not Required		458	378	361
20	Uttar Pradesh	May, 23	8	351	-	343	322	335	316	345	322	336	320	NR				558	-	590
21	Uttarakhand	May, 23	8	687	NR	446	407	459	410	490	448	493	437					717	NR	725
22	West Bengal	May, 23	8	501	350	364	325	353	316	373	335	341	313	532	-			540	498	540

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 Telangana do not give operation–wise details as they furnish data for the group

3. P* - Provisional as the State has not furnished data for its all districts.

4. NR: Not Reported

Prices

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

(All Prices in Rupees)

S.No.	Commodity	Variety	Unit	State	Centre	Sep-23	Aug-23	Sep-22
1	Wheat	PBW 343	Quintal	Punjab	Amritsar	NA	NA	2275
2	Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	2311	2353	2267
3	Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	2541	2404	2159
4	Jowar	-	Quintal	Maharashtra	Mumbai	4940	4875	3580
5	Gram	No III	Quintal	Madhya Pradesh	Sehore	6021	5353	4279
6	Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	1953	1878	2374
7	Gram Split	-	Quintal	Bihar	Patna	7018	6725	6400
8	Gram Split	-	Quintal	Maharashtra	Mumbai	6820	6350	6220
9	Arhar Split	-	Quintal	Bihar	Patna	13240	12513	9516
10	Arhar Split	-	Quintal	Maharashtra	Mumbai	13500	12875	10000
11	Arhar Split	-	Quintal	Delhi	Delhi	13740	12704	9660
12	Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	14040	12725	9660
13	Gur	-	Quintal	Maharashtra	Mumbai	4800	4800	4770
14	Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4700	4700	4960
15	Gur	Balti	Quintal	Uttar Pradesh	Hapur	3760	3725	3358
16	Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	5440	5444	6436
17	Mustard Seed	Black	Quintal	West Bengal	Raniganj	6380	6600	6360
18	Mustard Seed	-	Quintal	West Bengal	Kolkata	5980	5938	7090
19	Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	5282	5463	7650
20	Linseed	Small	Quintal	Uttar Pradesh	Varanasi	5314	5281	7645
21	Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	2870	2775	3120
22	Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	3750	3750	4010
23	Castor Seed	-	Quintal	Telangana	Hyderabad	NA	NA	NA
24	Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	13140	13450	10286
25	Copra	FAQ	Quintal	Kerala	Alleppey	8210	8350	8050
26	Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	7500	7125	6080
27	Groundnut	-	Quintal	Maharashtra	Mumbai	12400	11800	11000
28	Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	1821	1820	2416
29	Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	1817	1839	2246
30	Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	2669	2760	2492
31	Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2830	2950	2650

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

S.No.	Commodity	Variety	Unit	State	Centre	Sep-23	Aug-23	Sep-22
32	Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2154	2185	2347
33	Castor Oil	-	15 Kg.	Telangana	Hyderabad	2481	2513	2655
34	Sesamum Oil	-	15 Kg.	Delhi	Delhi	2780	2765	2500
35	Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	4510	4450	3530
36	Coconut Oil	-	15 Kg.	Kerala	Cochin	1869	1883	2007
37	Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	2937	2894	3055
38	Groundnut Cake	-	Quintal	Telangana	Hyderabad	NA	NA	NA
39	Cotton/Kapas	NH 44	Quintal	Andhra Pradesh	Nandyal	7490	6850	10200
40	Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	6060	6075	8770
41	Jute Raw	TD 5	Quintal	West Bengal	Kolkata	5230	5613	6070
42	Jute Raw	W 5	Quintal	West Bengal	Kolkata	5230	5613	6070
43	Oranges	Big	100 No	Tamil Nadu	Chennai	2540	2375	2600
44	Oranges	Nagpuri	100 No	West Bengal	Kolkata	NA	NA	NA
45	Banana	-	100 No.	Delhi	Delhi	417	521	417
46	Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	580	588	567
47	Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	60000	60000	65000
48	Almonds	-	Quintal	Maharashtra	Mumbai	75300	75000	55040
49	Walnuts	-	Quintal	Maharashtra	Mumbai	100000	100000	105600
50	Kishmish	-	Quintal	Maharashtra	Mumbai	20000	20000	16020
51	Peas Green	-	Quintal	Maharashtra	Mumbai	7960	7800	6860
52	Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	1950	6325	2210
53	Ladyfinger	-	Quintal	Tamil Nadu	Chennai	1360	2375	1400
54	Cauliflower	-	100 No.	Tamil Nadu	Chennai	1780	1825	3100
55	Potato	Red	Quintal	Bihar	Patna	1390	1418	1700
56	Potato	Desi	Quintal	West Bengal	Kolkata	1564	1640	2160
57	Potato	Sort I	Quintal	Tamil Nadu	Mettuppalayam	4142	4145	4643
58	Onion	Pole	Quintal	Maharashtra	Nashik	2010	1800	1030
59	Turmeric	Nadan	Quintal	Kerala	Cochin	12700	11625	11000
60	Turmeric	Salam	Quintal	Tamil Nadu	Chennai	18400	18000	12320
61	Chillies	-	Quintal	Bihar	Patna	22600	22175	20306
62	Black Pepper	Nadan	Quintal	Kerala	Kozhikode	61520	59150	47980
63	Ginger	Dry	Quintal	Kerala	Cochin	33000	29875	15500
64	Cardamom	Major	Quintal	Delhi	Delhi	59600	57913	57660
65	Cardamom	Small	Quintal	West Bengal	Kolkata	226000	198750	153500
66	Milk	Buffalo	100 Liters	West Bengal	Kolkata	7750	7625	6500
67	Ghee Deshi	Deshi No 1	Quintal	Delhi	Delhi	62006	62016	60030
68	Ghee Deshi	-	Quintal	Maharashtra	Mumbai	75000	84500	44400

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

S.No.	Commodity	Variety	Unit	State	Centre	Sep-23	Aug-23	Sep-22
69	Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	48500	47738	46660
70	Fish	Rohu	Quintal	Delhi	Delhi	12400	11775	13400
71	Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	54400	65750	60800
72	Eggs	Madras	1000 No.	West Bengal	Kolkata	5732	5088	4931
73	Tea	-	Quintal	Bihar	Patna	25380	25400	27400
74	Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	10202	10029	11372
75	Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	41800	44000	49000
76	Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	28000	28000	24000
77	Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	9190	9663	8520
78	Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	4290	4731	4215
79	Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	13240	13200	13300
80	Rubber	-	Quintal	Kerala	Kottayam	12760	12325	14360
81	Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	91200	91000	91800
82	Paddy	2716	Quintal	Andhra Pradesh	Vijayawada	2386	2330	2200
83	Paddy	Basmati	Quintal	Punjab	Amritsar	3460	NA	3342
84	Paddy	No III	Quintal	Uttar Pradesh	Kanpur	2076	2025	1741
85	Paddy	Common	Quintal	West Bengal	Kolkata	2183	2183	2020

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

Crop Production

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING THE MONTH OF OCTOBER, 2023

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

Note to Contributors

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