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# Times of Agriculture

A Resonance in Agriculture

Monthly Agriculture E-Magazine

October-2024

## POST-HARVEST LOSSES: **A Comparative Analysis of India and the World**



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## From the Editor's Desk

Dear Readers,

It is a pleasure to present the **October** edition of **Times of Agriculture Magazine**. As you know, post-harvest losses are a serious issue. According to an estimate, about **20 to 30%** of produce is lost after harvest. In this issue, we have discussed post-harvest losses in detail, highlighting both the Indian and global scenarios to show how this issue has become a major concern. We explore the causes, consequences, and potential solutions to this problem. The cover story explains deeply into these aspects. A few days ago, the **Global Hunger Index Report** was released, which **ranked India 105<sup>th</sup> out of 127 countries**, showing that hunger remains a critical issue in our country. If we can reduce post-harvest losses, not only will our total production increase, but we will also make significant progress in addressing hunger.

This edition also includes important agricultural updates and other relevant articles. We hope you enjoy this issue and look forward to receiving your valuable feedback.

Thank you very much, and enjoy reading!

**Editor-In-Chief**



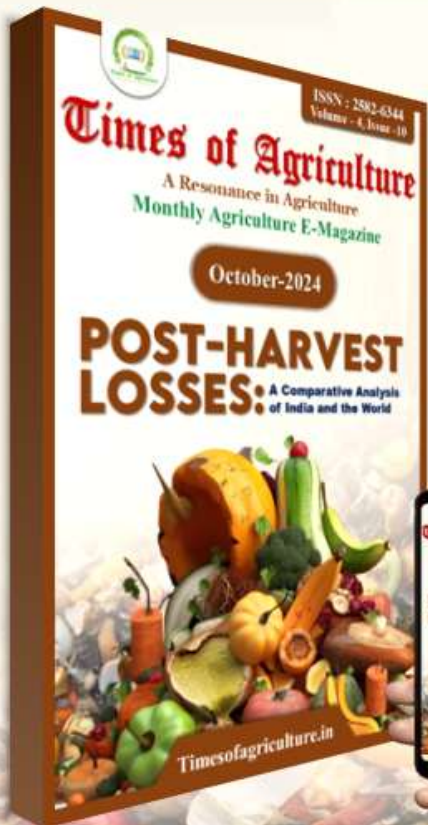


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## POST-HARVEST LOSSES



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# AGRICULTURE UPDATES





## Cabinet approves Minimum Support Prices (MSP) for Rabi Crops

The Cabinet Committee on Economic Affairs (CCEA) chaired by the Prime Minister Shri Narendra Modi, has approved the increase in the Minimum Support Prices (MSP) for all mandated Rabi Crops for Marketing Season 2025-26. Government has increased the MSP of Rabi Crops for Marketing Season 2025-26, to ensure remunerative prices to the growers for their produce.

The increase in MSP for mandated Rabi Crops for Marketing Season 2025-26 is in line with the Union Budget 2018-19 announcement of fixing the MSP at a level of at least 1.5 times of the All-India weighted average Cost of Production. The expected margin over All-India weighted average cost of production is 105 percent for wheat, followed by 98 percent for rapeseed & mustard; 89 per cent for lentil; 60 per cent for gram; 60 percent for barley; and 50 percent for safflower. This increased MSP of rabi crops will ensure remunerative prices to the farmers and incentivise crop diversification.

Crops	MSP RMS 2024-25	MSP RMS 2025-26	Increase in MSP (Absolute)
Wheat	2275	2425	150
Barley	1850	1980	130
Gram	5440	5650	210
Lentil	6425	6700	275
Rapeseed & Mustard	5650	5950	300
Safflower	5800	5940	140

## **PM Modi Launches Unified Genomic Chip 'Gau Chip' for Cattle**

Prime Minister Shri. Narendra Modi launched the **Unified Genomic Chip: 'Gau Chip'** for cattle and **'Mahish' chip for buffaloes** at Pohara Devi, Washim, Maharashtra, thereby heralding a major breakthrough in dairy farming in the country.

These SNP chips designed for genomic profiling and evaluation of Indian cattle breeds, have been developed by a consortium comprising of BAIF Development Research Foundation, National Institute of Animal Biotechnology and the ICAR-National Bureau of Animal Genetic Resources and led by the National Dairy Development Board. Each participating organization pooled their genome sequence and genotype data to facilitate the development of these genomic techniques. This advanced technology has enabled the direct application of DNA technologies to enhance the genetic potential of diverse dairy animal populations in the country. These chips will help farmers to identify young, superior quality bulls at an early age for selection and boost livestock productivity.

Sex sorted semen is very effective in breed improvement and till now it was manufactured by multinational companies. Its price was Rs.800, which was not available to the farmers at an affordable rate. Under the Prime Minister's 'Make in India' and 'Atmanirbhar Bharat' initiative, the National Dairy Development Board under the Department of Animal Husbandry and Dairying, has developed the indigenous technology of sex sorted semen worth Rs. 250, which was inaugurated today by Prime Minister Shri Narendra Modi. Now this sex sorted semen will be available to the farmers for Rs. 250 which will help in improving the livestock breed.





## **Center reduce Export Duty on Parboiled Rice to 10% from 20%**

India reduced export duty on parboiled rice to 10% from 20% earlier, the government said in a notification, as inventories in the world's biggest exporter of the grain surged and farmers are set to harvest a new crop in the coming weeks.

The reduction in export duty will lower India's export prices, boost shipments, and force competing countries like Thailand, Vietnam, Pakistan, and Myanmar to reduce their prices as well. India had imposed a 20% duty on parboiled rice exports in 2023 after its crop was affected by below-normal rainfall. The government also reduced the export duty on brown rice and husked rice to 10%, the notification said. This reduction will take effect immediately. The export duty on white rice has been reduced to zero, but the government did not clarify whether private traders would be allowed to export or if the trade would be restricted to government-to-government deals.

Earlier this month, the government removed a floor price for basmati rice exports to help thousands of farmers who complained about a lack of access to lucrative overseas markets such as Europe, the Middle East and the United States. Rice stocks at the Food Corporation of India on Sept. 1 stood at 32.3 million metric tons, 38.6% higher than last year, giving the government plenty of elbow room to relax rice export curbs.



## India ranks 105<sup>th</sup> in Global Hunger Index 2024, labelled as 'serious'

The 19<sup>th</sup> Global Hunger Index (GHI) report for 2024 has ranked India 105<sup>th</sup> out of 127 countries, placing it among nations with 'serious' hunger problems. India lags behind its neighbours Sri Lanka, Nepal, Myanmar, and Bangladesh, while it ranks just above Pakistan and Afghanistan. Jointly published by 'Concern Worldwide' and 'Welthungerhilfe', the GHI series tracks hunger worldwide, focusing on areas where urgent action is required.

India's score of 27.3 in the 2024 report reflects a serious level of hunger. The report notes a slight increase in the prevalence of undernourishment in India in recent years. While India's 2024 score shows some improvement from its 2016 GHI score of 29.3, which also fell under the 'serious' category, it is still far behind its neighbours. There has been considerable progress compared to the scores of 38.4 and 35.2 in 2000 and 2008, respectively, both of which were categorized as 'alarming'. The 2024 report is not directly comparable to the 2023 report due to a change in methodology and revised data. However, it provides comparative data for the years 2000, 2008, 2016, and 2024.

India continues to face severe challenges in child malnutrition, with the highest child wasting rate (18.7%) globally. The country also has a child stunting rate of 35.5%, an under-five mortality rate of 2.9%, and a prevalence of undernourishment at 13.7%. While India has significantly improved its child mortality rate since 2000, child undernutrition remains a critical issue, with both wasting and stunting rates still alarmingly high. The report emphasises that although stunting has reduced since 2000, these indicators continue to pose serious public health challenges.





