

Agriculture & Industry Survey

India's Leading Business Magazine for Agriculture



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Mr Suraj Kumar



Dr. Jagadeesh
B. Henjarappa



Mr Saket Kashyap

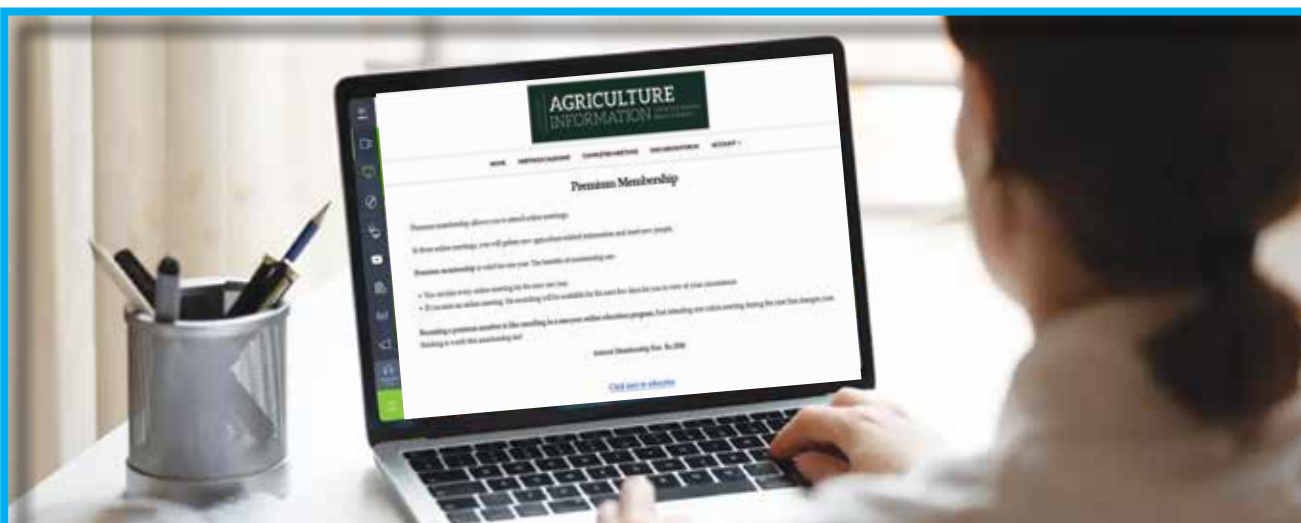
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**Advantages of drone
sprayers in agriculture.**

Dr. Jagadeesh B. Henjarappa
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**Photosynthetic stimulator technology and
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**Wheat seed value addition, bottlenecks,
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How to improve Indian Agriculture

Improving Indian agriculture is a multifaceted endeavor that requires addressing various challenges while capitalizing on opportunities. This comprehensive guide aims to explore the key areas for enhancement within the Indian agricultural sector, covering topics ranging from technology adoption and sustainable practices to policy reforms and market integration. By implementing these strategies, India can foster agricultural growth, enhance food security, and empower rural communities.

Enhancing Agricultural Technology Adoption: Promoting the adoption of modern agricultural technologies such as precision farming, drip irrigation, and greenhouse cultivation can significantly increase productivity and efficiency. Investing in research and development to develop high-yield crop varieties that are resilient to climate change and pests. Encouraging the use of farm mechanization and machinery to reduce labor intensity and increase farm output.

Improving Irrigation Infrastructure: Expanding irrigation coverage and improving water management through the construction of dams, reservoirs, and canals. Encouraging the adoption of water-saving techniques such as drip and sprinkler irrigation to optimize water usage. Implementing watershed management practices to conserve rainwater and recharge groundwater resources.

Promoting Sustainable Agricultural Practices: Encouraging the adoption of organic farming methods to minimize the use of chemical inputs and promote soil health. Promoting integrated pest management (IPM) techniques to control pests and diseases without excessive reliance on pesticides. Supporting agroforestry and mixed cropping systems to enhance biodiversity and improve soil fertility.

Strengthening Market Linkages and Value Chains: Establishing efficient market infrastructure such as cold storage facilities, warehouses, and agri-marketing platforms to reduce post-harvest losses. Facilitating access to credit, insurance, and market information for smallholder farmers to enable them to participate effectively in value chains. Promoting contract farming arrangements and farmer-producer organizations (FPOs) to improve market access and bargaining power for farmers.

Ensuring Policy Reforms and Institutional Support: Revising agricultural policies to incentivize sustainable practices, promote diversification, and address the needs of smallholder farmers. Strengthening agricultural extension services to provide technical know-how and advisory support to farmers. Establishing effective regulatory frameworks to ensure food safety, quality standards, and fair trade practices in the agricultural sector.

Investing in Rural Infrastructure and Livelihood Diversification: Developing rural infrastructure such as roads, electrification, and connectivity to facilitate market access and improve living standards in rural areas. Promoting non-farm livelihood options such as agro-processing, livestock rearing, and rural tourism to create additional income opportunities for rural households. Strengthening social safety nets and livelihood support programs to enhance the resilience of vulnerable communities to agricultural shocks and crises.

Fostering Public-Private Partnerships and Innovation Ecosystems: Encouraging collaboration between government, private sector, and research institutions to promote innovation, technology transfer, and entrepreneurship in agriculture. Supporting startups and agri-tech enterprises through incubation, funding, and policy support to drive innovation and create employment opportunities in the agricultural value chain. Facilitating knowledge exchange and capacity building initiatives to empower farmers with the latest agricultural practices, market trends, and business skills. In conclusion, improving Indian agriculture requires a holistic approach encompassing technological innovation, sustainable practices, market reforms, policy support, and rural development interventions. By addressing these interconnected challenges and leveraging emerging opportunities, India can transform its agricultural sector into a dynamic, resilient, and inclusive engine of economic growth and prosperity.

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Farmers Protest

Union minister Anurag Thakur said that positive discussions took place between the govt and the farmers.

Talking about the meeting that took place in Chandigarh, Thakur said, "Some Ministers of Central govt went to Chandigarh and met them and there were discussions happened for hours. There were positive discussions. In the future also whenever it is required, we are ready to hold talks. We need to try and make sure that there is no violence and loss of money and lives.

"Referring to the steps taken by the government to double farmers income, Thakur said, "We increased the MSP of sugar cane from Rs 315 to Rs 340 per quintal...not just this, we are taking every step to double the income of farmers. We implemented the report of scientist MS Swaminathan... during the Congress regime in 2013-14, farmers got Rs 6,30,000 crore from banks, but last year we gave more than Rs 20 lakh crore, which is 3 times more...Modi govt has taken every decision in the favour of farmers, and we will keep doing so...those people who ruled the nation for over 60 years and did nothing, we shouldn't be compared with them".

Source: <https://timesofindia.indiatimes.com/>

Punjab expecting bumper paddy yield despite kharif season marred by floods

Punjab is expecting a bumper output of paddy crop despite kharif season 2023-24 being marred by floods during July and August, officials said. The state, known as the food bowl of the country, is expecting paddy output to cross 205 lakh metric tonne with an average yield going up by more than four quintal per hectare as compared to last year.

"We are anticipating the paddy production to cross 205 lakh MT this year," said Punjab Agriculture department Director Jaswant Singh.

The state had achieved 205 lakh MT output in 2022-23. It had achieved the highest output of 208 lakh MT in 2020-21. The latest crop cutting experiments conducted by the state

agriculture department ensure the state's average yield at 69.39 quintal per hectare, which is 4.60 quintal more than the yield achieved last year.

<https://economictimes.indiatimes.com/>

Agroforestry a viable option to replace rice

Punjab Principal Secretary (Forests and Wildlife) Vikas Garg. Garg discussed the possibility of exploring crop diversification through the adoption of agroforestry in meetings with representatives of the Tree Growers Association and wood-based industries at the Punjab Agricultural University (PAU), Ludhiana.

Punjab Principal Secretary (Forests and Wildlife) Vikas Garg chaired separate meetings with representatives of the Tree Growers Association and wood-based industries at the Punjab Agricultural University (PAU), Ludhiana. Garg discussed the possibility of exploring crop diversification through the adoption of agroforestry in the state.

Enunciating concerns over depleting natural resources and declining farm income, Garg urged stakeholders to work together to achieve the goal of diversification to address contemporary agricultural challenges.

"Agroforestry is a viable option to replace rice in Punjab," he observed while making a pitch for the fast-paced adoption of agroforestry for sustainable income.

Harcharan Singh Grewal, president, Tree Growers Association, shared the problems of the farmers and demanded that a minimum support price for forest trees be fixed to avoid a fall in the prices of timber in the future.

Another farmer, Harmohanjit Singh, sought commensurate land reforms for tree growers on the pattern of horticulture.

Naresh Tiwari urged the government to declare the wood raised on farms as agricultural produce.

Source: indianexpress.com



Pulses, oilseeds demand to outstrip production by 2047-48

Amid protests by farmers at the Punjab-Haryana border demanding legalisation of minimum support price (MSP), a new NITI Aayog report has highlighted the urgent need to diversify from wheat and rice to pulses and oilseeds to bridge the demand-supply gap by 2047-48. According to the report of the working group on demand and supply projections in agriculture, released recently, under a business-as-usual scenario, India's pulses production will rise to around 47 million tonnes (mt) by 2047-48 from around 23 mt in 2019-20, while demand will grow to almost 49 mt during this period, leaving a gap of almost 2 mt.

"Their present production (of pulses) is insufficient to meet the demand. This gap may remain in future in the absence of yield improvements and acreage allocation to them," the report said. For edible oils, too, the report projected the demand to rise to around 31 mt by 2047-48 from 22 mt in 2019-20, and estimated the production of edible oils would grow to around 24 mt from 12 mt during the same period — a demand-supply gap of around 7 mt. "Augmentation of oilseeds yield, and production from secondary sources can reduce the gap in the short run, and achieve self-sufficiency in the long run," the report said. In contrast, the report said, rice demand is expected to be 110 mt in 2030-31 and 114 mt in 2047-48, compared with a projected production of 145 mt and 154 mt in the business-as-usual scenario.

The report said wheat production, too, was expected to be sufficient to meet the future demand, leaving a surplus of 19-26 mt in 2030-31 and 40-67 mt in 2047-48. "This suggests the



need for a reallocation of area under rice and wheat to other crops," the report said. In an attempt to break the logjam in talks with protesting farmers, the Centre earlier this week proposed to buy marketable surplus in the cases of masoor (lentil), urad (black gram), arhar, maize, and cotton over the next five years at their MSPs.

Source: <https://www.business-standard.com/>

India's merchandise exports in Jan 2024 registers 3.12 % growth at USD 36.92 Billion over USD 35.80 Billion in Jan 2023.

India's overall exports (Merchandise and Services combined) in January 2024* is estimated to be USD 69.72 Billion, exhibiting a positive growth of 9.28 per cent over January 2023. Overall imports in January 2024* is estimated to be USD 70.46 Billion, exhibiting a positive growth of 4.15 per cent over January 2023.

The latest data for services sector released by RBI is for December 2023. The data for January 2024 is an estimation, which will be revised based on RBI's subsequent release. (ii) Data for April-January 2022-23 and April-September 2023 has been revised on pro-rata basis using quarterly balance of payments data.

India's overall exports (Merchandise and Services combined) in April-January 2023-24* are estimated to be USD 638.37 Billion, exhibiting a negative growth of (-) 0.19 per cent over April-January 2022-23. Overall imports in April-January 2023-24* are estimated to be USD 708.79 Billion, exhibiting a negative growth of (-) 5.69 per cent over April-January 2022-23.

Source: <https://agriexchange.apeda.gov.in>



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Cabinet approves hike in sugarcane FRP by Rs 25 to Rs 340 per quintal for 2024-25

The government has decided to increase the Fair and Remunerative Price (FRP) for sugarcane growers by Rs 25 to Rs 340 per quintal for the 2024-25 season, marking the highest increase since 2014. This decision, taken at a meeting of the Cabinet Committee on Economic Affairs (CCEA), is aimed at benefiting over 5 crore sugarcane farmers and ensuring their prosperity. The new FRP, which will be effective from October 1, 2024, is 107% higher than the cost of production.

This move reaffirms the government's commitment to doubling farmers' income and comes ahead of the general elections. This is a historic price of sugarcane which is about 8 per cent higher than FRP of sugarcane for current season 2023-24," he added. The new FRP is 107 per cent higher than A2+FL cost of sugarcane, Thakur said, adding that this would ensure prosperity of sugarcane farmers. "India is paying the highest price of sugarcane in the world," the minister asserted.

Source: <https://economictimes.indiatimes.com/>



Sugar mills can now sell potash derived from molasses to fertiliser firms

The government will also pay a subsidy of ₹345 per tonne to PDM manufacturers as part of its plan to reduce India's dependence on fertiliser imports.

India's fertiliser import bill was ₹2.2 trillion in 2022-23. That year, the government also spent about ₹2.55 trillion, a record high, on fertiliser subsidies.

The union government said it has facilitated a mutually agreed price of ₹4,263 per metric tonne for the sale of PDM

by sugar mills to fertiliser companies for the current year. PDM manufacturers can also claim a subsidy at ₹345 per ton at current rates under Nutrient Based Subsidy Scheme (NBS) of the department of fertilisers. Sugar mills and fertiliser companies will now discuss how they can enter into long-term sale and purchase agreements for PDM.

PDM, a potassium-rich fertiliser, is a by-product of the sugar-based ethanol industry, derived from ash in molasses-based distilleries. India currently imports 100% of the potash it needs for fertilisers, in the form of muriate of potash (MOP).

The government has been trying to make India self-sufficient in fertilisers. It aims to achieve self-sufficiency in urea by 2025 by increasing production from 30 million tonnes to 31-31.5 million tonnes and replacing demand for 2.5 million tonnes with alternatives such as nano urea and urea gold. The target could be achieved by setting up new plants with attractive incentives for manufacturers, union chemicals and fertilisers minister Mansukh Mandaviya told Mint in a recent interview.

"Production of PDM domestically will reduce import dependency and will make India atmanirbhar (self-reliant) in the production of PDM. The goal is to produce 1 to 1.2 million tonnes of potash ash from ethanol distilleries and use it in the farming sector. At present about 500,000 tonnes of potash ash generated from ethanol distilleries is being sold domestically," Chopra said.

Source: <https://www.livemint.com>

NABARD envisages ₹26,816 crore credit flow for Tiruchi district in 2024-25

Potential Linked Credit Plan for the district released

The Potential Linked Credit Plan (PLP) drawn up by National Bank for Agriculture and Rural Development (NABARD) envisages a credit flow of ₹26,816 crore in Tiruchi district during 2024-25, projecting an 8.3% increase over the annual credit plan target for the current financial year.

The PLP forms the basis for the annual credit plan for the district. A lion's share of ₹14,829.60 crore of credit flow is envisaged for agriculture sector, with farm credit being estimated at ₹11,153.50 crore. This is followed by MSME sector with a projected credit flow potential of ₹6,110.95 crore. The rest of the outlay is envisaged as export credit, education and housing loans and credit for renewable energy and social infrastructure.

Releasing the PLP at the bankers' meeting held on Friday, Collector M. Pradeep Kumar advised banks to allocate more funds for medium and long term credit in agriculture sector

as there was good potential to promote farm mechanisation, micro irrigation and animal husbandry in the district. He also urged the banks to focus more on other priority sectors such as education, housing and renewable energy to promote holistic development of the district.

N. M. Mohan Karthik, District Development Manager, NABARD, said the PLP had been prepared in consultation with the block, district and State level officials of the government, banks and NGOs.

Source: <https://www.thehindu.com>

NITI Aayog, Ministry of Agriculture & Farmers' Welfare and FAO launches Investment Forum for Advancing Climate Resilient Agrifood Systems in India

The National Institution for Transforming India (NITI Aayog), the Ministry of Agriculture and Farmers' Welfare (MoA&FW), Government of India, and the Food and Agriculture Organization of the United Nations (FAO) jointly launched the 'Investment Forum for Advancing Climate Resilient Agrifood Systems in India' in New Delhi. The kickoff event for this transformative initiative is a two-day multi-stakeholder meet scheduled for January 18-19, 2024, at the India International Centre, New Delhi.

This initiative aims to develop an investment and partnership strategy to advance climate resilient agrifood systems among the government, private sectors, and farmers' organizations and financial institutions in India.



Delivering the keynote address at the inauguration, Prof Ramesh Chand, Member, NITI Aayog emphasized the need for awareness on how agriculture contributes to climate change, citing a contribution of a little more than 13% of total greenhouse gas emissions in the country. He shared that agriculture could play a role in carbon sequestration through tree plantation on farmland. Prof Chand also called for a new direction in economic analysis of agriculture production, considering natural resources impacts climate change, and future generations. He proposed incorporating metrics beyond financial prices to evaluate the economic impact of agricultural activities. Prof Chand also stressed the importance of aligning efforts with the larger UN approach for dealing with contemporary and long-term challenges.

Source: <https://www.fao.org/>

India Elected as Vice-Chair of UN FAO Committee on Fisheries

India has been elected as the Vice-Chair of the United Nations Food and Agriculture Organization (FAO) Committee on Fisheries (COFI) Management. India's role in this committee as a representative of least developed and developing countries in the field of fisheries and management will determine the direction of the sector.

- India will serve as a member of the global Bureau of Fisheries and Management for the first time in 57 years. The Indian Embassy in Italy has given this information.
- This will prove especially important in the case of artisanal and small scale fisheries. The embassy also said that India will work as a member of the FAO Fisheries Bureau on 'Capture Fisheries' for the first time in 57 years.

Platform for Fisheries Management at Global Level:

- The Sub-committee on Fisheries Management is a forum to discuss fisheries management issues at the national, regional and global levels.

- The decision comes at a time when many countries are protesting against China's illegal and unregulated fishing practices in international waters. China often violates the Exclusive Economic Zones (EEZ) of other countries.

- According to an investigative journalism report, between 2019 and 2021, China has violated the EEZ of more than 80 other countries.

Source: <https://utkarsh.com>



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India to supply 110,000 tonne rice to Guinea-Bissau, Djibouti, Tanzania.

Despite existing export restrictions, India will send 110,000 tonne of rice to three African nations—Guinea-Bissau, Djibouti, and Tanzania—on humanitarian grounds, two senior officials aware of the development told Mint. India had imposed ban on the export of certain rice varieties, including a curb on broken rice in September 2022 and on non-basmati white rice in July 2023, to ensure the country's food security and control domestic prices.

Since the ban, the Indian government has been supplying rice to its diplomatic partner countries and needy nations on a case-by-case basis. 'While Guinea-Bissau and Djibouti will get 50,000 tonnes of broken rice each, Tanzania will be sent about 30,000 tonnes of non-basmati white rice,' one of the officials said. The decision has been taken following a recommendation from the external affairs ministry.

