

Marvels of Modern Agriculture Technologies for Farming in India

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By 2050, the world's population is expected to increase to nearly 9 billion people. Finding ways and means to create enough food to feed it is difficult. The difficulty of reducing the amount of land used for agriculture and food loss during production and distribution are having a significant influence on the planet. The only way to go forward to a future where there is enough food is to increase the role of technology in tackling these concerns. Technology has the potential to boost output, reduce a nation's reliance on foreign exchange, and raise the general living standards of farming communities. India still has a long way to go before adopting technologically advanced modern farming methods. Teaching farmers about the advantages of technology, which are few and far between, requires groundbreaking efforts. The problem that must be met in order to create a better future is getting over the limitations of antiquated farming methods and mediaeval attitudes. Agriculture technology has the ability to make India genuinely "Atmanirbhar Bharat" in all respects and less reliant on outside influences.

Despite the fact that India's agriculture is mostly reliant on the natural world, climate change and other concerns make farming uncertain. Teaching farmers how to employ cutting-edge technology and creative strategies to boost production and profitability is urgently needed. Natural resources have been viewed as being used by agricultural development techniques over time more quickly than they could be replenished. The "natural" carrying capacity of the land is under strain to meet the demand for food and shelter brought on by the exponential rise of the human population.

Pollution, soil erosion, the dwindling number of animals, and changes to the flora and fauna brought about by humans are all signs of natural imbalance. It is reasonable to predict that the Agri-ecosystem will face higher demands as a result of the continued growth in human population. Therefore, technology has played and will continue to play a significant role in agricultural and sustainable development in the future.



With the development of digital technology, the role of technology in farming and agricultural activities has expanded. Agriculture is evolving as a result of innovation, which lowers costs and boosts productivity. Farmers are benefiting from this. Agriculture is undergoing continual improvement because to the use of digital and analytical technologies, and this trend is here to stay. This has improved crop yields and contributed to the farming community's income.

Importance of Technology in Agribusiness

Fertilizers, insecticides, seed technology, etc. are only a few examples of how technology in agriculture affects various aspects of agriculture. Pest resistance and higher agricultural yields are products of biotechnology and genetic engineering. Efficiency in tilling and harvesting, as well as a decrease in physical labour, are all results of mechanization. The impact is seen everywhere since irrigation techniques, transportation infrastructure, processing machinery, and other factors have all improved. Robotics, precise farming, artificial intelligence, blockchain technology, and other modern technologies are highlighted.

Some technological advancements that have innovated agriculture:

Mechanization of agriculture has increased production - The amount of energy and production that can be produced by manual labour and hand tools employed in agriculture is constrained, especially in tropical climates. Due to accessibility, cost, and maintenance concerns, resistance to agricultural mechanization, especially among smallholder farmers, frequently has a negative impact.

Combine harvesters are being used more frequently as a way to eliminate manual labour and speed up procedures. Small landholdings are a hallmark of Indian farming, and collaboration is required to benefit from contemporary machinery. Future usage of mechanization services will increase as farmers' capacity is increased through mentoring, new machinery is made available, especially on small farms, and affordability issues are addressed through policy. Agricultural mechanization has the ability to reduce post-harvest losses and boost harvest gains, which could have a direct and indirect impact on yields.

Climate/ weather prediction through artificial intelligence

The application of artificial intelligence in agriculture is a significant development (AI). Data collection is made possible by current technology and AI-based solutions, which also aid in precision farming and well-informed decision-making. Drones, remote sensors,

and satellites continuously collect data on the weather in and around fields, giving farmers crucial knowledge on temperature, rainfall, soil, humidity, and other factors. However, in a nation like India, where subpar farming, dispersed landholdings, and other factors operate as barriers, AI finds gradual acceptance. But there's no denying that AI-based technology can increase output exponentially while bringing precision to large-scale farming.



Artificial intelligence, automation, and unique monitoring gadgets contained in waterproof enclosures are all aimed to help farmers with task like:

- Plant seeding and spacing
- Growth management
- Water disbursement
- Energy conservation
- Grafting and harvesting
- Plant packaging and preparation

Resilient crops developed via use of biotechnology

Traditional breeding techniques, genetic engineering, and the creation of microbes specifically for agriculture are just a few of the many procedures that fall under the broad umbrella of agriculture. In general, genetic engineering employs an understanding of DNA to pinpoint and manipulate genes to improve animal and agricultural resistance to pests. Farmers and final consumers stand to gain from the application of biotechnology in agriculture on a broad scale. The adoption of SAFE biotechnology has faced resistance

because to various contentious methods, but there is no doubt that with the changing environment and rising population, agriculture's future is highly dependent on it.



Agriculture Sensors

Smart farming is now possible in India thanks to the country's rapidly developing communications technology. In order to help farmers, monitor and optimise crops given the environmental conditions and constraints, sensors are now being employed in agriculture.



These wirelessly connected sensors have a wide range of uses, including pinpointing precise locations, measuring airflow, identifying nutrients, and analyzing the moisture and composition of soil. Farmers can use sensors to apply fertilizer more effectively while using fewer pesticides and labour hours. With the least number of natural resources necessary, they enable farmers to maximize output.

Satellite Imaging

The continuous yield symbolism has been taken into account as distant satellite imagery has become more sophisticated. Not only are there aerial views, but also images with a 5-meter-pixel target and even higher resolution. Yield symbolism enables a rancher to view crops as if they were still there even though they are not. Whatever the case, continually glancing at photos can help a homestead save a lot of time and money. Additionally, this innovation can work with sensors for soil, water, and yield to provide ranchers with alerts and appropriate satellite images when threat edges are reached.



Improving farm yields and supply chain management use Big Data

Big data is evolving as a result of the gathering, assembling, and subsequent processing of data to make it useful for decision-making/problem-solving. Smart farming is expected to heavily rely on big data, and this will have positive effects on both the markets and the entire supply chain. Agriculture is expanding and is influenced by a wide range of factors.





As a result, complicated data is being gathered and used more frequently, which requires effective interpretation and management. Information may come from markets, supplier networks, social media, sensor/machine data from the fields, or from external sources like supplier networks. Crop production, supply chain management, yield prediction, and other aspects of agriculture are changing as a result of the use of big data.

Livestock monitoring

In order to operate large-scale livestock operations effectively, chips and body sensors are essential. Body sensors and chips measure essential data and signs that could identify disease early and stop herd infection. Similar to this, ultrasounds are a helpful tool for determining the quality of meat. The quality of the meat is improved and under better control as a result.