## Center approves Fortified Rice Supply Continuation till December 2028

The Union Cabinet, chaired by the Prime Minister Shri Narendra Modi, has approved continuation of the universal supply of Fortified Rice under all schemes of the Government including Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY) and Other Welfare Schemes etc. in its present form, from July 2024 and upto December 2028.

The rice fortification initiative will continue as a central sector initiative with 100% funding by the Government of India as part of PMGKAY (Food Subsidy), thus providing a unified institutional mechanism for implementation.

Prime Minister's address on 75<sup>th</sup> Independence Day on the necessity of Nutritional Security in the country, the initiative “Supply of fortified rice throughout the Targeted Public Distribution System (TPDS), Other Welfare Schemes, Integrated Child Development Service (ICDS), PM POSHAN (Erstwhile MDM) in all States and Union Territories (UTs)” to address anaemia and micronutrients deficiency in the country was taken up. The Cabinet Committee on Economic Affairs (CCEA) in April 2022, decided to implement the Rice fortification initiative throughout the country in a phased manner by March 2024. All three phases have been successfully completed and the target of universal coverage to supply fortified rice in all schemes of the Government was achieved by March 2024. Food fortification has been used globally as a safe and effective measure to address anaemia and micronutrient malnutrition in the vulnerable population. Rice fortification involves the addition of Fortified Rice Kernels (FRK) enriched with micronutrients (Iron, Folic Acid, Vitamin B 12) as per standards prescribed by FSSAI to regular Rice (Custom Milled Rice).



## **IRRI Launches New IRG Collection to Accelerate Linking Trait**

The International Rice Research Institute (IRRI) has unveiled a new resource, the Released Variety Panel (RVP). This panel includes over 130 sequenced rice varieties. The seed is available upon request by scientists and breeders through the International Rice Genebank (IRG), and the sequences are available on the SNP-Seek Database.

The release of this new set, facilitated by IRRI's Rice Breeding Innovations department, aims to increase the awareness and utilization of plant types and genotypes of improved rice varieties grown by rice farmers. These include types of rice that are popular in certain rice-growing countries, or are more resilient to climate change effects.

Through the High-Density Rice Array (HDRA) and the 3,000 Rice Genomes Project (3k RGP), many upstream scientists have become more familiar with IRG's collection of germplasm/landraces, having identified many valuable traits/genes/QTLs/donor accessions. However, the plant traits and alleles of modern/improved varieties that breeders have developed may differ from the diversity panels.

In addition, the RVP can facilitate linking upstream rice research with impact pathways. This can help provide benchmarks for varieties with several beneficial traits. Since many of the accessions in the RVP are currently grown by rice farmers, using these lines as benchmarks could increase the likelihood of upstream research results reaching farmers' fields.



## **Cabinet Approves National Mission on Edible Oils – Oilseeds (NMEO-Oilseeds)**

The Union Cabinet, chaired by the Prime Minister Shri Narendra Modi, has approved the National Mission on Edible Oils – Oilseeds (NMEO-Oilseeds), a landmark initiative aimed at boosting domestic oilseed production and achieving self-reliance (Atmanirbhar Bharat) in edible oils. The Mission will be implemented over a seven-year period, from 2024-25 to 2030-31, with a financial outlay of Rs 10,103 crore.

The newly approved NMEO-Oilseeds will focus on enhancing the production of key primary oilseed crops such as Rapeseed-Mustard, Groundnut, Soybean, Sunflower, and Sesamum, as well as increasing collection and extraction efficiency from secondary sources like Cottonseed, Rice Bran, and Tree Borne Oils. The mission aims to increase primary oilseed production from 39 million tonnes (2022-23) to 69.7 million tonnes by 2030-31. Together with NMEO-OP (Oil Palm), the Mission targets to increase domestic edible oil production to 25.45 million tonnes by 2030-31 meeting around 72% of our projected domestic requirement. This will be achieved by promoting adoption of high-yielding high oil content seed varieties, extending cultivation into rice fallow areas, and promoting intercropping.

To ensure the timely availability of quality seeds, the Mission will introduce an Online 5-year rolling seed plan through the ‘Seed Authentication, Traceability & Holistic Inventory (SATHI)’ Portal, enabling states to establish advance tie-ups with seed-producing agencies, including cooperatives, Farmer Producer Organizations (FPOs), and government or private seed corporations. 65 new seed hubs and 50 seed storage units will be set up in public sector to improve the seed production infrastructure.

# POST-HARVEST LOSSES: A Comparative Analysis of India and the World



About the Author

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The degradation of a food production from harvest to consumption can be defined as Postharvest loss. Losses in quality include those that affect a product's nutritional/caloric profile, its acceptance, and its digestibility. These losses are generally more common in developed countries than they are in developing countries.

Losses are a measurable reduction in foodstuffs and may affect either quantity or quality. Quantitative losses refer to how food loses bulk or volume, decreasing the volume of food suitable for consumption. These losses might be valued in terms of weight, money, or other factors such as energy. Quality losses are experienced before food is thrown out, eaten, or used in another way. Reduced nutritional content, palatability, safe, and eventually economic worth are some of the losses.

### **Global Post harvest losses:**

Between marketing and consumption, fruits and vegetables experience the highest postharvest losses of any food commodity in the world, accounting for between 28% and 55% of total production and costing roughly USD 750 billion annually. On the list of horticultural crops, **Coffee had the lowest post-harvest loss (15.75%), while tomatoes had the highest (45.32%) and mangoes (43.53%).** It's estimated that almost one-third of the world's production of fruits and vegetables is lost after harvest, omitting garbage that cannot be eaten.

In a recent report released by the FAO, **it was reported that fruit and vegetables are the food group with the second-highest value of losses and waste (about 22%),** exceeded only by roots, tubers, and oil-bearing crops at all stages in the food supply chain, due to their highly perishable nature. Failure to grade and sort onions prior to storage was the primary cause of the losses. Bangladesh was determined to experience average losses ranging from 11-33 percent based on the crops and middlemen involved. Around 25-30 percent of vegetables in Nepal are lost. Pakistan had 610,000 hectares devoted to growing vegetables, and experienced losses ranging from 15 to 40 percent of their total production. Half of Afghanistan's total vegetable production was lost to post-harvest practices, with farmers' lack of knowledge exacerbating the losses even further. In Bhutan, approximately 20-35% of major vegetables are lost after harvesting, while 16-40% of total vegetables are wasted in Sri Lanka.



## **Post harvest losses in India:**

India, renowned for its rich agricultural heritage, faces a significantly challenges in the form of post-harvest losses, especially concerning agricultural crops. These losses occur at various stages from harvest to consumption and are influenced by factors ranging from infrastructure limitations to inadequate storage facilities and logistical inefficiencies, **the economic loss for fruits stood at 15.05%, while for vegetables it was 4.87-11.61%. The horticultural produce accounts for 29.5% of the Agriculture GDP.** Therefore, post-harvest losses significantly affect the marketing quality, resulting in lower market prices and hindering the production of by-products, thus directly impacting the economy.

India is the world's largest producer of fruits and world second's vegetables producer. But between the time of harvest and consumption, **around 30-40% of fruits and vegetables are lost due to insufficient infrastructure, inadequate transportation, limited understanding of postharvest handling, storage and market inefficiencies.** These losses have far-reaching impacts, including economic hardships for farmers, compromised food security, environmental degradation, and market instability.

