AGRICULTURAL SITUATION IN INDIA

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From Editor's Desk

This edition of "Agricultural Situation in India" includes news pertaining to the agriculture sector, information on production and procurement of food grains, price indices and related data tables along with two research articles, one on "Impact of Improved Technology in Enhancing the Productivity and Profit of Paddy Farmers - A Study in Tinsukia District of Assam" and the second on "Growth and Instability Analysis of Area, Production and Productivity of Soybean in Karnataka". In addition, an Agro-Economic Research study titled "Estimating Transportation and Harvesting Cost of Sugarcane" conducted by the Agricultural Economics Research Centre, University of Delhi under the Agro-Economic Research scheme of Economics and Statistics Division, DA&FW is part of this edition.

The major farm sector news for the month of January cover the events of India Cold Chain conclave; Millets & Organics – 2023; Krishi-Mahotsav: Pradarshani evam Prashikshan; G-20 International Financial Architecture Working Group Meeting. The other news covered include, Focused Activities undertaken for IYM 2023; Digital India Award 2022; India elected as Vice-Chair at the 12th session of FAO's Inter-Governmental Technical Working Group (ITWG) on Animal Genetic Resources (AnGR) for Food and Agriculture; Indian delegation visits Nigeria among other news.

The annual rate of inflation based on all-India WPI has decreased from 13.68 percent in January, 2022 to 4.73 percent (provisional) in the month of January, 2023. The annual food inflation rate increased by 2.95 percent in the month January, 2023 (provisional) over January, 2022, whereas on month-on-month basis, the food inflation rate increased by 0.53 percent in January, 2023 over December, 2022, provisionally. The cumulative winter season rainfall in the country during the period 1st January, 2023 to 25th January, 2023 has been 45 percent lower than the long period average (LPA). Current live storage in 143 major water reservoirs in the country is 115.89 BCM as against the average storage of last 10 years, 97.35 BCM.

The article on "Impact of Improved Technology in Enhancing the Productivity and Profit of Paddy Farmers - A Study in Tinsukia District of Assam" assesses the impact of adoption of improved technology on the productivity of paddy in the sample district in the State of Assam. The study finds that the adoption of improved technology resulted gain in productivity, while the net returns increased manifold. Overall, there was a positive impact on productivity as well as income of farmers. The study suggests that inclusion of more suitable and profitable crops in calendar year with right use of suitable technology can enhance the productivity and income of farmers. Institutional interventions like spreading awareness on the use of improved technology in farming and infrastructure development will help bring more farmers under its coverage which will result in better realization of productivity and income for the farmers.

The article titled "Growth and Instability Analysis of Area, production and productivity of soybean in Karnataka" evaluates the growth and instability in area, production and productivity of soybean in the selected districts in Karnataka. The study reveals that soybean is a major Kharif crop in the study area and registered a significant and positive growth both in area and production; whereas the productivity showed insignificant growth and this could be due to non-adoption of improved available technologies. Thus the study suggests for creating awareness, adoption of improved technologies, and promotion of improved varieties of Soybean with scientific cultivation practices would increase the productivity of soybean crop.

The Agro-Economic Research study on "Estimating Transportation and Harvesting Cost of Sugarcane" is an attempt to estimate the harvesting and transportation costs considering the existing operational modes in major sugarcane producing States through field survey. The study finds that the harvesting cost on daily-wage basis is lower than the contract basis. Majority of the transportation is done through mechanized mode, but some areas make use of manual mode of transport. The transportation cost for both the modes is nearly the same on 'per quintal' basis, but manual mode is dearer when calculated on 'per quintal per km' basis. The major share of the harvested sugarcane is supplied to the sugar mills on an average, although these vary across the states. The study suggests use of skilled manpower; up-gradation in procurement, transport and processing of sugarcane using technology; unbiased distribution of dispatch slips; timely payments to farmers and granting of licenses to sugar mills so as to allow them to make by-products as some of the ways in which the costs can be reduced and make procurements efficient that would make sugarcane harvesting and processing profitable for both farmers and as well as mill owners.

Anil Kumar Sharma

Farm Sector News

Meetings and Events

India Cold Chain conclave

Ministry of Agriculture and Farmers Welfare, along with PHD Chamber of Commerce & Industry (PHDCCI) in association with National Centre for Cold Chain Development (NCCD) as a knowledge partner, organised a one-day exhibition and conference "India Cold Chain Conclave" in New Delhi on 19th January, 2023. The conference was organised with the objective to bring together all the stakeholders on one common platform where they can contribute thoughts and ideas for the growth of industry in a sustainable manner and to explore ways of reducing post-harvest losses with relevant technologies. An exhibition was also organised concurrently to demonstrate innovations and excellence in cold chain sector by industry leaders.

The conclave and exhibition was inaugurated by Shri Manoj Ahuja, Secretary, Department of Agriculture and Farmers Welfare. He said that Ministry of Agriculture recognizes the importance of the cold chain industry in ensuring food safety, reducing food waste and increasing the shelf life of perishable products and Ministry has set up an extensive outlay of policies and programmes to give strength to this sector. Technological innovation is crucial for the growth and development of the Indian cold chain industry. With the advent of advanced refrigeration and cooling systems, the industry is now able to store and transport goods at much lower temperatures, which helps to extend the shelf life of perishable products. This has led to an increase in the export of perishable goods from India, as the products can now reach international markets in better condition.

During the conclave, approval of the product specific horticulture clusters in various parts of the country under the Horticulture Cluster Development Programme of MoA&FW was accorded. On this occasion, Shri Ahuja handed over the letter of acceptance to five Cluster Development Agencies and Implementing Agencies for respective clusters *viz*., apple in Shopian (J&K), banana in Ananthapur (Andhra Pradesh), grapes in Nasik (Maharashtra), mango in Mahbubnagar (Telangana) and turmeric in West Jaintia Hills (Meghalaya), out of 12 selected clusters for pilot phase. The respective Implementing Agencies include FIL Industries Pvt. Ltd., Desai Agrifoods Pvt. Ltd., Sahayadri Farms Post-Harvest Care Limited, Prasad Seeds Pvt. Ltd. and Meghalaya Basin Management Agency through their Cluster Development Agencies, namely JK HPMC, Andhra Pradesh Horticulture Development Agency, Maharashtra State Horticulture and Medicinal Board, Telangana State Horticulture Development Corporation Limited and Meghalaya State Agricultural Marketing Board. It was also announced that the applications for 7 other pilot clusters, namely mango for Kutch and Lucknow, pomegranate for Solapur and Chitradurga, banana for Theni, apple for Kinnaur and pineapple for Sepahijala are under process.

Dr. Abhilaksh Likhi, Additional Secretary (DA& FW) said that the Indian cold chain industry is expected to experience significant growth in the coming years. The increasing demand for perishable goods such as fruits, vegetables and meat products as well as the rise in e-commerce and online grocery sales are driving this growth. As the demand for these goods continues to grow in India, the Government recognizes the need to support the development of the cold chain industry in order to ensure food security and public health.

Shri Priya Ranjan, Joint Secretary (Horticulture) said that the Agriculture Ministry, under the dynamic leadership of the Agriculture Minister, is working fast in understanding the new needs which are emerging on the cold chain front and we are progressing ahead with various programmes initiated to bring new developments in the cold chain sector.

During technical sessions, various issues relating to logistics and cluster development to unlock cold chain development prospects, cold chain energy efficiency, refrigeration technology and importance of Internet of Things in cold-chain, etc. were deliberated in detail by the delegates with the objectives to bring improvement of the development of cold-chain industry in sustainable manner.

Millets & Organics - 2023

Millets & Organics 2023 – International Trade Fair commenced in Thripuravasini, Bengaluru on 20th January, 2023. The three-day event was divided in multiple segments including Exhibition, Pavilion, B2B networking and much more.

The exhibition segment of the event was inaugurated by Shri. Basavaraj Bommai, Chief Minister, Government of Karnataka. Followed by the inaugural ceremony, Shri Pralhad Joshi, Minister of Parliamentary Affairs, Coal & Mines inaugurated the Karnataka Pavilion. Union Minister of State, Ministry of Agriculture & Farmers Welfare, Shri Kailash Choudhary also graced the event and inaugurated the B2B networking part.

The trade fair is a platform for farmers, farmer groups, domestic and international companies, central and state institutions in organic and millet sector to connect and explore opportunities in agriculture, horticulture, processing, machinery and agri-technology. The Government of Karnataka has been a leader in promotion of millets. The first Organics and Millets Fair was held in 2017, the second and third editions in 2018 and 2019 in Bengaluru.

The inauguration of the international conference was done by Sushri Shobha Karandlaje, Union Minister of State, Ministry of Agriculture & Farmers Welfare. In her address to the farmers and other participants, she called for cultivation of quality millets with optimal use of pesticides that can be taken to international platform which would help them in gaining competitive prices for their produce. The Government's commitment to increase farmers' income can be seen through significant rise witnessed in agriculture exports.

Shri Kailash Choudhary, Union Minister of State, Ministry of Agriculture & Farmers Welfare in his address highlighted that the budget allocation towards farmers has increased 6 times. Additionally, he also said that the country is focussed on developing 10,000 FPOs and aiding farmers in setting up sorting and grading units, along with production of value-added products which are export ready. He emphasized that consumption of millets is the solution to malnutrition, which will also benefit farmers to get better livelihood and increased income.

Ms. Shubha Thakur, JS (Crops), Ministry of Agriculture & Farmers' Welfare appreciated the model of Karnataka State Government in millets promotion. She said, "Karnataka has been distributing millet grains through the PDS system, organising district-wise kisan mela. Further to that, farmers in Karnataka have helped boost food production, especially during the Covid pandemic, by cultivating millets." She also added that in the coming year, National Food Security Mission (NFSM) programme will be reconstituted to the National Food and Nutrition Security Mission, paving the way for millets to reach the global forum.

Some of the key highlights from the fair included more than 250 stalls, millet and organic food court, buyer seller meets, international expo and conference, consumer connect, farmers workshop, cooking, drawing and quiz competitions, demonstration of millet recipes, among others. The key products on display during the fair were millets, organics and natural range, certified wild harvest produce, millet processing machinery, organic cereals and pulses, bio-degradable packaging, eco-friendly products, etc.

Krishi-Mahotsav: Pradarshani evam Prashikshan

The Ministry of Agriculture and Farmers Welfare, Government of India in collaboration with the Government of Rajasthan organized a two-day Agriculture Festival-Exhibition and Training at

Dussehra Ground in Kota, Rajasthan on 24th-25th January, 2023 to make Kota Division an advanced and a leading player in the field of agriculture and rural development. The exhibition was inaugurated by Lok Sabha Speaker, Shri Om Birla and Minister of State for Agriculture and Farmers Welfare, Shri Kailash Chowdhary.

Shri Lalchand Kataria, Minister of Agriculture and Animal Husbandry, Government of Rajasthan and Shri Udayalal Anjana, Minister of State, Cooperation Department, Government of Rajasthan were also present. Apart from them, senior officials from Central Government, State Government and Indian Council of Agricultural Research and around 15,000 farmers, agri startups, corporates bankers, extension workers and employees of private agricultural institutions participated in the first day of the event.

Lok Sabha Speaker, Shri Om Birla said that India is an agricultural country and is at the forefront in food production. In the changing agricultural landscape, we should resolve to use contemporary practices, and using innovation, we should aim to become a frontline country in the world. He said that AatmaNirbhar Bharat (self-reliant India) will be realized when our farmers use new agricultural practices, innovation, value addition, more crop per drop, etc. Shri Om Birla stressed on the use of horticulture, startups and drones. He said that through startups, we have worked to bring down production cost in some instances, and in other cases we have increased production, at some places we have set up food processing units and at other places we have achieved value addition.

Minister of State for Agriculture and Farmers Welfare, Shri Kailash Chowdhary while addressing the farmers said that keeping in view the global scenario of the agriculture sector, the Department of Agriculture and Farmers Welfare has implemented several important schemes for the progress of Indian agriculture. This is a proof of dedication towards farmers and efforts being made to increase their income. An unprecedented increase has been made in the budgetary allocation of the Ministry of Agriculture and Farmers Welfare. The combined budget allocation of the Ministry of Agriculture and Fisheries, Animal Husbandry and Dairying in the year 2013-14 was Rs. 30,223.88 crore which has been hiked by more than 4.59 times to Rs. 1,38,920.93 crore in the year 2022-23.

Shri Lalchand Kataria, Agriculture and Animal Husbandry Minister, Government of Rajasthan said that to improve the financial condition of the farmer, there is a need for new technology, innovation, animal husbandry, traditional farming, all of which has been displayed here. Through the startups, farmers will get information about how to store, how to do farming with less water and how to plough the field with less cost.

Shri Udayalal Anjana, Minister of State, Cooperative Department, Government of Rajasthan said that both Agriculture Department and Cooperative Department are complementary to each other. Farmers should be educated by organizing such fairs, which will strengthen their economic condition. Lok Sabha Speaker, Shri Om Birla and Minister of State for Agriculture and Farmers Welfare, Government of India, Shri Kailash Choudhary also inaugurated the drone demonstration by flying the drone themselves.

In this exhibition, 150 stalls were set up to provide farmers with updated information related to agriculture. Keeping in view the important role of startups in the field of agriculture, 75 stalls of startups were set up in this exhibition, which was one of the main features of the exhibition. Information about the schemes being run by the Central and State Governments for the farmers was provided through the various stalls set up in the exhibition. Along with this, private sector companies/organizations related to the supply of various inputs for agriculture also displayed their products. A programme to train about 5,000 farmers on subjects related to agriculture, horticulture and animal husbandry was organized in two sessions. A special workshop on Agriculture Infrastructure Fund was also organized for the benefit of farmers. Exhibition and training programme, parallel farmer training

sessions were organized in three training rooms on modern and scientific agricultural techniques on the subjects of agriculture, horticulture, animal husbandry and dairying. Farmers were taught the nuances of remunerative farming by various subject experts. Six training programmes were organized on contribution of quality seeds in crop production, advanced cultivation of guava and amla in Farmers Producer Organization Kisan Bazar, Kota division, climate smart farming practices, sheep farming for additional income and importance and use of nano urea in sustainable farming, etc.

G-20 International Financial Architecture Working Group Meeting

A two-day meeting of the first International Financial Architecture Working Group of G-20, being held under the chairmanship of India, was inaugurated in Chandigarh on 30th January, 2023 by the Hon'ble Union Minister of Agriculture and Farmers Welfare, Shri Narendra Singh Tomar and Minister of Food Processing Industries, Shri Pashupati Kumar Paras. On this occasion, Shri Tomar said that India is developing rapidly with science and innovation with both of them being deeply connected with the future of India. We have leveraged technology to create the digital public infrastructure. We have been a significant contributor to financial inclusion in global healthcare and the move to sustainable energy while people-centric development is the basis of our national strategy. This is the same philosophy that the theme of our G-20 Presidency - 'One Earth, One Family, One Future' underlines.

Union Minister Shri Tomar said that India's chairmanship of G-20 is a proud moment for all our citizens, besides we are well aware of the responsibilities that come with this historic occasion. Today the world is facing many complex challenges which are deeply interlinked and are not defined by boundaries alone. The challenges being faced are global in nature and require global solutions; therefore the world community today needs to push more towards globally coordinated policies and actions. There is also a need for a renewed faith in multilateralism. Our nation, which is fully committed to democracy and multilateralism, is poised to demonstrate not only multi-dimensional development but is also ready to display universally recognized power. It is not surprising that India was described as a beacon in a fragile world at the recently held World Economic Forum meeting and India's commitment to climate goals and return to the post-Covid development path has been lauded by one and all.

Union Minister Shri Paras said in the meeting that India's effort is to facilitate constructive dialogue, create, share knowledge and share the collective aspiration for a secure, peaceful and prosperous world. He said that during India's presidency of the G-20, it is our responsibility to advance progress and ensure that the international financial architecture today is well equipped to meet the acute challenges and provide maximum support to vulnerable groups. He added that the Hon'ble Prime Minister, Shri Narendra Modi, in his address to the World Economic Forum, Davos Summit deliberated upon whether the multilateral organizations are ready to meet the challenges of the new world order. This working group is committed to meet these challenges and in order to enhance their contribution to development financing towards meeting the development goals, this group may explore options to strengthen these organizations. It is imperative to urgently identify such systems that enable the financial assistance provided by international financial institutions is effectively responsive to the needs. This is important for the low income and developing countries as they are the major beneficiaries of these resources. Countries most affected by rising debt are the low-income countries and most are the middle-income countries. The Working Group can deliberate upon how policy initiatives can address the worsening credit situation. It is hoped that with a diverse array of eminent experts from around the world, the International Financial Architecture Working Group is better poised in coordinating the G-20 efforts towards developmental financing, supporting

vulnerable countries, maintain financial stability and achieve the goal of 'One Earth, One Family, One Future'.

The International Financial Architecture Working Group is one of the important working groups under the G-20 finance track, which focuses on strengthening the international financial architecture. It also aims to address various challenges faced by vulnerable countries. Around 100 delegates from G-20 member nations, invited countries and international organizations participated in the two-day meeting. Discussions during the two-day meeting were jointly moderated by the Ministry of Finance and the Reserve Bank of India, as well as by the co-chairs of the International Financial Architecture Working Group, France and South Korea.

The meeting discussed ways to enhance the stability and cohesion of the international financial architecture and how to make it capable of addressing the global challenges of the 21st century. The meeting also focused on finding ways to maximize aid to poor and vulnerable countries. On the sidelines of the G-20 Working Group meeting on January 30, a G-20 event titled 'Central Bank Digital Currencies (CBDCs): Opportunities and Challenges' was also held. The objective of the event was to share country experiences and develop a deeper understanding of the wider implications of CBDCs. Prior to this meeting, a number of events were organized across the city indicating widespread 'people's participation' and interest in the G-20 events under India's chairmanship.

As a precursor, a seminar on "Central Bank Digital Currencies: The Indian Story" was organized in Chandigarh on 25th January, 2023. The events are aimed at creating awareness about India's chairmanship of the G-20 in 2023 and its theme "Vasudhaiva Kutumbakam" or "One Earth - One Family - One Future".

During India's G-20 Presidency, this working group will meet further in March, June and September to continue discussions on the priorities set under India's Presidency. The discussions at the International Financial Architecture Working Group meeting will inform the G-20 Finance Ministers and Central Bank Governors (FMCBGs) on key deliberations on related priorities under India's G-20 finance track. The first meeting of the G-20 Finance Ministers and Central Bank Governors is scheduled to be held in Bengaluru on 24-25th February, 2023.