'The export will be done through National Cooperative Exports Ltd, a government export body that was set up under the Multi-State Cooperative Societies (MSCS) Act, 2002 to export agriculture produce and allied items,' the official added. The government had earlier approved exports of limited quantities of non-basmati white rice and broken rice to a dozen Asian and African nations, including Nepal, Malaysia, the Philippines, Bhutan, Mauritius, Singapore and the UAE in humanitarian efforts.

Several African nations are heavily dependent on rice imports from India. Togo imported a substantial 88% of its rice from India last year. Benin, the largest global importer of Indian broken rice, procured 61%, while almost half of Senegal's imports of the grain originated from India. Before the export restrictions in 2021, three African countries – Benin, Senegal, and Côte d'Ivoire – were among the top 10 markets for Indian rice.

In response to domestic inflationary pressures, India halted non-basmati white rice exports in July, followed by

the introduction of a minimum sale price for basmati rice and then a 20% tariff on parboiled rice. The ban on broken rice exports in September of the previous year hurt African countries that rely on India to meet domestic demand because of India's competitive price offerings.

Prime Minister Narendra Modi, in his Independence Day speech, pledged to curb inflation as he readies for the upcoming general elections. The International Monetary Fund (IMF) also encouraged India to lift its rice export bans due to their global inflationary impact. However, the Indian government said these measures were necessary to ensure adequate domestic supply and reduce local prices.

While India's food inflation moderated, rice is the only product in the cereal basket that continued to weigh on the consumer price index.

In January, food inflation, comprising nearly half of the overall consumer price basket, was 8.30%, down from 9.53% in December 2023. However, rice inflation was 13% in January against 12.3% in December and 10.4% in January 2023, according to economists.

Queries sent to the consumer affairs, food and public distribution department and Tanzania, Guinea-Bissau and Djibouti embassies in New Delhi remained unanswered at press time.

Experts suggest India should consider a policy mix instead of an outright ban on rice that can disrupt the global market as well as hurt India's position in global trade.

The export ban led to turmoil in the global rice market and hurt India's competitiveness in the world market that was built over the decades, Ashok Gulati, professor at the Indian Council for Research on International Economic Relations, said, adding this is not in line with the spirit of G20 proposals.

Source: livemint.com

Wheat output may exceed 114 million tonnes target, rise to record



coverage in Rajasthan and Maharashtra. The acreage in Bihar, Punjab and Haryana is almost at par with last year, but 80,000 hectares higher in Madhya Pradesh.

Meanwhile, India Meteorological Department (IMD) on Monday, predicted a Western Disturbance to affect western Himalayan region from February 29 and adjoining plains during March 1-4 with peak intensity on March 1-2. High moisture feeding from the Arabian Sea to north-west India is also likely during March 1-2, IMD said in the evening bulletin.

'Under its influence, fairly widespread to widespread light/moderate rainfall accompanied with thunderstorms and lightning are very likely over the western Himalayan region during March 1-3. Scattered to fairly widespread light/moderate rainfall accompanied with thunderstorms and lightning very likely over Punjab, Haryana, Delhi and isolated to scattered light/moderate rainfall over Uttar Pradesh, Rajasthan on March 1-2,' it said.

Isolated heavy rainfall/snowfall has also been predicted over the Western Himalayan Region on March 1-2, while IMD says hailstorm activity may be at isolated places over Uttarakhand on March 1. Hailstorm at isolated places over south Madhya Pradesh, Vidarbha region and south Chhattisgarh has been forecast for Monday and Tuesday.

Source: thehindubusinessline.com

Wheat production may exceed the targetted 114 million tonnes (mt) this year on good weather and higher acreage of climate resilient varieties, said G P Singh, director of Karnal-based Indian Institute of Wheat and Barley Research (IIWBR). Speaking to businessline on the sidelines of the ICAR conference of vice-chancellors of central and State agriculture universities, Singh said: 'Wheat crop in India as of now is in excellent conditions. There is no disease, the area has marginally increased from last year and the progress of crop is very well. If everything goes well (for another month), we can easily touch the target, and might even cross that.'

The government has set production target at 114 mt after wheat output in 2022-23 reached a record 110.55 mt. Singh said though there is no cause of worry till now, uncertainty remains as

temperature fluctuation is a constant. There are two causes for concern that need to be watched out for in the remaining days till harvest starts – western disturbance and temperature.

As western disturbance causes thunderstorm and unseasonal heavy rainfall, potentially resulting in water lodging in the fields, many experts see it as a damaging factor for wheat. High temperature in third and fourth week of March is also seen by experts as a negative factor for wheat yield.

Singh, however, said because of the deployment of climate-resilient varieties in over 80 per cent of the area, he is confident of crossing all such challenges in reaching the target.

Wheat acreage this year ended at 341.57 lakh hectares (lh) compared with 339.20 lh in 2022-23. Uttar Pradesh, the largest producer of wheat, has reported the highest acreage of over 102.40 lh, up by 5 per cent, and it has helped offset lower

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Recently Completed Meetings

Dr. RK Mathur on "Oil palm research and development in India"

Dr. RK Mathur is the Director at ICAR-Indian Institute of Oilseeds Research in Hyderabad, Telangana.

Mr. Pankaj Harsora on "Exploring the future of ornamental horticulture"

Mr. Pankaj Harsora is the Horticulturist at Haut Monde hotels in Dehradun, Uttarakhand. To know more view https://www.linkedin.com/in/pankaj-harsora-337624140?utm_source=share&utm_campaign=share_via&utm_content=profile&utm_medium=android_app

Mr. Randip Ghosh on "Custard Apple – Cultivation Practices, economics and challenges"

Mr. Randip Ghosh is the Assistant Manager – Production at VNR Nursery Private Limited in Raipur, Chhattisgarh.

Mr. Ashok Kumar Trisal on "Landscape design & principles"

Mr. Ashok Kumar Trisal is the Dy GM Horticulture with JP Group, Gautam Buddha Nagar, Uttar Pradesh, To know more view <https://bit.ly/30sGsBa>

Dr. Subhendu Adhikari on "Water & Soil quality management for successful aquaculture production"

Dr. Subhendu Adhikari is the Principal Scientist at ICAR-Central Institute of Freshwater Aquaculture in Kolkata, West Bengal

Dr. V K Jayaraghavendra Rao on "Public – Private partnerships in horticulture"

Dr. V K Jayaraghavendra Rao is the Principal Scientist ICAR-IIHR (Indian Institute of Horticultural Research) in Bengaluru, Karnataka.

Col. Sujan Mohanty on "Commercial orchids cultivation and its challenges"

Col. Sujan Mohanty is the Founder of Orchids n More in Bhubaneswar, Odisha. To know more view <https://www.linkedin.com/in/col-sujan-mohanty-488829169/>

Dr. Chandra Kiran Sant on "Combating Antimicrobial Resistance in Dairy"

Dr. Chandra Kiran Sant is the Dairy Advisor at Livestock Management Centre in Mumbai, Maharashtra. He is also associated with

1) Gomati Cooperative Milk Producers Union, Tripura as Expert Dairy Development for improving the milk quality & quantity as well as oversee installation of 40000 LPD Dairy Processing Plant.

2) Trainer (for Dairy Farming) in Indian Dairy Association – West Zone: covering Maharashtra, Gujarat, Goa, Madhya Pradesh, Daman and Diu Nagar Haveli since 2010.

Ms. V J Vandana on "What is natural farming? What are its benefits?"

Ms. V J Vandana is an Agronomist intern at Bighaat, Agro Pvt.Ltd. in Guntur, Andhra Pradesh.

Mr. Suvarna Kumar on "Value addition in sandalwood"

Mr. C. M. Suvarnakumar from Bengaluru, Karnataka is a Freelance Consultant and a retired General Manager (Marketing) of Karnataka Soaps and Detergent Limited who are manufacturers of world famous Mysore Sandal Soap.

Mr. Ranjith Kumar on "Government schemes for startups"

Mr. Ranjith Kumar is the Managing Director of AVKR Moringa Promise Wellness(OPC) Private Limited in C.Pudupatti in Theni District, Tamilnadu.

Mr. Mohamed Basith Ali M on "Spinach cultivation, economics and marketing"

Mr. Mohamed Basith Ali M is the Agronomist at Way2Grow in Chennai, Tamilnadu. To know more view <https://www.linkedin.com/in/mohamed-basith-ali>

Mr. Vignesh Manogaran on "Vital aspects of food processing and challenges in procuring raw- materials"

Mr. Vignesh Manogaran is the Head- Contract Manufacturing at WayCool Foods in Chennai, Tamil Nadu. To know more view <https://in.linkedin.com/in/vigneshkumarm>

Ms. Joe Shiney M.A on "IOT Technologies in agriculture"

Ms. Joe Shiney M.A is pursuing MSc Agricultural Extension Education at Kerala Agricultural University-KAU in Thiruvananthapuram, Kerala.

Dr. A.V. Ramanjaneyulu on "Melia Dubia – cultivation, economics and marketing opportunities"

Dr. A.V. Ramanjaneyulu is the Principal Scientist (Agro.) & Head, AICRP on Agroforestry, PJTSAU, Hyderabad.

Mr. Parikshit Sampat Sai on "How web3 technologies like blockchain, AI, and the metaverse transform the farming"

Mr. Parikshit Sampat Sai is the CEO of Pranam Kisan in Hanumangarh Town, Rajasthan. To know more view <https://www.linkedin.com/in/parikshitsampatsai/>

Mr. Arul Sekar P on "Agriculture economics and benefits of small scale agro machines"

Mr. Arul Sekar P is the Director – water and sustainability at Nansey Restoration LLP in Puducherry. To know more view <https://www.nansey.in/>

Ms. Krishna Rana on "Value addition in sorghum millets"

Ms. Krishna Rana is an Assistant Professor at PP Savani University in Surat, Gujarat.

Mr. Kailash Bisht on "Frozen vegetable market and support from agriculture"

Mr. Kailash Bisht is the Inside Sales Manager at Pal Frozen Food in Haldwani, Uttarakhand. To know more view <https://www.linkedin.com/in/kailash-bisht-6134b611b/?originalSubdomain=in>

Ms. Anitha Santhosh on "Anthurium cut flower cultivation"

Ms. Anitha Santhosh is the Founder of Blossoms Farms in Hassan, Karnataka.. She is into anthurium cultivation for the past 20 years.

Ms. Prachi Yadav on "Why choose mustard oil over any edible oil ? "

Ms. Prachi Yadav is the Associate Director Business Development at Sunvic Global Trading in Mumbai, Maharashtra. Her interests are on – Increasing demand for Indian products in International market.
– Agriculture products needs in foreign market.
– Creating awareness about product demand and supply.
– How to deal with foreign market.
– Procedure for export of agriculture products
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Mr. Ajay Kumar on "Challenges of low productivity and diminishing market prices for guava"

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Mr. Gnanaeshwar Ramesh on "Spice cultivation in soil-less systems"

Mr. Gnanaeshwar Ramesh is the Team lead-R&D Department at Way2grow in Chennai, Tamilnadu. To know more view <https://www.linkedin.com/in/gnanaeshwar/>

Ms. Payel Chatterjee on "What is a biogas plant and how does it work?"

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Mr. Jacob Jose on "Organic products exports"

Mr. Jacob Jose is the Manager at PDS Organic Spices in Kittikkanam, Kerala.

Dr. Sesha Kiran Kollipara on "Current status of Insects pests and Diseases of Tomato"

Dr. Sesha Kiran Kollipara is the Senior Scientist (Plant Pathology) at Horticulture Research Station (Dr. YSR Horticultural University) in Madanapalle, Chittoor Dt, Andhra Pradesh. To know more view <https://bit.ly/3FAOB2k>

Mr. Venkatesh Chabbi on "How does microbes works in soil health"

Mr. Venkatesh Chabbi is the Business Development Officer at Gujarat Eco Microbial Technologies Pvt. Ltd. in Hubli, Dharwad, Karnataka.

Ms. Shalini Mathur on "Industrial honeybee products"

Ms. Shalini Mathur is pursuing MSc. Entomology at Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior.

Mr. Parth Mukeshbhai Mangroliya on "Succulent plants wonders: Care and cultivation"

Mr. Parth Mukeshbhai Mangroliya M.Sc. Research Scholar ASPEE College of Horticulture in Navsari, Gujarat. To know more view <https://bit.ly.ws/395dV>

Ms. Swati Sharma on "Global Organic Certifications – Why they are needed, how they work, and their importance"

Ms. Swati Sharma is the Founder & Director of Parthavi Organic Vision Pvt. Ltd. in Delhi. To know more view <https://www.linkedin.com/in/swati-sharma-56642512/>

Dr. Devendra Pal Singh on "What is wheat blast disease and how to overcome it"

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Dr. Esakkimuthu M on "Market led extension in agricultural development"

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Mr. Kushagra Chaturvedi on "Cultivation and post harvest handling of proso millets"

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Mr. Shricharan Senthilkumar on "Postharvest loss of horticultural products"

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Mr. Mihir A. Hansalia on "Revolutionizing finger millet agriculture :breeding and biotech breakthroughs"

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Mr. Subhajit Mukherjee on "Innovative techniques in bee-keeping"

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Talking to

Mr Suraj Kumar

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He describes the advantages of drone sprayers in agriculture.

Our company is into manufacturing drones for agriculture purposes. Drones have many uses, but we are primarily into manufacturing the drones for spraying purposes. In India, the agriculture sector has plenty of problems, and statistics show a worrisome trend. Nearly 35 to 40% of the crop production is lost due to insects, weeds, and diseases. We are in a situation to feed nearly 140 crores of people. Imagine, If we can save some percentage, how much agricultural produce we can export, and we can also control food inflation. The productivity of our Indian labour when compared to developed countries is only 1%. This is because the developed nations are using advance machines operated by skilled labours to generate the highest output. In India, the land holding size is also very low at 1.08 hectares while in Canada it is more than 250 times that of India. The adoption of farm mechanisation in India is only 40% when compared to USA or Europe which is 95% or Russia which is 80% or Brazil, a developing country like India but has high mechanisation rate at 75%. Even productivity of grains when compared to other nations, India has very low rate of productivity. In

1991-92, the total work force involved in agriculture was 60%, and by 2050 it is expected that it will come down to 26%. There are also other challenges agriculture sector is facing. So, there are some broader fundamental challenges, which necessitates the use to adopt drone technology.

Agricultural mechanization unfolds in three key stages: firstly, before crop sowing, employing tractors for plowing and seeding; secondly, during the standing crop phase, where drone technology plays a pivotal role; and thirdly, during harvesting, utilizing harvesters. In the sowing stage, tractors and other machinery are commonly used, while during the crop's growth phase, mechanization tends to be low, often following traditional methods and sprayers.

Drones find valuable application in this phase, especially in crop spraying, which significantly enhances efficiency. Drones also contribute to crop health analysis, soil assessment, weather monitoring, field analysis, livestock management, plantation broadcasting, fencing, and crop monitoring. Among these applications, crop spraying

stands out as the most crucial. Many farmers have reported increase in profit margins for paddy crops and reduction in crop loss when opting for drones over traditional spraying methods.

What advantages do drone-based spraying systems offer in comparison to traditional methods?

There are two conventional spraying techniques – Boom and Knapsack spraying, with Boom spray being relatively newer. Drones represent the latest advancement in this field. Farmers typically incur a cost of Rs. 350 to 500 per acre when utilizing drone technology for chemical spraying in their fields, whereas the cost for Boom spraying is Rs. 220, and for Knapsack, it ranges from Rs. 210 to 300. Despite the slightly higher cost associated with drone usage, the benefits surpass the expense.

In terms of efficiency, drones outperform traditional methods significantly. Drones can cover one acre of land in just 7 minutes, whereas Boom takes significantly more time, and Knapsack spray requires 2-3 hours. Drones exhibit superior precision and accuracy in spraying, while



Boom spraying is moderately accurate, and Knapsack spraying lacks precision.

The water consumption with drones is minimal, at only 10 liters per acre, compared to Boom Sprayers and Knapsack, which require 120 to 150 liters per acre. Chemical wastage is also significantly reduced with drone usage, and there is no exposure to the human body. The process involves filling the tank, deploying the drones into the field for spraying, and then returning. In contrast, using Boom and Knapsack exposes individuals to a higher risk.

Drone-based spraying is conducive to precision farming, with minimal dependence on labor. Drones prove to be highly productive, capable of spraying one acre of land within 7 minutes, and a single pilot can cover approximately 25 to 30 acres in a day. Additionally, drones are adaptable to various crop types, unlike Knapsack or Boom. They excel in scenarios where plants are tall, as drones can hover over the vegetation and uniformly apply spray.

Drones offer various benefits, including higher crop yields leading to increased farmer income. Efficient chemical usage enables an 18 to 20% reduction in input costs, with a minimum 10% boost in yield. Reduced human exposure to harmful chemicals safeguards health. Drones are cost-effective and time-saving, allowing farmers to create business opportunities by assisting others. Suitable for diverse conditions, including different soils, hilly terrains, and crops like sugarcane or cotton, drones simplify operations—just fill the tank, set coordinates, and the drones autonomously complete the task, returning after spraying one acre.

How do drones sprayers improve the efficiency of traditional agriculture spraying methods?



Drones exhibit high efficiency in usage, with a minimal water consumption of only 10 liters per acre, in stark contrast to traditional sprayers that consume 150 liters. The spraying process is notably swift, with drones covering one acre in just 7 minutes, whereas traditional sprayers require 2 to 3 hours. The use of drones allows for reduced chemical application due to their efficiency, preventing percolation into the ground. The fine droplets set on leaves, resulting in lower input costs. Additionally, the dependency on labor is minimized, making drones highly efficient compared to traditional methods."

In terms of precision, how do drone sprayers minimise the risk of over-spraying or missing target areas in comparison to conventional methods?

When employing Knapsack sprayers, individuals manually position the nozzle over plants, resulting in human inaccuracies and imprecision. In contrast, using drones involves filling the tank, marking coordinates on the

field map, and setting a uniform spray rate. Drones fly at a consistent velocity, ensuring a uniform spray rate, covering the designated area precisely. This highlights the role of precision agriculture with drones, a feature absent in manual systems.

Can you elaborate on how drone sprayers contribute to reduced chemical usage and environmental impact in agriculture?

Traditional sprayers require 150 liters of water, whereas drones operate efficiently with just 10 liters. When using Knapsack or other traditional sprayers, large droplets are produced, causing chemicals to settle on the ground instead of adhering to the leaves. In contrast, drones create fine droplets that adhere to the leaves, ensuring better coverage. Hence, wastage is minimal, and if converged with crop health monitoring using multispectral camera, a heightened precision agriculture can be carried out, which will eventually substantially decrease the chemical usage, and thus negative affects on environment on chemical usage is reduced

Can you provide examples of cost saving achieved by farmers through implementation of drone sprayers?