According to a study by CIPHET, Indian Council of Agricultural Research 2015, the economic value of quantitative losses was found to be Rs. 16,644 Crores from seven fruits and Rs. 14,842 Crores from eight vegetables and Rs.9,325 Crores in case of nine spices and plantation crops. According to FAO, 2021 **around 30 % of the food produce never reach the human stomach. According to a Ministry of Food Processing Industries 2022 study, the post-harvest losses amount to approximately ₹1,52,790 crore annually.**





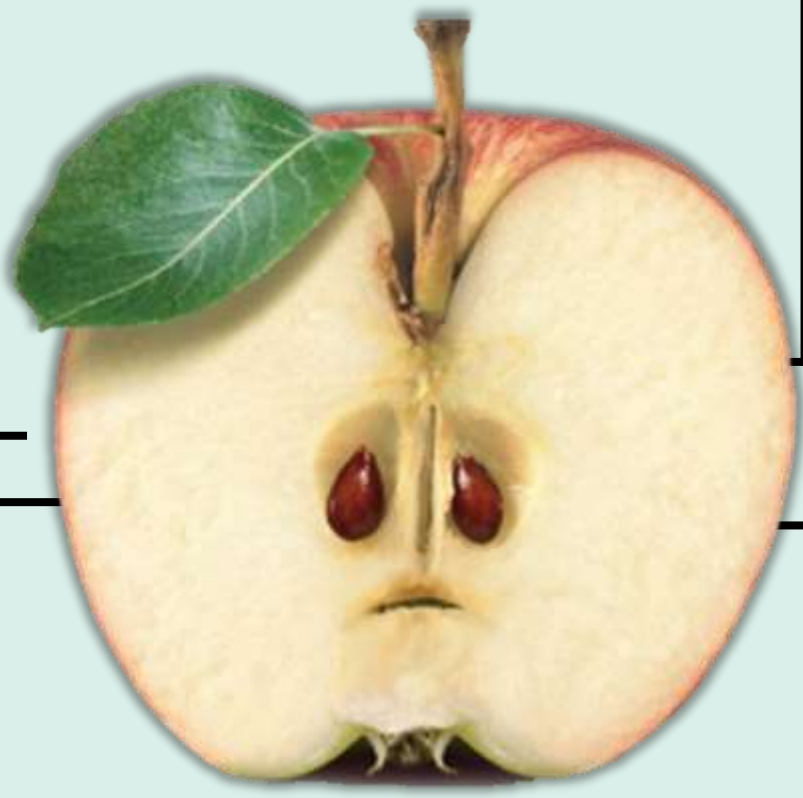
# THINK - EAT - SAVE

## 38%

Energy wasted due to lost and wasted food.

## 2.5 bn tons

Amount of produced food lost or wasted globally every year.



## 10%

Percentage of greenhouse gas emissions caused by food loss.

## 45%

Percentage of all fruits and vegetables not eaten globally every year.



## Factors responsible for Post-harvest losses:

1. **Physiological Factors:** These include natural processes such as respiration, transpiration, and senescence, which continue after harvest and can lead to deterioration of quality and quantity of the produce.
2. **Mechanical damage:** Improper handling during harvesting, sorting, packing, and transportation can cause physical injuries to the crops, making them more susceptible to spoilage and decay.
3. **Environmental Factors:** Temperature, humidity, and light conditions during storage and transportation can affect the shelf life of horticultural crops. Improper storage conditions can accelerate spoilage and deterioration.
4. **Pathogen and pests:** Microbial infections, fungi, bacteria, and pests (such as insects and rodents) can cause significant losses by attacking harvested crops during storage and transportation.
5. **Lack of Infrastructure and Facilities:** Inadequate storage facilities, packaging materials, and transportation infrastructure can contribute to losses by not providing proper protection and conditions for maintaining crop quality.
6. **Poor Post-Harvest Management Practices:** Inefficient handling practices, lack of training among handlers, and inadequate knowledge of optimal post-harvest handling techniques can lead to avoidable losses.
7. **Market and Economic Factors:** Issues related to market demand, pricing fluctuations, and market access can also contribute to post-harvest losses if crops cannot be sold in a timely manner or at a fair price.



## Impact of post harvest losses of horticultural crops:

### 1. Economic Impacts:

- ❖ Post-harvest losses directly hit farmers income as a significant portion of their hard work and investment goes to waste. This leads to decreased profits and perpetuates the cycle of poverty in rural communities.
- ❖ Wasted produce means lost revenues for both farmers and the government, resulting in lower contributions from the agricultural sector to the Gross Domestic Product (GDP).
- ❖ With lower availability of food, prices may rise, making it less affordable for consumers, especially low-income households, exacerbating food insecurity.
- ❖ Fluctuating supplies can create volatility in food markets, affecting both producers and consumers.

### 2. Social Impacts:

- ❖ Post-harvest losses limit job creation opportunities in food processing, storage, and transportation, impacting rural livelihoods.
- ❖ Limited access to essential vitamins and minerals negatively affects the overall health and well-being of the population, due to lower availability of fresh produce due to losses
- ❖ Affects rural livelihoods and community development. Post-harvest loss impacts the demand for labor, as less produce means fewer jobs in transportation, packaging, and market activities hence, less employment and income.

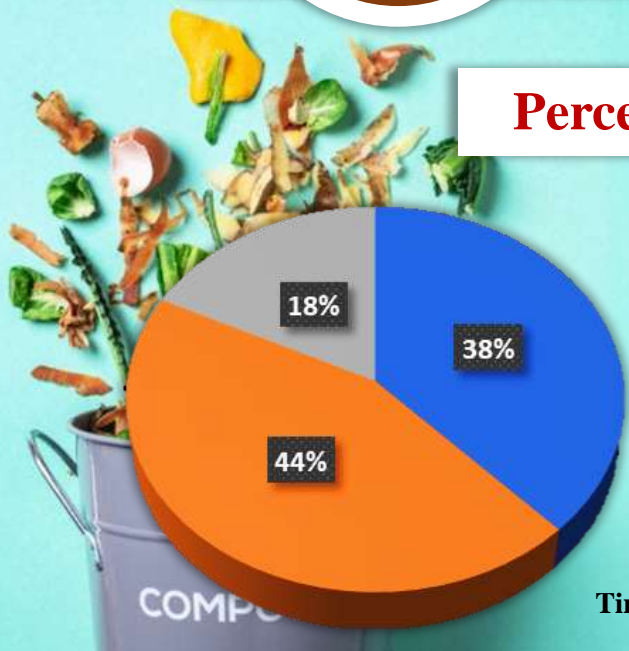
### 3. Environmental Impacts:

- ❖ Resources such as water, land, fertilizer, and energy invested on cultivation go to waste contributing to unnecessary environmental stress.
- ❖ Decomposing organic waste contributes to methane emissions, exacerbating climate change.

# Post-Harvest Losses



## Percent of food loss of fresh produce



- Fruits and Vegetables
- Roots, Tubers and Oil bearing crops
- Other



## Strategies to Reduce Post-Harvest Losses:

1. Harvest maturity refers to the time when the fruit are ready for harvest which impacts the quality of fresh fruits and produce. Fruits can be classified into climacteric and non-climacteric. Therefore, correct harvesting time is necessary.
2. Horticultural products may sustain irreversible damage as a result of improper harvesting techniques. For this reason, in order to reduce damage during harvest, harvesting methods for all fruits and vegetables must be standardized.
3. Cold chain is an ongoing supply of a good at a specific temperature from point of production to point of consumption. Maintaining a constant cold chain for perishable food guarantees that it will not spoil before it reaches the customer. According to study by the International Refrigeration Institute (IIR), 23% of perishable food in developing nations went bad because the refrigerator was not used.
4. Transportation can be one of the primary causes of losses since it adds a certain amount of time between production and consumption, particularly for fresh products. Perishable food delivery using refrigerated vehicles is extremely common in developed nations. Perishable food preservation is hampered in developing nations by inadequate transportation, bad roads, and ineffective logistics management.
5. Fresh fruits and vegetables can have their shelf life extended and losses minimized by using appropriate packaging. Thus, one of the main causes of fruits and vegetables being lost during the post-harvest stages Inadequate packaging materials can cause fresh produce to spoil more quickly and are unable to sufficiently shield it from harm. Regrettably, due to their low cost, low-quality packing materials are used extensively in many parts of the world.