General Agricultural Sector News

IYM 2023 kick-starts with Focussed Activities being undertaken by Central Ministries, State Governments and Indian Embassies

Spearheaded by the Hon'ble Prime Minister, the Government of India sponsored the proposal for International Year of Millets (IYM) 2023 which was accepted by the United Nations General Assembly (UNGA). The declaration has been instrumental for the Government of India to be at the forefront in celebrating the IYM. The PM of India, Shri Narendra Modi has also shared his vision to make IYM 2023 a 'People's Movement' alongside positioning India as the 'Global Hub for Millets'.

'Millets' were among the first crops to be domesticated in India with several evidence of its consumption during the Indus valley civilization. Being grown in more than 130 countries at present, millets are considered traditional food for more than half a billion people across Asia and Africa. In India, millets are primarily a kharif crop, requiring less water and agricultural inputs than other similar staples. Millets are important by the virtue of its mammoth potential to generate livelihoods, increase farmers' income and ensure food & nutritional security all over the world.

Recognising the enormous potential of millets, which also aligns with several UN Sustainable Development Goals (SDGs), the Government of India has prioritized millets. In April 2018, millets were rebranded as "Nutri Cereals", followed by the year 2018 being declared as the National Year of Millets, aiming at larger promotion and demand generation. The global millets market is projected to register a CAGR of 4.5%

during the forecast period 2021-2026.

On 6th December, 2022, the Food and Agriculture Organization (FAO) of the United Nations organized an opening ceremony for the International Year of Millets – 2023 at Rome, Italy. The event was attended by a delegation of senior government officials from India. Next in the series, prior to the year-long celebration of 'International Year of Millets (IYM) 2023', the Department of Agriculture & Farmers Welfare hosted a special 'Millet Luncheon' for the Members of the Parliament at the Parliament house.

The Department of Agriculture & Farmers Welfare has taken a proactive multi-stakeholder engagement approach (engaging all the Central Government Ministries, states/UTs, farmers, start-ups, exporters, retail businesses, hotels, Indian Embassies, etc.) to achieve the aim of IYM 2023 and taking Indian millets globally. Ministries, states and Indian embassies have been allocated focussed months in 2023 to carry out various activities for promotion of IYM and increase awareness about benefits of millets for the Consumer, Cultivator and Climate.

Among the Central Ministries, the activities related to IYM for the month of January, 2023 were kick started by the Ministry of Sports and Youth Affairs, Government of India. The Ministry planned 15 activities over 15 days in January which included engaging sports persons, nutritionists and fitness experts through video messages, conducting webinars on millets with leading nutritionists, dieticians and elite athletes, promotion amplification through Fit India App, etc. Some of the other Ministries which organized events in January were Ministry of Food Processing Industries which orgnaised Millet Fair-cum-exhibitions in Andhra Pradesh, Bihar and Madhya Pradesh; FSSAI which organized Eat Right Melas in Punjab, Kerala and Tamil Nadu, etc.

With respect to states, Chhattisgarh, Mizoram and Rajasthan were allocated the month of January for carrying out specific activities for sensitization and promotion of IYM. The states conducted millet centric activities including mahotsavs/melas and food festivals, training of farmers, awareness campaigns, workshops/seminars, placement of hoardings and distribution of promotional material at various key locations in the state, etc. Other states that are organizing similar activities in the month of January include Maharashtra, Uttarakhand and Punjab.

Digital India Awards 2022

e-NAM, a flagship initiative of the Ministry of Agriculture and Farmers Welfare, has won the Platinum Award in the Digital Empowerment of Citizens Category in Digital India Awards 2022 held in New Delhi on 7th January, 2023. The Hon'ble President of India, Smt. Droupadi Murmu, as Chief Guest of the event, conferred the Digital India Awards, 2022 to Dr. N. Vijaya Lakshmi, Joint Secretary, Ministry of Agriculture in the presence of Shri Ashwini Vaishnaw, Minister of Electronics & Information Technology, Railways & Communications and other dignitaries.

e-NAM is a digital platform integrating 1260 APMC mandis across 22 states and 3 UTs to facilitate online trading of 203 agriculture and horticulture commodities to enable farmers to realize better remunerative prices for their produce. e-NAM is catalysing the digital transformation of mandi operations and e-trading of agricultural commodities. As on 31.12.2022, more than 1.74 crore farmers and 2.39 lakh traders have been registered on e-NAM portal. A total trade consisting of 69 million metric tonnes of worth Rs. 2.42 lakh crore has been recorded on e-NAM platform.

e-NAM is providing various benefits/facilities to farmers and other stakeholders such as providing access to prevailing commodity price on mobile app, GPS based feature capturing e-NAM mandis and mandi prices within ~100 kms radius along with route map, advance lot registration, SMS alert on final bid price of the lot & payment receipt, real time competitive price bidding through e-NAM, weightment integration for accurate weight, bidding progress available on mobile,

facilitation of direct trade between farmer and trader, direct payment to farmer's bank account, reduction in the transaction costs of buyers and sellers, FPO trading module to facilitate FPOs to e-trade through e-NAM, etc.

Further with the launch of Platform of Platforms (PoPs) under e-NAM, a digital ecosystem has been created that leverages the expertise of individual service platforms across various segments of agri value chain.

Digital India Awards (DIA) have been instituted by MeitY, under the aegis of National Portal of India to encourage and honour innovative digital solutions / exemplary initiatives by various Government entities in the realm of Digital Governance. Digital India Awards 2022 aims to inspire and motivate not only Government entities but also startups in fulfilling the Digital India vision. Digital India Awards 2022 were given under 07 different categories *viz.,* Digital Empowerment of Citizens, Public Digital Platforms, Digital Initiatives in Collaboration with Start-ups, Digital Initiative for ease of doing business, Data sharing and use for socio-economic development, Digital Initiatives at Grassroots level, Best Web & Mobile initiatives, etc. Platinum, Gold & Silver awards were given to the winning teams under different categories.

India honours best Agripreneurs with awards on National Youth Day

The National Youth Day, also known as Vivekananda Jayanti, was celebrated on 12th January, 2023 in New Delhi in a befitting manner by giving National Awards to 82 best Agripreneurs who were trained under the Central Sector Scheme – Agri-Clinics and Agri-Business (AC&ABC) of Government of India for their significant contribution to farmers through agri-clinic and agribusiness services. Besides, 8 Nodal Training Institutes (NTIs) who impart AC&ABC training efficiently also received awards for their best training, handholding and facilitation activities.

More than 850 Agripreneurs from all parts of the country, senior officials from Ministry of Agriculture and Farmers Welfare, Government of India, MANAGE - Hyderabad, Senior Managers from NABARD, lead banks, ICAR scientists and private agri-business companies attended the award ceremony held at NASC Complex, New Delhi.

Dr. P Chandra Shekara, Director General, MANAGE stated that so far 83,810 agri-graduates were trained under AC&ABC Scheme and about 36,560 have established Agri-ventures in the rural areas. They are able to achieve self-employment by providing services to farmers and also create jobs to rural youth.

The chief guest, Smt. Shubha Thakur, Joint Secretary, MoA&FW, Government of India inaugurated the awards ceremony and distributed awards to best Agripreneurs and best Nodal Training Institutes. In her address, Smt. Thakur said the Agripreneur Awards have come a long way since being instituted two decades ago. The rising numbers of Agriprenuers proves that the youth is getting attracted to the agriculture sector. She appealed the youth to avail funding from the Agriculture Infrastructure Fund, NABARD and the banking sector.

During the presentations and discussions, senior officers from MoA&FW, MANAGE, NABARD, lead banks and Agri-Business Sector shared the policy reform in AC&ABC, latest developments in AC&ABC, subsidy and loans under AC&ABC and explained opportunities for Agripreneurs under Agriculture Infrastructure Fund, National Beekeeping and Honey Mission and RKVY-RAFTAAR.

Agri-Clinics and Agri-Business (AC&ABC), a mega flagship scheme of Government of India implemented in the country in collaboration with NABARD since 2002, aims to transform unemployed youth into self-employed Agripreneurs through a 45 days free residential training at different parts of the country with a provision for availing loan and subsidy from the banks. The AC&ABC Scheme is being implemented by National Institute of Agricultural Extension

Management (MANAGE), Hyderabad in different states in the country with a network of 136 Nodal Training Institutes (NTIs) spread across all the states.

India elected as Vice-Chair at the 12th session of FAO's Intergovernmental Technical Working Group (ITWG) on Animal Genetic Resources (AnGR) for Food and Agriculture

In the 12th Session of the Intergovernmental Technical Working Group (ITWG) on Animal Genetic Resources (AnGR) at Rome during 18-20th January, 2023, India was elected as Vice-Chair and represented Asia & Pacific region. Dr. BN Tripathi, Deputy Director General (Animal Sciences), ICAR, and the National Coordinator vice-chaired the Session and also act as rapporteur.

The Working Group, established by the FAO's Commission on Genetic Resources for Food and Agriculture (CGRFA), functions to review technical issues, advise and make recommendations to the Commission and further implement the Commission's programme related to AnGR at global level.

In the 12th Session of ITWG, implementation of the Global Plan of Action for Animal Genetic Resources, monitoring of AnGR diversity and preparing 3rd Country Report were reviewed. Further, agenda points on role of microorganisms relevant to ruminant digestion, role of genetic resources in mitigating and adapting to climate change; access and benefit-sharing for AnGR; digital sequence information and potential implications for the conservation and sustainable use of genetic resources were discussed.

Earlier to the ITWG Session, the Global National Coordinators' Workshop was held at FAO Headquarter from 16-17th January, 2023. In the Workshop, Dr. BN Tripathi shared the country's experience in updating data in Domestic Animal Diversity – Information System (DAD-IS) and presented framework for cataloguing native populations including breed registration, notification system, etc. National priorities for germplasm cryopreservation and documenting non - descript AnGR to fulfil SDG indicators were appreciated by the members.

Indian delegation visits Nigeria for taking South-South Collaboration and Cooperation on Millets to next stage

A high-level Indian delegation led by Additional Secretary, Ministry of Agriculture and Farmers Welfare, Shri Abhilaksh Likhi arrived in Abuja, the capital of Nigeria on 26th January, 2023 to take South-South Collaboration and Cooperation on Millets to next higher stage.

In a departure statement to Nigeria for a four-day "Millet-Specific Visit" from 26th January to 29th January, 2023, Shri Likhi said, it comes in the wake of India kick starting the International Year of Millets (IYM) 2023 on the very first day of this year with focused activities being undertaken by Central Ministries, State Governments/UTs and Indian Embassies.

Nigeria is the 2nd richest and most populous country of the 54 nations in African continent and it could become a model of South-South Cooperation on Millets along with other important Indian partners like Egypt, South Africa, Algeria, Morocco, Ethiopia, Kenya, Angola, Ghana and Sudan to address the "lack of food security", which remains one of the most formidable challenges facing the African continent. India and Africa's complementary sectoral priorities and similar roles in the evolving global food markets present numerous opportunities for collaboration in the agricultural sector, and particularly in areas of millets production and promotion.

It may also be recalled that the President of the Cooperative Republic of Guyana, Dr. Mohamed Irfaan Ali met Union Agriculture and Farmers Welfare Minister, Shri Narendra Singh Tomar on 12th January, 2023 during his week-long visit to India and offered 200 acres of land in his country for exclusive cultivation and production of millets for private sector in honor of the United Nations declaring the year 2023 as the International Year of Millet (IYM).

Dr. Irfaan Ali also asked Shri Tomar that he will be truly honored, if Prime Minister Shri Narendra Modi will agree to address the Conference of Heads of Government of the Caribbean Community (CARICOM) scheduled in Februray, 2023 to present India's Vision on Agriculture and Food Security. He said, even a virtual address by Shri Modi to 17 Heads of States will go a long way in promoting and popularizing millets in the Caribbean community. He also offered to have a session of Indian Agriculture Minister for talk on millets.

The High Commission of India, Abuja in Nigeria in partnership with the high-level Indian delegation organized Millets Food Festival & Cooking Competition on 28th January, 2023 at the Chancery premises. On this occasion, several restaurants put up their stalls and served food (prepared with millets) to the participants to promote the millets. Several exhibitions from IITA, ICRISAT, Niger State, Farmers Association of Nigeria and Nigerian Export Promotion Council also participated in the event. Apart from this showcasing, many partner organizations put up their food stalls including stall of Niger State Showcasing Niger State Cuisine. A cooking competition was also organized by the High Commission of India in which 16 participants took part. Several cultural performances from Niger State artists and from Federal Ministry of Information and Culture were also the part of the event.

Speaking on the occasion, Shri Likhi said, the "Millet Event" in Nigeria could become a launching pad for promotion and production of environment friendly, healthy "nutri-cereals" in the true spirit of South-South Collaboration and Cooperation on Millets. He said that millets have served as a traditional staple for hundreds of millions of people in Sub-Saharan Africa and Asia for 7000 years, and are now being revived as alternate to staple food of rice and wheat cultivated across the world. Shri Likhi informed the delegates that after the Nigerian success story, India's Ministry of Agriculture will undertake such promotional events in coordination with Indian Embassies / High Commissions / Consulates in other African countries like Egypt, South Africa, Algeria, Morocco, Ethiopia, Kenya, Angola, Ghana and Sudan to address the challenge of food security facing 54 member strong African continent.

General Survey of Agriculture

Trend in Food Prices

The rate of inflation, based on all-India WPI, stood at 4.73% (Provisional) for the month of January, 2023 as compared to 13.68% 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 have increased from 170.3 in December, 2022 to 171.2 in January, 2023. The rate of inflation based on WPI Food Index increased from 0.65% in December, 2022 to 2.95% in January, 2023.

Based on Wholesale Price Index (WPI) (2011-12=100), the WPI of pulses, cereals and fruits increased by 2.41 percent, 15.46 percent and 4.14 percent, and for vegetables it decreased by 26.48 percent respectively, in January, 2023 over corresponding period of last year. Whereas, on month-on-month basis, the WPI for cereals, fruits and pulses increased by 1.72 percent, 1.81 percent and 0.23 percent and for vegetables, it decreased by 3.66 percent in January, 2023 over December, 2022.

Among cereals, the WPI based rate of inflation for wheat and paddy increased by 23.63 percent and 7.18 percent, respectively, in January, 2023 over January, 2022 while on month-on-month basis, the WPI for wheat and paddy increased by 2.72 percent and 0.52 percent, respectively, in January, 2023 over December, 2022.

Rainfall and Reservoir Situation, Water Storage in Major Reservoirs

Cumulative Winter Season (January-February), 2023 rainfall for the country as a whole during the period 1st January, 2023 to 25th January, 2023 has been 45% lower than the Long Period Average (LPA). Rainfall in the four broad geographical divisions of the country during the above period has been lower than LPA by 94% in Central India, by 86% in East & North East India, by 70% in South Peninsula and by 18% in North-West India.

Out of 36 meteorological sub-divisions, 02 meteorological sub-divisions received large excess/ excess rainfall, 02 meteorological sub-divisions received normal rainfall, 26 meteorological sub-divisions received deficient / large deficient rainfall and 06 meteorological sub-divisions received no rainfall.

Current live storage in 143 reservoirs (as on 25th January, 2023) monitored by Central Water Commission having Total Live Capacity of 177.46 BCM was 115.89 BCM as against 118.51 BCM on 25.01.2022 (last year) and 97.35 BCM of normal storage (average storage of last 10 years). Current year's storage is 98% of last year's storage and 119% of the normal storage.

Crop Situation - Rabi

During the current Rabi season 2022-23, (as on 27.01.2023), 700.92 lakh ha area has been sown as compared to 678.78 lakh ha during 2022-23 during the same period.

A statement indicating comparative position of area coverage during the current Rabi season 2022-23 is given in the **Annexure-I**.

Annexure I

ALL-INDIA CROPS SITUATION – RABI (2022-23) AS ON 27.01.2023

(Area in lakh hectares)

Crop name	Normal area	Area sown			Absolute change
		This year	% of normal	Last year	
Wheat	304.47	341.85	112.3	340.56	1.29
Rice	45.65	33.49	73.4	23.64	9.86
Jowar	29.34	22.41	76.4	24.25	-1.84
Maize	19.17	21.36	111.4	17.92	3.44
Barley	6.15	7.45	121.2	6.79	0.66
Total coarse cereals	**54.67**	**51.90**	**94.9**	**49.57**	**2.33**
Total cereals	**404.79**	**427.24**	**105.5**	**413.77**	**13.47**
Gram	98.86	111.35	112.6	112.89	-1.54
Lentil	14.29	18.49	129.4	17.55	0.95
Peas	7.45	9.62	129.1	10.05	-0.43
Kulthi (Horse gram)	1.98	4.04	203.6	3.69	0.35
Urad	9.13	7.17	78.5	7.52	-0.35
Moong	10.46	5.76	55.1	4.70	1.06
Lathyrus	3.40	3.64	107.3	3.43	0.21
Others	4.62	5.27	114.0	4.68	0.59
Total pulses	**150.19**	**165.35**	**110.1**	**164.51**	**0.84**
Total foodgrains	**554.98**	**592.59**	**106.8**	**578.28**	**14.31**
Rapeseed & Mustard	63.46	97.17	153.1	90.23	6.94
Groundnut	7.22	5.22	72.3	4.71	0.51
Safflower	0.76	0.86	112.7	0.73	0.13
Sunflower	1.46	0.87	59.3	1.10	-0.24
Linseed	2.36	0.42	17.7	0.41	0.01
Sesamum	3.42	3.24	94.6	2.85	0.39
Other oilseeds	0.11	0.57	517.3	0.46	0.11
Total oilseeds (Nine)	**78.79**	**108.34**	**137.5**	**100.50**	**7.84**
All-Crops	**633.78**	**700.92**	**110.6**	**678.78**	**22.15**

Articles

Impact of Improved Technology in Enhancing the Productivity and Profit of Paddy Farmers- A Study in Tinsukia District of Assam

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Abstract

Paddy is the most dominant crop in Assam occupying 71.59 percent of its total net cropped area. Among paddy, Sali paddy occupies 78.56 percent of total paddy area in the state and 27.2 lakh farm families are engaged in cultivation of this particular crop every year. Hence, the present study was conducted in Tinsukia district of Assam to access the impact of improved technology adoption in paddy cultivation in terms of per hectare productivity gained, gross return and net return realized over its traditional mode of cultivation. As paddy is the most dominant crop of the district, it was selected purposively and from two randomly selected blocks, 100 farm households were selected randomly for the purpose of data collection in the pre-tested interview schedules. Collected data were later on compiled and analyzed with suitable economic and statistical tools to derive judicious decision for the betterment of paddy farmers of the district. Results from the study revealed that the average productivity gain due to the adoption of improved technology in paddy cultivation was 109.80 percent and its gain in gross return and net return were 179.73 percent and 1771.88 percent, respectively, over its traditional way of crop cultivation. Moreover, the extent of horizontal spread of improved technology of paddy crop in terms of new household coverage was 147.69 percent and in terms of new area coverage was 90.99 percent. Thus the study established that there was a distinct positive impact of improved technology adoption in paddy cultivation in the district.