Data indicates a noteworthy increase in profits and a reduction in crop loss when farmers utilize drones. As per the data quoted in Forbes India, In the case of paddy, using drones results



Talking to



in a 32% reduction in crop loss, while for potatoes, the reduction is 20%, fenugreek 24%, cumin 20%, and moong bean 18%. It's imperative to recognize the need for an efficient spraying method. A comparison of agricultural practices on Indian lands with global productivity reveals differences not only in spraying methods but also in other contributing factors, with insect, pest, and weed-related losses being significant. Globally, maize production averages 5664 kgs per acre, while in India, it stands at 2632 kgs, indicating a substantial disparity. Efficient drone usage can contribute to bridging this productivity gap, aligning with or even exceeding the global average observed in developed countries.

Can you share the success stories or case studies where adoption of drone sprayers led to significant improvement in crop productivity and quality?

We have a Service Provider in Bihar by the name of Krishav Organics, they uses our drones for spraying purpose. He had a big contract for spraying in Sugarcane, and sugarcane crop of that area was heavily infested by a disease

called red rot. There were two kinds of areas where the spray had to be done. One area was near the border to Nepal which is a red zone area, and drones are not allowed to fly. The other area was green zone, and he got the contract to spray both areas. But he could not spray in the red zone but successfully sprayed in the other areas. As per the indicative picture given by Krishav Organics, farmers of red zone reported a loss of even upto 40%, which is huge, whereas in the sprayed areas red rot disease was curbed at the right time.

What are the challenges that any farmer encounters when integrating drone sprayers into the agriculture practices, and how are they addressed?

The primary hurdle lies in the cost-effectiveness of drones. While a traditional Knapsack spray ranges between Rs. 5,000 and 10,000, the comprehensive drone package costs Rs. 10 lakh. The substantial initial purchase cost poses a significant challenge for farmers. Another issue pertains to battery charging and storage, a common problem in both the electric vehicle (EV) and drone industries. Travel area

is restricted, requiring battery recharge after covering 2 to 3 acres on a single charge, along with regular battery replacements, presenting challenges to battery lifespan. Additionally, skilled manpower for drone operation is essential due to the technology-oriented nature of the product, because at the end of the day pilots are the ones who is present in the farms. These collectively constitute the main challenges. We are working in different directions to reduce these bottlenecks for bringing greater adoption among the masses.

How do drone sprayers enhance the safety of agriculture workers by minimising their exposure to potentially harmful chemicals?

With traditional sprayers, we accompany the machine in the field during spraying. However, with drones, all that's required is to fill the tank, set coordinates, and let it autonomously fly, spray, with the pilot understanding the designated area. This eliminates exposure to humans. Unlike traditional sprayers, where individuals enter the field to spray, exposing them to chemical impact on the body, drone pilots remain detached from direct contact with the chemicals.

Is there anything else you would like add here?

Drone technology is in its early stages in India, with China and Japan showcasing notable advancements. The USA is also increasingly adopting drones in agriculture. India has recently begun exploring drone usage. We at IoTechWorlds aims to raise awareness about drone technology in rural India, bringing significant benefits to the farming community.

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Dr. Jagadeesh B. Henjarappa

Managing Director, Achyutha Innovations,
Tumkur, Karnataka

Talks about photosynthetic stimulator technology and implication in enhancing yield and quality in pomegranate crop.



We have developed a technology called Photosynthetic Stimulator Technology to increase yield and disease resistance in pomegranate crops, thereby improving social and economical status of the farmers. The main microorganism that causes diseases pomegranate plants are *Xanthomonas*, *Phytophthora*, and many more. We combine the research based technology and package and practices recommended by ICAR so that the farmers benefit by using this technology.

Photosynthetic Stimulator Technology mainly deals with photosynthates concentrating on Calvin cycle and photophosphorylation relations. My formulas can increase the activity of enzymes, mainly Calvin cycle, ribulose biphosphate and carboxylation enzymes which improves to capture more atmospheric CO₂ and convert it into sugar. This in turn helps the plants to increase both biomass and quality. For it to work, it needs NADPH and

ATP which are biochemical currencies from protoplasm relations. We have developed one more formulation called Photon Max to stimulate Photophosphorylation. It triggers the protein complexes even in dim light so that the plant can efficiently produce NADPH and ATP and to fix CO₂. Water is the media without which no biochemical reaction takes place, hence adequate watering is must in pomegranate crop to get best quality pomegranate fruits.

In pomegranate cultivation, after second harvest, many farmers are facing the problem with respect to flower formation. They get more male flowers than hermaphrodite or functional male flowers which is because they do not considering nourishing the plants after harvest. I suggest that immediately after harvest, they have to give sufficient nourishment so that the energy drained in the plant has to be replenished. By using our technology immediately after fruit harvest, plants can regain the strength and accumulate the photosynthates in the form of sugar and other molecules. Even if the farmers go for pruning, we have found them using excessive Ethrel 2 ml per one litre in a spray that causes problems to the plant system. When they use lower amounts, then it can help in uniform flowering. Ethrel is also called Senescence hormone as it is responsible for detachment of leaves and reduction in cell wall thickness. One has to use only the minimum quantity for defoliating so that the diseased leaves are removed. Watering is important for getting proper functional flowers to





Horticulture

convert into fruits. Plants develop die back symptoms and anthracnose. One can minimise the incident of blight and anthracnose and the impact of Ethrel. We have also developed called flower booster (flower bud initiator) to get more functional flowers which has to be applied on the 8th day from Ethrel spraying. We suggest to the farmers not to use more than 0.5 ml per litre with other additives for formation of better flowers.

In pomegranates, the roots help to produce more tertiary roots which absorb the plant nutrients from the soil, water, and minerals. When we establish the functional roots, we can alter the functionality of leaves and activating Calvin cycle. The technology has to be implemented during the vegetative growth of leaves and leaf differentiation. Initial 3 months are crucial. We have 3 sprays of RuBis CO-ACT, Photon Max, and one Magic Root drenching along with zinc EDTA. This makes the complete nutrients for proper flowering and produce more effective and functional leaves. Usually the leaves have parrot green colour.

With Photosynthetic Stimulator Technology, we can enhance the productivity and quality and shorten the development period from 6 months. It realises increased photosynthetic efficiency to produce and capture atmospheric CO₂ to be converted into sugar to reach the fruits easily. We do this by stimulating the root hairs, make biosynthetic pathways for more efficient way for leaves to capture more CO₂, and to ensure that the light that falls on leaves is used by the plant to convert into food. Our technology makes the reeds thick and not easily get damaged by insects or pests. The Photosynthetic Stimulator Technology works well when farmers use drip irrigation or regulated pressure drip water application. It is crucial to spray fungicide on the day by evening itself, and fungicides such as Bavistin or

COC are the best. Our SR 85 0.5 ml per one litre of water and COC helps in mobilising the molecules across the cubicle. Water stoppage should not exceed 28 days. Immediately after harvest, we should provide the nutrients required to rejuvenate the plants. Then we can stress it. we can use neem oil, monoammonium phosphate 8 gm per litre of water, and 8.5 gram per litre of monopotassium phosphate. This will help in more shoots. We can do the drenching with Magic root. Another molecule that supports photosynthesis is Kreeya to activate the cell cycle activity and to reduce flower drop. Once the flower is pollinated it will not fall. Once in a harvest, we have to apply these.

To improve the disease resistance and quality one has to increase the photosynthates by using Photosynthetic Stimulator Technology as the main diseases that spread in pomegranates are thrips, aphids, and jassids apart from shoot borers. They have to be controlled at the earliest before the plants get damaged. My suggestion is to apply 1.5 kg of carbon powder for the plant to enhance the nutrients, water retention, and suppress the insects. Helpful microbes like Pseudomonas and Trichoderma can be used. Application of fungicide should be done before monsoon starts and in the evening to help the chemicals enter the leaves through diffusion. By using Photosynthetic Stimulator Technology, farmers can see an increase in yield per plant in the first harvest itself.

Can you share any real world examples of case studies of pomegranate growers who have successfully used this technology? What are the current challenges and limitations in pomegranate crop production, particularly in terms of yield and fruit quality?

A farmer grew his crops in an area from where eucalyptus plantation



was removed. He lost 200 crops immediately as the crop was affected by blight. After using our Photosynthetic Stimulator Technology, he has not faced any problem with respect to flower setting. He could retain the crop and get a better quality, quantity, and good weight of the fruits. During my visit to farmers' field, I observed that they are not educated and do not have enough knowledge. They are unable to diagnose the root formation, and by using things that others suggested, he has made the land barren and not supporting the plant system. When there are knowledgeable people with good idea about biochemistry, physiology, and soil science, the problem gets solved easily than following people who do not have knowledge about plants and try to sell their product.

What specific benefits can pomegranate growers expect from Photosynthetic Stimulator Technology in terms of yield improvement? Are there any specific environmental and climatic conditions that influence the effectiveness of Photosynthetic Stimulator Technology in pomegranate cultivation?

When it comes to yield improvement, most of the pomegranate farmers spray things in higher quantities which does not give the required effect. The chemicals impact the health of the



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farming methods? Are there any potential risks or challenges associated with Photosynthetic Stimulator Technology in pomegranate cultivation?

The cost depends on the crop type and productivity. If you are getting something like 8 tons per acre, then your cost for Photosynthetic Stimulator Technology is around Rs. 22 thousand, but if the same plant is giving you 12 tons, then since the dosage is based on the foliate, we recommend the Photosynthetic Stimulator Technology. As the yield goes up, there is a marginal increase in the price. However, the cost per acre will be around Rs. 22 to 28 thousand. No. When it comes to quality, as analysed in the laboratory, it shows almost equally grown organic. So there is no residual insecticide or fungicide as the usage is reduced to a large extent. When it comes to overall cost effect also, you have almost 25% less cost when compared to normal pomegranate cultivation practice.

Can you provide guidance on application process and timing for using these stimulators in pomegranate orchards? How long does it typically take to get noticeable result in terms of yield and quality after using the technology? Any research and development related to Photosynthetic Stimulator Technology in pomegranate cultivation?

Yes. We provide both services and product. We suggest that initially the farmers have to contact us when they get the final harvest from where to start. Multiple things are there to practise during the cultivation. If something goes wrong in the initial steps the crops may not grow proper. So we get details of what they followed in the past two years, positives and negatives they faced. The yield is decided for them based on area and soil specific schedule. It is estimated based on the flower setting. Once you have flower setting properly most of the farmers retail these flowers. By applying the

technology, it takes 2 to 3 months to see the effect. In India or globally it is not there. But in USA there is a team who work on a similar project for black gram and tobacco. They use a different pathway called Gluconate pathway, the yield increases by 15%, but here the increment is almost 35%.

What training and support are available for farmers who want to adopt this technology? Any best practices for integrating Photosynthetic Stimulator Technology into existing pomegranate farming method?

The farmers have to be open to us fully as to what they use, what issues they face etc, but we find that the major issues are because they do not water the plant or give nutrients after harvest. With Photosynthetic Stimulator Technology, we can revive the plant within 3 months to get proper flower setting. The farmers are taught these in their field itself. The standard practice is designed by ICAR, New Delhi. We have used their schedule and Photosynthetic Stimulator Technology for the farmers to follow normally. They will not see any change except extra price.

Can you share any information on the potential economic impact of adopting this technology including ROI and market advantages?

In Karnataka, the price of pomegranate was less because the farmers used lot of chemical sprays and pesticides. They could not export to Middle East. Now the person who is using our technology is able to sell his produce at Rs. 80 per kg while the market price is Rs. 35 per kg. When you improve the quality and reduce usage of insecticide and pesticide, it adds a lot to ROI. Farmers can get almost 4 times what they invest in purchasing the Photosynthetic Stimulator Technology products.

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plant, and by third harvest the plants are dry. So now farmers are going for high density cultivation. If something happens in one place, it can spread to the other plants fast. By following Photosynthetic Stimulator Technology, people can work on the distance between plants and rows, water irrigation, and go up to 12 harvests compared to the regular 3. Farmers can also minimise the die back by using Photosynthetic Stimulator Technology, making the plants stronger and get more photosynthates for defence, fight against pathogens, give good branches, leaves, flowers, and fruits. In summer when you apply Photosynthetic Stimulator Technology, your yield increases by 80%, and in winter it does not work because the enzymes work better in warmer conditions. But with Photosynthetic Stimulator Technology, even if the temperature goes up to 42 degree centigrade, there will not be any problem as the processes inside the plant system are channelled properly. If carbon fixation is not done properly by Cavin cycle, more energy is produced which if not used will affect the leaves. What it establishes is the understanding between water requirement, solar radiation, and Cavin cycle. Once it is established, the effects are more.

What is the cost involved in implementing this technique, and how does it compare to traditional



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We are developing products for various sectors such as agriculture, forestry, horticulture, landscaping, and cleaning. We are world number one in producing chainsaws which are used for pruning trees, cutting trees, and maintaining them. Whenever there is a natural calamity, our chainsaws are used across the globe, and our main revenue is from this product segment. Our chainsaws range from MS 170 1.8 hp and MS 661 7 hp, and MS 880 8.7 hp.

Farmers who have plantations and horticulture crops use our products. The semi-professional ones in the range of 2.5 hp and professional chainsaws are used by professional loggers in Uttarakhand, Kerala, and Tamil Nadu. Furniture makers find our chainsaws very useful, and also forestry department use these products to remove fallen trees during natural calamities. We offer one year standard warranty for our products which use petrol or gasoline.

We have electrical chainsaws models MSE 141 and MSE 170 apart from ones that are battery operated. The limitation with the battery operated ones is the run time which is 45 minutes. When people are keen about less noise and less pollution, they prefer our chainsaws. All these chainsaws are made in Switzerland, and we have technically superior chainsaws compared to our competitors. The various types of chainsaws are picco micro, rapid micro, picco super, rapid super, and picco micro mini. The two components are guide bars and chains for various purposes.

Brush cutters are very handy, and we offer a huge range of products from 1 hp up to FS 460 3 hp professional model. The brush cutters have 3 main components. Engine is a very important part as we are conscious about mileage.

Our engines are fuel efficient, environment friendly, less noise, and less pollution. Though the cost is slightly high, we benefit in the long run by buying such a quality product. We should always consider serviceability when we buy a product. Many of our customers have opined that they have visited our showrooms very less number of times for service. The machines will last longer if it is maintained and serviced properly. Cost of spare parts is an important aspect.

We should buy only genuine ones even if slightly costly to get more life of the machines. Up to 2 acres, we can go for FS 55 2 hp, and if it is more than 2 acres, we have to look for higher hp brush cutter. Post-monsoon, the usage of brush cutters will be high. We have many people using the machine almost for 12 hours, and we recommend professional range of brush cutters for them which comes with antivibration system. We do not feel the vibration, and they are used to remove weeds,

maintain grass, removing the thick vegetation. These are petrol operated. We have backpack brush cutters also operated by both electricity and battery. The different attachments are two teeth grass blade, auto cut with moving head with nylon thread used for removing weeds regularly. In case of thick vegetation it is better to for brush knife or 4 teeth grass cutting blade. For cutting down small branches, vines, and twigs, circular saw blade is idea.

Paddy weeder is used to remove weeds in between the paddy rows. We can use this for crops other than paddy too. Pick tines and bolo tines are used in small farms where vegetable and intercrop cultivation is done to remove weeds. The soil is churned to help in crop growth and when weeds are removed. Our power weeders are light in weight, low vibration, and easy to operate for women farmers too. The three categories in this segment are BC 230 2 HP, MN 610 and MN 710 which is very powerful. The difference among them is the area that weeding and intercropping to be done. BC 230 is quite handy and easy to manoeuvre, easy to carry too. The top end model MN 710 7 hp is quite robust and powerful with Euro 5 engine. Its advantages are less pollution, less emission, and less vibration.

Along with power weeder there are a few accessories such as ridger adjustable particularly for cutting land, loosening soil, opening pores for water flow for row crops such as sugarcane, potato, chilly, tobacco, and banana. Ploughing attachment turns and breaks up soil to bury crop residues, cut loose the soil, control the weeds, and bring new nutrition to the soil. Cage wheel is another attachment. When we use regular tyre, the machine may slip in wet soil. The cage wheel is used for traction in such soils to provide floating effect. Deep tines are used when the soil is very hard, has stones, and we go

for this to break the stones. Bracket and puddling wheel are other attachments.

Water pumps are used since many parts of India get scanty rainfall. The water pump helps in drawing water from wells, rivers, and canals to pass on to the fields. A small farmer can use 1.5 inch 2 hp pump with discharge of 250 litres per minute and delivery head 27 metres. It is easy to carry as it weighs 11 kgs. This is very helpful in hilly terrains where they need to draw water to a particular height. We have 3 models in this WP 300, WP 600, and WP 900 which help in less pollution and less sound. WP 900 is mainly used for industrial purposes and municipal corporation. They help in removing the water logging. Our engine is 6 hp to give robust performance and heavy duty output.

Handled blowers are used nowadays to do landscaping in their houses. We have different blowers petrol, or battery, or electrically operated models. The forest department uses the blowers to douse fire if it is within an area of 300 to 500 sq. Ft. While laying new roads, these are used to remove dust. Mist blowers belong to the same segment helpful for vineyards and pomegranate growers. They can be used to spray insecticide, pesticide and chemicals. The difference between

regular sprayers and mist blowers is the droplet size and adjustable nozzle to adjust the discharge. SF 450 is easy to spray and dusting, and it is a two in one model, and by twisting the tank we can easily interchange the application from spraying to dusting. Portable sprayer is a handy sprayer, but farmers have expressed that they are improving product portfolio. We are coming up with many new products which are fuel efficient and user friendly. We have also very good vacuum cleaners, and our earth auger to dig pits.

What are the latest advancements in agro-machinery, and how can they benefit farmers and Agri-entrepreneurs?

I suggest that you should go for quality driven product which has less impact on environmental pollution and ensure serviceability. Many companies have switched to higher capacity engines, talking about less carbon emissions. We are also moving from old engines to the ones that are fuel efficient, less pollution, and environment friendly and taking care of carbon footprint in gasoline engines. We find lot of enthusiasm about battery products, but the reason why it is not picking up greatly is the price aspect. We have promising new technology driven products, but the price is the bottleneck which is why many farmers are not switching to this. There is a shift going on in the industry with lot of technological advancement. So farmers should opt for a product which is long lasting, robust, versatile, user-friendly, and not expensive too.

Can you provide examples of specific agro machines that have transformed the traditional farming practices?

Farmers are moving on from manual machines, such as from handsaw blade to brush cutter.



We see that in India, mechanisation is mainly use of tractors. But other traditional hand tools such as sickles, pruners, or shears are not getting mechanised. These manual tools are time consuming and not productive. While America, Europe, and China have high percentage of mechanisation, India is still at 35%. 75% of the farmer population is having less than two acres.

So these new products coming up in the industry are big challenges. Also finding skilled labour to operate these technology driven products like power weeders, brush cutters, and water pumps or earth augers. If we employ a labour who charges Rs. 500 to 800 a day to dig pits can maximum dig between 6 to 7 pits. But with simple earth auger, a person can do 30 to 50 pits a day depending on the soil, and size of the pit can be good. The person becomes more productive when he uses these products. Departments across the states are educating the farmers.