6. Allow grains and seeds to dry adequately in sunlight to reduce moisture content and prevent mold growth. In areas where sun drying isn't efficient or reliable, mechanical dryers can ensure faster and uniform drying.
7. Sometimes ripening inhibitors, high carbon dioxide levels, low oxygen levels, and waxing are combined to extend the period of time that the product can be stored. Small-scale farmers might not be able to afford ethylene absorbents like calcium chloride ( $\text{CaCl}_2$ ) and potassium permanganate ( $\text{KMnO}_4$ ), but they have significant economic potential.
8. Providing farmers with knowledge of post-harvest handling, processing, and storage techniques helps reduce losses. Organizing farmers into cooperatives or groups allows them to pool resources, share best practices, and access better post-harvest equipment and storage facilities.

## Conclusion

Horticultural produce contributes 29.5 per cent to Agriculture GDP. So, post-harvest losses show major impact on decreasing the marketing quality which leads to low market price and also by-products cannot be produced and show direct impact on economy. By strategically reducing post-harvest losses, India can improve its agricultural efficiency, ensure food availability, and pave the way for a more sustainable and resilient food supply chain. Lower prices and improved food security are some of the benefits consumers receive from reducing losses. Post-harvest activities such as processing and marketing can create employment (and thus income) and better food security in the agricultural sector.

It is clear that reducing PHL complements other efforts to enhance food security through improved farm-level productivity. ■





## Previous Issues



## Website Statistics (September 2024)

212K

Monthly  
Pageview

74K

Monthly  
Visitor

2.1M

Monthly  
Impression

## Social Stats



6.5K



5.4K



7.6K



1.7K



2K





# USE OF IOT ON LIVESTOCK MANAGEMENT AND HEALTH MONITORING

## About Author



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As we all know that new inventions are happening every day in the world and our achievement will be to adapt ourselves based on them. Because with these inventions all the work can become easy and it requires convenience and less time. In the present era, the internet has become ubiquitous. From the agricultural point of view, modern mobile applications are becoming quite popular today. Through these, farmers or any person can find out about crop ailments (diseases, pests), lack of

nutrients in crops, market price of agricultural produce. They can even buy animals, agricultural equipment, agrochemicals etc. from their homes. The present era is the era of working smartly. In the present era, the Internet has an important role to play in our office work as well as in our daily lives. Now it seems as if life would be impossible without it. Internet plays an important role in our life, with the help of which our work becomes easier. There have been inventions related to the Internet of Things (IoT).

The advent of the Internet of Things (IoT) has revolutionised agriculture and related sectors. Its application in livestock management and health monitoring is also proving to be transformative. This article explores the impact of IoT technologies on livestock farming, focusing on how connected devices and data analytics are enhancing animal health, welfare, and productivity.

The integration of IoT in livestock management involves the use of smart sensors, wearable devices and automated systems to collect real-time

data on animal behaviour, physiological parameters and environmental conditions. These technologies enable continuous monitoring of livestock, detecting health problems, optimising feeding regimes and improving breeding management.

## Advantages

By analysing data from IoT devices, farmers can make appropriate and timely decisions-

- Disease outbreak in animals can be easily detected and suppressed in time or prevented from spreading to other animals.
- The disease spreading among animals can be identified in time, so that other animals can be saved from getting infected.
- Helps track health indicators in animals using smart collars and ear tags.
- With the use of smart technology, animals can be easily identified even in a herd.
- Due to various diseases and poor health of animals, animal mortality and loss as well as wasteful







management and health monitoring, leading to more sustainable and productive agricultural systems. We can find and control the Stationary, Feeding, Drinking, Rumination, Heat, Moving, Standing and Lying of animals by the help of various of sensors. Timely mitigation of risks through the help of IoT. Continued research, innovation, and support for farmers are essential to fully realize the benefits of these emerging technologies. The aim of this article is to contribute to the ongoing conversation on the future of agriculture in the digital age, to provide farmers with new technologies and information, to reduce time and cost through proper

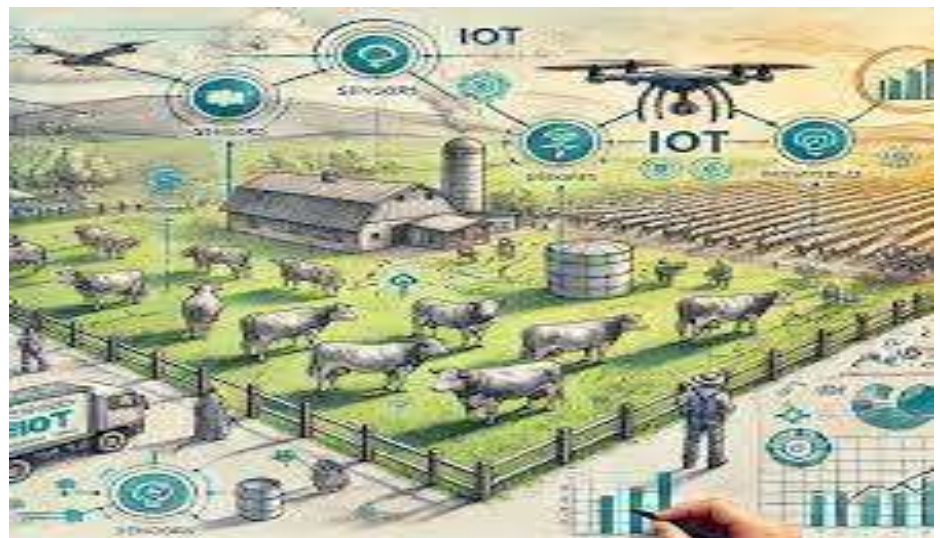
expenditure of farmers can be reduced.

- We can track the activities and movement of each animal with the help of IoT (Sensors).
- Automated feeding systems that adjust based on real-time requirements can be operated with the help of IoT.
- Climate control systems that ensure optimal living conditions can also be controlled via IoT.
- With the use of IoT, the activities happening in the cattle farm can be easily monitored. This can prevent the risks occurring in the cattle farm.

These technologies not only improve animal welfare but also contribute to sustainable agricultural practices by reducing resource waste and environmental impact.

## Challenges

There are a number of challenges associated with the adoption of IoT for livestock production and management such as-



- Need for reliable internet connectivity in rural areas.
- Data security concerns.
- Initial investment costs.
- Lack of technical knowledge among farmers.
- Examining the role of policy frameworks and extension services in promoting the use of IoT technologies among small farmers etc.

management as well as to increase efficiency. This will help the farmer's economic condition to rise above its normal level. It emphasizes the important role of IoT in promoting efficiency and sustainability in livestock farming.

■■■

IoT has the potential to significantly enhance livestock





# AgriSURE

# AgriSURE SCHEME

## A PIONEERING INITIATIVE TO REVOLUTIONIZE INDIA'S AGRICULTURE SECTOR

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On September 5, 2024, Shivraj Singh Chouhan, the Union Minister of Agriculture and Farmers' Welfare, unveiled the AgriSURE Scheme in New Delhi. This groundbreaking initiative, officially known as AgriSURE – Agri Fund for Start-ups & Rural Enterprises, marks a significant advancement in transforming the agricultural landscape of India. The scheme introduces a Blended Capital

Fund amounting to ₹750 crore, structured as a SEBI Registered Category II Alternative Investment Fund (AIF). The fund's capital is composed of contributions from the Government of India (₹250 crore), NABARD (₹250 crore), and an additional ₹250 crore mobilized from banks, insurance companies, and private investors.