Keywords: *Impact, Improved Technology, Productivity, Profit, Paddy, Gross Return and Net Return*

1. Introduction

Assam is an agrarian state with a geographical area of 78,438 square kilometer which is 2.4 percent of our country's geographical area and supports population of 312.05 lakh (Anonymous, 2011). Geographically, the state is situated between 89° 42′ E to 96° E longitude and 24° 8′ N to 28° 2′ N latitude. The gross cropped and net cropped area of the state are 39.75 lakh hectare and 26.99 lakh hectare, respectively, and its resulting cropping intensity is 145 percent (Anonymous, 2021-22). The annual average rainfall in the state as a whole is about 2900 mm with maximum precipitation during June and July. The average temperature in the state varies from 4°C to 19°C during the winter and 26°C to 37°C during the summer accompanied by high humidity.

Agriculture and allied field of activities provide livelihood to 75 percent of its total population and hence is of great economic importance. Among all the crops, paddy is the most dominant crop occupying 88.89 percent of the net cropped area. Rice being a staple food for the people of Assam, the economic influence of paddy on the livelihood of people in the state is quite sizable where 27.2 lakh farm families are engaged in cultivation of this particular crop every year. With the increasing population pressure due to their various developmental needs, the average size of operational holding has decreased and at present, this is 1.09 ha in the state (Anonymous, 2021-22). So to have a better standard of living with respectable income and profit from agriculture besides maintenance of food security,

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production and productivity of crops must be optimum or maximum on continuous basis where adoption of suitable proven technology have due potential to pave the way for establishing a desirable farming society. Therefore, present study was conducted in Tinsukia district of Assam to know the impact of improved technology adoption in enhancing the productivity and profit of paddy farmers as large section of farming community depend upon paddy cultivation for their livelihood.

1.1 Objectives of the study

1. To study the impact of improved technology adoption in enhancing the productivity and profit of paddy farmers over their traditional method of cultivation.
2. To study the horizontal spread of technology adopted in paddy cultivation.

2. Data sources and methodology

The present study was conducted in Tinsukia district of Assam as the prevalence of agricultural activities is very well noticed among farmers and paddy is the most dominant crop of the district. The district is well-to-do with 4.36 percent of net cropped area of the state and supports 4.26 percent of the state's total population (Census, 2011). Among 7 blocks in the district, two blocks were selected randomly and from these two blocks, 12 villages were selected at random. From these villages, 100 farm household were selected randomly for the purpose of primary data collection. The primary data were collected during the year 2021-22 from the respondent farmers with the help of specially designed pre-tested interview schedules through personal interview method. Respondent farm households were stratified into four size groups *viz*., Marginal (below 1 ha), Small (1-2 ha), Medium (2-10 ha) and Large (10 ha and above). In the sample area, there were no large farmers. 55 marginal, 28 small and 17 medium group of farmers were interviewed. Data collected were compiled and analyzed duly for the purpose of report writing and future decision making.

2.1 Description about study area

Tinsukia district is situated between 27°23′ to 27°48'N latitude and 95°22′ to 95°38'E longitude. The total area of the district is 3790 sq. km. The total population of the district is 13, 16,948 as per Census 2011. The district is divided into 3 sub-divisions, 4 revenue circles, 1162 revenue villages and 7 development blocks. The climate of the district is generally warm and temperate. The actual and normal annual average rainfall of the district was 2854 mm and 3781 mm, respectively, during the year 2018. Soil of the district is highly suitable for variety of crops and horticulture crops. Soils of the area are taxonomically classified into four orders, *i.e.* Alfisols, Inceptisols, Entisols and Ultisols. The net cropped area and gross cropped area of the district is 130705 hectares and 145452 hectares, respectively, and its cropping intensity is 111.28 percent (Anonymous, 2019-20). There are 95718 farm families in the district and 80.56 percent are small and marginal (Anonymous, 2010-11). Total paddy area in the district is 62640 hectares which is 47.92 percent of its net cropped area and 53.60 percent of paddy area is under high yielding varieties of paddy. The average productivity of paddy in the district is 3137 kg per hectare (Anonymous, 2020-21).

3. Results and discussion

3.1 Cropping pattern and cropping intensity of the sample area of Tinsukia district

The sample area of Tinsukia district was found to be endowed with gross cropped area of 100.9 ha and net cropped area of 93.05 ha. This gross cropped area among various farm types was - marginal with 30.54 ha, small with 34.93 ha and medium farms with 35.43 ha. Net cropped area across these farms was 29.7 ha in marginal farms, 32.05 ha in small farms and 31.3 ha in medium farms (Table 1).

TABLE 1: CROPPING PATTERN OF THE SAMPLE FARM

(Area in ha)

Name of crop	Marginal	%	Small	%	Medium	%	All farms	%
Local paddy	5.33	17.45	11.4	32.6	19.87	56.08	36.6	36.27
HYV paddy	10.67	34.94	21.2	60.7	10.8	30.48	42.67	42.29
Total paddy	16	52.39	32.6	93.3	30.67	86.57	79.27	78.56
Rapeseed	0.37	1.21	0	0	0.53	1.5	0.9	0.89
Black gram	0.57	1.87	0	0	0.2	0.56	0.77	0.76
Green gram	0	0	0	0	0.13	0.37	0.13	0.13
Cabbage	3.93	12.87	0.8	2.29	0.8	2.26	5.53	5.48
Cauliflower	2.79	9.14	0.07	0.2	0.27	0.76	3.13	3.1
Knolkhol	0.73	2.39	0.07	0.2	0.13	0.37	0.93	0.92
Ridge gourd	2.09	6.84	0.33	0.94	0.8	2.26	3.22	3.19
Cowpea	0.56	1.83	0.07	0.2	0.33	0.93	0.96	0.95
Okra	0.86	2.82	0.13	0.37	0	0	0.99	0.98
Cucumber	0.49	1.6	0.07	0.2	0.43	1.21	0.99	0.98
Potato	0.53	1.74	0	0	0.47	1.33	1	0.99
Pumpkin	0.37	1.21	0.23	0.66	0.4	1.13	1	0.99
Chilli	0.4	1.31	0.43	1.23	0	0	0.83	0.82
Brinjal	0.85	2.78	0.13	0.37	0	0	0.98	0.97
Colocasia	0	0	0	0	0.27	0.76	0.27	0.27
GCA	30.54	100	34.93	100	35.43	100	100.9	100
NCA	29.7		32.05		31.3		93.05	
Cropping Intensity (%)	102.83		108.99		113.19		108.44	

Source: Analysis of primary data

Major crops in the sample area were - Sali paddy with 78.56 percent area coverage followed by cabbage (5.48%), ridge gourd (3.19%) and cauliflower (3.10%). The cropping intensity of this sample area was also found to be very low as compared to state average cropping intensity. The cropping intensity was found to be 108.44 percent against the state figure of 147.24 percent. This means that there is vast scope to increase the cropping intensity of this area through adoption of suitable improved and profitable technologies or interventions in due space and time which can ultimately pave way for increased production, productivity, income and profit to lead a desirable standard of living in the long run for our farming community.

3.2 Economic impact of improved technology on productivity and income from major crops in the sample area

In Tinsukia district, major crops found in the sample area were paddy, cabbage, cauliflower and ridge gourd. In the study area, improved technology included several components like high yield variety, seed rate, seed treatment, time of planting, recommended dose of fertilizers and farm yard manures, timely intercultural operations, plant protection measures, etc. along with training of paddy farmers on improved cultivation of Sali paddy in time. Impact of improved technology application was studied in terms of change in productivity, income and profit along with the horizontal spread of improved technology of paddy in the locality. This was compared with the results of paddy without adoption of improved technology in the sample area.

TABLE 2: ECONOMIC IMPACT OF TECHNOLOGY INTERVENTION ON PADDY CULTIVATION (HYV) IN THE SAMPLE AREA

Parameters	Size group											
	Marginal			Small			Medium			All Farm		
	WoT	WT	Difference	WoT	WT	Difference	WoT	WT	Difference	WoT	WT	Difference
Productivity (kg/ha)	2250	4546	2296	2229	4929	2700	2259	4888	2629	2246	4712	2466
% increase in productivity		102.04			121.13			116.38			109.80	
Cost of cultivation (Rs./ha)	18570	29530	10960	18957	30580	11623	18825	31170	12345	18828	30596	11769
% change in cost of cultivation		59.02			61.31			65.58			62.51	
Gross return (Rs./ha)	20250	54552	34302	20061	59148	39087	20331	58656	38325	20214	56544	36330
% change in gross return		169.39			194.84			188.51			179.73	
Net return (Rs./ha)	1680	25022	23342	1104	28568	27464	1506	27486	25980	1386	25948	24562
% change in net return		1389.40			2487.68			1725.10			1771.88	
Benefit-Cost ratio	1.09	1.85		1.06	1.93		1.08	1.88		1.07	1.85	

Source: Analysis of primary data
Note: WoT= Without intervention of technology, WT= With intervention of technology

From the study, it was found that there was a positive impact on the productivity and income of farmers due to the adoption of improved technology in their cultivation. The results reveal that the productivity of paddy due to the adoption of improved technology was 4712 kg per hectare which was 2246 kg per hectare without the use of technology. Thus, there was a benefit of 2466 kg per hectare in paddy due to the adoption of improved technology in its cultivation. In the sample area, productivity of paddy increased by 109.80 percent over its traditional method of cultivation. In the sample area, the productivity of paddy ranged from 4546 kg per hectare to 4929 kg per hectare across various size groups of farms while in traditional method of cultivation, these variations were 2229 kg per hectare to 2259 kg per hectare (Table 2). In case of gross return per hectare, the

variations were from Rs. 54552 to Rs. 59148 in case of improved cultivation which for traditional cultivation varied from Rs. 20061 to Rs. 20331 per hectare. Similarly, in case of net return per hectare for improved cultivation, the variation was from Rs. 25022 to Rs. 28568 which for the traditional method of cultivation was from Rs. 1104 to Rs. 1680. These differences might be due the variation in the use of technological inputs or operations used, variation in the nature or manner of technology used along with the variation of economic condition and attitude of farmers.

The gross return and net return per hectare in improved method of paddy cultivation was Rs. 56544 and Rs. 25948, respectively, and in traditional method of cultivation these were Rs. 20214 and Rs. 1386, respectively. Thus, gross return per hectare due to the adoption of improved technology increased by 179.73 percent (Rs. 36330/ha) and net return per hectare increased by Rs. 24562 per hectare (18.72 times) over its cultivation without the intervention of technology. The benefit-cost ratios for improved cultivation and traditional mode of cultivation were 1.85 and 1.07, respectively.

Another parameter of impact of adoption of technology was also reflected in the form of horizontal spread of technology adopted by farmers. The horizontal spread of technology means mainly the spread of improved high yielding varieties of paddy from the adopted farmers to earlier non-adopted farmers. It was counted both in terms of number of new adopters and resulting new area covered by these improved high yielding varieties of paddy in the sample area. It was calculated as the additional number of new adopters (No. or Area) in a particular size group of farm over the total number of original adopters of technology in that size group of farm and expressed as percentage. It was found that the horizontal spread of technology in the form of number of newly adopted farmers increased by 147.69 percent and area covered through horizontal spread increased by 90.99 percent. Thus, adoption of improved technology intervention in paddy cultivation was able to exhibit positive impact on the income and productivity of farmers (Table 3). This finding was in conformity with the findings of Bhati *et al.* (2018); Tadesa (2019); Singh *et al.* (2019); Sharma and Thomas (2013); Rimal *et al.* (2015) and Khaiwal (2014).

TABLE 3: HORIZONTAL SPREAD OF TECHNOLOGY FROM THE SAMPLE AREA

Particulars	Size group			
	Marginal	Small	Medium	All farm
Original adopter of technology in paddy	28	22	15	65
No. of farmers covered through horizontal spread	32.00	37.00	27.00	96.00
% of farm households covered by horizontal spread	114.29	168.18	180.00	147.69
Original area of paddy with improved cultivation	6.67	10	8.53	25.20
Area increase (ha)	8	8.93	6	22.93
% area of horizontal spread	119.94	89.30	70.34	90.99

Source: Analysis of primary data

4. Conclusion and policy implication

Several conclusions and positive policy decisions can be derived from the present study and on these decisions, if due actions are implemented in due space and time, will pave the way for enhancing the productivity and income of farming community not only in the extended area of sample area but also in areas having similar agro-ecological characteristics. These conclusion and decisions are

1. As the cropping intensity of the sample area was found to be very low (108.44%), so inclusion of more suitable and profitable crops in a crop calendar in a year with right use of suitable improved technology in right time and place can have the potential to enhance the productivity and income of farmers. Area expansion of high yielding varieties of suitable crops with suitable adoption of improve production technologies can enhance the productivity and

income of farmers in the locality.

2. There is still great scope to enhance the productivity and income from the right adoption of improved technology, not only in paddy crop but also in other high value crops like vegetables with optimum area expansion can benefit farming community with encouraging productivity, income and satisfaction.
3. Institutional interventions like regular awareness about the benefits of adoption of improved technology in agriculture, development and maintenance of adequate and effective infrastructures at affordable and accessible mode, efficient markets can ascertain more and continuous adoption of improved technology in agriculture paving the way for better realization of productivity and income of farming community. This will ultimately result into a better mode of livelihood and effective attraction and retention towards to field of sustainable agriculture.

References

Anonymous (2021-22). Economic Survey of Assam, 2021-22. Directorate of Economics and Statistics, Government of Assam, Guwahati.

Anonymous (2019-20). Land Utilization Statistics (Provisional), 2019-20. Directorate of Economics & Statistics, Assam, Guwahati.

Anonymous (2010-11). Report on Agricultural Census 2010-11 on Number and Area of Operational Holdings (Phase-I), Assam. Directorate of Economics and Statistics, GoA.

Anonymous(2020-21). Economic Survey of Assam, 2020-21. Directorate of Economics and Statistics, Government of Assam, Guwahati.

Bhati, B.S., Soni, R.L., and Bugalia, H.L. (2018). Impact of Front Line Demonstration on Yield and Profitablitiy of Chickpea (Cicer arietinum Linn) in Banswara District of Rajasthan. Indian Journal of Extension Education, 54(3), 150-153.

Census (2011). Population Census 2011. Registrar General and Census Commissioner of India, Ministry of Home Affairs, Government of India.

Khaiwal, R. (2014). Impact of Improved Technologies on Productivity and Profitability of Vegetables on Farmers' Fields in Hamirput District, Bundelkhand Tract of Uttar Pradesh. Indian Journal of Applied Research, Volume 4, Issue 7, pp: 393-395.

Rimal, N.S, Kumar, S., Chahal, V.P., Singh, V. (2015). Impact of Adoption of Improved Varieties of Chickpea (Cicer arietnum) on Yield and Income in Madhya Pradesh. Indian Journal of Agricultural Sciences, 85(4): 99-104.

Sharma, A.K., and Thomas, L. (2013). Technology Inputs and its Impact on Farm Profits: A Case Study of Rapeseed – Mustard. Indian Journal Extension Education.13 (3): 9-14.

Singh, D., Singh, A., Singh, R., and Baghel, M.S. (2019). Impact of FLDs Intervention on Yield and Economics of Paddy cultivation. Indian Journal of Extension Education, 55(1), 164-167.

Tadesa, E. (2019). Determinants of Adoption of Improved Agricultural Technology and its Impact on Income of Smallholder Farmers in Chiro District West Hararghe Zone, Oromia National Regional State, Ethiopia. Journal of Agricultural Economics and Rural Development, Vol. 5(2), pp: 605-614, September, 2019.

Growth and Instability Analysis of Area, Production and Productivity of Soybean in Karnataka

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Abstract

Soybean (Glycine max (L.) Merrill) is a major oilseed crop and is known as 'Golden bean' and 'Miracle crop'. A multistage purposive sampling technique was employed for selection of 128 sample respondents who were cultivating soybean from Belagavi and Dharwad districts for the crop year 2021-22. The secondary data was collected from various published sources. The growth in area, production and productivity of soybean in selected districts of Karnataka and India and their instability as measured by Compound Annual Growth Rate (CAGR) and Cuddy-Della Valle Instability index (CDVI), respectively, was estimated for a period of 20 years from 1999-2000 to 2018-19. The entire study period was divided into two sub-periods viz., period I (1999-00 to 2008-09) and period II (2009-10 to 2018-19). The results revealed that soybean is a major kharif crop in study area which occupied about 21.38 percent, 17.21 percent and 18.95 percent of the gross cropped area in Dharwad, Belagavi and the study area as a whole among sample respondents. In Karnataka, area under soybean registered a significant and positive growth during period I (11.74%), period II (6.36%) and overall period (9.17%) with instability indices of 25.16 percent, 12.54 percent and 18.43 percent, respectively. Likewise, the production of soybean recorded a significant positive growth rate during period I (8.53%), period II (9.26%) and overall period (10.17%) with instability indices of 23.50 percent, 22.91 percent and 23.16 percent, respectively. However, the productivity of soybean registered non-significant growth during all the study periods.

Keywords: *CAGR, CDVI index, Kharif, Soybean, Multistage Purposive Sampling.*

1. Introduction

Oilseeds are primarily grown for the production of edible oils. India is one of the major producers of oilseeds with an area, production and productivity of 24.79 million ha, 31.52 million metric tonnes and 1271 kgha^{-1}, respectively, during 2018-19. Despite this, more than 50 percent of India's domestic edible oil consumption is met through imports (Anonymous, 2020a). Thus, oilseeds cultivation and processing is gaining wider importance. Hence, there is a need to promote the production of oilseeds like soybean due to short supply of edible oil.