We are educating farmers through online platforms, exhibitions, melas, and Common Service Centres. We are tied up with various initiatives the other companies are doing, such as Better Life Farming project, and FPOs. We explain to them the benefits of using our products. Initially the products were designed for other countries, but now STIHL are doing R and D in India. For example, coffee harvesting is very laborious as we have to pluck every coffee bean and pluck only the ripened cherries. So





Agro Machinery

we have introduced a machine coffee harvester used in Brazil, Vietnam, and a few more countries in Africa. When we brought it in India, we found that what two persons would take to pluck berries from one tree in 10 minutes, the machine could do it in 2 minutes. All these show that mechanisation is the need of the hour, and farmers are highly benefited by these.

How about technical support and maintenance service to your product users?

We provide a user manual along with the product so that basic troubleshooting can be done by referring to the manual. We also through our YouTube channel show how to maintain the machines and how often to service them. Our authorised dealer will explain the details, show how the machines are operated, and give basic tips on how to ensure the improved product life. We offer two free services, and post that we have spare parts assurance for our customers for 10 years. If you

buy STIHL products, you need not worry about service, we provide that assurance too.

Can battery operated chainsaws effectively handle the tasks commonly encountered in Agri settings such as pruning, felling small trees or cutting firewood? What are the precautions farmers should take when using brush cutters?

WE have small GTA machines for continuous operations up to 25 minutes and MSA 200 which are liked by many and are as good as petrol chainsaw. We recommend to use safety goggles that the companies provide. They will be useful in case of stones which if the machines running at 8 to 11 thousand rpm of speed hit can fly anywhere. They should also use the safety guard on machines given the companies regularly. They can also use hand gloves so that they can withstand the vibration, ear plugs or mufflers to tackle noise effect.



Are there different paddy harvester models optimised for different types of rice cultivation methods such as flooded fields or dryland cultivation? What are the financial incentives support programs available for farmers to invest in advanced agro machinery?

We have currently only paddy multi row crops operation, but there are other companies like VST who have different models. We get paddy weeders nowadays with different rows of paddy. Many governments are offering subsidies. We know the constraints of farmers, and if subsidy is not available, we are offering our products through EMI purchase, and we are flexible in terms of payment structures. There is also a credit facility available to the farmers through NABARD and government organisations. We help them when they find it difficult to purchase machines. When the products are within Rs. 50 thousand, farmers do not feel the pinch these days. There are price sensitive markets, and they come with added advantages such as government subsidies, credit facilities available through third party banks, NBFCs, and local dealers. Definitely there are credit facilities nowadays. Many also buy online, and so these online partners are providing the credit facility depending on the user credit score.

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Explains the production technology of mango.

The botanical name of mango is *Mangifera indica* and belongs to family *Anacardiaceae*. It is a drupe kind of fruit, falling after getting ripe. India is the highest producer of the mangoes with the cultivated land area of 2325000 hectares and production of 20822000 MT as per the agriculture statistics at Glance 2021.

Soil and climate: Mango can be grown on a wide variety of soils, right from the topmost location to the lowest part. In areas with temperate climate like Jammu and Kashmir and very hot areas like Rajasthan mangoes cannot be grown. It cannot be grown in high humidity, rainfall or frost, as during flowering season there are chances of disease attack. The ideal temperature for mango cultivation is 24 to 27 degree Celsius, and during the developmental stage high temperature is required.

Important cultivars: Some important cultivars are totapuri, banganapalli, dasheri, and alphonso. Dasheris is mainly grown in Uttar Pradesh apart from malgoa, vanraj, langda, and keshar. Malda mango is mainly grown in West Bengal. There are varieties according to time frame, such as early varieties such as Bombay, Bombay Green, Himsagar, Kesar, and Suvernaksha that grow in February and March with less time for fruiting. The mid-season starts from May and June, and varieties such as alphonso, mankurad, bangalora, vanraj, banganapalli, dashaheri, langar,

kishen bhog, and zardalu etc. The late varieties start coming up in July and August, and the varieties include Fazli, Fernandin, Mulgoa, Neelum, and Chausa.

There are certain hybrid varieties grown in IARI and FRS, and these include Vengurla, Mallika parented by Neelum and Dashehari.

These are regular bearers, with great colour, high TSS, uniform size, and moderate keeping quality. Another such variety is Amarapali from IARI, Delhi, and these are dwarf, regular bearers, with cluster bearing small sized fruits and good keeping quality. Ratna Sindhu and Arka Puneet are other such hybrid varieties.

Propagation: We use three grafting methods to propagate mango trees – veneer grafting, approach grafting, and soft wood grafting. In veneer grafting and soft wood grafting, we can use any other plants, but in case of approach grafting, we have to use the same plant. We have to take a small part, put in a grown stem, and attach for a period of time, spray good growth regulators, and they will start growing. In approach grafting, we remove the upper tissue part of the tree, attach, and bind with ropes and tapes as used in agriculture. After a certain healing period, they get united and start growing. In soft wood grafting, we use young stem and put another mango's stem in a triangular cutting, and then we let them grow.



These are quick methods, and if we use seeds, it takes 5 to 6 years, but using the quick methods, we get early yield and used in commercial propagation.

We can use square, quincunx, or triangular systems. Square planting is when we put 4 trees in the same distance length and breadth. In Quincunx method, we place a fifth tree in the centre of the square. Triangular method has 3 trees. When we use pits, they should be of 90 x 90 x 90 cms at a spacing of 8 to 10 metres. They should be filled with fertilisers, well composed FYM organic manure. Planting is done during rainy season, and grafting point should be kept at least 6 inches above soil. They are susceptible to water logging conditions and certain diseases also in the earlier phase.

Irrigation and fertiliser: In the early stages, water should be applied after planting when rains are not available. When trees are in fruit bearing mode, irrigation should be done at 10 to 15 days' interval for fruits to mature. Mango starts bearing fruits from November, December, and January. It is better



to apply organic manure for better nutrition, and it should be applied in small trenches dug from about 1.2 metres away from the trunk up to the drip line. We have to have the distance as the roots are elongated. For the trees 1 to 3 years old, we have to apply FYM 20 kg, Nitrogen 100 g, Phosphorous 50 g, and Potash 200 g per plant. We should never put fertilisers just below the tree, we should make a small trench, and put the fertilisers there and cover with soil so that it reaches the roots. For trees 4 to 6 years old we have to apply 40 kg FYM, and for 7 to 9 years old plant 80 kg, and for trees 10 years old, 130 kg of FYM, and NPK will also increase proportionately.

Trimming and pruning: 75 cm of main stem from the main branch should be allowed and not more than that. There is a chance of breakage due to small crotch angle and heavy top. After resting period of 15 to 20 days of harvesting, we have to start pruning. We have to prune all diseased and broken branches and twigs. We can apply 0.3% copper oxychloride or paste the cut ends with 10% Bordeaux paste. We have to collect the pruned parts and destroy by burning as this will lead to formation of insects. Fruit dropping is the most natural phenomenon

and high in mango especially during the first 4 weeks soon after flower opening, fertilisation, and grain stage of fruits. This occurs as an adjustment to resources available in the plant for the development of fruits. This can be minimised by regular irrigation during fruit development with optimum doses of nutrient, effective control of pests and diseases, and hormone sprays.

Harvesting: Harvesting at the right stage is important which can be ascertained with colour development, shoulder development on the upper surface, and falling of one or two fruits from the plant which is known as Tapka in common language.

Specific gravity of 1 to 1.02 is dependable. Mango takes 90 to 120 days for the fruits to mature. Harvesting is done using poles to prevent damage to the fruits in commercial method. We should know that after flowering season, we can get fruits only from 1% of flowers. The rest of the flowers drop. Our productivity will increase by 200 to 300% if we can prevent this 99% of dropping of flowers. Average yield is 8 tons pre hectare which may vary according to variety, locality, and climatic conditions, and factors like humidity etc.

Uses and packing: Mangoes are full of vitamins, minerals, and antioxidants that help in controlling blood pressure, heart diseases, and many more diseases. They are good to stop bleeding, strengthen heart and brain, make complexion fair, and skin soft and shining. The dietary fibre present in mangoes has a protective effect against degenerative diseases and against certain types of cancer. Mangoes are usually packed in bamboo baskets (for commercial purpose) using straw as the padding material for cushion effect to prevent damage. Wooden and cardboard boxes are also used with padding materials and wrapping fruits individually to maintain the quality of fruits.

Diseases: Anthracnose is a disease that attacks mangoes with black spots on leaves and fruits, and lesions on leaves start as small angular brown to black spots and enlarge to form extensive dead areas. The ripe fruits develop sunken prominent and dark

brown to black decay spots. We can control it by applying Carbendazim and Bavistin 0.1% during flowering to prevent blossom infection. Dip treatment of fruits in Bavistin in hot water at 50 to 60 degrees Celsius for 10 to 12 minutes but not more than 15 minutes. Powdery mildew: It is a white superficial powdery structure on the leaves and branches in flowering stage of mangoes. It affects leaves which drop prematurely. We can control by three spraying of fungicides at 15 days' interval. Wettable sulphur 0.2% g of Sulfex per 1 litre water or Tridemorph 0.1% in one litre of water and Dinocap 0.1% in one litre of water.

Pests that attack mangoes include mango hopper where nymphs and adults suck the sap of inflorescence. Withering or shedding of flowering of buds and flowers can be seen and also a honey bee structure on the leaves and mould developing. We can manage this by using two rounds of Acehate 75 sp @ 1 g per litre or Phosalone 35 EC. Mealy bug is another pest where we find drying of leaves and inflorescence are seen. Presence of pinkish nymphs and adult bugs on the fruits and stalks is seen.

We can prevent it by banding the



trees with 20 cm wide alkathelene or polyethene by December 50 cm above the ground level and just below the junction of branching and stem, bind it with jute thread and apply a little mud of fruit tree grease on the lower edge of the band. Mealy bugs are also known to bribe ants with sugary secretion, and ants help in spreading the mealy bugs. We can also include ladybugs as natural enemies.

Physical disorder: Due to nutrient deficiency malformation happens. Thick vegetative bunchy top shoots compact mass in sterile flower is malformation which causes infestation of virus, fungus, mites. The main causes are nutrient deficiency, C to N ratio, carbohydrates, and amino acids. We can apply fungicides like Captan, Bavistin, remove the affected parts and paste with Bordeaux.

Biennial bearing in mango is another concern with one yield in a year and no yield in another. Climatic changes like rain, humidity, and low temperature are the reasons. Proper upkeep and maintenance of orchards, timely pruning, and de-blossoming with NAA applications are the measures. Black tip is seen due to pollution, smoke, carbon dioxide, and carbon monoxide.

Spraying with Borax at 0.6% on fruit set at 10 to 15 days interval will help. When clustering of fruits not forming together and falling down due to adverse weather conditions during February and March leads to this. Often we find mangoes spongy inside due to high temperature. Mulching also helps apart from harvesting fruits at 3/4th maturity stage. Calcium deficiency causes breakdown of flesh towards apex is another problem. we can prevent it by plucking at 3/4th maturity.

What are the key factors to consider when selecting suitable mango variety for cultivation? How do you prepare the soil for mango cultivation, and what are the ideal

soil conditions?

We have to check climatic conditions, area we grow the mango trees. We have to inspect the field, check for water availability, and humidity conditions to grow the suitable variety. Black soil is the ideal one for mango cultivation. We can prepare the soil by applying FYM in pits and grow them organically. Planting distance is 1 to 2 metres. We have to make a ring around the tree at a distance of 1 to 2 metres and fill them with water. Frequent watering is needed in the maturity period. For one plant 40 litres of water is needed.

What are the nutrients needed for healthy mango trees, and how to apply it? What are the post-harvest handling and storage techniques to be used to prevent spoilage? Any specific climate and environmental considerations for successful mango production?

NPK is the main nutrient needed. Proper trimming and pruning and exposure to sunlight is needed. We should not let the fruits ripen fully and pluck when 3/4th ripened. It should have less humidity and dry area. Temperature should be within 20 to 25 degrees. In summer mangoes grow well, there are early, mid, and later varieties. We cannot grow mangoes in excessive rain or cold climate. Less humidity is needed.

How can we market mangoes and earn profits in mango industry? Please tell us about yourself and your interest in this field.

We can make a chain with a local market, sell to people around us, and if we are big producers, government agencies can be contacted. Portals of IARI can be contacted for assistance. There are government plants where we can get access to storage and processing. After joining Engineering course, due to a traumatic phase in life, I found out my love for nature which included agriculture. Hence



I opted for agriculture and pursued B.Sc. Hons in Agriculture. I request the agriculture students to take the sector positively. This sector can revolutionise everything in India. We need a better approach as many people think you will be doing farming only.

We study so many subjects in the course. If we take the course seriously, we need not import anything from other countries. India has versatile climate conditions, and we have to think from the business aspect which is applicable for farmers too.

We have to think of developing products in organic way. We can change the whole market. We need a perception for agriculture, and people should not see us as just farmers. They should know that we are the reasons why we all survive.

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Mr Saket Kashyap

Director - Kash Fisheries, Sangrampur Motihari, Bihar

Discusses the problems faced during fish breeding.



Mr Yatendr Kashyap



Mr Saket Kashyap

In 2016, we started the hatchery business with the help of state government who had announced a scheme to invite people to start hatchery business. We started with two ponds for raising and one for breeding. We faced many problems such as finding skilled labour at that time. The next problem was getting quality brooders as the ones that we got in our area were not healthy and seeds not matured enough. The ponds were getting recovered very slowly and not

sustainable at all. Water parameters were not good, and we had to get it tested every time. The lab where we got it tested was not good, technicians not trained, and the results were always varying and never gave correct readings.

To elaborate on the problems, the first major problem was the trained labour. We had to get high quality skilled labour to set up hatchery units, to give medicines, to treat brooders, and all these were very difficult to get. We ourselves were not trained in these aspects, and we had to depend on labours. It was difficult to find skilled labours in the local area as even those available had very less knowledge. So we had to go to Kolkata to get some skilled labours who knew how to get things done. Then getting good brooders was difficult as what we got were not matured. The ones in the local or nearby ponds were not well-fed and not taken care properly. So we had to go to rivers nearby and get some fresh brooders.

Once we started getting the breeding, we started getting good quality seeds, eggs coming out properly, though initially the swelling of seed eggs was not happening properly, it was either nothing or inadequate. We had this problem for some time, and we had to do lot of experimentation to make it happen. We used the borewells to fill the tank and were using that water. We guessed there was a problem with the water quality. So we got the water tested. Scientists from the Fishery department came to check the problem. So we came up with the idea to mix the pond water into the tank water to do the breeding. Again it was not too reliable. So we put a borewell, filled in the overhead tank, and pond water was used to solve the issue. We made 4 tanks to move water from one to the next and so on, kept the water in the overhead

tanks for 4 to 5 days and used that water after one month. Then breeding started happening properly, but it was not a sustainable model. So we wanted to get the parameters checked which was not getting revealed in the local lab. We then connected to ICAR, Patna, had discussions with the scientists there. They came with all the testing kits and found that the hardness of water was too high. So to get rid of it, we had to get a new borewell of 400 metres and checked the water. The hardness was not there, but the quality was not good either.

We started the first season in 2016 which was very bad and went ahead with experimentations such as creating tanks and circulating water. In 2017, we got the precise contract labour for one year, but after one year, they left, and we had to find the new set of labour who can take care of the breeding and other things. In the first year, we had quality brooders correct, and in the second year, when the season ended, the scientists checked the water again and found hardness had reduced. Third year we checked the parameters and started breeding. The production was really good, brooders were good, but the quality of produce was not good we felt. We got connected with ICAR experts from Aquaculture Research Centre, Bhubaneswar. There was a special feed being made for production of good breeders. We got the first lot of seeds in September 2017, we fed the brooders with the feed, and in 2018, we started breeding. The quality and production really were high. We created 7 pools and a breeding pool. We saw real growth of hatchery in our firm.

Even now we have the problem of skilled labour. Though we get from West Bengal or any other state, we have to generate inhouse labour also with proper scientific skill in them. But the labours are not usually technically sound, they go by their experience. Brooders management is also a challenge still as we have to keep changing the feed. We retain the same brooders for two years and then change to a fresh lot and get rid of old ones. The next challenge is marketing which is highly local dependent. We have to go to those areas to get the produce sold.



as ammonia, hardness, salinity, acidity, which need to be properly checked. Also the water has to be clean. We have a shower like structure on the overhead tank so that the water absorbs the dissolved oxygen. We do not have proper channel where we can get information about things to be done. The scientists are not located in our area and cannot measure everything and suggest. We have to manage

lot of things.

What role does temperature regulation play in fish breeding, and what problems can arise if it is not properly controlled?

Our breeding business starts in early March and goes on until end of July or August. In Bihar, since many villages are near Nepal, the winters till March end also, with chilly weather. So we start the season in March and have seen that the production is not that good. When we start the season in when the temperature is high, the production goes down. In June when the rainy season starts with temperature at 35 or 36 degrees, the productions is good. We have seen the number of seeds and output increasing well. Controlling the temperature and environment is something we cannot do as the cost of production of seeds is high. It is good to have control the parameters and temperature, but it is not practically possible to operate in such conditions.

How about freshwater shrimps in Caribbean? Is it

good?

We have not done freshwater shrimps since beginning. Though we wanted to do it with the help of ICAR, Bhubaneswar using bio flocc, it did not work out. We have not tried it since the beginning.

Are there specific diseases or health issues that commonly impact fish breeding, and how are they managed?

During breeding time, the fish are small and do not get many diseases. But fungal attack is something that affects breeding. After the egg is fertilised and rotating, proper cleaning has to be done as the egg shells break and start floating. We have to keep continuously cleaning at least for 2 days. Otherwise, it will release ammonia inside the water that will kill the baby fish. So we need someone to keep cleaning the water every 15 minutes to remove the shell floating on top of the water. Any fungal attack gets deposited at the bottom, and babies start dying. We have to ensure



We also lack proper testing labs and trainings on new technologies that need to be taught to the farmers. There are many technologies that are not farmer-friendly, and cost is also high. So sustainability becomes a problem. We find that plenty of hatcheries are coming up, but they are not keen about the quality of the seeds and sell the produce at a low price. There is no standardization of quality parameters to maintain the seeds produced. So we always suggest the other farms to maintain the quality parameters for seed production. The consumer who buys should know what quality of seeds they are buying. If we are not good quality seed producer, we can sell it at a low price, but if the quality is good, we cannot sell it at a low cost. The price challenges are another issue we are trying to come over.

How does water quality affect the fish breeding success, and what are the issues that can arise?

Water quality is a major parameter and ultimate one. When the seeds fertilise, we rotate the seeds for 72 hours. The eggs start swelling in the first stage, and then the fish is born. They break the eggs and come out. If the water is hard, the egg shell becomes hard in the water and does not allow the fish to come out.