### Background and objectives

The inception of the AgriSURE Fund aligns with the objectives outlined by the Hon'ble Finance Minister in the Budget Speech of 2022-23. The speech emphasized the need for a blended capital fund, facilitated through NABARD, aimed at financing start-ups within the agriculture and rural enterprise sectors. This initiative focuses on enhancing the farm produce value chain through various activities such as supporting Farmer Producer Organizations (FPOs), providing rental machinery to farmers, and advancing technology, including IT-based solutions.

The AgriSURE Fund is designed to foster innovation and

technological advancement in agriculture by providing financial support to high-risk, high-impact ventures. The fund's structure includes investments in sector-specific AIFs, sector-agnostic AIFs, debt AIFs, and direct equity investments in start-ups. The primary objective is to create an investment-friendly environment for agricultural and rural start-ups, thereby accelerating their growth and increasing their capital absorption capacities.

### Key objectives of the AgriSURE fund

**Investment facilitation:** Create a conducive climate for investment in agri-tech and rural enterprises, thereby enhancing their capacity to absorb and utilize capital.

**Start-up acceleration:** Propel the growth of start-ups within the agricultural ecosystem by increasing capital commitments to sector-specific AIFs. This will enable these funds to provide equity support to agri and agri-tech start-ups catering to farmers and FPOs/FPCs/Primary Cooperative Societies.





**Enhanced investment:** Augment the average size and volume of investments made by AIFs in agri and agri-tech start-ups, stimulating their growth and development.

**Support for innovation:** Encourage young entrepreneurs with innovative, technology-driven ideas to engage in high-risk, high-impact activities within the agricultural sector.

**Liquidity provision:** Address the liquidity challenges faced by existing agri and agri-tech start-ups, enabling them to upscale their operations through various financing instruments such as equity and debt.

**Strengthening value chains:** Enhance the efficiency and profitability of the farm produce value chain by supporting start-ups that offer innovative solutions in forward and backward linkages.

**Employment generation:** Create additional employment opportunities for

both rural and urban youth by promoting agriculture as a viable business opportunity and fostering new start-ups in the rural agricultural ecosystem.

**Youth retention and attraction:** Retain rural youth in agriculture and attract urban youth to rural start-ups, facilitating a mutually beneficial relationship that strengthens the agricultural sector.

**Investment attraction:** Increase overall investment in the agri and rural start-up ecosystem by contributing to various AIFs.

### **Target beneficiaries**

The AgriSURE Fund aims to support approximately 85 start-ups by the end of its lifecycle, with individual investments of up to ₹25 crore. The beneficiaries will span a diverse range of sectors, including agritech, food processing, animal husbandry, fisheries, supply chain management, farm

mechanization, biotechnology, waste management, renewable energy, and agri-value chain development, among others. The fund's impact will be contingent on the investment absorption capacity of the enterprises and prevailing market conditions.

### **In conclusion**

The AgriSURE Scheme represents a transformative step toward enhancing the agricultural sector in India. By providing critical financial support and fostering innovation, the scheme aims to strengthen the agricultural ecosystem, empower entrepreneurs, and create sustainable growth opportunities in rural and agrarian enterprises.



## **Top 24 Agriculture Startups in India Transforming Agriculture [2024]**



# CARBON MARKET

## A PANACEA FOR BOOSTING RURAL ECONOMY

### About Author



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The carbon market is a system where companies, governments, and other organizations can buy and sell carbon credits to help reduce greenhouse gas emissions. A carbon credit represents the right to emit one ton of carbon dioxide or an equivalent amount of other greenhouse gases. The carbon market was created to help combat Global climate change by giving economic value to efforts that reduce greenhouse gas emissions. By trading carbon credits, countries and companies can financially benefit from reducing their emissions, encouraging more sustainable practices.

### The evolution and genesis of carbon market

The concept of Carbon Market took shape under the Kyoto Protocol in 1997 by United Nations, which set country-specific limits on GHG emissions, thereby giving economic value to emission reductions. This facilitated the development of carbon markets, where emission units could be traded, helping to lower the economic costs of reducing emissions. India, one of the early adopters of this mechanism, currently holds the second highest number of projects registered under the Clean Development Mechanism (CDM), following China (Ministry of Environment Forest and Climate Change, 2020). The Paris Agreement of 2015 further advanced these efforts by introducing a voluntary mechanism aimed at promoting sustainable development and reducing global emission levels through international cooperation.

### Status of carbon market in the globe

The World Bank (2021) mentions that carbon credit markets show remarkable growth in the past year, despite the COVID-19 pandemic

and the related economic downturn. Both the number of registered projects and the number of credits issued have increased by 11 per cent and 10 per cent respectively. This growth brings the total number of credits issued since 2002 to around 4.3 billion tonnes of carbon-dioxide equivalent (tCO<sub>2</sub>e) (Source: World Bank 2021c). It also estimated that Carbon Market will grow by 31% annually between 2023 to 2028. It is reported that about 74 Billion US Dollar are raised in 2023. All total 303 billion USD raised since 2007 through Carbon Market. Also, about 18% of global GHG emission is covered under Global Carbon market as reported by International Carbon Action Policy (2024). EUETS (European Union Emissions Trading system) accounts for highest i.e. 84% of the total Global Carbon share. A total of 8161 activities are registered under the CDM mechanism across more than 140 countries globally which issues 2046 million tone CO<sub>2</sub> equivalent (mtCO<sub>2</sub>e) CERs (Certified Emission reduction) that means it reduces 2046 mtCO<sub>2</sub>e to get released into air globally (Voluntary Carbon Markets Insights, 2018).





## Status of carbon market in India

In the purview of Global Carbon Market Government of India has initiated the development of the unified carbon market mechanism 'Indian Carbon Market' (ICM) which will mobilize new mitigation opportunities through demand for emission reduction credits by private and public entities. India with 46 projects is second to China (279) and is leading in emission reduction among countries with Agricultural projects on Voluntary Carbon Market VERRA. Total 3023 projects under CDM in India. Maharashtra having highest number of projects followed by Gujarat and Tamil Nadu. About 278 Million units of Carbon Credits issued by India between 2010 and 2022. i.e. 278 million tonnes of GHGs are reduced or absorbed. Also India commits to increase an additional carbon sink of 2.5-3.0 billion tonnes of CO<sub>2</sub> equivalent through forest and tree cover by 2030.

## Recent initiatives: Driving sustainable development

Assam Agricultural University, Jorhat recently signs an MoU with TERI (The Energy Resource institute) on 10 May, 2024 to plant 1 crore trees in 10 districts of Assam. It includes Jorhat, Sivasagar, Golaghat, Bongaigaon, Sonitpur, Darrang, Udalguri, Baksa, Nalbari, Barpeta district. It aims to provide income by selling carbon credits of the tree in the international market after 3 years of plantation. The institutions involved with this noble initiative are TERI, ReNew Synergy and Resource Centers and Krishi Vigyan Kendras under AAU.

Tea Research Association, Jorhat also initiated a programme partnering with Boomitra. This initiative is designed to enhance productivity, promote soil health, and contribute to carbon sequestration. It Promotes regenerative agriculture guidance in Tea cultivation. Boomitra will enable tea growers associated with TRA to generate income through the sale of carbon credits.

Assam Government implemented *Amrit Vriksha Andolon* which aims to plant 1 Crore Seedlings in Assam. It provides financial Support of Rs 100 for planting a tree & Rs. 200 will be provided in the third year to ensure plant survival. Through Amrit Vriksha plantation programme, Assam can earn Green credits which can be traded in Carbon market.

## Role of agriculture in the carbon market and its potential

Agriculture holds significant potential within carbon markets, offering a dual benefit of generating revenue for farmers and combating climate change. Through practices such as reducing stubble burning, cover cropping, zero tillage, agroforestry, and improved manure management, farmers can sequester carbon or reduce emissions, thereby generating carbon credits. These credits can then be sold to companies looking to offset their emissions, providing a new revenue stream for farmers or rural youths and incentivizing sustainable practices. This will also boost the rural economy.