Soybean (*Glycine max*) is one of the important primary oilseed crops in India. It is a species of legumes native to East Asia. It is a global crop widely cultivated for its edible bean which has numerous uses. Hence, it is known as the "Golden bean" and "Miracle crop". Soybean was first introduced to Europe in the early 18th century and to British colonies in North America in 1765.

Soybean is the world's most important seed legume, which contributes to 25 percent of the global edible oil and about two-thirds of the world's total protein concentrate which is used as cheap source of livestock feed. The total world soybean production during 2018-19 was 348.71 million metric tonnes (Anonymous, 2020b). Among the countries, Brazil stood first with production of 125.89 million metric tonnes in 2018-19, followed by United States of America (123.66 million metric tonnes), Argentina (37.79 million metric tonnes), China (14.19 million metric tonnes) and India (13.27 million metric tonnes) (Anonymous, 2020b). Soybean

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contains proteins, several vitamins, calcium, phosphorous and iron and is ideally suited for human diet. It is an admirable source of protein and oil. It contains about 40 percent of good quality protein and about 20 percent of oil. Besides utilization of soybean as vegetable, it is also used in oil industry where it occupies first place in the world oil production. Food uses of soybean include beverages; fermented products like soya sauce and yoghurt; cheese analogous like fried and roasted nuts, sprouts, etc. Small quantities of soybean flour are already being used in baked goods, primarily in biscuits and snacks. Substantial quantity of soya flour is also used in place of besan in sweets, pappads and similar products. Soybean based food products are also suitable to diabetic patients as they contain less amount of carbohydrates and low cholesterol content. Therefore, it is one of the most economical protein sources in the world. It is a versatile crop with innumerable possibilities of improving agriculture and supporting farming industry. There is demand for soya for its uses in the pharmaceutical industry, plywood glues, asphalt cements, detergent products, paper boards, laminations and fibre boards.

1.1 Indian scenario

The initiation of commercial exploitation of soybean in India was about four decades ago. India activated its development programme in 1960's. Soybean has established itself as a major kharif season crop in the rainfed ecosystem of central and peninsular India. India is ranked fifth in the world after USA, Brazil, Argentina and China, both in terms of area (111.3 lakh hectare) and production (132.7 lakh tonnes) of soybean during 2018-19 with productivity of 1192 kg/ha. Among the states of India, Madhya Pradesh is the leading producer of soybean with production of 66.7 lakh tonnes, followed by Maharashtra (46.1 lakh tonnes), Rajasthan (11.7 lakh tonnes) and Karnataka (2.6 lakh tonnes). These states together contribute more than 90 percent to the country's total soybean production. Madhya Pradesh is called 'Soya State of India' since it occupies major portion (51.23%) of area under soybean cultivation (Anonymous, 2020c). Soybean has attained a prominent position in India's farm economy. India exported 3.9 lakh tonnes of soybean meals/de-oiled cakes worth of Rs. 1434.03 crore during 2019-20 (April-August) which contributes significantly to total country agricultural export. Domestic consumption of soya meal in India has increased from 5.48 million tonnes in 2018-19 to 5.80 million tonnes in 2019-2020 (Anonymous, 2020a).

1.2 Karnataka scenario

The area under soybean crop in Karnataka state during 2018-19 was 2.5 lakh hectares with production of 2.6 lakh tonnes and productivity of 1034 $kgha^{-1}$. Among the districts, Bidar was the leading producer of soybean with production of 1.03 lakh tonnes, followed by Belagavi (0.90 lakh tonnes), Gulbarga (0.30 lakh tonnes) and Dharwad (0.27 lakh tonnes) during 2018-19. These districts together contribute to about 95 percent of the total soybean production in Karnataka. Bidar district alone occupies about 47.8 percent of area under soybean cultivation in Karnataka.

1.3 Objectives of the study

The major objectives of the paper are to study

1. Cropping pattern of sample respondents in study area.
2. Growth and instability in area, production and productivity of soybean.

2. Data sources and methodology

A multistage purposive sampling method was employed for the selection of sample respondents for compilation of primary data regarding cropping pattern in study area. In the first stage, Belagavi and Dharwad districts were selected purposively for the study based on highest area under soybean cultivation in the jurisdiction of University of Agricultural Sciences, Dharwad. In the second stage, based on maximum area under soybean cultivation, two taluks namely Bailhongal and Hukkeri from Belagavi district and two taluks namely Kalghatagi and Hubballi from Dharwad district were chosen purposively for the study. In the third stage, two villages from each taluk based on highest area under soybean cultivation as recommended by Raith Sampark Kendras (RSK) were selected purposively. In the fourth stage, sixteen respondents were selected from each village which comprised of eight sample respondents who were growing University soybean variety Dsb-21 released in

the year 2015 and eight respondents who were growing other existing soybean variety JS-335 in University of Agricultural Sciences, Dharwad jurisdiction making total sample size of 128 soybean growing respondents. The secondary data pertaining to area, production and productivity of soybean was collected from various published authentic resources.

2.1 Analytical tools

2.1.1 Tabular analysis

The data collected were presented in tabular form to facilitate easy comparisons. A tabular presentation technique was followed to study the economic characteristics such as size of land holding, cropping pattern in relation to production of soybean and for analyzing the data elicited through opinion survey from the sample respondents. The data were summarized with the aid of statistical tools like averages, percentages to obtain the meaningful results.

2.1.2 Compound Growth Rate (CAGR) analysis

In order to analyse the growth in area, production and productivity of soybean, compound growth rates were computed using the following model.

$$Y_t = ab^t e^u$$

where,

Y_t = dependent variable (area/yield/production of soybean)

a = intercept

b = (1+r)

r = (b - 1)

'r' is the compound annual growth rate percent per annum,

t = time period

u = error term

The above model in the logarithmic form is expressed as

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

We can thus calculate the compound growth rates (r) as under:

CAGR in percent (r) = (Antilog of log b-1) x 100

The coefficient of variation (CV) was calculated by using the equation given below:

$$CV(\%) = \frac{\text{Standard deviation (SD)}}{\text{Mean}} \times 100$$

The coefficient of variation (CV) was modified as Cuddy-Della Valle index (CDVI).

In this study, Cuddy-Della Valle index was used to measure instability of soybean crop. The instability index is given by the expression:

$$\text{Instability index} = CV \times \sqrt{1 - R^{*2}}$$

where,

R^{*2}= Adjusted coefficient of determination

3. Results and discussion

3.1 Cropping pattern of sample respondents in study area

It is evident from cropping pattern of sample respondents (Table 1) that soybean is one of the major kharif crops in study area which occupied about 21.38 percent of the gross cropped area in Dharwad district, 17.21 percent of gross cropped area in Belagavi district and 18.95 percent of the gross cropped area in the study area as a whole. Similarly, chickpea was one of the major rabi crop which occupied about 7.87 percent, 6.08 percent and 6.81 percent of the gross cropped area in Dharwad, Belagavi and study area as a whole, respectively. Likewise, sorghum is one of the major summer crops which occupied about 6.38 percent, 5.19 percent and 5.68 percent of the gross cropped area in Dharwad district, Belagavi district and study area as a whole, respectively. It is also apparent from the table that cropping intensity was found to be highest in Belagavi district (251.49%), followed by Dharwad district (198.73%) while the whole study area had a cropping intensity of 227.10%.

TABLE 1: CROPPING PATTERN OF SAMPLE RESPONDENTS IN STUDY AREA

S.No.	Crops	Area coverage (ha)		
		Dharwad (n=64)	Belagavi (n=64)	Overall (n=128)
1.	**Kharif**			
	Soybean	2.01 (21.38)	2.32 (17.21)	2.17 (18.95)
	Sugarcane	0.34 (3.62)	1.79 (13.28)	1.06 (9.26)
	Groundnut	1.40 (14.89)	0.51 (3.78)	0.96 (8.38)
	Cotton	0.65 (6.91)	0.72 (5.34)	0.69 (6.03)
	Green gram	0.30 (3.19)	-	0.15 (1.31)
	Sub-total	**4.70 (50.00)**	**5.34 (39.61)**	**5.03 (43.93)**
2.	**Rabi**			
	Maize	0.55 (5.85)	0.64 (4.75)	0.59 (5.15)
	Sorghum	0.59 (6.28)	0.66 (4.90)	0.63 (5.50)
	Wheat	0.36 (3.83)	0.42 (3.12)	0.39 (3.41)
	Chickpea	0.74 (7.87)	0.82 (6.08)	0.78 (6.81)
	Sugarcane	0.34 (3.62)	1.79 (13.28)	1.06 (9.26)
	Cotton	0.65 (6.91)	0.72 (5.34)	0.69 (6.03)
	Sub-total	**2.24 (23.83)**	**2.54 (18.84)**	**2.39 (20.87)**
3.	**Summer**			
	Sorghum	0.60 (6.38)	0.70 (5.19)	0.65 (5.68)
	Maize	0.53 (5.64)	0.60 (4.45)	0.57 (4.98)
	Sugarcane	0.34 (3.62)	1.79 (13.28)	1.06 (9.26)
	Sub-total	**1.13 (12.02)**	**1.30 (9.64)**	**1.22 (10.66)**
4.	Gross cropped area	9.40	13.48	11.45
5.	Net sown area	4.73	5.36	5.04
6.	Cropping intensity (%)	198.73	251.49	227.1

Source: Primary data
Note: Figures in parentheses indicate percent to gross cropped area.

The probable reason for this might be due to Belagavi district being the traditional area for soybean production and the processing industries are concentrated in vicinity of Belagavi district (Basavaraj, 1999) which has resulted in stable demand and remunerative prices for soybean cultivation in Belagavi district and also in non-traditional soybean growing Dharwad district which might be influenced by the border district *i.e.*, Belagavi. As per the opinion expressed by officials of the Archer-Daniels-Midland (ADM) Agro-Industries India Pvt. Ltd., Belur Industrial Area, Dharwad, which is a sunflower and soybean edible oil solvent extraction plant in Belur, they require around 500 metric tonnes of soybean everyday for oil extraction all-round the year. So, this stable demand might have encouraged farmers to grow more and more soybean in the study area. As a result of this, soybean occupied a prominent position in cropping pattern in Belagavi and Dharwad districts.

Cropping intensity was found to be 251.49 percent in Belagavi district which was on par with the previous findings of Yogananda (2016) while of cropping intensity of 198.73 percent observed in Dharwad district was in contrast with the findings of the study conducted by Laxmi and Mundinamani during 2015 wherein cropping intensity was 154.79 percent. Thus, it may be concluded that cropping intensity remained almost the same in Belagavi district whereas cropping intensity increased in Dharwad district. This shows an increase in demand for soybean production due to oil extraction units located in and around Dharwad district.

3.2 Growth and instability in area, production and productivity of soybean

The results from Table 2 reveal that in Dharwad district, the area under soybean registered a significant positive growth during period I (28.01%) and overall study period (10.90%) with instability indices of 26.38 percent and 28.48 percent, respectively, whereas, the growth remained insignificant in period II. Correspondingly, the production of soybean recorded a significant positive growth during period I (22.98%) and overall study period (13.00%) with instability indices of 34.88 percent and 32.99 percent, respectively, whereas, the production growth remained insignificant in period II. Likewise, the soybean productivity registered a significant positive growth rate during overall study period (1.89%) with instability index of 27.45 percent but remained insignificant during periods I and II. In nutshell, area and production of soybean registered a positive and significant growth in periods I and overall study period while productivity showed a positively significant growth during the overall study period.

TABLE 2: GROWTH AND INSTABILITY IN AREA, PRODUCTION AND PRODUCTIVITY OF SOYBEAN IN DHARWAD DISTRICT

Period	Area		Production		Productivity	
	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)
Period I (1999-00 to 2008-09)	28.01***	26.38	22.98***	34.88	-3.92^{NS}	21.31
Period II (2009-10 to 2018-19)	2.38^{NS}	19.30	5.64^{NS}	35.45	3.19^{NS}	27.30
Overall period (1999-00 to 2018-19)	10.90***	28.48	13.00***	32.99	1.89*	27.45

Source: Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare, GOI.
Note: ***Significance at 1% level, **Significance at 5 % level, *Significance at 10 % level, NS-Non-Significant, CDVI-Cuddy Della Valle Index.

Table 3 portrays that in Belagavi district, the area under soybean registered a significant positive growth rate (5.02%) during period I and overall study period (2.28%) with instability indices of 20.36 percent and 18.07 percent, respectively, whereas, it showed insignificant growth in period II. Likewise, the production of soybean recorded a positively significant growth during overall study period (3.20%) with instability index of 32.20 percent, whereas it showed insignificant growth in both periods I and II. Correspondingly, the soybean productivity registered insignificant growth performance during all the study periods.

TABLE 3: GROWTH AND INSTABILITY IN AREA, PRODUCTION AND PRODUCTIVITY OF SOYBEAN IN BELAGAVI DISTRICT

Period	Area		Production		Productivity	
	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)
Period I (1999-00 to 2008-09)	5.02**	20.36	1.35^{NS}	24.40	-3.50^{NS}	24.57
Period II (2009-10 to 2018-19)	-0.36^{NS}	15.97	5.55^{NS}	35.00	5.93^{NS}	33.85
Overall period (1999-00 to 2018-19	2.28***	18.07	3.20***	32.20	0.90^{NS}	31.51

Source: Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, GOI.
Note: ***Significance at 1% level, **Significance at 5 % level, *Significance at 10 % level, NS-Non-Significant, CDVI-Cuddy Della Valle Index.

This significant positive growth in soybean production with higher instabilities as classified by Rakesh (2014) (low instability (0-15%), median instability (15-30%) and high instability (greater than 30%)) might be due to erratic behaviour of rainfall in the study districts and it was on par with constraints identified by Jamanal and Syed (2017). A significant productivity growth rate was found in overall study period (1.89%) in Dharwad district which showed a insignificant growth in remaining periods of both districts. This might be due to the release of technology by the University of Agricultural Sciences, Dharwad and soya processing unit like Tinna-Agro Industries Pvt Ltd., which is a leading manufacturer, supplier of edible oil, soybean oil, de-oiled cakes from Dharwad and actively working Karnataka Oilseed Federation in Dharwad district as these institutes might have influenced larger extent on adoption of improved varieties of soybean through field level demonstrations by the KVKs.

Table 4 portrays that in Karnataka state as a whole, the area under soybean registered a significant and positive growth during period I (11.74%), period II (6.36%) and overall period (9.17%) with instability indices of 25.16 percent, 12.54 percent and 18.43 percent, respectively. Likewise, the production of soybean recorded a significant and positive growth during period I (8.53%), period II (9.26%) and overall period (10.17%) with instability indices of 23.50 percent, 22.91 percent and 23.16 percent, respectively. However, the productivity of soybean registered an insignificant growth during all the study periods. In nutshell, area and production of soybean registered positive and significant growth in all the study periods while productivity showed insignificant growth during all the study periods.

TABLE 4: GROWTH AND INSTABILITY IN AREA, PRODUCTION AND PRODUCTIVITY OF SOYBEAN IN KARNATAKA

Period	Area		Production		Productivity	
	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)
Period I (1999-00 to 2008-09)	11.74***	25.16	8.53***	23.50	-2.87^{NS}	20.61
Period II (2009-10 to 2018-19)	6.36***	12.54	9.26***	22.91	2.72^{NS}	28.68
Overall period (1999-00 to 2018-19)	9.17***	18.43	10.17***	23.16	0.91^{NS}	25.92

Source: Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare, GOI.
Note: ***Significance at 1% level, **Significance at 5 % level, *Significance at 10 % level, NS-Non-Significant, CDVI-Cuddy Della Valle Index.

The results from Table 5 indicate that in India, the area under soybean registered a significant and positive growth rate during period I (5.16%), period II (1.44%) and overall period (3.76%) with instability indices of 5.94 percent, 5.78 percent and 7.47 percent, respectively. Similarly, the production of soybean recorded a significant positive growth during period I (7.36%) and overall study period (4.47%) with instability indices of 17.32 percent and 18.06 percent, respectively. Congruently, the productivity of soybean registered insignificant growth during all the study periods.

TABLE 5: GROWTH AND INSTABILITY IN AREA, PRODUCTION AND PRODUCTIVITY OF SOYBEAN IN INDIA

Period	Area		Production		Productivity	
	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)	CAGR (%)	CDVI (%)
Period I (1999-00 to 2008-09)	5.16***	5.94	7.36***	17.32	2.09^{NS}	14.97
Period II (2009-10 to 2018-19)	1.44**	5.78	0.08^{NS}	16.40	-1.34^{NS}	17.36
Overall period (1999-00 to 2018-19)	3.76***	7.47	4.47***	18.06	0.68^{NS}	16.26

Source: Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare, GOI.
Note: ***Significance at 1% level, **Significance at 5 % level, *Significance at 10 % level, NS-Non-Significant, CDVI-Cuddy Della Valle Index.

An increase in soybean production trend might be attributed to the fact that 55.70 percent (134.16 lakh tonnes) of edible oil required for the total domestic consumption (240.71 lakh tonnes) of India is met through imports only. The country is spending worth of Rs. 73,000 crore against import of edible oils in order to meet the growing domestic requirements, but at the same time, the country also earned sizable foreign exchange worth of Rs. 29,000 crore through export of oilseed products. India is one of the largest importers of vegetable oils in the world (15% share) followed by China and USA. One of the biggest constraints to raise domestic oilseed production in the country is that it is largely concentrated in traditional rainfed areas. Only one-fourth of the oilseed producing area in the country remains under the irrigation. India is self-sufficient in food grains, sugarcane and fiber crops but deficit in pulses and oilseeds. Hence, the Government has been making concerted efforts to increase domestic oilseed production through launch of various flagship schemes

like National Mission on Oilseeds (1986) to improve productivity. This has resulted in some sluggish growth only in this field. Current Union Government promoted National Mission on Oilseeds and Oil Palm (NMOOP) during 2014-15 with the main aim of increasing seed replacement ratio (SRR) in oil crops with focus on varietal replacement, increasing irrigation coverage under oilseeds from 26 to 36 percent, expansion of cultivation of oil palm and tree borne oilseeds in watersheds and wastelands and inter-cropping during gestation period of oil palm and tree borne oilseeds which would provide economic returns to the farmers when there is no production. National Food Security Mission (NFSM) and Minimum Support Price (MSP) have significantly contributed to the increase in area under oilseed crops in general and soybean in particular. These results are on par with the findings of the study conducted by Prem (2016) wherein the research revealed that there was 1.7 percent annual increase in area of oilseeds after launching of technology mission on oilseeds as compared to 1 percent before technology mission on oilseeds.