That is why I suggest to get the water and other parameters checked often. If it is acidic, it can affect the production. Once the fish come out of eggs, then they keep moving around in the water. If the water quality is not good, there is every chance of bacteria developing in the water, and also fungal attack. Even with little bit of fungus, the things can change. The seeds will start dying. There could be hidden parameters such

Fishery

there is no fungal attack. Also dead cells in the fish skin get removed that can pollute the water. So cleaning the water tank where breeding is done is very important.

What are the potential problems related to fish breeding during breeding process?

Feeding is an important factor when doing brooder management. We usually separate the female and male fish in the beginning itself and feed them differently. There are special feed produced by CIFA, Bhubaneswar which is meant to be used during breeding seasons. This helps brooders to get healthy eggs. How we manage the brooders in the beginning and how healthy they become decide the production.

How does the selection of breeding pairs influence successful reproduction, and what difficulties can arise in this area?

It is a genetic thing. The females lay eggs. At times the male fish is not getting proper food or care. The egg may not be matured or strong enough to give healthy seeds. We have to take proper care of male and female fish separately, feed them properly, depending on the species so that they are properly fed



and healthy.

Are there any particular environmental factors that can hinder fish breeding, and how can they be mitigated?

It is the weather condition that affects fish breeding. If the temperature is high, it affects. If the water is hard, it is difficult to get good yield. Every time, we breed we have to test the water, and it is not easy to get it tested in lab. It is usually the temperature that has impact on the breeding. With low monsoon, it affects next set, and so we have to be informed and be prepared for that. If the water is hard, we have to make the process by filling tank water into the borewell. We were informed that the ground water that is accumulated is not clean which will increase the hardness of water. So we have to keep experimenting to achieve.

How do we manage potential aggression or territorial behaviour among breeding fish?

This behaviour is seen among the ornamental fish. In other kinds of fish, we do not see this aggression. We do not deal with ornamental fish much. We stop this behaviour in natural habitat.

Are there any generic or hereditary issues that can arise during fish breeding, and how are they addressed?

Yes, we keep changing the broods every year because this can create problems. We get a set of brooders in the first year, get baby fish, sell most of them, and only a few are left with us. So within the next cycle, they are ready to breed. If we keep using the same siblings again and again, there will be hereditary issues and disorders. We keep mixing the broods. We get fresh water broods from the market or other natural resources such as river. We sell the old ones in the market and get new brooders. We keep rotating the brooders continuously. It is advisable to change the brooders at least once in two to three years.

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Mr N. Sreenivasarao

**Business Head,
Research Paddy and Jute,
Nuziveedu Seeds Ltd,
Hyderabad, Telangana**

Wheat and rice are the most important food crops, and India is likely to be the food basket of the world soon. Of the two, rice is more advanced, and there is a very good competition among research organisations, private, and public sector companies because of which farmers are able to access latest technologies, inputs, and best value added products. But there is very less competition among the research institutions or extension organisations with regard to wheat, and so the farmers are using low quality seed with age old techniques with low inputs and productivity.

I have explained in one of my posts in LinkedIn how the gap between research potential and average yield potential is huge. The gap between the lab and land is more than 60% while in other crops the gap is not so much, be it rice, maize or others. With such a huge gap, it is evident that the potential is not used up to the last milestone, which is land. There is a lot of extension activity needed, but the important bottleneck is the low productivity. The main reasons are low SRR (Seed Replacement Rate) meaning if the farmer is using age old farm saved seeds and same varieties despite the improvement in technologies and varieties, the productivity will come down. The lack of information reaching the farmers is another reason.

We have to do the evaluation of wheat seeds to address malnutrition of micronutrients such as iron and zinc which reflects among the population. We have to increase the nutrition through our wheat seeds like NWS-2084 Kavita which is having more Zinc percentage. So biofortification is the need of the world now. Organisations are working on this aspect and to address the hidden hunger and increasing per acre productivity. Other

Talks about wheat seed value addition, bottlenecks, and reasons for low wheat production.

challenges such as temperature also have a role in this. wheat requires optimum temperature of 23 degree Celsius, but if the temperature shoots up, we get less gain and per unit yield will be low. Farmers need to adopt climate smart heat tolerant new varieties like NWS-2194 Badsha. Mechanisation is needed to increase like in Punjab and Haryana in all other states. When farmers use the age old farm saved seeds, the yield is low, and they do not know the percentage of seeds that will germinate and genetical purity of seed. They are not updating or accessing the new technologies or new seeds. Timely irrigation is needed at 20 to 25 days interval. With rain fall in India not certain, we have to develop varieties tolerant to drought and adapt water saving measures. Also weeds like Phalaris minor and mimic weed are causing yield loss. We have to apply weedicides to prevent loss.

In Rajasthan they use old varieties occupying the major portion of land and leading to low productivity and disease susceptibility. Recent varieties such as HD 3385, NWS 2084, Kavita, NWS 2214 Kanak, NWS-2194 Badsha and Sriram are some new products with high disease tolerance and high photosynthetic efficiencies and high

yield. The need of the hour is to bring the change in wheat cultivation to meet the needs of not only Indians but across the globe. The per capita income of the farmers should also improve with the newly developed varieties by replacing the old ones with the newly developed ones. Organisations like ICAR and Nuziveedu seeds are conducting researches, but the details are not reaching the farmers. Awareness has to be created through the social media, and people working in agro input industries and research organisations should focus on wheat which is the need of the hour.

Wheat is largely grown in various geographical locations. High Northwestern zone has the highest per hectare productivity. Central zone is slightly better while Northeastern zone is low. With good water availability, timely sowing, and high management practices, Northwestern plain has the high yield. It is essential we choose the best variety suitable for the area and conditions there. Timely planting methods and avoiding delay in sowing is important as wheat is sensitive to temperature. High temperature at the time of maturity causes loss and injury to yield and quality. We should not grow varieties which are zone





specific. Wheat is a selective crop, and scientists will test during the launch, evaluate properly across the country in different locations. We should have the knowledge to grow only the recommended varieties. Utilisation of fertilisers, water, herbicides, and timely spraying of fungicide are also the need of the hour. Harvesting on proper maturity is important as wheat is sensitive to lodging, and if crops lodge, there is a crop loss up to 50%. If wind velocity is high, we should not irrigate the field.

Scientists are working on technologies to improve wheat traits such as heat and drought resistance, waxy coating, tillering, canopy colour, high chlorophyll content in leaves to improve photosynthetic efficiency and improved productivity. Lodging tolerance, adaptability, and suitability system to varied climatic conditions and input requirements are the other areas scientists are working on. Efficient water management and plant height are important aspects.

The plants should not be too tall since there will be a chance of lodging and 50% crop loss. Straw in wheat is an economical part as we will get equal quantity of grains. Straw is also used as animal feed. We should choose bold seed with high per volume weight to get higher density. There are many new diseases coming up, and scientists are working on solving these. Some of these issues are already being addressed,

but the outcome has not reached the ground level.

We have to maximise the yield and optimise the input usage by developing climate resistant varieties like NWS-2194 Badshah and reduce the cost of cultivation and improve farmers' income like NWS-2084 Kavita. Return on Investment table shows that we should not offer older varieties to the farmers. Kavita has higher yield and per acre high productivity. So we have to increase the per acre straw yield and income also. We should also address the problems faced by the farmers such as disease or lodging or other issues through new technologies, new varieties and value addition by improving the grain size, nutrient quality. We have tested variety Kavita and request farmers in Rajasthan, Gujarat, Maharashtra, and Madhya Pradesh to use these varieties to increase the income.

With huge seed requirement in India there is a need for 50% SRR which is currently only 20%. Farmers are

purchasing only 1.5 lakhs tons seeds and other are using the old varieties, low quality seeds for the rest of their usage. There should be a good and healthy competition among companies and research organisations to come out with newer varieties, get the technology reach to the farmers. Next year we are coming up with two more varieties to reduce the lab to land gap and increase the yield potential exploitation up to 80-90%.

What are the potential benefits of using value added wheat seeds for farmers and agriculture industry?

Potential differentiation is value addition over existing products in terms of nutrients such as zinc, and iron, Climate smart with high heat tolerance, High genetic purity, High physical purity, yield protection by delivering non shrunked seed under stress conditions, disease and drought tolerance. They have not reached the farmers to the fullest extent. The benefits to the farmers are the increased productivity and income increase. The

main challenge with low SRR is farmers are not using the high purity and quality seeds. They are not in a position to get the benefits available in the market. When they are able to access them, the farmers will benefit up to Rs. 5 thousand per acre additional benefit by using pure and quality seeds and advance improved varieties.

Can you explain some common techniques





Value Addition



and practices used for value addition in wheat seeds?

Value addition will be done by producing the seed from pure breeder and foundation seed to maintain more genetical purity. Processing to maintain more physical purity. Seed treatment to help in better initial vigour and establishment. Breeding techniques to increase adoption for climate change, drought tolerance, yield increase and Non lodging.

What are the major bottlenecks or challenges that hinder wheat production on a global scale?

If we see India, any bottleneck in India in wheat production affects the world. The main bottleneck is low productivity with very low SRR. All agriculture graduates, young generation should venture in to agriculture and come forward to take up agriculture. This is another reason the latest developments and technologies are not reaching the farmers.

Are there any specific regions or countries that experience more pronounced bottlenecks in wheat production? What are the challenges?

The main bottleneck in India that I found after traveling extensively across India are low SRR, lab to land gap which is huge. Farmers are using old seeds resulting in low yield. The youngsters should come forward to address these issues. This is the age of mobiles, technology, and these are reaching even the remote villages, but the agricultural advancements and technologies are not reaching the farmers. The biggest hurdle is the young and educated youth are not coming forward to take up agriculture. It is the duty of the government institutions and research institutions to educate the farmers to use quality seeds and follow the procedures without fail.

Are there instances where soil health and fertility issues that have led to decrease wheat yields? Can

you elaborate on these cases?

Definitely soil fertility is depleting year after year. Since the last 10 years, organic carbon content of the soil has decreased from 3% to 0.3%. Organic carbon content is the life of the soil. If it depletes and pH value increases, it is a threat not only to wheat but all crops. Currently we are unable to sustain without using chemical fertilisers. There is a definite and immediate need to improve the organic carbon content. The value of the land is not the benchmark, but the organic carbon content is. We have to sustain this to keep the productivity of the soil alive.

What role do pests and diseases and plant pathogens play in reducing the wheat production, and how can these issues be addressed effectively?

Pests, diseases, and weeds are biotic stress to the crop. These can be

controlled, and already controlling measures are being taken. If we are unable to control them in time, they will cause huge loss up to 30%, but currently enough awareness has been created about pesticide and fertilisers, and farmers are controlling at that level without any problem. I request one and all the farmers to focus on increasing the productivity of wheat in the country. They need to address SRR by using high quality seeds and by accessing the information about best quality seeds available in the market. By following the appropriate protocols, I request the farmers to increase the income and yield higher than what you are getting currently.

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Value Chain

Mr Mradul Choubey

Manager, Ernst and Young,
Bhopal, Madhya Pradesh

Talks about the importance of aggregation, grading, marketing and harvesting practices in a value chain.

Mr Mradul Choubey, Manager at Ernst and Young in Bhopal, Madhya Pradesh, emphasizes the significance of aggregation, grading, marketing, and harvesting practices within the context of a value chain.

During his discussion, he highlighted the key features and distinctions among value chains in horticulture, agriculture, dairy, non-timber, and forest products. The comprehensive value chain analysis encompasses the entire life cycle of products, identifying bottlenecks and designing interventions at each step to achieve better pricing realization for farmers or collectors.

A critical factor affecting farmers' ability to negotiate favorable prices is the lack of scale, mainly due to small landholdings, often below 2 hectares. This limitation hinders their capacity to negotiate and secure better prices for their produce. To bridge the gap, traders act as aggregators, fulfilling the requirement for large volumes of agricultural produce necessary for processors or buyers to optimize costs. However, challenges such as small landholdings, low yields, and outdated techniques contribute to farmers' inability to achieve optimal yields.

Farmers often neglect the grading of produce, selling it directly in mandis, leading to a lack of transparency in pricing. While farmers are aware of good agricultural practices, traditional farming methods persist, contributing to resource inefficiency and increased production costs. Limited post-harvest infrastructure for aggregation, grading, and storage of perishable produce also affects price realization for horticulture products.

In addressing these challenges, various entities, including the Government of India, NGOs, and technical agencies, are attempting interventions. However, these schemes often overlook crucial aspects like aggregation, market linkages, storage, and post-harvest practices, impacting their effectiveness.

It's essential to recognize the unique characteristics of each value chain, tailoring interventions accordingly. Agriculture and horticulture value chains, for instance, are season-dependent, with production and availability influenced by the harvesting season. Storage considerations vary, with horticulture products requiring cold storage due to their limited shelf life.

Margin dynamics also differ across value chains, with high production scale impacting margins for agriculture and horticulture products. Dairy value chains, despite having lower overall margins for processors, benefit from daily procurement

and cooperative models. Forest products, being relatively rare and produced on a limited scale, command higher margins for processors. The discussion delves into price realization, highlighting the disparity between what primary producers receive and what end consumers pay. Cost drivers in value chains encompass cultivation, harvesting, packaging, storage, and transportation expenses. The involvement of multiple intermediaries further raises overall costs, including mandi cess and GST.

Aggregation and value addition play pivotal roles in optimizing value chains. Various stakeholders, including farmers, aggregators, traders, cooperatives, and processors, contribute to the efficient functioning of value chains. Farmers' associations and cooperatives aid in aggregation and grading, leading to better price negotiations and transparency.

The talk underscores the importance of interventions at every stage of the



value chain, emphasizing the need for strategic planning and consideration of local factors. Examples from different regions, were provided such as the sustainable harvesting practices in Maharashtra's mango orchards, illustrate the impact of end-to-end interventions on price realization and overall sustainability. The importance of using the right fertilizers, implementing organic certification, and adopting proper harvesting practices is emphasized for achieving better prices in horticulture products like mahua.

Examples: Mango (UP vs Maharashtra)
In Uttar Pradesh, the state boasts numerous high-quality varieties of mangoes, but the orchards are often leased out. The aggregator typically pays a lump sum to the farmer, undertaking the entire harvesting process without proper sorting. Unfortunately, this practice results in damaged produce and plants, rendering the harvesting process unsustainable. In contrast, Maharashtra employs a more meticulous approach by inspecting for mature produce before harvesting, leading to better price realization.

In Maharashtra, farmers adopt sustainable harvesting practices, including retaining twigs and leaves on fruits destined for export. This thoughtful approach contributes to a sustainable harvest and positively impacts price realization. It underscores the need for comprehensive interventions throughout the entire value chain.

Guava in Uttar Pradesh:

In the case of guava, susceptibility to diseases is a concern, yet farmers often neglect to apply Trichoderma for disease reduction. This oversight leads to a shortened orchard lifespan, and consequently, farmers do not realize the true value of their produce. It is crucial to emphasize the application of appropriate fertilizers and inputs before implementing interventions to address these issues effectively.

Forestry value chain Mahua:

When it comes to mahua, adopting measures such as organic certification becomes essential to enhance its market value. By following these practices, farmers can secure a better

price for their mahua produce, demonstrating the importance of integrating sustainable and quality-focused interventions across the value chain. In Madhya Pradesh, 68 MT of sustainability harvested food grade Mahua collected from Mahua nets has been exported, assuring 3X price realisation over MSP for collectors.

How can proper grading of Agri products enhance their market value and consumer appeal?

Each produce needs to be graded before being sold. Typically, agriculture produce contains 70-80% good quality material, 10-20% average, and 10% poor quality. Typically, agricultural produce consists of approximately 70-80% high-quality material, 10-20% average, and 10% poor quality. The potential to secure higher prices for the produce is significantly enhanced when it undergoes proper sorting and grading. Traders critically evaluate the overall quality of the produce, and if it lacks proper grading, they may offer a reduced price or one closer to the average. In such instances, the farmer invariably incurs losses due to inadequate grading. Mustard, for example, is graded, and based on the oil content, the price is determined and the auction price is usually higher in Mandi's with testing and grading facility than in the mandis where there was no testing or grading of the produce.

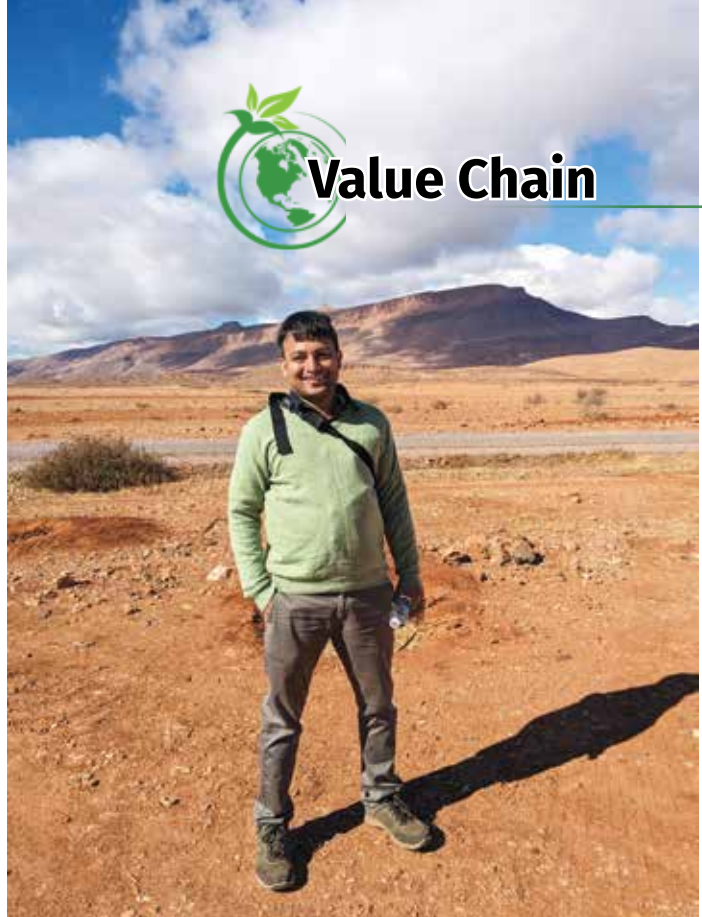
How can farmers benefit from implementing effective grading practices in their produce? Explain the significance of effective marketing strategies in promoting Agri produce to various consumer segments.

It will give them better price realisation and transparency. The farmers who are selling entire produce to a local trader at farm gate, they will get price which is 25 to 30% less than average market

price as proper grading is not done. When graded, the price of the produce is always high as it is a saleable variety. The not-so-good produce is used for processing. When traded properly, we get higher price for better quality produce. This is the first intervention for any Agri produce we can do. Aggregation and grading of produce in any value chain are needed for any value chain to get good quality. In case of wheat, the price for atta or wheat is higher if it is from Madhya Pradesh. When the average atta is not branded, it will not get good price. So we have to brand and link to the market.