In India, the rise in GHG emissions due to stubble burning is a significant concern. From 2011 to 2020, emissions from crop residue burning increased by 75%, from 19.34 million tonnes CO<sub>2</sub> equivalent in 2011 reaching 33.83 million tonnes of CO<sub>2</sub> equivalent in 2020. By avoiding stubble burning, India could potentially earn substantial revenue by selling the resulting carbon credits. For instance, at a rate of \$10 per carbon credit, avoiding crop residue burning in 2020 alone could have generated approximately \$338.3 million (Rs. 2811.83 crores). Also, we can earn money through biogas plant. The Global warming mitigating potential (GMP) of a family size biogas plant is 9.7 ton CO<sub>2</sub> equivalent per year. The current price of 1 Carbon credit = 10 US dollar. Therefore we can earn about 97 US dollar /Year. (8054 INR/year).

Through proper feed additives and manure management can sequester 3.4 Metric tonnes CO<sub>2</sub> equivalent (e) per year; One solar-powered water pump

can replace a 5 horsepower diesel pump and can reduce 5 ton CO<sub>2</sub> e per year; Drip Irrigation uses 30%-60% less water and delivers 20%-50% higher crop yield, compared to furrow irrigation it decreases N<sub>2</sub>O and CH<sub>4</sub> direct emissions by 21%.

Direct Seeded Rice reduces India's GHG emissions in rice-growing regions by 34 tonnes CO<sub>2</sub>e (25%) because it minimizes the nursery bed preparation; Intercropping cereals and legumes reduces nitrogen fertilizer use as legumes supply 15% of nitrogen and emit fewer GHGs compared to non-legumes. On average, inter-cropping can sequester 0.184 tonnes CO<sub>2</sub> per hectare per year; Biochar reduces CH<sub>4</sub> emissions by 79% reduces N<sub>2</sub>O emissions by 22%-48% after 2-7 years; Zero tillage reduces CH<sub>4</sub>, CO<sub>2</sub>, and N<sub>2</sub>O emissions by an average of 20%, 15%, and 8% respectively.

## Conclusion

Farmers stand to benefit substantially from participating in carbon markets, as it offers them an avenue to earn additional income. Additionally, it will play a pivotal role in invigorating the rural economy. By monetizing carbon sequestration and emission reductions, farmers are incentivized to adopt practices that enhance carbon storage in agricultural landscapes while diversifying their income streams.

While the Indian carbon market holds immense promise in advancing climate action and sustainable development, its success will depend on addressing these challenges through coordinated efforts from government, industry, civil society, and international partners. By leveraging the strengths of a diversified economy, a vibrant entrepreneurial ecosystem, and a rich pool of human capital, India has the opportunity to emerge as a global leader in carbon markets, driving innovation, prosperity, and environmental resilience for generations to come.

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# BUTTERFLY GARDENS

## NURTURING NATURE'S DIVERSE DIETS BEYOND NECTAR

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**B**utterfly gardening focuses on creating habitats that attract and support butterflies by providing them with food, shelter and breeding sites. The behaviours and survival strategies observed in butterflies, particularly their diverse feeding habits, can significantly influence the design and effectiveness of butterfly gardens. Butterflies are often known for their vibrant colours and delicate beauty, captivating enthusiasts and researchers alike. While nectar provides butterflies with essential sugars and some nutrients, it does not supply all the nutrients required for their growth and reproduction. Hence, nectar seekers

often engage in a behaviour known as mud-puddling, where they gather in large groups to use their proboscis to absorb fluids from sources like soil, dung or carrion. In response, some butterflies have evolved to exploit alternative food sources to meet their nutritional needs. Dung and decaying organic matter offer valuable nutrients, such as amino acids, salts and minerals, which are often absent from nectar. These diets may also help them to establish intestinal microbes. Understanding these atypical feeding behaviours provides insight into the survival strategies and ecological roles of butterflies.

### Essential parts of a butterfly garden

#### 1. Diverse plant selection:

Traditional butterfly gardens emphasize nectar-rich plants to attract adult butterflies. Species like lantanas, milkweeds and zinnias are commonly planted for this purpose. However, recognizing that nectar alone may not provide all necessary nutrients, including a variety of nectar plants that bloom at different times ensures a continuous supply of food.

Including specific host plants where butterflies can lay eggs and caterpillars can feed is essential. They may also seek out alternative food sources when nectar is insufficient, so ensuring a mix of host plants that cater to various butterfly species is crucial.

#### 2. Incorporating mud-puddling sites:

The mud-puddling is a behaviour, where butterflies seek out minerals and salts. In a butterfly garden, creating damp areas with exposed soil, sand or even compost can attract butterflies. Adding a shallow dish with water and dissolved salts or placing fruit peels and compost in these areas can mimic natural mud-puddling sites.

#### 3. Supporting alternative feeding behaviours:

The coprophagous (dung-feeding) and saprophagous (feeding on decaying matter) behaviours of butterflies suggest that the gardens could benefit from a more naturalistic approach. Adding sources like some moist soil, dung, decaying organic matter and even ash can provide additional nutrients that butterflies seek. This also contributes to a more







**Fig. 1 Green Commodore butterfly exhibiting coprophagy**



**Fig. 2 Red Helen butterfly exhibiting mud puddling**



**Fig. 3 Red Admiral butterfly exhibiting coprophagy**



**Fig. 4 Orange oakleaf butterfly exhibiting saprophagy**



**Fig. 5 Lycaenid butterfly exhibiting mud puddling**



**Fig. 6 Indian Nawab butterfly exhibiting ash feeding**



**Fig. 8 Vagrant butterfly exhibiting ash feeding**



**Fig. 7 Green Commodore butterfly exhibiting coprophagy**

sustainable and ecologically diverse garden.

#### **4. Creating a multi-layered habitat:**

The varying altitudes and ecological zones can be simulated in a garden by creating a multi-layered habitat with different plant heights, from ground covers to shrubs and trees. This variety not only supports different butterfly species but also offers microhabitats that cater to their diverse needs.

#### **5. Conservation and education:**

Understanding the full spectrum of butterfly behaviours, including their less-known feeding habits, can inform conservation efforts in butterfly gardening. Educating gardeners about the ecological roles of butterflies, such as their contribution to nutrient cycling through feeding on dung

and decaying matter, can foster a more holistic approach to gardening.

#### **6. Seasonal considerations:**

The importance of considering seasonal changes in a butterfly garden lies in ensuring a continuous habitat that supports the life cycles of various butterfly species. By planting species that thrive and provide resources during different seasons, gardeners can maintain a steady supply of nectar, host plants and shelter, ensuring that butterflies have access to the essentials they need for survival, reproduction and migration throughout the year.

#### **7. Encouraging natural predators and pest control:**

By allowing some level of natural decay and organic matter in the garden, you encourage a balanced ecosystem where butterflies can thrive without excessive interference. This

approach supports not only butterflies but also other beneficial insects and natural predators, contributing to overall garden health.

#### **8. Educational value:**

A butterfly garden that incorporates elements to support alternative feeding behaviours can serve as an educational tool, showcasing the complex ecological interactions in nature. This can inspire a deeper appreciation and understanding of biodiversity among visitors and gardeners.

#### **Conclusion**

The behaviours documented in our study, such as mud-puddling and feeding on dung or dead animals, highlight the importance of creating diverse, ecologically rich environments in butterfly gardens. While nectar remains the primary food source for most butterflies, the ability to utilize alternative food sources such as dung and dead animals highlights their ecological flexibility and survival strategies. By supporting a range of feeding strategies, gardeners can attract and sustain a wider variety of butterfly species, ultimately contributing to conservation and ecological balance.