4. Conclusion

The cultivation of soybean in Karnataka and India registered a significant positive growth in study periods in terms of area and production due to stable demand and remunerative price from oil processing industries. Though the productivity showed positive growth in almost all the study periods, but it was very low which might be due to non-adoption of improved available soybean technologies opined by majority of farmers. Thus, there is a need to create awareness and promote cultivation of improved soybean varieties and also adoption of recommended scientific cultivation practices.

5. Policy recommendations

- To create awareness through increased number of field demonstrations variety-wise at farmers field level and soybean field visits to successful farmers and follow-up.
- To make provisions for easy and sufficient availability of required seeds at Raitha Samparka Kendra (RSK) in village and Hobli levels where majority of farmers come and buy the seeds so that farmers could reap the economic benefits.

References

Anonymous (2020a). Annual Report (2020-21). Ministry of Consumer Affairs, Food and Public Distribution, GOI, New Delhi.

Anonymous (2020b). Annual Report (2020-21). Food and Agricultural Organisation, Rome, Italy.

Anonymous (2020c). Agriculture Statistics at a Glance. Ministry of Agriculture and Farmer's Welfare, GOI, New Delhi.

Basavaraj, K.S. (1999). Production and Marketing of Soybean in Karnataka - An Economic Analysis. M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, India.

Jamanal, S.K., and Syed, S. (2017). Constraints faced by the Soybean Growers. Journal of Pharmacognosy and Phytochemistry, 6(6): 31-32.

Yogananda, R.E. (2016). Production and Marketing of Soybean in Belagavi District of Karnataka - An Economic Analysis. M.sc (Agri.) Thesis, University of Agricultural Sciences, Dharwad, Karnataka, India.

Laxmi, T.N., and Mundinamani, S.M. (2015). An Economic Analysis on Land Use and Cropping Pattern in Dharwad District. Internat. Res. J. Agric. Eco. & Stat., 6 (1): 176-181.

Rakesh, S. (2014). Growth and Instability in Agricultural Production in Haryana: A District level Analysis. International Journal of Scientific and Research Publications. 4 (7): 1-12.

Prem, N. (2016). Recent Demand-Supply and Growth of Oilseeds and Edible Oil in India: An Analytical Approach. International Journal of Advanced Engineering Research and Science, 4 (1): 32-46.

Agro-Economic Research

Estimating Transportation and Harvesting Cost of Sugarcane

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Abstract

The transportation and harvesting costs are important components of the overall cost structure of sugarcane. This paper is an attempt to estimate the harvesting and transportation costs based on the field survey in major producing states. Multi-stage stratified sampling technique is used to select the sample farmers. The cost of harvesting and transportation is by considering existing operational modes. The overall cost of harvesting on contract-based is nearly Rs. 45 per quintal and Rs. 37 per quintal on daily-wage basis. The overall transportation cost covering all modes and destinations, altogether, is nearly Rs. 15.4 on 'per quintal' basis and Rs. 1.14 on 'per quintal per kilometre' basis with variation in cost by mode and destinations across states due to various underlying local factors such as modes, distance, availability and minimum threshold rates. The state specific costs and problems associated with states, farmers and mills on such operations are discussed.

Keywords: *Sugarcane, Transportation, Harvesting cost, Marketing.*

1. Introduction

India is the second largest producer of sugarcane after Brazil. Indian sugar industry impacts rural livelihoods of about 50 million sugarcane farmers, and around 5 lakh workers are directly employed in sugar mills. The cane price announced by the Central Government is decided on the basis of the recommendations of the Commission for Agricultural Costs and Prices (CACP) after consulting the State Governments and associations of sugar industry. The Commission publishes a price policy report on sugarcane crop every marketing year. Sugarcane is one of the important cash crops grown in India. The crop provides a lumpsum financial support to farmer's annual income. The transportation and harvesting costs are important components of the overall cost structure of any crop, in particular for sugarcane. The timely and efficient transportation is an important post-harvest activity.

In India, the manual mode of transportation has been replaced with the mechanised modes in recent times. It has helped farmers to transfer large quantities to mills and has highly reduced the time of transportation. But it has resulted in increased input cost to the farmers. Most of the marginal and small farmers in India still can't buy own mechanised mode and hence they have to depend on the hired modes. There are usual losses to the farmers if the harvested produce is not timely transferred to the mill which may be due to unavailability of transport, higher hiring charges, losses due to long waiting times, peak season inefficiencies, etc. It is evident that timely transportation of sugarcane plays an important role in developing efficient and effective value chain. A reliable database and scientific methodology needs to be developed to estimate the harvesting and transportation costs. The paper intends to estimate the harvesting and transportation costs of sugarcane using different modes and disposal destinations and to identify various factors and input costs in the overall costs.

Limited numbers of studies were carried out on the harvesting and transportation cost of sugarcane. CACP (2019-20) suggests incentives for farmers to adopt new

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technologies to promote efficiency and competitiveness of sugar sector. Due to high cost of cane harvesters as well as non-availability of appropriate harvesting machines, mechanization for planting and harvesting operations could not be widely adopted. Singh *et al.* (2016) discussed about mechanizing sugarcane cultivation in India. The small size of fields, cane purchase system, initial cost, field losses, etc. are some of the factors which are limiting the introduction of large sugarcane harvesters, especially in Northern India. A similar study by Rao (2014) analysed the input use and cost of cultivation of sugarcane in Telangana. Upreti and Singh (2017) utilized the cost of cultivation data to study relationship between productivity of sugarcane and various inputs including farm size. The study report on Vision 2030 by Indian Institute of Sugarcane Research (IISR-2011) suggests that the reduction in radius in cane reserve area will reduce transportation cost of cane, will improve fresh cane supply to the mill and thereby improve the sugar recovery. Navaneethakumar(2012) discussed the idea of minimum transportation cost of sugarcane in Tamil Nadu using linear programming and the mode of transportation between the field and the factory. Raut *et al.* (2017) examined the efficiency of various input factors employed in the production of sugarcane. Cardoen *et al.* (2015) carried out an assessment on post-harvest losses and found that these losses contributed to 2% loss in transportation and 10% in harvesting process. Shroff and Kajale (2014) suggest that different regulations in the form of cane reservation area, regulated release mechanism for the produced sugar, levy sugar obligation and dual pricing of sugarcane have adversely affected the competitiveness and growth performance of mills and therefore led to delayed payment to sugarcane farmers. Several important committees such as Jha Committee in 1965, Sen Committee in 1979, Hanumantha Rao Committee in 1990, Y.K. Alagh Committee in 2005 and C. Rangarajan Committee in 2012 have also reviewed the status of the sugar sector in the country and suggested the improvements needed. These committees have suggested various policy measures at various times to improve the status of the sugar sector.

1.1 Objectives of the study

The present study intends to estimate the harvesting and transportation costs of sugarcane marketed by the farmers. The specific objectives of the study are as follows:

(i) To estimate the harvesting cost of sugarcane using different methods of harvesting.

(ii) To estimate the transportation cost of sugarcane from the farmers' field to the sugar mill and other selling points using different modes of transportation.

(iii) To identify various factors and input costs in the overall harvesting and transportation costs.

2. Data and methodology

The study majorly utilizes survey based primary data from the selected states. Secondary data is also used for state-level analysis of the study variables on sugarcane crop. The database on Cost of Cultivation published by Ministry of Agriculture and Farmers Welfare and from United States' Department of Agriculture is utilised for secondary data analysis. A multi-stage sampling technique has been adopted to select the farmers. At the first stage, eight sugarcane producing states are selected based on the production share. Two districts from each state have been selected in the second stage following the sampling frame drawn from the 'list of selected states and crops' of the State-Wise Crop Complex Selection published by the CACP. Four districts have been selected from Uttar Pradesh (two districts from Western region and two from Eastern regions). At the third stage, a cluster of sugarcane growing villages is randomly selected to survey 100 farmers from each district. Stratified random sampling is used to select the sample farmers from the list of farmers growing sugarcane in a particular village cluster to give representation to each of the farm classes. Based on this sampling methodology, the aggregate sample size of 1800 farmers is selected. The study covers the state of Andhra Pradesh, Bihar, Haryana, Punjab, Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand which contribute approximately 68 percent share in total sugarcane production and area. The study sample size

represents participation from each farm class. The detailed household questionnaire is finalized to survey the sugarcane farmers. A separate questionnaire is used to get the details from sugar mills located in the survey regions. The survey pertains to the sugar season 2018-19 and was conducted during December, 2019.

The components of the harvesting costs included are i) the wage rates, ii) number of labours employed and iii) number of days utilised. These vary across the study states. The cost is calculated separately for two modes – i) contract rate based harvesting cost and ii) daily wage based harvesting cost. The daily wage based harvesting cost is further measured for specific cases - i) only casual labour, ii) only family labour, iii) casual and family labour, both, for harvesting is also measured specifically for each farm classes. The weighted average of cost results in more accurate estimate considering farm class-wise number of farmers as the weights for calculating overall harvesting cost. Similarly, the components of transportation cost are expenditure incurred on fuel, driver and labour wages, maintenance and repair charges, hiring charges. The distance covered and other such charges vary accordingly based on the 'hired' or 'own' transportation type used. The cost is calculated separately for each destination covered – i) mill gate, ii) purchase centres of mill, iii) gur manufacturers, iv) khandsari units, and v) on overall basis. The cost is measured for the modes of transportation used, *i.e.* i) manual, ii) mechanised, and iii) on combined basis. The cost is measured under two sub-heads, *i.e.* i) on 'per quintal' basis, and ii) on 'per quintal per kilometre' basis. The weighted average transportation cost is measured considering the distance and quantity as weights as applicable.

3. Results and discussion

3.1 Demographic and land details of sample households

Among the sample states, nearly 30 percent farmers are marginal. The largest proportion of marginal farmers, *i.e.* 54 percent, is in Uttar Pradesh, followed by Bihar (45 percent) and Uttarakhand (39 percent). Contrary to this, representation of marginal farmers is very low in Haryana (4 percent) and Punjab (8 percent). Nearly 46-48 percent of the sample farmers are large farmers in these states. The average family size is 5.2 persons per household with an average family size of 5 or more persons per household across all the farm classes. The largest average family size of 6.2 persons per household is in Uttar Pradesh, while the minimum average family size of 4.4 persons per household in reported in Andhra Pradesh. The sex ratio of the sample population is 889 females per 1000 male population. Nearly half of the households (49.9 percent) belong to 'general' category, 43 percent are 'OBC' and rest 7 percent are 'SC' or 'ST' category farmers. Close to 60 percent of large and medium households belong to 'general' category. Nearly 83 percent of household heads are either 'intermediate' pass or less. The highest proportion of 'graduates or above' level of education (above 20 percent) is reported for large farmers while the same is just 14 percent for marginal and small category household heads. About 15-20 percent of small and marginal farmers never went to school. The share is just 5 percent for large farmers.

Of the total area cultivated by the sample farmers, about 59 percent is under sugarcane, of which nearly 96 percent is irrigated. All the area under sugarcane is irrigated in study states except Bihar (79 percent), Andhra Pradesh (88 percent) and Telangana (98 percent). The average yield of sugarcane is 320 quintal/acre for the sample households from 7.18 thousand acres of land. The productivity of sugarcane in Tamil Nadu is close to 500 quintal/acre, which is highest among the study states, while the crop yield in Bihar is just 228 quintal/acre, which is the lowest across study states.

3.2 Marketing of sugarcane

Almost the entire sugarcane produced (97.9 percent) is sold to the various marketing channels by the sample households. Of the sold produce, major share, 85.8 percent, is sold at the sugar mills while 10.4 percent is sold at the purchase centres. In Andhra Pradesh, Punjab, Tamil Nadu and Telangana, the entire quantity is sold at the sugar mill gates. In other states too, majority of the sale occurred at the sugar mill gates. However in Uttarakhand, majority (90 percent) of produce is sold to

the purchase centres. The farmers in Uttar Pradesh and Haryana also sell sugarcane to the local gur manufacturers due to urgent need of money which they get in hand instantly, although at reduced profit. The payment from the mill usually gets delayed, in some cases by up to one year. Some farmers in Uttar Pradesh and Bihar also prefer to sell sugarcane to the khandsari units. The farmers did not pay any direct market fee for selling the sugarcane to the mill gates or at the purchase centre in the study states.

3.3 Harvesting and loading of sugarcane

3.3.1 Harvesting of sugarcane

The harvesting operation is performed manually by the farmers. In the surveyed districts of Tamil Nadu, operations like harvesting, transportation and loading-unloading are performed by mills through their own arrangements. The contract labour arrangement system and daily wage labour arrangement system of harvesting, both, are in practice in general in the study states. However, in three out of the eight study states, *i.e.* Haryana, Tamil Nadu and Telangana, harvesting is completely on contract basis. In Andhra Pradesh and Uttarakhand, in one out of two survey districts, contract-based harvesting is in practice. The daily wage labour arrangement-based harvesting is practiced in Uttar Pradesh, Bihar and Punjab. At an aggregate level, nearly 53 percent sample households are performing harvesting on daily-wage basis and about 47 percent prefer contract-based harvesting.

A large proportion of casual labours were employed in 'daily-wage' based harvesting. Nearly one-fourth of total labours employed are women. Bihar and Punjab employed highest labours among the study states. The wages are nearly double for men labours as compared to women labours. The average wage rates are nearly Rs. 388 per day for men labours and Rs. 189 per day for women labours. Male labours employed in Punjab were receiving the highest wages (Rs. 452 per day) whereas the rate for male labour in Bihar and West Uttar Pradesh is just at Rs. 268 per day. The wages of women labours vary from Rs. 158 to Rs. 261, highest being in Uttarakhand and lowest in East Uttar Pradesh. On an average, nearly 12 days of harvesting is practiced during a sugar season by the sugarcane farmers with an average 7.4 hours in a day spent on field for harvesting operation.

3.3.2 Cost of harvesting

The estimated cost of 'contract' based harvesting is nearly Rs. 44.91, at the aggregate level, for the selected states. The rate varies from Rs. 38.4 per quintal in Uttarakhand to Rs. 63.7 per quintal in Andhra Pradesh. This contract rate also includes the loading costs in it. Unloading of produce is performed by mills in these states, except for very few cases in Uttar Pradesh. In Tamil Nadu, the average contract rate of Rs. 72 per quintal includes the cost of all major operations such as harvesting, transportation and loading-unloading. The cost is initially borne by the mills and deducted during the final payment made to the farmers. The daily wage labour use based cost of harvesting is worked out at nearly Rs. 37 per quintal which also includes family labour in it. The highest overall cost of Rs. 48 per quintal is in Punjab and Andhra Pradesh while the harvesting cost in Uttar Pradesh is Rs. 38.42 per quintal. The harvesting cost in Bihar is close to Rs. 13.1 per quintal which is the lowest. The main reason behind this is the cheap wage rates and a smaller number of operational days. The cost of harvesting is also calculated separately when only 'casual labour' and 'family labour' is utilized for harvesting because they will not add up to the overall cost as the cases are not mutually exclusive. The farm class-wise harvesting cost is also worked out. On overall basis, the highest cost for harvesting is paid by large farmers, nearly Rs. 40.5 per quintal. The harvesting cost paid by small and medium farmers is close to Rs. 38 per quintal, whereas the marginal farmers paid nearly Rs. 36 per quintal. The variation in harvesting cost across state are mainly due to variation in cost components - wage rates, average number of labours employed and average days utilised across study states. The wage rates of men and women are observed to be least in Bihar and West Uttar Pradesh. The days utilised for harvesting are also lowest in Bihar. In Uttarakhand, least man power is used for harvesting. In Andhra Pradesh and Punjab, the wage rates are high for the male labours and the labour and days employed are also high, reflecting on high cost of harvesting.

Loading is performed manually in all the study states. The loading charges are included in the contract amount if harvesting is done on contractual basis. The rates are lower in Punjab and Uttarakhand as loading is being done by labour deployed for harvesting on a part time basis. The overall loading cost based on limited samples is nearly Rs. 3.4 per quintal. Only male labourers are performing the loading operations. In most of the states, unloading is mechanized and performed by sugar mills. Among the major harvesting related problems, shortage of labour is one such serious problem for the farmers. Arranging labour becomes more difficult during peak season due to summers, unavailability and high wage rates. The machine harvesting is minimal due to sowing norms, structure and uneven depths of fields. Being a perennial crop, the farmers don't have much choices left if payment is delayed.

TABLE 1: CONTRACT BASED AND DAILY-WAGE BASED AVERAGE HARVESTING COST

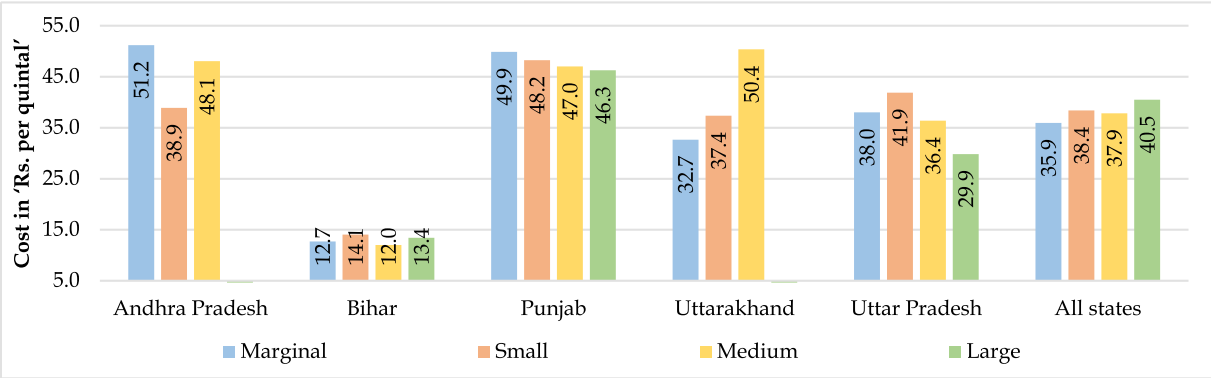
(in 'Rs. per quintal')

State	Contract based cost		Daily-wage based cost		
	Manual	Mechanized	Casual labour	Family labour	Overall labour
Andhra Pradesh	63.71	NA	39.74	9.67	47.9
Bihar	NA	NA	13.30	3.20	13.06
Haryana	44.65	NA	NA	NA	NA
Punjab	NA	NA	46.36	1.83	48.1
Telangana	47.81	47.46#	NA	NA	NA
Tamil Nadu	72.10	NA	NA	NA	NA
Uttarakhand	38.38	NA	36.40	20.54	33.8
Uttar Pradesh-West	NA	NA	34.05	3.30	36.61
Uttar Pradesh-East	NA	NA	44.13	12.17	41.08
Uttar Pradesh	NA	NA	37.77	8.46	38.42
All states	**44.91**	**47.46#**	**35.73**	**9.23**	**36.99**

Note: #Few farmers in Telangana performed harvesting through mechanised mode. NA indicates 'not applicable' as no sample household is involved.