There is always a paranoia even when we say we apply less fertiliser and inputs. With food grade and organic certification, we get higher price. We should have a better and appropriate testing mechanism in place and test the produce in right labs to get quality specifications. Then we can get higher price. We can sell the produce to a market where there is demand. We can brand the product and sell. Otherwise only aggregation and testing are needed.

What is the impact of digital marketing on connecting farmers directly with consumers for benefits? Can you provide examples of innovative marketing





Value Chain



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campaigns that have influenced farmers' income? What is the role of mechanised harvesting practices in modernising agriculture and improving productivity?

Farmers have the option to undertake packing, grading, and cleaning activities at their farms, enabling them to sell directly to consumers at retail prices. While digital marketing proves beneficial for fostering entrepreneur relations, maintaining quality assurance is paramount.

There should be no compromise on quality standards. Digital marketing, while enhancing entrepreneurial connections, introduces challenges such as transparency and assurance of quality.

Marketing campaigns play a pivotal role in increasing demand and subsequently improving price realization. Remarkably, some entities, like ITC, excel in aggregation and selling produce.

They have established trading centres and integrated testing with procurement. Cooperatives, exemplified by Amul, provide farmers with an 80% margin, something many other cooperatives are struggling to achieve. Notably, Amul, is known for its innovative marketing approach with quirky cartoons during major geo-political national and international events.

Mechanized harvesting emerges as a solution to reduce wastage and labor

costs. The government has initiated custom hiring centers where machines are purchased and then rented out to farmers. This approach not only improves the quality of harvesting but also accelerates the process. Given the high cost of machinery, it is more feasible for farmers to opt for renting unless they possess extensive landholdings, making ownership economically viable.



facilitate the purchase of agricultural products but also offer advisory services on optimal harvesting practices to farmers. To enhance effectiveness, it is crucial for these startups to express a willingness to procure graded products based on predetermined prices.

In many cases, farmers engage in the grading process only when they are aware of potential buyers or exporters for their produce. Consequently, startups can play a vital role in establishing that connect.

They can help in disseminating information on harvesting best practices, grading techniques, and the importance of adhering to proper harvesting protocols.

Ensuring that farmers receive fair and justified price realization for their produce is equally essential for the success of these interventions.

Without this assurance,

there is a risk of escalating overall costs without tangible benefits. Hence, startups must focus on providing comprehensive information and end-to-end integrated support to farmers to make their interventions truly effective.

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Dr. C. Tara Satyavathi

Director, ICAR-Indian Institute of Millet Research, Hyderabad, Telangana

Talks about the role of IIMR in millet research and development.

India's proposal to declare 2023 as Year of Millets was supported by 72 countries, and Indian Government has decided to make it a people's movement so that the millet recipes and value added products are accepted globally. Millets are small-seeded grasses grown for food and fodder. The major millets are jowar, bajra, ragi and small millets are foxtail, kodo, little, proso, barnard, and brown top millets. The exotic millets are teff and fonio. The government of India has renamed millets as Nutri cereals because of their nutritional superiority. The USP of millets is that they are climate resilient, good for human health, food and nutrition security. They are short duration crops, grow well with less moisture, put less stress on environment. They grow organically with lesser fertiliser and pesticide, and can survive with less rainfall, they withstand drought and heat, thus the farmers are benefited. They also have high yielding potential under good management and are resistant to pests and diseases. They have multiple usage such as food, feed, fodder, brewing, and biofuel providing a sustainable source of income for humans. They are rich in iron, zinc, calcium, dietary fibres, antioxidants and have low glycaemic index, gluten free, high in protein, vitamin D and rich in polyphenols and phytohormones.

The main health benefits of millets are they detoxify the body, lower bad cholesterol level, prevent onset of breast cancer and type 2 diabetes, effective in controlling blood pressure, protect against heart diseases, treat respiratory conditions, and immune system, and reduces gastrointestinal issues. The

year 2018 was declared as National Year of Millets. We have established 25 seed hubs, 18 breeder seed production centres to promote production of quality seeds.

In 2022, we have established 377 FPOs and 500 startups functioning with millet value chains. The Government of India has seven-pronged approach to put millets on every plate by creating awareness, branding, labelling, and promotion to make people aware of nutrition and health benefits of millets, value addition options, processing technologies and recipe development. Further, the government has rebranded millets as Shree Anna as they are a means of holistic development in India, linking villages and poor, felicitating tribal communities, helping in withstanding climate change, and promoting chemical-free farming. ICAR-IIMR has been declared as the Global Centre of Excellence of millets by the Hon'ble Prime Minister on 18th March, 2023.

Millets are grown in 74 million hectare in the world with a total production of 89.17 million tons, of which two major millets sorghum and pearl millet contribute 90%. India contributes 20% of the total production and has a productivity of 1322 kg per hectare. India is the top producer of barnyard, finger, kodo, pearl, and little millets. We have 2 regional station, one for pearl millet in Barmer, Rajasthan, one for rabi sorghum in Solapur, Maharashtra, besides one off-season nursery in Warangal, Telangana, apart from two AICRP's and research centres in various state agriculture universities for improvement of millets. We have 267 releases in pearl millet, 144 in sorghum, and 118 in small millets. All these centres have complete multidisciplinary scientific and technical teams.

With regard to pearl millet, it is grown in 7.41 million hectares in India with a yield of 1391 kg per hectare in major states like Rajasthan, Maharashtra,





Millet

Gujarat, Uttar Pradesh, and Haryana. Based on different ecological conditions in different states, we have classified them into different zones. The A1 zone covers North Western Rajasthan where the rainfall is less than 400 mm and another zone is where the annual rainfall is around 1000 mm. The southern part of the country is termed B zone and area of millet cultivation is 1.5 million hectare. Another segment is where pearl millet is grown in 0.4 million hectare in places like Rajasthan and northern part of Gujarat. We have different product profiles for different zones, and millets are taken care of in the direction as per the profile. We target for maturity of flowering less than 45 days as it will help in escaping drought even in case of less rainfall. In A zone where we have more than 1000 mm rainfall, medium duration of flowering time is 50 days. In summer ecology, we prefer late duration variety with high yield grains. Pearl millet is also good for fodder as it has all the traits suitable for fodder crop, and fodder pearl millet is grown in Rajasthan, Haryana, UP, Maharashtra, MP, and Uttarakhand. This is one millet where we have formulated specific criteria for nutritional traits in the grain; we have fixed the zinc and iron bench mark levels for promotion of cultivars. Those not fulfilling the nutritional benchmark are not promoted in coordinated trials and are not identified for release notification.

Sorghum is cultivated globally in 41.5 million hectare with India producing 4.37 million tons grains. The forage sorghum is grown in another 4 million hectare. We have different types of sorghum production systems such



as kharif, rabi, and summer grain sorghum, multi-cut and single cut forage sorghum, and sweet sorghum for biofuel. In the rainy season we have early type, extra early type, medium duration ones, which flowering in less than 60 days. We categorise and group them, and we ensure that particular variety falls into the best category and zones identified. We have varieties suitable for different forage production systems in forage sorghum such as single-cut or multi-cut. Single cut are mainly rainfed and harvested at 50% flowering, and multi-cut can be harvested at least 3 to 4 times with 45 to 60 days interval between harvests. Sorghum is an industrial crop used for food and research industry, poultry, potable alcohol industry, livestock development using quality forage, and sweet stalk juice for biofuel industry.

Finger millet is largely cultivated in South India and Northern hilly regions. We have different varieties and cultivars with different adaptation and productivity potentials. The spikelet are difficult to harvest and to cross. The flowers open in the midnight, and farmers cannot go to fields at that time to check what is happening. We have standardised some hybridisation techniques and developed many processes. Based on the maturity group, we have early,

medium, late, rabi, crops. Finger millet have large quantity of calcium, iron and zinc, and. Foxtail millet is cultivated in 10.57 lakh hectare globally. In India it is grown in Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, and internationally in China, India and USA. We have different product profile with different maturity groups. Barnyard millet is largely grown in northern hilly regions and southern plains. Proso millet contains high amount of protein and there are many varieties. Kodo millet is highly adaptable to hilly ecology and is salinity stress tolerant. It is rich in dietary fibre and antioxidants. In little millet also you can find different varieties, some with early maturity and shattering behaviour and some where fodder yield is high and the seeds do not shatter.

We are also coming up with varieties that are high in iron and protein content in grains, in little millet and proso millet. For the development of cultivars we deploy different approaches. We are into conventional breeding, marker-assisted breeding, mutations, transgenics, genomics-assisted breeding, speed breeding, and genome editing approaches to come up with new varieties and hybrids in millet crops. Though there is a decline in production area, the yield per hectare has increased due to improved cultivars and production technologies. At IIMR we also have a large collection of germplasm of all millets. We also evaluate them and advanced breeding material, identify suitable superior genetic stocks, which are registered from time to time. We also produce nucleus seed and breeder seed of latest and promising varieties and hybrids of millets, which find way to the national seed chain and add to the production and productivity of millets. We also produce quality seed of millets for demonstrations and popularization purposes. We also have millets seed hub centres for different millets for taking up seed production.

IIMR is involved in millet extension research and outreach with many new markets developed for farmers. We have also developed applications using ICT tools to connect farmers with technologies of the institute as well as



with markets. We have promoted many model millet FPOs. We help the farmers in various ways, such as handholding to establish custom hiring centre, loan and credit system, providing inputs, market accessibility, information and technology for processing and value addition, storage and warehousing and millet aggregation. We have supported millet FPOs in Karnataka, Telangana, MP, and AP.

Millet value chain development at various levels are being worked upon. Various technologies such as milling, extrusion, puffing, flaking, baking, and instant mixes, beverages and proteins from millets are disseminated through various agencies. Machineries such as destoner cum aspiration cum grader, biscuit making, and roti making machineries have been introduced by IIMR. We have 77 millet value added technologies for flour, semolina, noodles, dairy analogues and composite foods, etc.

We have various kinds of recipes, both contemporary, traditional, and international. We have our brand EATRITE with number of millet products. Our business incubators and Nutri Hub help in technology business incubation and handholding for forward and backward linkages for promoting millets.

Our programs NGRAIN support early startups with one market value product, and with good scope in development, they will get Rs 25 lakhs support, and NEST with supporting fund of Rs. 5 lakhs if one has innovative business ideas. We have formulated standards for millets, and published a white paper on millets. We have come up with a proposal to exchange ideas among nations, evolve common projects, and seek funding on an interactive platform called MAHARISHI.

How has IIMR contributed to enhancing the yield and quality of millet crops to benefit farmers? Can you mention some varieties or practices that have proved to be

beneficial?

Various varieties/cultivars and hybrids have been developed along with technologies using research programs in pearl millet, sorghum, and small millets. Due to the adoption of improved varieties and hybrids by farmers, the productivity of millets has increased to 1391 kgs per hectare. Different millets are grown in different ecologies, states, conditions, and under our All India Coordinated Research network, almost all major millet growing areas are covered to develop region-specific technologies.

How does IIMR prioritise and address the challenges faced by regions such as climate, cultivation,



and consumption? Any modern technology and data driven approaches?

The priority has been to help farmers realize higher yield and quality in production of millets. Besides, value addition technologies are developed to promote consumption of millets for health and nutrition. We have different product profiles to suit the requirements of various regions. In pearl millet we have 267 hybrids. We have put most of our information on our website and those of stations involved in millet research and development. You can refer and get the information from them, the publications with details, bulletins and from our compilation of things in digital form.

What specific farming practices of IIMR are adopted by farmers? What resources or initiatives IIMR provides to individuals interested in

learning about nutrition and culinary uses of millets?

We see that the varieties and hybrids developed by IIMR are popular among farmers as they are high yielding and adapted to their growing conditions. We have varieties and technologies and package of practices for each crop. We have programs for cooking with millets where people can come and learn to cook with millets, learn about nutritional value, and development of value added products apart from Agri value chain systems. They can join our startup ignition programs where they are taught how to go for development of different value added products. Many avenues for learning are there, we have courses going on, many trained batches are coming out from Nutri Hub at IIMR.

How does IIMR collaborate with Agri startups focusing on millet based products, processing and value addition?

IIMR technology incubator NutriHub is incubating Startups and also providing technologies to entrepreneurs. who I have mentioned about NEST

and NGRAIN program and startup ignition programs continuing. We call for applications through Nutri Hub website where people can apply and then are screened. They will be called for training and graduated. Then they can, depending on their interest, capacity, place, and other things, come up with their ideas. We will support them and handhold them till they are placed in market. We also help in branding the products, labelling, packaging, and designing of these things. These are part and parcel of our programs continuously given at Nutri Hub and IIMR.

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Dutch farming

The floral industry is focused on the production, distribution and sale of flowers for human enjoyment. The floral industry began in the Golden Century of the Netherlands, where flowers were grown on a large scale on vast estates. The industry continues to diversify from the production of cut flowers to the production and sale of plants and flowers in many different forms. The global floral industry market size is estimated to be worth US\$ 50040 million in 2022 and is forecast to increase to US\$ 58030 million by 2028 with a compound annual growth rate of 2.5% during the review period.

For example, the U.S. Agricultural Census identifies six categories of "flowers". Most U.S. consumers purchase "flowers" as a general category because plant purchases are made based on appearance and enjoyment, not by name. These groups are just for convenience to help organize the long list of flowering plants in the floral industry.

The groups are Cut Flowers, Cut Cultivated Greens, Annual Bedding/Garden Plants, Potted Flowering Plants, Herbaceous Perennial Plants, Foliage Plants - Indoor/Patio Use, Propagative Floriculture Materials. Generally, these are

garden flowers and houseplants, most produce attractive flowers, while some offer attractive foliage. Although these plants are from diverse native habitats and taxa, years of selection have found those that can be produced economically and are adaptable to the human environment.

The floral industry includes transportation companies, brokers, and wholesalers that ship the flowers from the production location to population centers around the world where the flowers are purchased. Additionally, the floral industry includes plant breeders and companies that sell seed, bulbs, and cuttings, and companies that sell greenhouses, pots of all kinds, potting soil, labels and marketing supplies, fertilizer, pesticides and machines for plant production activities. The service segment includes floral designers and florists, garden designers, and interior and exterior landscaping companies. Garden centers, supermarkets and hardware stores add the retail segment to the floral industry.

In the 1950s and 1960s, the center of cut flower production as near the largest consumers; production was local. The developed world, Japan, Western Europe and North America, were both major producers and consumers. In 2021, the world wide cut flower market is estimated at US\$10.8 Billion, wholesale value, based on trade statistics from 114 countries.[9] The major importers of cut flowers, as percent of world cut flower imports, in 2021 were the United States (21%), Germany (15%), the Netherlands (12.5%), the United Kingdom (9.4%), Russia (5%), France (4.6%).[9]

The Netherlands and the history of the flower industry

The Tulip was a wild flower growing in Central Asia when it was first cultivated by the Turks as early as 1000AD. Mania



in Turkey struck in the 16th century, at the time of the Ottoman Empire, when the Sultan demanded cultivation of particular blooms for his pleasure.

Tulips became popular garden plants in the east and west, but, whereas the tulip in Turkish culture was a symbol of paradise on earth and had almost a divine status, in the Netherlands, it represented the briefness of life.

The Netherlands remains the center of production for the European floral market, as well as a major international supplier to other continents. The flower auction at Royal FloraHolland[10] is the largest flower market in the world. Since the mid-1970s, the production and distribution of cut flowers in the Netherlands has burgeoned. Billions of cut flowers are shipped to the Netherlands every year to be sold at auction followed by immediate transport to buyers around the world.

New flower growing centers

Experts believe that the production focus has moved from traditional growers to countries where the climates are better and production and labor costs are lower. This has resulted in a paradigm shift in the floral industry. The Netherlands, for instance, has already shifted attention from flower production to flower trading, though it plays an important role still in the development of flower genetics.

The new centers of production are developing countries like Ecuador (largest producer and exporter of roses worldwide), Colombia (second largest exporter in the world and with a market more than 40 years old), Ethiopia, Kenya, and India. Other players in this global industry are Mexico, Israel, South Africa, Australia, Thailand and Malaysia. New Zealand, due to its position in the Southern Hemisphere, is a common source for seasonal flowers that are typically unavailable in Europe and the United States.

In Africa, Kenya is the largest exporter, supplying a significant percentage of Europe's flowers. The industry there is represented by the Kenya Flower Council.

Source: <https://en.wikipedia.org/>

How the Dutch Flower Industry rose from the ashes

The Netherlands' floral empire did not return to prominence overnight. Rather, centuries of horticultural skills built up in service to flowers were repurposed and turned to the cultivation of farming crops. The tulip did not come back in to vogue until the years following the Great War – but this time, it was priced in a range that let a majority of people enjoy its fragile beauty.

At this point, farmers began to shift back to the cultivation of flowers – a move that was encouraged and supported by the Dutch government, which offered a variety of subsidies in the 1950s that let ambitious flower-growers invest in new technology and research. This combination of centuries of experience and government backing helped to propel the Dutch flower industry back to something like its former glory. With the arrival of the 'Flying Dutchman' in the 1980s, the Netherlands began exporting cheap flowers on a massive scale. And despite competition from a number of other countries (Kenya, South America, and more) it is still the world's dominant supplier.



For the Netherlands, flowers are a major industry. Roughly 60% of the country is devoted to agriculture or horticulture, and the multi-billion-euro flower industry accounts for 10% of its Gross Domestic Product.

How Brexit will affect the flower industry

There is, of course, an elephant in the room. The UK buys a billion pounds-worth of flowers from Holland every year. After Brexit, when the UK and the Netherlands become separate markets, that could change. When the UK and the EU divorce, goods travelling between them will become subject to customs checks, sanitary checks, and tariffs. Those tariffs – on a no deal basis – could hit 7%, which would shock the flower industry. And the UK may have to look to other, lower-cost, markets for its goods.

The main threat, however, is administrative in nature: neither the UK nor Europe have facilities set up for flower checking at ports. The potential problems with getting flowers across the border at all – whatever the tariffs – are manifold. It is not only Britain's florists that could suffer. If flower growers decide to bypass online auctions and trade directly with the UK, the auctions would diminish, proving devastating to smaller growers who rely upon them.

In a best-case scenario, it is almost certain that Dutch flowers will no longer be as fresh when they reach the UK, having been held up by checks at the border.

The problem we are left with, like most businesses in the UK is the uncertainty. Nevertheless, the flower industry has weathered similar difficulties in the past, so regardless of what happens when the UK leaves the EU, the industry will adapt.

Source: <https://londonflowerschool.com/>





Special Feature

Dutch horticulture industry leads the world

The Netherlands is one of the world's largest exporters of agricultural and food products. Yet it has less than half the land area of the island of Ireland and is bereft of almost every resource long thought to be necessary for large-scale agriculture.

How did the Netherlands become the world's number two exporter of food as measured by value, second only to the United States, which has 270 times its landmass?