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# PRECISION FARMING SHOWS GREAT SCOPE FOR INCREASING AGRICULTURAL PRODUCTIVITY AND PROFITABILITY

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According to the World Bank's article on Climate Smart Agriculture, the world's population is expected to exceed 9 billion by 2050, meaning that around 70% more food would need to be produced to fulfill demand. One of the biggest problems confronting mankind today is producing food in a sustainable manner for a population that is expanding quickly. The problem has been made more difficult by declining production and earnings as well as the environmental effects of traditional agricultural practices. Using cutting-edge digital technology, precision agriculture will be crucial to the third modern farming revolution. It maximizes production and profitability, assures sustainability, lessens environmental impact, and efficiently minimizes inputs, labor, and time in a sustainable manner. The precision

agriculture market is estimated to touch \$15.6 billion by 2030.

## What is precision agriculture?

Precision Agriculture is a notion in farm management that centers on the act of monitoring, quantifying, and adapting to different inputs that introduce variability both within and between fields in contemporary agriculture. The phrase "precision agriculture" (PA) or "site-specific crop management" (SSCM) is commonly defined as a technology-enabled farming management technique that monitors, assesses, and evaluates the requirements of particular fields and crops. Precision farming aims to lower input costs, boost output and efficiency, and enhance environmental sustainability. As a result of technological advancements, more recently developed genetically modified crops that are resistant to pests and require less water were introduced, enabling each farmer to feed 155 people. By 2050, there will be 9.6 billion people on the planet, meaning that twice as much food would need to be produced as is now done in order to feed everyone. The third revolution will mostly involve continually evolving IoT capabilities, such as precision agriculture drones, and advanced analytical skills.

## Precision agriculture's scope

Using the same set of techniques with smart farming technology to meet the demands of particular plots and crops is an example

of precision farming. Drones and other big data analytics tools, like Cropin Grow (Smart Farm), may obtain extensive information about the plot, the kind of soil, appropriate crops, irrigation requirements, and fertilizer requirements. The data collected is utilized to customize an extremely accurate crop selection, amount of fertilizer, and watering requirements. Because precision agriculture minimizes total environmental effect while reducing production costs and losses, it also helps farmer's live debt-free lives.

## Precision agriculture's benefits

Instead of spreading inputs (such seeds, fertilizer, and pesticides) evenly throughout the field, farmers may target these regions with the most need by employing precision agriculture technology and methods. In addition to reducing input costs, farmers may improve crop quality and output with this focused strategy. Precision agricultural technology also enables farmers to monitor and manage their crops more successfully, which enables them to react swiftly and efficiently to possible issues (such pests or illnesses). Farmers can accurately apply fertilizers at the proper rate and place by using mapping tools and sensors. Furthermore, farmers may optimize their irrigation techniques with the use of precision agricultural technology, saving water and energy. Precision agriculture helps farmers in many ways since it allows for the tracing of specific regions within a





single farm. It Minimizes environmental impact; optimizes fertilizer use; optimizes irrigation techniques for water management; refines cultivation methods and crop selection based on land suitability; eliminates volatility and risk; minimizes waste; and enhances soil health.

### **Ten tools and technologies for precision agriculture**

It is important for anyone searching for a precision agricultural solution to be aware of the many tools and technologies available. Precise farm planning, field maps, yield maps, crop scouting, and the determination of the precise quantity of inputs to be applied to fields are all produced using computer-based software. The capacity to create a friendly agriculture approach that lowers costs and increases yields is one advantage of this technology. However, these apps only provide low-value data that cannot be utilized for extensive precision farming solutions as the collected data cannot be incorporated into other supporting systems. Now let's explore the instruments and technology required for precision farming-

- Geographic Information System (GIS).
- Remote Sensors for precise data capture.
- Auto-Guidance Systems.
- Proximate Sensors for precise crop and soil data capture.

- Computer Hardware and Software.
- Grid sampling for targeted farming.
- Variable-Rate Technology (VRT).
- Yield Monitors.
- Yield Maps.
- Global Positioning System (GPS).

### **The future of agriculture with precision agriculture**

Because precision farming and current agricultural techniques are customized to meet the demands of individual plots, they concentrate on lowering production costs and waste. The main focus is on gathering and analyzing data from farm plots using sensors, drones, and robots. Software as a service (SaaS) may be utilized to accommodate precision farming systems.

### **Precision agriculture's use of machine learning and artificial intelligence**

The governments of economies where agriculture is the primary industry invest in other cutting-edge technologies, such as artificial intelligence and machine learning (AI/ML), even while IoT is still in its infancy, in order to make more informed agricultural decisions. The application of IoT in agriculture has particular advantages and difficulties in nations like India. First of all, because they are unaware of how the technology may be used in agriculture, farmers are afraid to

upgrade to agritech. In addition, the sensors, robots, and drones are costly, need a lot of maintenance, and need workers with specialized training to operate. Additionally, the collected data must be examined in a laboratory or on the farm with specialized equipment. Additionally, a range of sensors are needed to gather data on various aspects, each of which needs to be evaluated independently, raising operational expenses. Because farms vary in size, the digital farming solution needs to be both highly scalable and reasonably priced.

Variable Rate Application (VRA) is used in precision agriculture to maximize input while addressing the inherent variations in field. In order to apply VRA, comprehensive spatial data must be gathered from various fields and places utilizing remote sensing and GPS to track crop lifecycles and use geographic information systems (GIS). Information management systems, yield mapping and monitoring tools and precision irrigation systems are some of the instruments utilized in precision farming. Precision agriculture uses sophisticated descriptive, predictive, and prescriptive analytics engines to evaluate the data and make data-driven management decisions that enable the adoption of economical, environmentally sustainable, and contemporary farming practices.



**[Bharatagri: Revolutionizing Indian agriculture](#)**



**[From Tea Stall to Farming Frontiers: The Journey of Gramik's Founder](#)**





# DRONE ANALYSIS IN AGRICULTURE



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Drones have already significantly changed the agricultural industry and will continue to grow in the coming years. While drone use is becoming more useful to small farmers, there is still a ways to go before they become part of every farmer's

equipment roster, particularly in developing nations. Regulations around drone use need to be made and revised in many countries and more research needs to be done on their effectiveness at certain tasks, such as pesticide application and spraying. There are many ways drones can be useful to farmers but it is important to understand their limitations and functions before investing in expensive equipment. Drone Deploy, an agricultural drone supplier and programming company, suggest starting small and incorporating drone data into your organization slowly for the best results. There are few points that exist for drone analysis in agriculture.

- Soil and field analysis
- Crop monitoring
- Plantation & Seeding
- Livestock management
- Crop spraying
- Check crop health
- Avoid overuse of chemicals
- Prepare for weather glitches
- Monitor growth
- Geofencing

## Soil and field analysis

In the Earth sciences sector, sensors for measuring properties of the Earth are rapidly becoming adapted for

drone use now that new developments in technology have led to an increase in the size and payload of unmanned aerial vehicles (UAVs or 'drones'). This article presents two studies that explore the opportunities for adding a gamma-ray spectrometer to a drone in order to map the texture or contamination of soil.

For efficient field planning, agricultural drones can be used for soil and field analysis. They can be used to mount sensors to evaluate moisture content in the soil, terrain conditions, soil conditions, soil erosion, nutrients content, and fertility of the soil.

## Crop monitoring

Agriculture drones are outfitted with cutting-edge sensors and high-resolution cameras, facilitating precision mapping and surveying of agricultural landscapes. These technological marvels empower farmers with intricate insights into topographical variations, soil composition, and drainage patterns across their fields. The resulting data serves as the foundation for optimized planting strategies, resource allocation, and land management.

Crop surveillance is the supervision of crop progress from the time seeds are sown to the time for harvest. This includes providing





fertilizers at the right time, checking for pest attack, and monitoring the effect of weather conditions. Crop surveillance is the only way that a farmer can ensure a timely harvest, especially when dealing with seasonal crops.