Figure 1: Farm Class-wise Daily Wage Based Average Harvesting Cost

(in Rs. per quintal)



Note: The calculation is performed for household cases reported performing 'daily-wage' harvesting. NA indicates 'not applicable', as no household exists in particular farm class in the survey state.

3.4 Transportation of sugarcane

The transportation is mechanised (91 percent), majorly using tractor trolleys and trucks. Manual carts (9 percent) are used for shorter distances or when the mechanized transportation is not available or have own such arrangements. Nearly half of the quantity sold in Andhra Pradesh and one-third of quantity sold in Telangana was transported through manual mode. Nearly 85 percent of total produce marketed is sold to sugar mills and about 11 percent to the purchase centres. Only 4 percent is carried to gur manufacturers through mechanised mode.

The distance covered for marketing produce is a major component of the transportation cost. The distance from the sugarcane fields to the village centre is a fraction of the overall distance but varies by farmer households as the distance from the village centre to the mill gate or to the purchase centres is usually same for farmers due to common routes. Almost 72 percent of the household's farms are located within the range of 2 km from the village centre. On combined basis, weighted distance covering all destinations covered by the farmers is 13.5 km. The average distance covered by manual modes is 4.7 km and the same covered by mechanized mode is 14.6 km. The least distance covered by farmers is in Uttarakhand (3.15 km) as they sell at the nearby purchase centre, whereas the farmers in Bihar and Telangana covered up to 19 km. The distance covered by the sugar mills is nearly 27 km, mainly to carry produce from their purchase centres till the mill gate and varies from 18.4 km in Bihar to 32.5 km in Uttarakhand.

3.4.1 Cost of transportation

If the farmers have their own mechanised transportation, they incur expenses on fuel charges, driver's wages and labour. On the other hand, the hiring charges include vehicle, fuel and driver/helper/labour charges, etc. The costs involved in manually transporting sugarcane to various destinations include the feed and fodder cost to the livestock used in carts and the hiring charges, if the cart is hired. The cost of transporting the produce on all modes and all destinations altogether is nearly Rs. 15.38 per quintal or Rs. 1.14 per quintal per kilometre. Factors such as distance and hiring charges affect the transportation cost of carrying sugarcane to various destinations. Moreover, a minimum basic hiring rate is observed in many states, irrespective of the distance travelled to the mill and purchase centres.

`The cost of mechanised transportation on combined basis is Rs. 15.2 per quintal or Rs. 1.04 per quintal per kilometre. At the state level, the highest cost is Rs. 30 per quintal in Bihar as the mill and purchase centres are located far as compared to other states. Higher mechanised cost is also observed for Andhra Pradesh, Telangana and Uttar Pradesh–East on Rs. per quintal basis. The cost is lowest in Punjab, about Rs. 8 per quintal or Rs. 0.6 per quintal per kilometre. On per quintal per kilometre basis, the cost is nearly in range of Rs. 2.5 to Rs. 2.9 for Uttarakhand and Andhra Pradesh. This is mainly due to high wage rates (in Andhra Pradesh) and comparatively higher charges paid by farmers even for closely located purchase centres (in Uttarakhand). There is a threshold cost in many states to be paid by farmers for hiring vehicles even for smaller distance to the service provider due to the time, labour and vehicle arrangements. The cost in Uttar Pradesh is Rs. 1.96 per quintal per kilometre which is contributed by a high cost in Eastern Uttar Pradesh, nearly threefold of Western Uttar Pradesh on per km basis.

For manual transportation mode, the feed and fodder cost for livestock of owned manual transport is comparatively low (Rs. 150–Rs. 225 per day) as compared to the hired manual transportation. The average transportation cost for the manual mode on combined basis for all the states, altogether, covering all destinations, is worked out at nearly Rs. 16.9 per quintal. The cost is varying in range of Rs. 16 to Rs. 18 per quintal for Andhra Pradesh and Telangana, and comparatively low (in range of Rs. 4.4 to Rs. 6.7 per quintal) for Bihar and Uttarakhand. The cost appears nearly same whether the sugarcane is disposed at the mill or at the purchase centre. There is a variation in cost paid on per quintal per kilometre basis for two modes of transportation. The average cost on per quintal per kilometre is high for manual transportation as this mode is mainly used for shorter distances. The cost is nearly Rs. 3.57 per quintal per kilometre if manual mode is preferred. This mode is preferred majorly in Andhra Pradesh and Telangana. The cost of hired manual transportation in Andhra Pradesh is higher compared to other states, sometimes even higher compared to the mechanised transportation modes. This is because the cart has to make multiple rounds around to the mill gate

on a particular day.

Considering various destinations of sugarcane disposal, the overall aggregate average transportation cost at the mill gate combing manual and mechanised modes is Rs. 16.45 per quintal (Rs. 1.1 per quintal per km). The cost is nearly the same for both, manual and mechanised transportation on per quintal basis but it is higher for manual mode on per quintal per km basis. The overall cost of transportation at the purchase centre combining manual and mechanised cases and for all the states altogether is Rs. 11.05 per quintal (Rs. 3.0 per quintal per km). The cost is nearly Rs. 9.4 at the gur manufacturers and Rs. 14.65 at the khandsari units on per quintal basis.

Long waiting time in queues due to slow processing at mill gates, traffic jams, situations like factory break down, etc. are some major transportation related problems costing farmers heavily in terms of time and money. Most often, farmers pay a customary tip (beta) to the drivers either on field basis or on trip basis, especially in southern states.

TABLE 2: STATE-WISE WEIGHTED AVERAGE TRANSPORTATION COST

States	To the mill gate			To the purchase centres			To gur manufacturer	To khandsari units	To all destinations		
	Manual	Mechanized	Combined	Manual	Mechanized	Combined	(mechanized)	(mechanized)	Manual	Mechanized	Combined
Transportation cost on per quintal basis											
Andhra Pradesh	17.8	26.0	21.9	16.2	NA	16.2	NA	NA	17.7	26.0	21.9
Bihar	3.7	30.1	29.9	8.9	31.7	31.0	16.6	16.9	4.4	30.0	29.8
Haryana	NA.	14.2	14.2	NA	7.0	7.0	9.6	NA	NA	12.2	12.2
Punjab	NA	8.0	8.0	NA	NA	NA	2.1	NA	NA	7.9	7.9
Telangana	16.1	24.2	21.6	NA	NA	NA	NA	NA	16.1	24.2	21.6
Uttarakhand	NA	7.65*	7.7	6.7	9.2	9.2	12.8	NA	6.7	9.2	9.1
Uttar Pradesh-W	NA	13.7	13.7	NA	10.5	10.5	8.3	14.2	NA	11.8	11.8
Uttar Pradesh-E	NA	26.0	26.0	NA	16.5	16.5	19.0	NA	NA	22.1	22.1
Uttar Pradesh T	NA	19.2	19.2	NA	14.5	14.5	9.0	14.2	NA	16.3	16.3
All states	17.0	16.4	16.5	15.2	10.8	11.1	9.4	14.7	16.9	15.2	15.4
Transportation cost on per quintal per kilometre basis											
Andhra Pradesh	2.9	2.5	2.6	4.4	NA	4.4	NA	NA	3.0	2.5	2.6
Bihar	0.2	1.6	1.6	0.8	1.3	1.3	1.0	2.3	0.3	1.6	1.5
Haryana	NA	0.7	0.7	NA	1.1	1.1	0.8	NA	NA	0.7	0.7
Punjab	NA	0.6	0.6	NA	NA	NA	0.7	NA	NA	0.6	0.6
Telangana	5.8	0.9	1.1	NA	NA	NA	NA	NA	5.8	0.9	1.1
Uttarakhand	NA	0.7	0.7	3.4	4.0	4.0	1.0	NA	3.4	2.9	2.9
Uttar Pradesh-W	NA	0.9	0.9	NA	5.0	5.0	2.3	2.9	NA	1.2	1.2
Uttar Pradesh-E	NA	3.0	3.0	NA	7.5	7.5	2.8	NA	NA	3.6	3.6
Uttar Pradesh-T	NA	1.5	1.5	NA	6.7	6.7	2.4	2.9	NA	2.0	2.0
All States	**3.5**	**1.0**	**1.1**	**4.2**	**3.0**	**3.0**	**1.1**	**2.8**	**3.6**	**1.0**	**1.1**

3.5 Role of sugar mills

The study covered 29 sugar mills spread across twenty districts in eight survey states. Many of these mills had established the purchase centres near the village clusters to procure sugarcane. From these purchase centres, the mills manage the transfer of produce stored to the mill gate with the help of transport companies if they do not have own logistic or transfer mechanism. These mills initially bear the transportation cost but deducted either partial or full cost during the final settlement of the payments made to the farmers. At the aggregate level, these surveyed mills have total installed capacity of nearly 179 thousand tonnes with a capacity utilization rate of above 84 percent and recovery rate of 10.84 percent during 2018-19. Nearly 80 percent of sugarcane is received at the mill gates and rest 20 percent is procured at the purchase centres.

The weighted average distance of the mill gate from the purchase centres is nearly 27 kilometres. The weighted average transportation cost borne by these mills from these purchase centres to the mill gates is nearly Rs. 16.8 per quintal (Rs. 0.62 per quintal per kilometre), ranging from Rs. 15 per quintal (Andhra Pradesh) to Rs. 19.55 per quintal (Haryana). Transportation cost on per quintal per kilometre ranged from Rs. 0.50 (in Uttarakhand) to Rs. 0.89 (in Bihar).

Lack of government support to upgrade the degrading outdated machinery is the major problem of these mills, especially the cooperative mills. The deteriorating infrastructure causes dent on their margins due to reduced capacity. The economic stringency of the sugar processing units has brought them at the verge of closure or staring at a financial crisis. The mills also face the extra burden of storage and transportation of sugarcane from far-off distances if the nearby mill is non-operational, mostly due to deteriorating status. This increases their transportation costs. The supports such as licenses facilitation to make other by-products such as ethanol can increase their revenue and improve their viability.

4. Conclusions and policy suggestions

Engagement of the skilled manpower, especially with the managerial skills such as operational research, queuing management and digital tracking of transportation operations at the sugar mill level will help farmers as well as mills to save transportation cost and travel time, reduce long waiting time and enhance recovery of sugar due to timely processing of harvested sugarcane.

Measures are needed to improve technological adoption and up - gradation in procurement, transportation and processing of sugarcane by the mills. Emphasis should be on ensuring unbiased and timely distribution of dispatch slips without human interface to farmers by the mills for harvesting and transporting produce to mill/purchase centre in time bound manner. Timely payment of dues online on farmer's account must also be ensured.

Wherever possible, sugarcane harvesting and transportation operations should be included under the mill's jurisdiction for efficient and unbiased processing. Sugar mills may be facilitated with licenses to make by-products from sugarcane so as to increase their efficiency and revenue to manage the maintenance cost. Sugar mills need to be helped to upgrade their deteriorating infrastructure.

References

CACP (2019-20). Price Policy for Sugarcane - The 2019-20 Sugar Season. The Commission for Agricultural Costs & Prices. Ministry of Agriculture and Farmers Welfare. Retrieved from https://cacp.dacnet.nic.in/KeyBullets.aspx?pid=41

Cardoen, D., Joshi, P., Diels, L., Sarma, P.M., and Pant, D. (2015). Agriculture Biomass in India: Part 2. Post-Harvest Losses, Cost and Environmental Impacts. Resources, Conservation and Recycling, 101, 143-153.

IISR (2011). Vision 2030. Indian Institute of Sugarcane Research, Lucknow, ICAR, India

Navaneethakumar, P.S.A.V. (2012). A Mathematical Model in Reduction of Cost on Transportation of Sugarcane and the Loss Due to the Accident in Transportation. Journal of Applied and Computational Mathematics, 1(3).DOI: 10.4172/2168-9679.1000106

Rao, A.S. (2014). Input Use and Cost of Cultivation of Sugarcane–A Study in Telangana Region of Andhra Pradesh. Journal of Economics and Finance, 5(5), 67-74.

Rout, R.K., Das, L.K., Behera, S., Padhiary, A.K., Mohapatra, N.R. and Ranasingh, N. (2017). A Comparative Analysis in Cost and Returns of Sugarcane Production in Odisha, India. International Journal of Current Microbiology and Applied Sciences 6(11): 3827-3839.

Shroff, S., and Kajale, J. (2014). Sugar Sector: Is It Sustained by Subsidies? Indian Journal of Agricultural Economics, 69(3): 375-384.

Singh, S., Singh, P.R., Singh, A.K., and Gupta, R. (2016). Present Status and Future Need of Mechanizing Sugarcane Cultivation in India. Agricultural Mechanization in Asia, Africa and Latin America, 47(1), 75-81.

Upreti, P., and Singh, A. (2017). An Economic Analysis of Sugarcane Cultivation and its Productivity in Major Sugar Producing States of Uttar Pradesh and Maharashtra. Economic Affairs, Vol. 62, No. 4, pp. 711-718.

Commodity Review

Foodgrains

Procurement of Rice

The total procurement of rice during kharif marketing season 2022-23 up to 15.02.2023 is 51400 thousand metric tonnes as against 57600 thousand metric tonnes during the corresponding period of last year. The details are given in Table 1. A comparative analysis of procurement of rice for the period of marketing season 2022-23 (up to 15.02.2023) 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

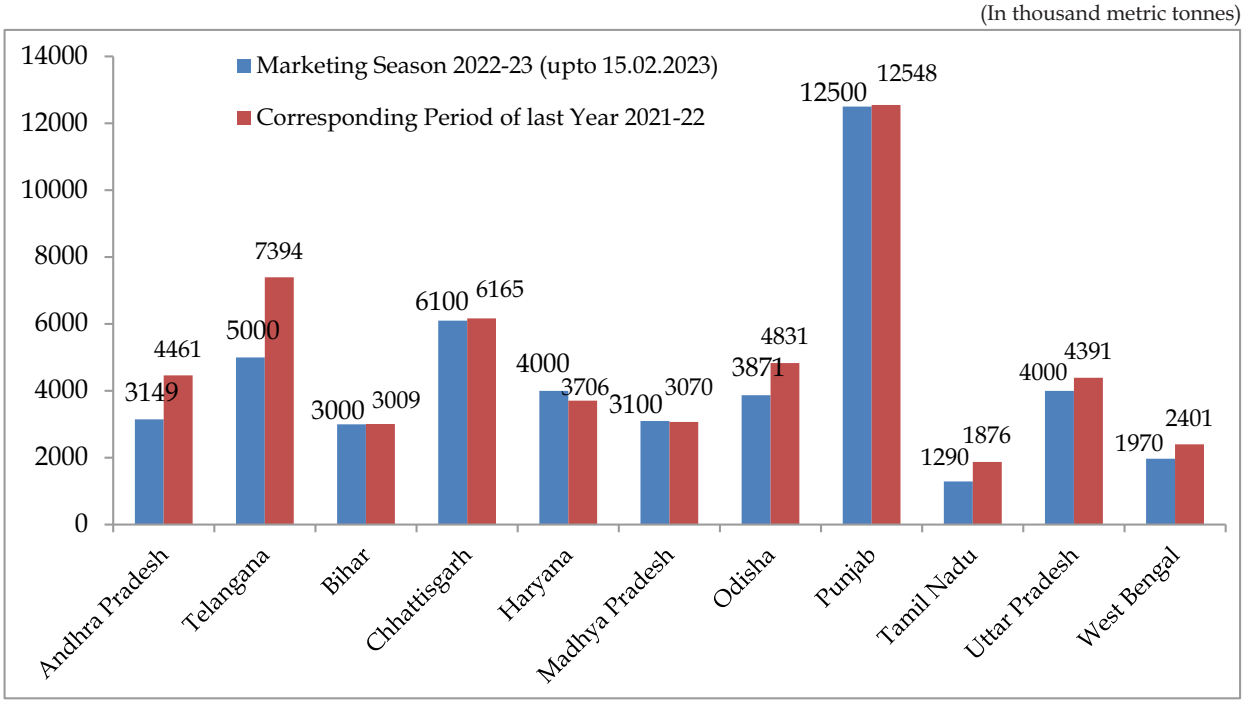
(In thousand metric tonnes)

State	Marketing Season 2022-23 (upto 15.02.2023)		Corresponding Period of last Year 2021-22(up to 31.01.23)	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Andhra Pradesh	3149	6.1	4461	7.7
Telangana	5000	9.7	7394	12.8
Bihar	3000	5.8	3009	5.2
Chhattisgarh	6100	11.9	6165	10.7
Haryana	4000	7.8	3706	6.4
Madhya Pradesh	3100	6.0	3070	5.3
Odisha	3871	7.5	4831	8.4
Punjab	12500	24.3	12548	21.8
Tamil Nadu	1290	2.5	1876	3.3
Uttar Pradesh	4000	7.8	4391	7.6
West Bengal	1970	3.8	2401	4.2
Others	3420	6.7	3738	6.5
All India Total	**51400**	**100.0**	**57600**	**100.0**