Before we look at the answer, here are a few statistics:

- Together with the USA and Spain, the Netherlands is one of the world's three leading producers of vegetables and fruit.
- The Netherlands supplies a quarter of the vegetables that are exported from Europe.
- It is the number 1 exporter in the world for live trees, plants, bulbs, roots and cut flowers, with 44% share

of the worldwide trade in flowers and floricultural products.

- It is the world's number 3 exporter in plant-based food products.
 - In 2014 the Netherlands was the world's second largest exporter (in value) of fresh vegetables, exporting vegetables with a market value of €7 billion.
 - Nearly 50% of the agricultural exports from the Netherlands are plant based.
 - The Dutch tillage sector produces mostly cereals (wheat in particular), feed crops (such as fodder maize) and potatoes. The horticultural sector focuses on vegetables and flower bulbs.
- "God created the Earth, but the Dutch created the Netherlands"

To try to get to the bottom of the Dutch success, it is worthwhile considering their history. 50% of Dutch land is barely a metre above sea level, and nearly 17% is below sea level. The territory is mostly flat, and for most of its history the Netherlands was prone

to flooding. Most of the areas below sea level, known as polders, are the result of land reclamation that began in the 16th century.

In 1953 a dam and barriers were built as part of the North Sea Protection Works. This vast engineering feat is now considered one of the Seven Wonders of the Modern World. Further protective dikes and works including dams, sluices, locks, levees and storm surge barriers were subsequently built. By 1961 about half of the country consisted of land that had been reclaimed from the sea.

With so much effort having gone into land reclamation, and also being quite a densely populated country, Dutch land is at premium. Farms in the Netherlands are (and by necessity have to be) some of the most intensive, sustainable, and efficient in the world. More than half the nation's land area is used for agriculture and horticulture. 60% of the land area of the Netherlands is used for plant based agriculture with large fruit, vegetable and ornamental flower sectors.

DOING MORE WITH LESS

Since the 1950s farming in the Netherlands followed a model of increased intensification on larger farms with increasing inputs of fertilisers, pesticides and energy. This had a very negative impact on biodiversity, GHG emissions, air and water pollution, etc. Then, around two decades ago, the Dutch made a national commitment to sustainable agriculture under the rallying cry "Twice as much food using half as many resources", and since then they have been moving in a more sustainable direction. Local farmers have reduced dependence on water for key crops by as much as 90% and almost completely eliminated the use of chemical pesticides on plants grown in greenhouses.

Before farmers or growers use crop





protection products such as fertilisers and pesticides, they must try alternative measures such as growing particular types of crop, or non-chemical crop protection. Plant protection agents must be used only if these fail, and their use requires proof of competence.

SUPPORT FOR ORGANIC FARMERS

To make organic farms more competitive with regular agriculture and to increase the sale of organic products, the government signed covenants with supermarkets, the Dutch Confederation of Agriculture and Horticulture (LTO) and other parties for the joint promotion of organic products and a wider selection in the shops.

GREENHOUSES

Dutch expertise under glass is well known. Nowhere else in the world are plants cultivated on such a large scale, and with such a relatively low impact on the environment. In one region, Westland, which accounts for nearly half of the Netherlands' horticultural production, a staggering 80% of cultivated land is under greenhouse glass, with some greenhouse complexes covering 175 acres.

'Doing more with less' is illustrated in the efficiency of used cultivation space. Per square mile, the Dutch are able to produce 144,352 tons of harvested

tomatoes, for example, leaving other countries far behind. Each acre in the greenhouse yields as much lettuce as 10 acres outdoors.

Crops can grow around the clock and in every kind of weather in these climate-controlled conditions, allowing farmers to closely control growing conditions and use fewer resources like water and fertilizer.

The current generation of greenhouses already generates approximately 10% of Holland's power needs by using combined heat and power (CHP). The government stimulates the development of new, sustainable technology through 'The greenhouse as a source of energy' programme.

The Dutch government aims to drastically reduce energy and gas consumption in the greenhouse sector. From 2020 all new greenhouses must be climate-neutral and produce net zero carbon dioxide (CO₂).

SMART FARMING, RESEARCH AND INNOVATION

The Dutch are very forward-looking, and this is reflected in the world renowned research and innovation infrastructure of the Netherlands, with Wageningen University at its centre. The university is at the centre of Food Valley, a large cluster of agricultural technology start-ups and experimental farms. Five of the top 26 global agri-food companies have R&D facilities here. Technological innovations developed here include intelligent greenhouses that can float on water, robot fruit pickers, innovative energy-saving lighting, water and waste recycling, and greenhouses that generate more energy than they consume and feed power to the grid.

The Dutch have also developed the idea of 'precision farming'. This refers to the monitoring of crops (via drones, etc.) to provide detailed readings on soil chemistry, water content, nutrients, and growth.

VERTICAL FARMING

Leo Marcelis, horticulture professor at Wageningen University, says vertical farms are the way forward. "In the future, we'll have vertical

farms that will go as high as tall buildings that will only use artificial light, with units built on top of each other as high as you like, with only artificial light and where farming will be completely independent of the climate and completely reliable", says Marcelis. The plants can also be grown at night time using wind generated power when everyone else is sleeping.

AN EXAMPLE TO THE REST OF THE WORLD

The success of the Dutch model of horticulture shows that there is no obstacle to the growing of plants. Anything can be achieved as long as the will to do so exists. When farmers say they cannot switch from animal farming to plant-based because of the poor quality of their soil – just point them to the Dutch model. As people turn gradually towards a plant-based diet the Netherlands shows that growing plants can be achieved pretty much anywhere – in any location or condition.

SourceL: <https://vegansustainability.com/>





Special Feature

The Dutch Floriculture Industry

World Model

The Dutch floriculture industry is widely known as the leading industry in the world. It is the center for international marketing for cut flowers. The Netherlands has quite advanced methods of production and innovative marketing mechanism. The Netherlands makes up only 10% of the world's total production but the country's export volume accounts for 60% of world export (Market News Services, 2008).

It has centennial experience in the flower business. Growers are supported by several services in terms of research and development, and efficient distribution system well connected by air and by ground transportations with the most important producing and consuming countries. The driving force for the success of the industry is related to the crucial role of the auctions and the well developed infrastructure.

PRODUCTION TRENDS IN THE DUTCH FLOWER INDUSTRY

The production share of the Dutch floriculture stands at 27% in the agriculture sector in the Netherlands. The total area of cut flowers, including propagation was 3,499 ha in This steadily decreased to 2,809 ha between 2007 and 2008. The number of ornamental plants cultivated under glass, the production of flower bulbs and propagating materials decreased considerably between 2003 and 2008.

This indicates the weakening position of the Dutch floriculture industry in production. The industry shows a correlation between value of production and cultivation area (ha). The production in millions of euros decreased by 13% in 2008 from €9,954 million to €9,743 million.

Despite the decrease in production the labor market in the industry experienced a slight increase in As the competition got stiffer, the number of



exporters declined from 1,156 down to 911 between 2003 and 2008 (Flower Council of Holland, 2008). That could be related to the high logistics requirements to export large volume of flowers, so only big and economically viable exporters could survive.

EXPORT TRENDS FOR DUTCH FLOWER PRODUCTS

The Netherlands play a pivotal role in the world flower industry and trade. The main export destinations for Dutch flowers are European countries, the USA and eastern Europe. African and Asian countries are the main destinations for the Dutch planting materials.

Majority of planting materials for Kenyan and Chinese flower producers come from The Netherlands. Export of planting materials to Kenya and China increased to 17.2 and 36.6% respectively, in 2008, making Kenya and China the 16th and 30th destinations for Dutch planting materials in the world (Market News Services, 2008). Germany, United Kingdom, France, Italy, Belgium, and Russia were the leading destinations for Dutch flower products in 2007 and 2008.

IMPORT AND LOCAL SUPPLY FOR THE DUTCH FLOWER INDUSTRY

During the last five years, the quantities of imported cut flowers increased by 15.2% and the average price increased by 12.9%.

At the same time the locally-produced stems decreased by 6.8%, while the average price increased by 8%. The total quantity of stems imported in 2008 was 3.7 billion and the locally-produced was 7.7 billion (Market News Services, 2008).

AUCTIONS

The Dutch auctions are the largest flower market in the world. Four Dutch companies participated in the auctions in 2003 – 2007. However, in 2008 the number of Dutch auctions reduced to two.

The turnover of the auctions grew in 2007/2008 at an insignificant rate of 0.3 and 4% (Flower Council of Holland, 2008) for Flora Holland flower auction and Plantition flower auction, respectively. The Dutch flower auctions use a clock system to determine the price of flower products.

Source: <https://eagle-linkflowers.com>

The Netherlands, often referred to as the "Flower Capital of the World," is renowned for its vibrant and picturesque flower fields, with tulips, roses, and various other blooms adorning the Dutch landscape. However, behind this scenic beauty lies a complex world of flower farming.

For flower farmers in the Netherlands, the industry brings both opportunities and challenges. In this article, I will explore the difficulties faced by flower farmers, especially from Hydrangea growers, in this flower-loving nation.

SEASONAL VARIABILITY

One of the primary challenges that flower farmers in the Netherlands encounter is the seasonal variability of the industry. Flower production is highly dependent on the changing seasons. Spring and summer are the peak seasons, while winter often brings a slowdown in production where the farmer takes the time to recharge. They must plan meticulously to ensure they have a year-round income, which might include crossbreeding and selling off own cross breeding plants or finding ways to extend the growing season.

COMPETITION AND MARKET SATURATION

The Netherlands has a highly competitive flower market, both domestically and internationally. Dutch flower farmers must compete with local and global suppliers, including countries like Ecuador, which have the advantage of lower labour costs and more favourable climates for year-round production. However, they are not afraid as they are known for their freshness and high-quality. As a result, the flower farmers need to constantly innovate, invest in technology, and focus on niche markets to maintain their competitiveness.

ENVIRONMENTAL REGULATIONS

The Netherlands is known for its strict environmental regulations. Flower farmers face challenges related to water usage, pesticide control, waste management ect. Complying with these regulations can be costly and time-consuming, but it is essential for preserving the environment and



Challenges Faced by Flower Farmers in the Netherlands

the reputation of Dutch flowers as sustainable and high-quality products. Many flower farmers only sell to the Local market. It is extremely helpful as they do not have to comply with export documentation and other export requirements.

BLOSSOMS UNDER TAXATION IS ANOTHER CONCERN ADDRESSING THE FARMER.

In a surprising and controversial move, the government has announced a substantial increase in electric energy taxes on flower farmers, sending ripples through the agricultural sector and raising concerns within the blossoming industry. Flower farmers and industry representatives are vocal about their concerns regarding the repercussions of these tax hikes. They argue that the flower industry is already highly competitive, and the additional financial strain is likely to result in job cuts and hinder the sector's ability to compete in the global market. Moreover, the tax policy might inadvertently discourage environmentally responsible practices, as energy-efficient technologies and sustainable farming methods could become economically unviable. It has a ripple effect as flower farmers pass on the increased expenses to consumers, the cost of flowers has been on the rise.

LABOR COSTS AND AVAILABILITY

Flower farming is a labour-intensive industry. Labor costs in the Netherlands are relatively high, and finding skilled and reliable workers can be a challenge. They rely on seasonal labour, often coming from other countries, like Poland.

Some are very thankful for the same workers every year. When the peak season has come to an end the workers work at other companies that has other peak working periods. An ideal problem solver.

WEATHER AND CLIMATE CHANGE

The Dutch climate can be unpredictable, with cold, wet winters and dry, hot summers. Climate change has introduced more uncertainty and extreme weather events, which can negatively impact flower production. Dutch flower farmers must adapt by implementing climate-resilient farming practices and investing in greenhouse technology to protect their crops from adverse weather conditions.

FLUCTUATING MARKET PRICES

Flower prices can fluctuate significantly due to factors such as global supply and demand, currency exchange rates, and economic conditions. These fluctuations can impact the income, making financial planning and stability



Special Feature

a constant concern. Most Hydrangea farmers do not have fixed prices with suppliers. They say they will bear the risk as it is a day-day industry.

While Dutch flower farmers enjoy the advantage of being in a country with a strong tradition of flower cultivation and a well-established export market, they also face a host of challenges.

Adapting to seasonal variability, competition, environmental regulations, labour costs, climate change, market fluctuations, and sustainability concerns that requires resilience and innovation. The love of flowers might seem frivolous, but it drives a worldwide industry worth billions of pounds.

The Netherlands may be the Flower Capital of the World, but its flower farmers work diligently to maintain that title and meet the evolving demands of a global market that values quality, sustainability, and ethics.

Despite facing an ever-increasing array of regulations and challenges, flower farmers are emerging stronger than ever, proving that their passion for blossoms is unstoppable.

Source: <https://www.linkedin.com/>

Netherlands Flower Industry Size & Share Analysis

Netherlands Flower Market is Segmented by Type of Flower (Roses, Tulipa, Chrysanthemums, Gerbera, Freesia, Lily, Orchids, Nursery Stocks, and Other Types of Flowers). The report offers market estimation and forecast.

Netherlands Floriculture Market Analysis : The Netherlands Floriculture Market size is estimated at USD 4.89 billion in 2024, and is expected to reach USD 6.15 billion by 2029, growing at a CAGR of 4.70% during the forecast period (2024-2029).

- The Netherlands is a key producer of cut flowers and imports a considerable volume from underdeveloped countries. Floriculture is one of the most lucrative industries in the Netherlands. Spring is usually the busiest time of year at the Aalsmeer Flower Auction in the Netherlands, the world's blossom trade capital. Aside from being a global leader in cut flowers, the Netherlands is also a major commerce center.

- The Netherlands is Europe's flower market core due to its logistical position within Europe and established international trade relations within the flower business. It has a century of experience in the floral industry. Growers are supported by various services, including R&D and an efficient distribution infrastructure well connected by air and ground transportation to the most major producing and consuming countries. The vital function of auctions and well-developed infrastructure is the driving factor behind the industries.

- With the development of e-commerce platforms such as Fleurop, Flowers, and Euroflorist, with the ability to complete direct sales with consumers rather than utilizing an intermediary such as a wholesaler, the sales of cut flowers are expected to have a favorable impact on the Netherlands Floriculture Market. Due to the increased demand from peak days and the adoption of new technologies, cut flower production in the country is increasing, which is anticipated to boost the growth of the floriculture market during the forecast period.

Netherlands Floriculture Market Trends

This section covers the major market trends shaping the Netherlands Floriculture Market according to our research experts:

Netherlands Importance for Trade Hub for Cut Flowers

- The Netherlands is the largest cut flower producer and a critical exporter to developing countries. Apart from being one of the market leaders for cut flowers, the Netherlands is also the central trade hub, especially in the area of Aalsmeer.

- The flower market in the Netherlands is a dynamic, fast-growing global industry defined by three major components, growers, wholesalers, and retailers. The Dutch flower auction, i.e., Royal Flora Holland, is Europe's main marketplace for cut flowers. Flowers worldwide find their buyers through this auction and the Dutch network of flower traders. It serves as an essential trade platform for traders from developing countries.

- The main export markets of floriculture are Germany, followed by the United Kingdom, France, Russian Federation, and Poland. According to the International Trade Center (ITC) trade map, in 2021, the Netherlands exported 680,090 metric tons of cut flowers valued at USD 5.7 billion. Thus, the increased demand for cut flowers globally is driving the export market in the Netherlands

Source: <https://www.mordorintelligence.com/industry-reports/netherlands-floriculture-market>

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DIRECTOR



Excellent customer experience and 24/7 support

Dutch Flower Group, a globally renowned supplier of flowers, plants and decorative greens, ensures excellent customer experience and 24/7 support with the Userlane Digital Adoption Platform. Initially, as we were deciding on the Digital Adoption Platform, we chose Userlane as the most promising solution, and we got it right! With Userlane, we've got a universal solution to complement our customer support strategy; while navigating through a new process directly in the system, the customer actually gets to complete the task while following the guide. This is extremely helpful for us.

The customer challenge : If you have bought flowers recently, they likely came via a Dutch Flower Group company. Dutch Flower Group is a unique family of more than 30 specialized trading companies, who together serve the entire international floriculture chain. They deliver top quality fresh cut flowers, mixed bouquets, plants and decorative greens to their customers. Via whom a weekly average of 75 million flowers, 10 million bouquets and 15 million plants find their way to consumers around the world. With more than 5,200 employees, Dutch Flower Group supplies all distribution channels, from importing wholesalers (who supply florists) to the multiple retail sectors (including supermarket chains, DIY centers, garden centers and petrol stations) and e-tailers.

While introducing the new e-commerce solution, SAP Commerce Cloud, across five sales business units and 20 production sites, Dutch Flower Group was undergoing a massive organizational transition and needed to ensure effective onboarding of their customers and support in the moment of need. Customers, however, struggled to adapt to the new system, making numerous calls to support teams, as overall user frustration ran high. Thus,

Dutch Flower Group turned to the Userlane Digital Adoption Platform to address these challenges.

How we helped : Userlane helped streamline the onboarding of over 10,500 customer users worldwide, all while enabling Dutch Flower Group to create interactive content in 24 languages for their customers. With Userlane's in-app training, users were guided through new and uncommon tasks at the point of need and in real-time, allowing task automation and enabling self-service.

Allowing decentralized content creation : The shift to the new SAP Commerce Cloud system and new self-service processes had their challenges. Every sales business unit wanted to be in charge of how they worked with Userlane and have the liberty to create in-app content based on what their users valued the most. Userlane made it possible to plan, maintain and update content within minutes and completely independently, ensuring that every user group had all necessary information and support.

Ensuring a great customer experience : Onboarding is just one part of the deal; consistent knowledge retention is another story. The main goal when implementing Userlane was to make it easy for customers to work with the new system and complete necessary processes, even if they had not done so in a long time since the initial onboarding. Thanks to Userlane interactive guidance,



every user can now quickly and easily navigate the SAP Commerce Cloud system and complete their tasks with minimum confusion or disruption. As a result, time spent on software training reduced dramatically, and the efficiency increased significantly.

Offering support around the clock : As Dutch Flower Group runs its operations all over the world, timely customer support is essential, especially when dealing with customers in different time zones. Therefore, Userlane has become an integral part of Dutch Flower Group's customer support strategy, offering guidance and help in the moment of need and around the clock.

The results : Userlane delivered significant improvements to customer onboarding, training and software rollout processes at Dutch Flower Group. Training and support staff spent less time creating and updating training material, and customers were more satisfied and efficient, completing their orders in the SAP Commerce Cloud system.

- 40% user engagement rate
By automating their customer onboarding, Dutch Flower Group boosted their in-app user engagement.
- 24/7 customer support
Userlane enabled Dutch Flower Group to offer their customers guidance and help in the moment of need and around the clock.
- 10,500 onboarded customers
Userlane helped streamline the onboarding of over 10,500 customers worldwide.
- 24 languages supported
- With multiple language support, Dutch Flower Group was able to tailor and customize interactive content in 24 languages to best serve their customers around the world.