Any errors at this stage can result in crop failure. Crop surveillance helps in understanding and planning for the next farming season. Drones can help in effective crop surveillance by inspecting the field with infrared cameras and based on their real-time information, farmers can take active measures to improve the condition of plants in the field.

### **Plantation & Seeding**

Drones can help in planting trees and crops, which was done by farmers before. This technology will not only save labor but also help in saving fuels. Soon, it is expected that budget-friendly drones will be used instead of huge tractors, as they emit harmful gases and pollute the environment in the process.

### **Livestock management**

Drones can be used to monitor and manage huge livestock as their sensors have high-resolution infrared cameras, which can detect a sick animal and swiftly take actions accordingly. So, the impact of drones on precision dairy farming is soon to become a new normal. There are few points that exist in livestock management.

- Locate animals in real-time & offline.
- Save time, effort and money.
- Track missing livestock, even beyond the fence.
- Lifetime ID traceability and tracking.
- No paddock infrastructure required.

- One drone, multiple applications and sensors.

### **Crop spraying & Spray Application**

Agri-drones can be used to spray chemicals as they have reservoirs, which can be filled with fertilizers and pesticides for spraying on crops in very little time, as compared to traditional methods. Thus, drone technology can usher in a new era for precision agriculture.

### **Check crop health**

Farming is a large-scale activity that takes place over acres of land. Constant surveys are necessary to monitor the health of the soil and the crop that has been planted. Manually, this may take days, and even then, there is space for human error. Drones can do the same job in a matter of hours. With infrared mapping, drones can gather information about both the health of the soil and the crop.

### **Avoid overuse of chemicals**

Drones can prove to be especially effective in reducing the overuse of pesticides, insecticides, and other chemicals. These chemicals indeed help to protect the crop. But, their overuse can prove to be detrimental. Drones can detect minute signs of pest attacks, and provide accurate data regarding the degree and range of the attack. This can help farmers calculate the required amount of chemicals to be used that would only protect the crops rather than harming them.

### **Prepare for weather glitches**

Weather conditions can prove to be a farmer's best friend and worst enemy. Since these cannot be accurately predicted, it becomes extremely difficult

to prepare for any shift in patterns. Drones can be used to detect upcoming weather conditions. Storm drones are already being used to make better predictions. And this information can be used by farmers to be better prepared. Advance notice of storms or lack of rain can be used to plan the crop to be planted that would be best suited to the season, and how to take care of planted crops at a later stage.

### **Monitor growth**

Even when everything is going according to plan, crops need to be surveyed and monitored to ensure that the right amount of yield will be available at the time of harvest. It is also important for future planning, whether it is about determining the right price for the open market, or harvesting cyclical crops. Drones can provide accurate data about every stage of crop growth, and report any variations before they become a crisis. Multispectral images can also provide accurate information about subtle differences between healthy and unhealthy crops that may be missed by the naked eye. For example, stressed crops will reflect less near-infrared light as compared to healthy crops. This difference cannot be detected by the human eye always. But drones can provide this information in the early stages

### **Geofencing**

The thermal cameras installed over drones can easily detect animals or human beings. So, drones can guard the fields from external damage caused by animals, especially at night.



# TRIPURA EXPANDS ORGANIC FARMING TO 50,000 HECTARES TARGETS GERMAN MARKET WITH BIRD'S EYE CHILLI

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**T**ripura's government at Agartala, September 27, 2024 has embarked on a transformative plan to increase organic farming across 50,000 hectares, with the goal of exporting its signature Bird's Eye Chilli to Germany. This initiative, unveiled by honourable Agriculture Minister Ratan Lal Nath at a special event in Agartala, is part of the state's broader strategy to

empower local farmers, promote sustainable agricultural practices, and open international markets for its organic products.

## **Health benefits of bird's eye chilli:**

- ➔ **Aids digestion:** Boosts enzyme and gastric acid production, helping digestion and gas expulsion.
- ➔ **Helps lose weight:** Burns fat cells, assisting in faster weight loss.
- ➔ **Treats diseases:** Fights fungal infections, preventing disease spread.
- ➔ **Eases joint pain:** Capsaicin reduces muscle tension and joint pain.
- ➔ **Anti-cancer:** Capsaicin selectively targets and destroys cancer cells.
- ➔ **Improves heart health:** Lowers cholesterol and reduces the risk of heart attacks by dilating arteries.
- ➔ **Prevents stroke:** Enhances blood flow, reducing stroke risk from blood clots.

- ➔ **Increases appetite:** Boosts endorphin production, increasing hunger.
- ➔ **Boosts immunity:** High in vitamin C, enhancing immune function.
- ➔ **Reduces fungal skin infections:** Capsaicin helps clear fungal rashes.
- ➔ **Relieves headaches:** Redirects pain signals, easing headache symptoms.
- ➔ **Anti-inflammatory:** Treats diabetes, arthritis, psoriasis, and nerve damage.
- ➔ **Detoxifies:** Promotes sweating to eliminate toxins from the body.
- ➔ **Increases saliva production:** Enhances metabolism and oral health.
- ➔ **Prevents blood clotting:** Reduces the risk of atherosclerosis and cardiac arrest.
- ➔ **Supports hair growth:** Improves scalp circulation, preventing hair loss.
- ➔ **Regulates blood pressure:** Ensures smooth blood flow, reducing hypertension.





- ➔ **Reduces fever:** Herbal remedy for lowering fever when mixed with other herbs.
- ➔ **Treats flu:** Clears nasal congestion by loosening mucus.
- ➔ **Promotes eye health:** Vitamin B2 content protects eyes and improves vision.

During the event at the SARS Complex in AD Nagar, Ratan Lal Nath distributed transport vehicles to Farmers Producer Companies (FPCs) to enhance logistical capabilities. These vehicles are expected to help farmers deliver their produce more efficiently, reducing waste and improving their market reach. "Farming doesn't stop at cultivation. If the produce can't reach the market, it risks going to waste. That's why improving logistics is essential," Nath said. The initiative aligns with Prime Minister Narendra Modi vision of sustainable agriculture, emphasizing organic farming methods that minimize the use of chemical fertilizers and pesticides. "We are focusing on scientific and organic cultivation to protect the environment and ensure healthier food. The aim is to practice

farming without the use of harmful chemicals," Nath explained.

The government's efforts have already yielded results, with Tripura successfully exporting its Queen Pineapple to Germany. Now, there's a growing demand from the European market for Bird's Eye Chilli. Nath highlighted that this success has spurred the state to increase production, not only of chilli but also other organic crops like aromatic rice. "We are working tirelessly to expand our organic farming practices. There is strong demand for our Bird's Eye Chilli, and we want to meet that demand by increasing our organic cultivation. The state's organic farming footprint has expanded significantly in recent years, Tripura has seen a rapid increase in organic farming land from just 2,000 hectares in previous years to over 26,000 hectares today. The government has set a target to reach 50,000 hectares in the near future, with the goal of boosting both domestic and international demand for its organic products.

In addition to expanding land under cultivation, Tripura is introducing

modern farming technologies to increase productivity while maintaining sustainability. By adopting advanced techniques, the state hopes to strengthen its position in the global market for organic products, contributing to environmental conservation and creating more resilient farming systems.

This large-scale push towards organic farming is part of the state's broader strategy to improve farmers' incomes. By supporting local producers from cultivation to marketing and securing international buyers, Tripura's government is ensuring that agriculture remains a profitable and sustainable livelihood. With its commitment to sustainable agriculture and growing presence in international markets, Tripura is positioning itself as a key player in the organic farming sector. Through continued innovation, logistical improvements, and expanding organic production, the state is not only enhancing its agricultural economy but also securing a prosperous future for its farmers.



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