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

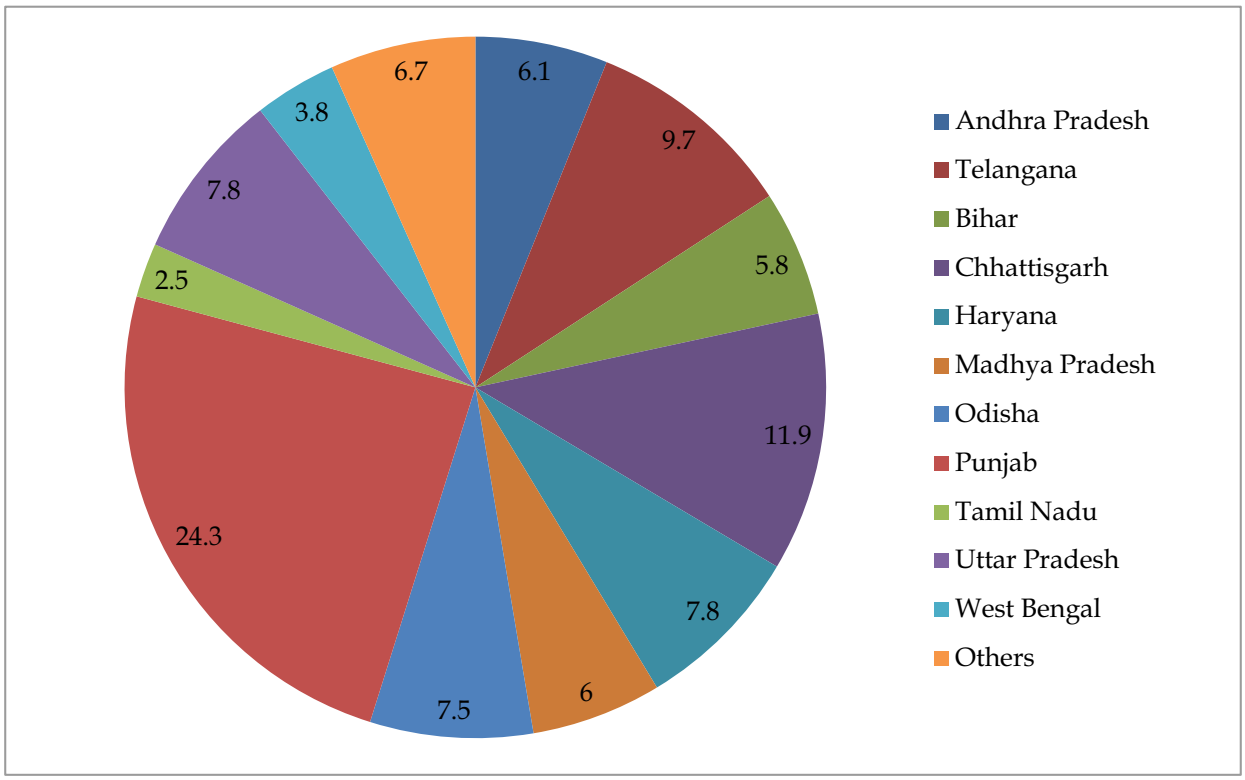
Figure 1: Procurement of Rice in Major States

(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 2022-23 (up to 15.02.2023)



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

Procurement of Wheat

The total procurement of wheat during rabi marketing season 2022-23 up to 18.10.2022 is 18792 thousand metric tonnes as against 43014 thousand metric tonnes during the corresponding period of last year. The details are given in Table 2. The figure 3 depicts the comparison of procurement of wheat during the marketing season 2022-23 (up to 18.10.2022) with the corresponding period of last year. The percentage share of different states in procurement of rice has been given in figure 4.

TABLE 2: PROCUREMENT OF WHEAT IN MAJOR STATES

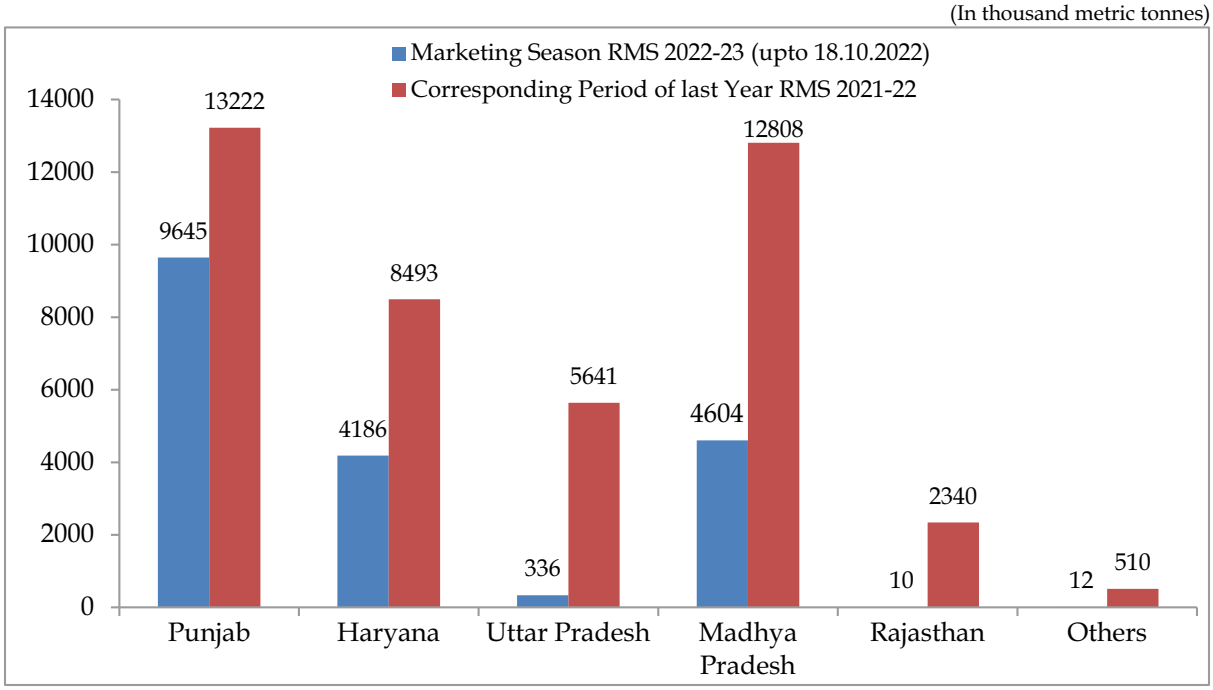
(In thousand metric tonnes)

State	Marketing Season RMS 2022-23 (upto 18.10.2022)		Corresponding period of last year RMS 2021-22	
	Procurement	Percentage to Total	Procurement	Percentage to Total
1	2	3	4	5
Punjab	9645	51.3	13222	30.7
Haryana	4186	22.3	8493	19.7
Uttar Pradesh	336	1.8	5641	13.1
Madhya Pradesh	4604	24.5	12808	29.8
Rajasthan	10	0.1	2340	5.4
Others	12	0.1	510	1.2
All India Total	**18792**	**100.0**	**43014**	**100.0**

Source: Department of Food & Public Distribution Government of India.

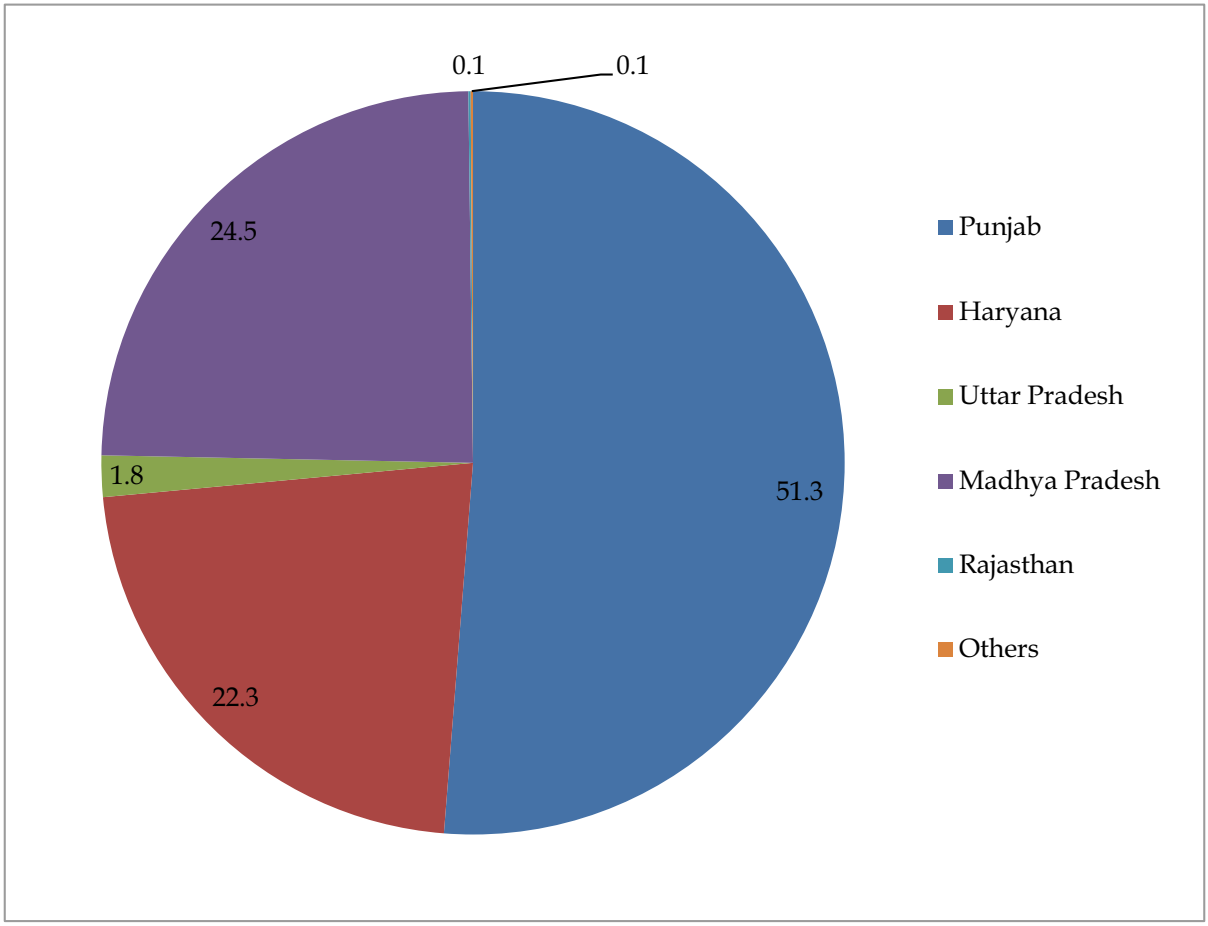
Figure 3: Procurement of Wheat in Major States

(In thousand metric tonnes)



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

Figure 4 : Percentage Share of Different States in Procurement of Wheat during Marketing Season 2022-23 (Up to 18.10.2022)



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

Commercial Crops

Oilseeds

The Wholesale Price Index (WPI) of nine major oilseeds as a group stood at 201.9 in January, 2023 showing an increase of 0.95 percent over the previous month and decreased by 4.22 percent over the corresponding month of the previous year.

The WPI of all individual oilseeds showed a mixed trend. The WPI of groundnut seed (4.46 percent), cotton seed (0.66 percent), gingelly seed (sesamum) (5.01 percent), soybean (1.41 percent), increased over the previous month. However, the WPI of rape & mustard seed (1.56 percent), copra (coconut) (1.32 percent), niger seed (0.04 percent), safflower (2.21 percent) and sunflower (0.54 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 166.7 in January, 2023 which shows a decrease of 1.48 percent over the previous month. Moreover, it is decreased by 7.80 percent over the corresponding month of the previous year. The WPI of groundnut oil (0.52 percent) increased over the previous month. However, the WPI of mustard oil (2.80 percent), soybean oil (1.26 percent), sunflower oil (3.23 percent), rapeseed oil (7.28 percent), copra oil (0.37 percent) and cotton seed oil (6.57 percent) decreased over the previous month.

Fruits & Vegetable

The WPI of fruits & vegetable as a group stood at 171.2 in January, 2023 showing a decrease of 1.27 percent over previous month and a decrease of 15.16 percent over the corresponding month of the previous year.

Potato

The WPI of potato stood at 188.5 in January, 2023 showing a decrease of 26.51 percent over the previous month. However, it increased by 9.78 percent over the corresponding month of the previous year.

Onion

The WPI of onion stood at 198.6 in January, 2023 showing an increase of 0.25 percent over the previous month and a decrease of 25.20 percent over the corresponding month of the previous year.

Condiments & Spices

The WPI of condiments & spices (group) stood at 195.7 in January, 2023 showing an increase of 2.19 percent over the previous month and an increase of 16.14 percent over the corresponding month of the previous year. The WPI of black pepper increased by 0.84 percent, chillies (dry) decreased by 0.32 percent and turmeric increased by 0.87 percent over the previous month.

Tea

The WPI of tea stood at 161.8 in January, 2023 showing a decrease of 4.03 percent over the previous month and an increase of 4.45 percent over the corresponding month of the previous year.

Coffee

The WPI of coffee stood at 154.1 in January, 2023 showing no change over the previous month. However, there is an increase of 14.49 percent over the corresponding month of the previous year.

Sugarcane

The WPI of sugarcane stood at 210.1 in January, 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 172.7 in January, 2023 showing a decrease of 3.57 percent over the previous month and an increase of 8.55 percent over the corresponding month of the previous year.

Raw Jute

The WPI of raw jute stood at 257.3 in January, 2023 showing a decrease of 0.27 percent over the previous month and a decrease of 11.09 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 January, 2023 and December, 2022 is given in figure 5 and the comparison of WPI during the January, 2023 with the corresponding month of last year has been given in figure 6.

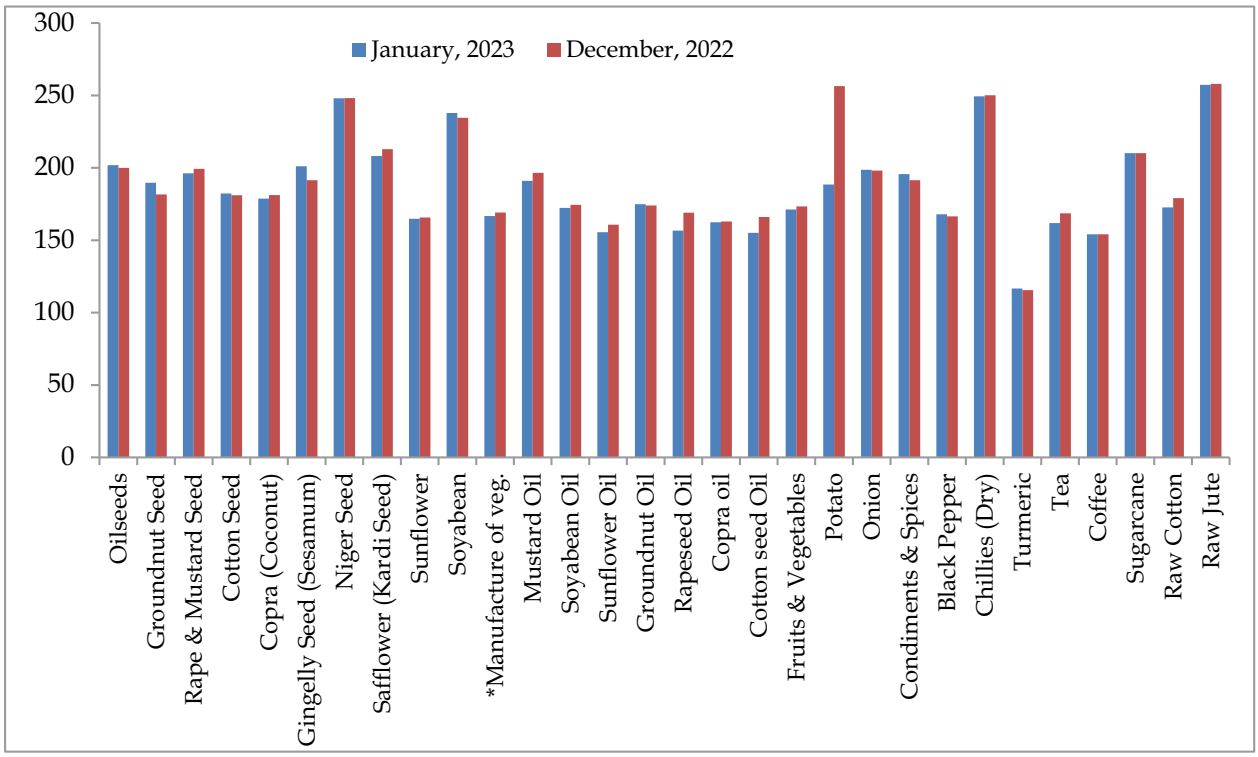
TABLE 3: WHOLESALE PRICE INDEX OF COMMERCIAL CROPS

Base Year: 2011-12

Commodity	Jan-2023	Dec-2022	Jan-2022	Percentage variation over the	
				Month	Year
Oilseeds	201.9	200.0	210.8	0.95	-4.22
Groundnut Seed	189.7	181.6	167.3	4.46	13.39
Rape & Mustard Seed	196.2	199.3	216.8	-1.56	-9.50
Cotton Seed	182.3	181.1	187.5	0.66	-2.77
Copra (Coconut)	178.8	181.2	205.7	-1.32	-13.08
Gingelly Seed (Sesamum)	201.1	191.5	184.5	5.01	9.00
Niger Seed	248.1	248.2	254.5	-0.04	-2.51
Safflower (Kardi Seed)	208.2	212.9	217.6	-2.21	-4.32
Sunflower	164.8	165.7	169.5	-0.54	-2.77
Soyabean	237.9	234.6	263.7	1.41	-9.78
Manufacture of vegetable and animal oils and fats	166.7	169.2	180.8	-1.48	-7.80
Mustard Oil	191.0	196.5	224.5	-2.80	-14.92
Soyabean Oil	172.3	174.5	170.2	-1.26	1.23
Sunflower Oil	155.6	160.8	152.3	-3.23	2.17
Groundnut Oil	174.9	174.0	154.1	0.52	13.50
Rapeseed Oil	156.7	169.0	185.8	-7.28	-15.66
Copra oil	162.4	163.0	188.5	-0.37	-13.85
Cotton seed Oil	155.1	166.0	158.0	-6.57	-1.84
Fruits & Vegetables	171.2	173.4	201.8	-1.27	-15.16
Potato	188.5	256.5	171.7	-26.51	9.78
Onion	198.6	198.1	265.5	0.25	-25.20
Condiments & Spices	195.7	191.5	168.5	2.19	16.14
Black Pepper	167.9	166.5	165	0.84	1.76
Chillies (Dry)	249.4	250.2	183.1	-0.32	36.21
Turmeric	116.6	115.6	127.1	0.87	-8.26
Tea	161.8	168.6	154.9	-4.03	4.45
Coffee	154.1	154.1	134.6	0.00	14.49
Sugarcane	210.1	210.1	199.8	0.00	5.16
Raw Cotton	172.7	179.1	159.1	-3.57	8.55
Raw Jute	257.3	258.0	289.4	-0.27	-11.09

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

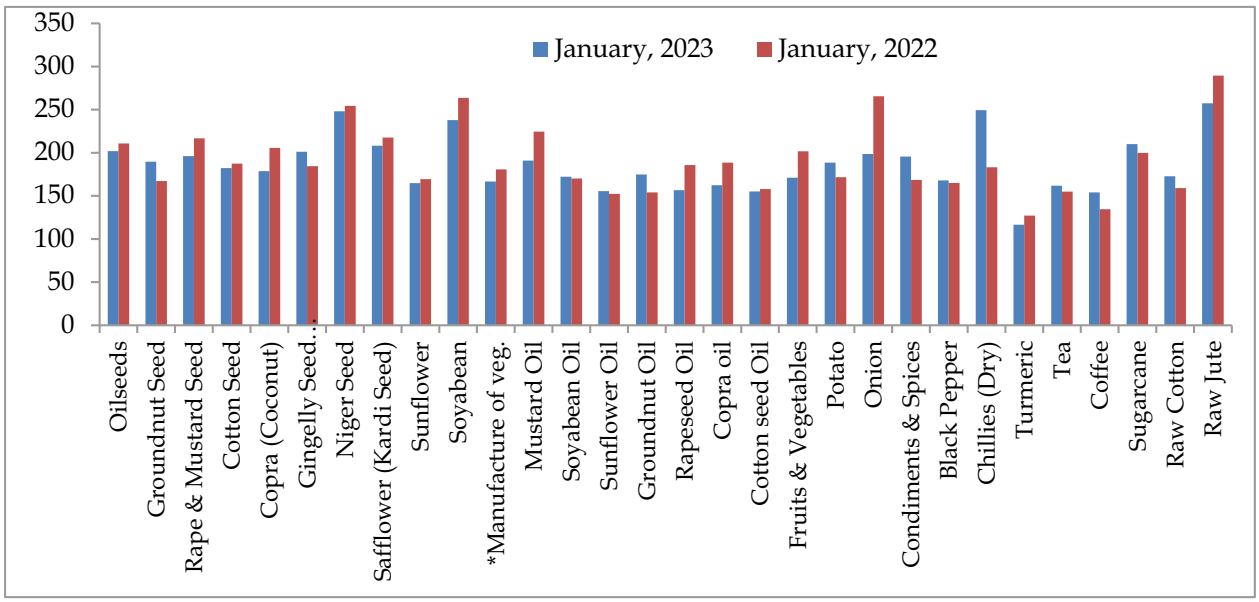
Figure 5: WPI of Commercial Crops during January, 2023 and December, 2022



*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 January, 2023 and January, 2022



*Manufacture of Vegetable, Animal Oils and Fats.