Source : <https://www.userlane.com>



How Dutch farmers use precision farming for floriculture

Tulips are an important export article for the Netherlands. In order to remain successful while acting sustainably, the flower sector is experimenting intensively with precision agriculture.

If you ask people what they think of when you mention the Netherlands, the most common answer – aside from clogs – is likely to be tulips. That is far from absurd, because the cultivation of ornamental crops is in third place for the country's biggest-selling export articles. To remain agriculturally successful while acting sustainably, the sector has to be constantly imaginative. That is why, in the course of digitisation, intensive experimentation with precision farming is ongoing. Drones fly through the greenhouses to detect plant diseases and search for weeds among the fields of lilies and tulips.

Those who are not tall must be smart. The room for farming in the Netherlands is limited. To get as much as possible out of the soil, the Dutch farmers have to be innovative. The scarcity of agricultural land has made Dutch farming a world leader in various disciplines, such as greenhouse horticulture and floriculture. The country sees a new opportunity in digital agriculture.

DOUBLE HARVESTS WITH MULTI-LAYERED CULTIVATION

Digital innovations in the flower bulb sector have repeatedly led to developments in agriculture and horticulture. One example of this is multi-layered tulip cultivation. This is where cultivation in the greenhouse is stacked vertically, so that the grower can increase production without having to expand the ground area in the greenhouse. The maths is very simple: with just two cultivation levels, the harvest is already doubled.

SMART FARMING

In this type of smart farming, an automated transport system moves the tulips and other crops from one level to the next. The tulips are grown partly in the dark, partly under LED lighting and partly in daylight. Searching for the ideal illumination for each individual level serves to develop the best tulip quality with minimal energy costs and thus achieve the greatest economic value.

HEALTHY PLANTS THROUGH THE USE OF PRECISION AGRICULTURE

Diseases and pests are the most common causes of lost plant

harvests in both quantitative and qualitative terms. Farmers and gardeners therefore do their best to protect the health of their plants. Greenhouse growers also check their crops daily for disease. An intensive, costly procedure for the operation.

A drone sees more and can detect more than a person walking through the greenhouse. A group of aeronautical engineering students is therefore investigating the added value of drones in detecting problems with plants in greenhouses. First, they developed a drone that could fly through greenhouses. While drones usually work with GPS, this is not possible in a greenhouse. The development of special software for digital agriculture has made it possible to locate and geographically position the greenhouse.

BENEFITS OF DIGITISATION: RECOGNISING DISEASE WITH DRONES

The students eventually managed to use drones to create images that exposed spots and anomalies in an orchid greenhouse. This information alone saves the grower a lot of time removing sick crops. In the next step, digital software is being written that analyses the photos and automatically detects diseases: a step forward for farming.

IMPROVED SUSTAINABILITY THROUGH PRECISION FARMING

The cultivation of ornamental plants is not exactly known as the most sustainable sector in agriculture. Although the use of plant protection and pest control products in the flower bulb sector has already drastically decreased since the 1990s, Dutch entrepreneurs are aware of the need for sustainability to continue to improve and dependence on crop protection products to be reduced. Technological developments such as precision agriculture, big data and smart farming are being explored as potential solutions.

PRECISION WEED TREATMENT

Thanks to digital agriculture, it is easy to discover hedge bindweed among crops of lilies using images from drones. Hedge bindweed is a weed that can be very well handled chemically when it grows out of the top of the lily. If the farmer has drones fly over the lily fields, they receive a lot of data about the presence of hedge bindweed. If this information is processed into a task map, machines will be able to take location-dependent action against weeds. That means spraying only takes place where it is absolutely necessary. In



Digital Agriculture

this way, less chemicals are used. The precision techniques are not only intended as 'plug and play' for agriculture. In terms of ease of use, all options are open. Moreover, not all farmers and farms are convinced of profitability. In order to promote greater acceptance of precision farming, the 'National Proeftuin Precisielandbouw' (NPPL) (National Experimental Garden for Precision Farming) project has been launched in the Netherlands. In this project, experts from Wageningen University support farmers and gardeners in the application of various methods, such as location-dependent weed control and precision fertilisation. The objectives are better harvests and a lower environmental impact from agriculture.

10-20% WATER SAVING

The project started in 2018 with six farmers. In 2019, ten other farmers joined, including a number of bulb growers. One of the participants, Huetink Bloembollen, grows onions and strawberry crops as well as lilies. Those are all plants that need a lot of water. The grower's plots of land are also in unusual shapes and often border built-up or paved areas, making them difficult to irrigate efficiently. In order to save water, Huetink is testing digital methods for measured ir-

rigation in the NPPL project. To irrigate the flower bulbs at the right time, in the right place and with the right amount of water, the grower is testing a digital system in which irrigation reels are fitted with technology. This allows the farmer to control, calculate and coordinate the water supply. The first results are promising. It is possible to irrigate within the boundaries of the property, and the irrigation machines are able to irrigate over obstacles such as dwellings. With this method, the grower expects a water saving of about 10-20%.

DIGITAL FARMING: SENSORS IN THE GROUND

However, the search for optimal water savings is not yet over. With the help of moisture sensors in the soil, the water content in the various soil layers can be documented very precisely. In the future, the grower wants to create digital task maps on the basis of these soil samples, which should be decisive for irrigation. Ideally they would like to go one step further: by connecting the soil moisture sensors to a consulting system for automatic irrigation, they could further optimise their work and farming. By saving water in this way, they are working on a solution to future long-lasting droughts, which can be catastrophic for the harvest.

THE FUTURE OF PRECISION FARMING

Another initiative that contributes to the digitisation of agriculture and farming is well known in the Netherlands: the 'Bollenrevolutie 4.0' (Bulb Revolution 4.0) programme was launched at the beginning of 2019. Various entrepreneurs from the flower bulb sector are working with Wageningen University & Research in experimental gardens to develop methods for growing bulbs using such technologies as precision agriculture, smart farming, robotics, artificial intelligence and big data.

Through both the NPPL project and Bollenrevolutie, the Netherlands is building up a lot of experience with precision farming and smart farming. GPS on tractors, sensors in the soil, drones flying over the fields – all this has been made reality by advancing digitisation. The challenge now is to achieve ever-increasing accuracy in machines and robotic systems, so that the data can be used optimally and costs reduced. In addition, the systems need to become more user-friendly so that farmers can use them more quickly and easily. Only then will the technology pay off for the environment, agriculture and their wallets.

For the time being, let us not forget that drones are not only useful in the context of digital agriculture for the detection of weeds and diseases. It is also thanks to this innovation that we can enjoy magnificent images of Dutch tulip fields.

Source: <https://www.konicaminolta.eu/>

The number of drones in Dutch agriculture



The number of farmers who use drones

→ 2018: 1.8%

→ 2019: 4.7%
(more than double)

The number of farmers who say they are interested in the use of drones

→ 2018: 13.4%

→ 2019: 19.2%

Major operations compared to smaller ones

→ 12.3% of larger operations (farmers with a usable area of over 100 ha) use drones.

→ 1.8% of smaller operations (farmers with a usable area of 10-20 ha) use drones.

→ 31.2% of larger operations (with a usable area of over 100 ha) are interested in using drones.

→ 11.7% of smaller operations (with a usable area of 10-20 ha) are interested in using drones.

Source: <https://www.agridirect.nl/persberichten/drones-in-akkerbouw-verdubbeld/>

Question

Q&A

Answer

01

NEED GUIDANCE FOR ORGANIC FARMING

poultry90: Hi, Kindly assist to share the soft copy for the study materials to my email address below, I own a 20acre land in Bangalore and I'm currently working outside india. I'm keen to know more about organic farming to cultivate Corps to serve our people in a healthy way.

Answer 1 : jkan8a5f : Hello Advertiser, I'm Mr. J. Kantharaj, resident of Bangalore. Have good knowledge about organic or natural farming practices to be adopted in our farms to get pure organic products. I don't have any research papers to give you, it's years of practice thru which I had gained some knowledge. If interested in converting your land to organic / natural farm, foremost is you must have pure natti / desi cow. Without there is no way, your wish can be solved. Send a mail with your contact details, location of your farm, & what's happening in farm as of date. Can send what all has to be done to convert the land suitable for giving organic products in return, it's not magic & wont happen in few months, the day you stop applying dangerous fertilisers etc & proceed with farm made inputs (few materials have to be sourced from outside, for some time,) Respond to me if interested . Hope to hear from you. Bye

Answer 2 : agrifriend: Hi, Sir we have innovative organic technology please contact me.

Answer 3 : mbsgowda : Hi there, advertiser I am Mr. Sid-danagowda, MB, a Bangalore resident. Be well-versed in the natural or organic farming methods that farms should use in order to produce pure organic goods. I work for an organic company that procures organic crops and performs organic certification. You require certification for organic farming and post-cultivation marketing. Global certification is what we do. Please get in touch with us if you are interested.

Answer 4 : aleidapic: Thank you all for your suggestions. I am also a farmer who believes in using natural methods to grow my crops. I use natural organic products to increase the efficiency of the soil and it has proven to be successful for me. My focus is on making the soil hold more healthy helping microbes. I also implement multiple cropping techniques.

02

BANANA FIBRE EXTRACTION

avaniadiga: Hello I want to join the workshop about banana fibre extraction. Is there any such training program

Answer 1 : vrikshaay: We can supply the Banana Fibre Extraction machines and give hands-on training along with setting up the machines. We can also provide Bankable Project

Report to get bank loan with subsidy. For further details, please contact us by private conversation (> click on our name on the left > Start conversation) expressing your interest to set up banana fibre extraction industry and give your WA number and Email ID (do not give your contact details in public post here)



03

BIOFLOC FISH PRODUCTION

vermaaditya: Dear Experts, I have seen lots of videos on youtube and even attended training on biofloc fish production. Though there are tall claims but in none of the video I have heard people doing it profitably for many years. Would any of you know the reality of it? and if its really profitable, how much would be the profit per year per tank? Thanks in advance.

Answer 1 : garao56: Latest method is RAS system of fish cultivation is being implemented by the Department of Fisheries , GOI

COCONUT

nsk70: Hi, I would like to know if a seed from D*T coconut tree will germinate and yield nuts. If not so Please educate what is the technical reason.

04

Answer 1 : vrikshaay: It will germinate. Better not to allow the nuts for seeds to fall from the tree. Seed nuts to be collected by using a rope to slide down the bunch from the tree slowly into the ground, and avoid any nuts that falls from the height of the tree. Most fallen nuts may germinate but better to avoid fallen nuts for germination to develop saplings.

05

SECURITY CAMERA FOR MY FARM

penchala: Hello all welcome, I am wondering if I can install security camera for my farm with night vision and motion detection .we do have solar panels installed, power can be with drawn from the solar panels .what would be effeciant and reliable solution .

Came across this forum and I am really excited to be part of this family .

Any suggestions and guidance would be greatly appreciated .

Answer 1 : vrikshaay: Yes. If there is security issues/ threats/theft possibilities etc, you can set up CCTV system with night vision and motion detection. We can provide best solution for farm security including organic fencing and also technological solutions such as CCTV etc.

Please contact us with details



of your farm, privately by clicking on our name > start conversation (contact details are not allowed in public posts in this site - you can provide it by conversation) Please see conversation from us with our contact details and you can mail or WA details of your farm and your contact details to us by referring this post/our conversation to you.

Answer 2 : karaf5ea: Hi, Its Possible to use from Solar Panel, Required additional Power for CCTV System.

Example, If using 6 Cameras with DVR, It will Power consumption ~ 50 Watts.

So Backup system is required for night time, When Battery required.

1. CCTV Cameras with DVR

2. Battery 50 Ah or 75Ah (Back up time: 6-8 hrs)

3. Solar panel power (100 W)

Answer 3 : samrich: I put 8 cameras on my farm thanks to which I am not afraid for my livestock.

Answer 4 : arunmunda: Power from solar or power from board but 24hrs power is required

Answer 5 : devendran _100 : What's the lowest price you people can instal in my farm

Answer 6 : invisible: Hi sir, can you suggest a CCTV brand? I have no power at my farmland, no wifi... also I need to monitor through mobile from my home which is 200 km far from the farmland... can you guide me ?please

Answer 7 : janardhangowda: I did it on my own. have about 23 cameras around 3 farms. Accessing them on GSM. research for 4G cameras solar or powered ones.



06 NEED PRACTICAL TRAINING ON COCONUT PLANTATION

punitkansara: Hello, I live in Valsad, Gujarat. I am planning to plant hybrid coconut in my small farm (by organic method). I need some practical training for the same. Members from the nearby areas of Valsad. Please guide me. Also feel free if you have some suggestions for getting such training. I tried Krishi Vigyan Kendra but that was not much useful. Thank you.

Answer 1 : garao56: If you are going for hybrid coconuts go for plantation of DJ Sampoorana Hybrid, Till bearing use traditional cultivation after starting bearing go for organic farming for best results

punitkansara: Thank you for your valuable response. I have researched the recommended variety and have contacted them. Have a wonderful day.

Answer 2 : minalahm: Hii , first of all, Good afternoon. Sir.

I am from Assam, Hojai District. Actually I am a plant supplier as well as consultant of plants, I mean any plant , Such as , agriculture, horticulture, sericulture, medicinal, ornamental, forestry, fruit, flowers, I have available. If you are going to planning a small

hybrid coconut firm. then I will provide full guide. Also I can supply hybrid coconut plant as well , more information contact number

Answer 3 : garao56: If you decide what type variety of coconut plants to be raised we will guide you, so much training is not required



punitkansara: Thank you Sir, I had checked with DeeJay variety but they are very costly, around 600-650 rs each plant.

I am looking for some other good hybrid varieties txd or dxt

Answer 5 : garao56: What is the extent of land you are taking up for coconut cultivation, if the area is more than 5 acres then 35 % subsidy is available from National Horticulture Board provide you avail a loan of 25 - 50% of the project cost . Please approach us for guidance



punitkansara: No Sir, actually my age is 34 yrs and was quite interested in horticulture especially for the coconut cultivation. So I have recently bought a very tiny agriculture land say 12,000 sq ft and planning for some 40-50 hybrid coconut with some intercrop like black pepper bush variety. Thank you

Answer 6 : garao56: It is about 0.27 acres , please take up coconut plantation with inter cropping with black pepper

GERBERA POLYHOUSE FARMING

agarwal71: I want to start gerbera farming at my farm-house sonarpur gangajowara polyhouse farming. PLEASE tell me details



Answer 1 : maitys: The wedding season happens to be peak time of cut flowers (Gerbera, Rose, Gladiolus, Carnation, Orchids, Aster , Chrysanthemum etc.) Business in India .

In peak season you may get Rs 5-Rs 10 (includes packing , C&F charges) per Gerbera stick rate and in non-ceremonial seasons rates will drop per piece to Rs 2-Rs 3 per stick in major cut flower trading hubs in India i.e. Mumbai , Bangalore , Hyderabad , Kolkata , Delhi , Ahmadabad, Madurai , Lucknow etc.

West Bengal based floriculture farmers prefers to cultivate Gerbera in open land keeping the peak season demand in mind .

As per Flower Council of India , floriculture is a Rs. 20,000 crore business in India, per annum .

Due to pandemic floriculture market took a reverse turn ... wait and watch then proceed. The United Nations has warned that the world could see a hunger pandemic by the end of 2020.



Question

Q&A

Answer

So it's makes more sense and practical to grow vegetables instead . If you have strong investment and marketing back up then you can go for high end fruit cultivation viz. Blue berry , Strawberry , Fig etc. in playhouse as well .

Answer 2 : garao56: Marketing will be problem in this karo-na pandemic time. Please take up vegetable initially and later Gerbara cultivation can be taken up in the same polyhouse after harvesting vegetables like capsicum, musk melon, braco-li etc

Answer 3 : kaushlendrkm: First of all thanks for the post. As I read that due to pandemic floriculture market took a reverse turn..... Wait and watch , cause of I am a gladiolus grower.

Answer 4 : garao56: Due to corona pandemic there is lesser demand for flowers in the market , please postpone gerbera cultivation for some more time. Please inform whether you are owing poly house or open field cultivation .

Answer 5 : chemorgs: I am into pharamaceutical business and now wish to enter either Floriculture or Coffee plantation. I am evaluating Hi Tech floriculture business . Could you kindly throw some light please

Answer 6 : garao56: Coffee is open field crop can be taken up for cultivation in large area. Gerbara can be cultivated in polyhouses .4 polyhouses of 1000 sq mts each can be constructed. Please take up both crops

Answer 7 : aravindsf: Any idea where can I get strawberry saplings in and around bangalore ?

08

IS IT POSSIBLE TO GROW ANJEER WITH TEAK

yogeshbar: I am having teak plantation in 3 acre land, In 6x9 feet, can I grow anjeer in between teak as mix crop

Answer 1 : garao56: Fig plants can be planted at a spacing of 16.40 x 16.40 ft which accomodates 160 plants per acre. In the spaces you can mix with teak as the teak will grow straight and branches will be pruned

09

WHAT IS THE BEST WAY TO CONVERT ANY TYPES OF ORGANIC WASTE INTO COMPOST ?

kelvinwat: What is the best way to convert any types of organic waste into compost ?

Answer 1 : gunda: Depends upon the quantum and variety of wastes.

Answer 2 : garao56: Please inform the source of waste

Answer 3 : rekha666: There are 4 to 5. ways of making compost if want contact

Answer 4 : garao56: There are several methods of composting

- Indore method,
- Activated compost,
- Bangalore method,
- NADEP method,
- Coimbatore method,
- Synthetic compost,
- Windrow composting (leaf compost),
- Accelerated composting and enrichment,
- Phospho-compost,
- Reinforced compost from sugarcane trash and press mud and
- Japanese method of composting.

NEED CAPSICUM SEEDS OF GREEN, RED AND YELLOW?

vsatya8: Hello friends I am looking for Capsicum seeds of Green, Red and Yellow variety as I am planning to cultivate in my farm near Rajamundry. First, would like to go for pilot project of 10 to 50 plants in order to look how it grows under our climatic conditions and also to know how far our soil supports. I want good quality seeds. In market there are many companies selling these, but they had not yielded any results. regards

Answer 1 : perumal99: I have capsicum crop experience in 5 years any information you need please contact.

Answer 2 : garao56: Where is your native place and seed required please inform.

Answer 3 : rcdixit: I need seed for all three varieties. What will be the cost?

Answer 4 : yuwaraj: We have 350 lines/ germplasm in yellow, green and red segments in Capsicum if interested be in touch !!

Answer 5 : ravi3006: Please share pictures, interested.

















Answer 6 : vsatya8: My place is near Rajamundry, East Godavari District



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	Events Discussions related to scheduled events, meetings, training programmes etc	Threads 407	Messages 1.5K
	Feedback, Polls & Reviews Share your feedback, experience and reviews about agriculture products/services	Threads 1	Messages 14
	Job Vacancies Discussions related to job opportunities	Threads 145	Messages 539
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