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Towards precision agriculture

Harnessing environmental data through tech is vital for such a shift

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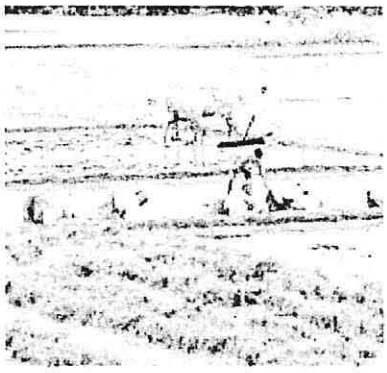
In the 2020-21 Economic Survey, agriculture in GDP accounted to 19.9 per cent, an increase from 17.8 per cent in 2019-20. The last time the sector contributed such figures was in 2003-04. In spite of the current political climate surrounding India's agricultural sector, it has witnessed a shot in the arm through a myriad of incentives this past year. Like the ₹4,000 crore allocation towards Pradhan Mantri Krishi Sinchayee Yojana to provide irrigated water access to farmers. It's all part of the government's ambitious goal to double farm income by 2022.

At the same time, there is a dire need to confront the requirement of increased agricultural production to feed a growing population. Crop production must be increased by 60-100 per cent by 2050. The answer is not aggressive farming, but sustainable practices while soldiering through climate change, depletion of natural resources, increased erosion, and more.

To meet the future demand for food, data scientists are counting on agribusiness to fuel innovation. Today, precision agriculture is harnessing the power of artificial intelligence (AI). IoT, satellite imagery, drones, Web-GIS frameworks, Big Data, cloud and machine learning are expected to improve global agricultural productivity in the near future.

According to the *Indian Journal of Fertilisers*, precision agriculture is basically the 'right-input' at the 'right-time' in the 'right-amount' at the 'right-place' and in the 'right-manner' for improving productivity, conserving natural resources and avoiding any ecological or social tribulations.

But to arrive at these desired results, huge amounts of data collation is required. Environmental data, through technological intervention, has already fuelled better farming techniques in developed countries.



Way forward Sustainable farming

However, it's no secret that environmental data has permeated and is effecting positive change in Indian agriculture.

Sensors and analysis tools can boost crop yield. In order to do this, environmental data is collected in the geospatial format to measure quantifiable variables like weather, soil moisture, volumetric soil temperature, fertiliser rates, water run-off, agrochemicals movement and rain.

Often, precision agriculture requires the use of non-destructive measures such as remote sensing with geographic information systems (GISs) and global positioning systems (GPSs). This expanding technology enables land owners to optimise output and minimise risk combining satellite data and ground sensors that work as a network.

Companies like Tata Kisan Kendra (TKK) and Fasal are already implementing these technologies in India.

Data for conservation

Precision conservation, a subset of precision agriculture, is primarily restricted to soil and water conservation in agricultural and natural ecosystems. Spatial technologies and procedures help create conservation management practices across natural and agricultural systems.

Again, global positioning systems, remote sensing, geographic information systems are incorporated to achieve insights that can be made use of for efficient harnessing of soil and water. For instance, the Indian Institute of Maize Research undertook the 'Development of precision conservation agriculture practices in cereal-based system in Indo-Gangetic Plains'. After two years, in 2020, the project leaders unearthed notable achievements, including around 82 per cent water saving in maize-wheat as compared to rice-wheat cropping systems.

Soil test-based nutrient management practices have for long helped improve foodgrains production. However, the nutrient use efficiency has been met with roadblocks. Accordingly, scientists and researchers have shifted to crop improvement instead of working on soil.

Losses of reactive nitrogen will significantly impact the environment via emissions of nitrous oxide, ammonia emissions, nitrate leaching losses and off-site transport of surface losses of nitrogen. Using a GreenSeeker optical sensor, researchers at the Department of Soil Science, Punjab Agricultural University, conducted seven field experiments during 2004-06 to observe in-season sensor documentation and wheat production, along with the application of nitrogen fertiliser. They observed higher yields and a more efficient use of the fertiliser.

It's evident that environmental data, along with the application of analytics and AI, will certainly improve the current siloed data management.

Environmental data can help influence a paradigm shift to digitally transform agriculture using real-time dashboards that monitor crops, water requirements, fertiliser effectiveness, market and economic conditions, too. Environmental data is thus leading the way towards modernising agriculture. Of course the technologies are here, but its wide-scale implementation is still a dream to be realised.

The writer is CIO and Co-Founder of Ambee