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

Statistical Tables

Wages

1. STATE-WISE PREVAILING AVERAGE DAILY WAGES

(Value in Rs.)

Sr. No.	State	Month & Year	Normal Working Hours	Field Labour												Non-Agri. Occupation		
				Ploughing		Sowing		Weeding		Reaping & Harvesting		Other Agri. Labour		Tractor Driver		* Field Labour		Carpenter	Blacksmith	Mason
				M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	M	M
1	Andhra Pradesh	Oct, 22	8	Not Required								606	379	NR		510	352	570	485	NR
2	Assam	Aug, 21	8	362	NR	334	302	336	282	361	294	342	293					454	436	NR
3	Bihar	Oct, 22	8	374	335	347	310	344	310	353	320	353	320	451	-			541	523	533
4	Chhattisgarh	Aug, 22	8	363	180	223	194	200	181	231	194	231	191	406	-			416	334	406
5	Goa	June, 22	8	700	400	683	405	NR	NR	NR	300	650	362	1225	-			1069	800	866
6	Gujarat	July, 22	8	323	NR	263	254	246	246	260	257	200	200	381	-			507	504	504
7	Haryana	Nov, 22	8	609	500	539	463	507	453	527	480	493	455	603	-			705	665	771
8	Himachal Pradesh	Aug, 21	8	389	NR	337	337	335	336	334	332	335	335	328	-			510	503	494
9	Jharkhand	June,21	8	290	265	270	249	278	242	274	NR	256	238			Not Required		408	434	NR
10	Karnataka	June, 21	8	437	312	401	293	344	267	352	260	411	304	NR				545	498	NR
11	Kerala	May, 22	8	947	NR	NR	609	NR	592	744	609	731	632					986	973	986
12	Madhya Pradesh	Nov, 22	8	368	276	330	263	293	262	321	284	343	293	430	-			491	470	502
13	Maharashtra (P*)	June, 22	8	406	283	381	256	356	244	490	NR	378	244	607	-			500	450	472
14	Odisha	June, 22	8	412	373	366	324	353	307	363	NR	379	313	513	-			577	529	590
15	Punjab	Sep, 22	8	499	462	472	427	453	405	489	NR	468	407	501	-			600	591	598
16	Rajasthan	Oct, 22	8	439	314	442	314	351	316	378	328	384	274	488	-			522	471	583
17	Tamil Nadu	Dec, 22	8	695	485	627	345	649	332	715	337	655	341	859	-			795	710	844
18	Telanagana	June, 22	8	Not Required								397	NR			470	312		NR	
19	Tripura	Dec, 21	8	315	NR	363	180	337	243	263	180	233	173					340	NR	NR
20	Uttar Pradesh	Sep, 22	8	300	NR	328	306	321	303	336	303	320	304	NR		Not Required		539	NR	569
21	Uttarakhand	Nov, 22	8	691	NR	462	412	425	390	441	403	485	428					694	NR	718
22	West Bengal	June, 22	8	417	313	324	301	315	286	343	298	314	275					465	485	NR

Source : State Governments

Note: 1. Other agricultural labour include field watering,carrying load, well diggers, cleaning silt from waterways and embankment, etc.

2. * States of Andhra Pradesh and 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

Statistical Tables

Prices

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

(All Prices in Rupees)

Commodity	Variety	Unit	State	Centre	Jan-23	Dec-22	Jan-22
Wheat	PBW 343	Quintal	Punjab	Amritsar	NA	NA	2100
Wheat	Dara	Quintal	Uttar Pradesh	Chandausi	2780	2560	1970
Wheat	Lokvan	Quintal	Madhya Pradesh	Bhopal	2818	2651	1933
Jowar	-	Quintal	Maharashtra	Mumbai	4000	3800	3500
Gram	No III	Quintal	Madhya Pradesh	Sehore	4400	4400	4700
Maize	Yellow	Quintal	Uttar Pradesh	Kanpur	2500	2200	1680
Gram Split	-	Quintal	Bihar	Patna	6530	6500	6570
Gram Split	-	Quintal	Maharashtra	Mumbai	6200	6500	6300
Arhar Split	-	Quintal	Bihar	Patna	10050	10040	9430
Arhar Split	-	Quintal	Maharashtra	Mumbai	10100	10000	8500
Arhar Split	-	Quintal	NCT of Delhi	Delhi	10500	10000	9700
Arhar Split	Sort II	Quintal	Tamil Nadu	Chennai	9000	9600	8500
Gur	-	Quintal	Maharashtra	Mumbai	4850	4800	3900
Gur	Sort II	Quintal	Tamil Nadu	Coimbatore	4800	4800	5000
Gur	Balti	Quintal	Uttar Pradesh	Hapur	2850	2650	2730
Mustard Seed	Black (S)	Quintal	Uttar Pradesh	Kanpur	6600	6540	6650
Mustard Seed	Black	Quintal	West Bengal	Raniganj	6500	6450	6100
Mustard Seed	-	Quintal	West Bengal	Kolkata	6750	7000	8400
Linseed	Bada Dana	Quintal	Uttar Pradesh	Kanpur	6600	6800	8000
Linseed	Small	Quintal	Uttar Pradesh	Varanasi	6750	6850	8100
Cotton Seed	Mixed	Quintal	Tamil Nadu	Virudhunagar	3400	3000	3500
Cotton Seed	MCU 5	Quintal	Tamil Nadu	Coimbatore	4100	4200	4500
Castor Seed	-	Quintal	Telangana	Hyderabad	NT	NT	NT
Sesamum Seed	White	Quintal	Uttar Pradesh	Varanasi	12800	11850	9700
Copra	FAQ	Quintal	Kerala	Alleppey	8650	8750	9050
Groundnut	Pods	Quintal	Tamil Nadu	Coimbatore	6300	6800	6500
Groundnut	-	Quintal	Maharashtra	Mumbai	12000	12500	9100
Mustard Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2470	2470	2380
Mustard Oil	Ordinary	15 Kg.	West Bengal	Kolkata	2100	2325	2722
Groundnut Oil	-	15 Kg.	Maharashtra	Mumbai	2400	2450	2010
Groundnut Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	2500	2650	2500
Linseed Oil	-	15 Kg.	Uttar Pradesh	Kanpur	2455	2480	2315
Castor Oil	-	15 Kg.	Telangana	Hyderabad	2625	2550	2175
Sesamum Oil	-	15 Kg.	NCT of Delhi	Delhi	2550	2550	2750
Sesamum Oil	Ordinary	15 Kg.	Tamil Nadu	Chennai	3800	3850	3100
Coconut Oil	-	15 Kg.	Kerala	Cochin	1965	1995	2235
Mustard Cake	-	Quintal	Uttar Pradesh	Kanpur	3225	3225	2860
Groundnut Cake	-	Quintal	Telangana	Hyderabad	NT	NT	NT
Cotton/Kapas	NH 44	Quintal	Andhra pradesh	Nandyal	8300	9600	9350

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

Commodity	Variety	Unit	State	Centre	Jan-23	Dec-22	Jan-22
Cotton/Kapas	LRA	Quintal	Tamil Nadu	Virudhunagar	8000	6500	9500
Jute Raw	TD 5	Quintal	West Bengal	Kolkata	5800	5775	6500
Jute Raw	W 5	Quintal	West Bengal	Kolkata	5800	5775	6650
Oranges	Big	100 No	Tamil Nadu	Chennai	2100	2000	1400
Oranges	Nagpuri	100 No	West Bengal	Kolkata	850	550	750
Banana	-	100 No.	NCT of Delhi	Delhi	417	417	333
Banana	Medium	100 No.	Tamil Nadu	Kodaikkanal	610	590	580
Cashewnuts	Raw	Quintal	Maharashtra	Mumbai	55000	55000	75000
Almonds	-	Quintal	Maharashtra	Mumbai	75000	75000	65000
Walnuts	-	Quintal	Maharashtra	Mumbai	80000	80000	95000
Kishmish	-	Quintal	Maharashtra	Mumbai	23000	23000	22500
Peas Green	-	Quintal	Maharashtra	Mumbai	7000	7200	8200
Tomato	Ripe	Quintal	Uttar Pradesh	Kanpur	850	1150	1250
Ladyfinger	-	Quintal	Tamil Nadu	Chennai	7000	3000	3000
Cauliflower	-	100 No.	Tamil Nadu	Chennai	2000	2000	1500
Potato	Red	Quintal	Bihar	Patna	920	1320	980
Potato	Desi	Quintal	West Bengal	Kolkata	640	1300	1100
Potato	Sort I	Quintal	Tamil Nadu	Mettuppalayam	3297	3689	4538
Onion	Pole	Quintal	Maharashtra	Nashik	1250	1800	1650
Turmeric	Nadan	Quintal	Kerala	Cochin	11000	11000	11000
Turmeric	Salam	Quintal	Tamil Nadu	Chennai	11800	11500	12500
Chillies	-	Quintal	Bihar	Patna	22000	21600	13800
Black Pepper	Nadan	Quintal	Kerala	Kozhikode	48600	48500	46000
Ginger	Dry	Quintal	Kerala	Cochin	17500	17500	17500
Cardamom	Major	Quintal	NCT of Delhi	Delhi	57750	57750	57300
Cardamom	Small	Quintal	West Bengal	Kolkata	143000	120000	120000
Milk	Buffalo	100 Liters	West Bengal	Kolkata	7500	7000	6000
Ghee Deshi	Deshi No 1	Quintal	NCT of Delhi	Delhi	61698	61698	58667
Ghee Deshi	-	Quintal	Maharashtra	Mumbai	70000	65000	40000
Ghee Deshi	Desi	Quintal	Uttar Pradesh	Kanpur	48700	48600	40300
Fish	Rohu	Quintal	NCT of Delhi	Delhi	13000	13000	13000
Fish	Pomphrets	Quintal	Tamil Nadu	Chennai	58000	50000	55000
Eggs	Madras	1000 No.	West Bengal	Kolkata	5580	5857	4900
Tea	-	Quintal	Bihar	Patna	25200	25500	26500
Tea	Atti Kunna	Quintal	Tamil Nadu	Coimbatore	12743	11968	11005
Coffee	Plant-A	Quintal	Tamil Nadu	Coimbatore	40000	40000	39000
Coffee	Rubusta	Quintal	Tamil Nadu	Coimbatore	20000	20000	21500
Tobacco	Kampila	Quintal	Uttar Pradesh	Farukhabad	9650	9100	8700
Tobacco	Raisa	Quintal	Uttar Pradesh	Farukhabad	4725	4400	4100
Tobacco	Bidi Tobacco	Quintal	West Bengal	Kolkata	13200	13200	13200
Rubber	-	Quintal	Kerala	Kottayam	13300	12500	15300
Arecanut	Pheton	Quintal	Tamil Nadu	Chennai	90000	90000	85000

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

Crop Production

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING FEBRUARY, 2023

State	Sowing	Harvesting
(1)	(2)	(3)
Andhra Pradesh	Summer Rice, Ragi (R) Sugarcane.	Winter Rice Jowar (K), Maize (R), Ragi (K), Wheat Gram, Tur (K), Urad (K), Mung (K), Other Kharif Pulses, Winter Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Castorseed, Linseed, Cotton, Turmeric, Onion (2nd Crop) Coriander.
Assam	Assam Autumn Rice, Summer Potato (Hills), Jute.	Gram Urad (R), Winter Potato, Tobacco, Rapeseed & Mustard, Linseed, Cotton.
Bihar	Sugarcane.	Wheat, Barley, Gram, Winter Potato (Plain), Rapeseed & Mustard, Sugarcane, Linseed.
Gujarat	Sugarcane.	Jowar (R), Wheat, Gram Tur (K), Other Rabi Pulses, Winter Potato, Sugarcane, Ginger, Chillies (Dry), Tobacco, Castorseed, Rapeseed & Mustard, Cotton, Turmeric, Onion.
Himachal Pradesh	Winter Potato (Hills).	--
Jammu & Kashmir	Sugarcane, Onion.	Winter Potato.
Karnataka	Summer Rice, Mung (R), Sugarcane.	Winter Rice, Jowar (R), Maize (R), Wheat, Barley, Gram, Tur (K), Other Kharif Pulses, Potato, Sugarcane, Black Pepper, Tobacco, Castorseed, Rapeseed & Mustard, Linseed, Cotton, Turmeric Cardiseed.
Kerala	Summer Rice, Tur (K), other Rabi Pulses (Kulthi), Sugarcane, Sesamum.	Winter Rice, Urad (R), Surgarcane, Cotton, Sweet Potato.
Madhya Pradesh	Sugarcane, Onion.	Jowar (R), Wheat, Barley, Small Millets (R), Gram, Tur, Urad (R), Mung (R), Other Rabi Pulses, Winter Potato (Hills) Sugarcane, Ginger, Chillies (Dry), Tobacco, Castorseed, Rapeseed & Mustard, Linseed, Cotton, Sweet Potato, Turmeric, Sannhemp, Cardiseed, Onion.
Maharashtra	Sugarcane.	Jowar (R), Wheat, Barley, Gram, Tur (K), Urad (R), Mung (R), Other Rabi Pulses, Winter Potato (Plains), Sugarcane, Chillies (Dry), Tobacco, Castorseed, Rapeseed & Mustard, Linseed, Cotton, Cardiseed.
Manipur	Jute.	Wheat, Castorseed, Rapeseed & Mustard, Turmeric.

SOWING AND HARVESTING OPERATIONS NORMALLY IN PROGRESS DURING FEBRUARY, 2023

State	Sowing	Harvesting
(1)	(2)	(3)
Orissa	Sugarcane, Chillies (Dry).	Bajra (R), Winter Potato (Plains), Chillies (Dry), Rapeseed & Mustard.
Punjab and Haryana	Sugarcane, Tobacco, Onion, Potato.	Potato, Sugarcane, Rapeseed & Mustard, Turmeric.
Rajasthan	Sugarcane.	Gram, Tur (K), Winter Potato (Plains), Sugarcane, Castorseed, Rapeseed & Mustard, Linseed.
Tamil Nadu	Summer Rice, Jowar (R), Sugarcane, Groundnut, Cotton, Onion, Sesamum (Late).	Winter Rice, Jowar (R), Bajra, Ragi, Small Millets (K), Gram, Tur, Urad (K), Mung (K), Other Rabi Pulses (Kulthi), Winter Potato, Sugarcane, Black Papper, Tobacco, Castor seed, Sesamum, Cotton, Turmeric, Onion.
Tripura	Sugarcane.	Gram, Urad (R), Mung (R), Other Rabi Pulses, Winter Potato (Plains), Sugarcane, Chillies (Dry), Rapeseed & Mustard, Sweet Potato.
Uttar Pradesh	Summer Rice, Small Millets (R), Sugarcane, Tobacco Jute, Tapioca (1st Crop).	Winter Potato (Plains), Sugarcane, Ginger, Tobacco, Castorseed, Rapeseed & Mustard, Sweet Potato.
West Bengal	Summer Rice, Sugarcane, Sesamum (2nd Crop).	Tur (K), Urd (R), Mung (R), Other Rabi Rulses, Winter Potato, Sugarcane, Ginger, Chillies (Dry), Tobacco, Sesamum, (1st Crop), Rapeseed & Mustard.

(K) -Kharif (R) -Rabi

The journal is brought out by the Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare, it aims at presenting an integrated picture of the food and agricultural situation in India on month to month basis. The views expressed are not necessarily those of the Government of India.

Note to Contributors

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Abbreviations used

N.A.	—	Not Available.
N.Q.	—	Not Quoted.
N.T.	—	No Transactions.
N.S.	—	No Supply/No Stock.
R.	—	Revised.
M.C.	—	Market Closed.
N.R.	—	Not Reported.
Neg.	—	Negligible.
Kg.	—	Kilogram.
Q.	—	Quintal.
(P)	—	Provisional.

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