

Precision agriculture can do wonders for Indian farming

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Farmers are looking at selling their land and moving away from farming as a livelihood.

The worrisome reality in India is that agriculture is facing a crisis. In village after village, farmers are looking at selling their land and moving away from farming as a livelihood.

Poor availability of funds, unscientific farm inputs, poor support price structures for farm produce and almost no farm insurance are some important reasons that lead to crippling debts that force farmers to see farming as non-remunerative.

Without mechanisation, farming is hard, back-breaking work. This has resulted in most farmers' children quitting farming for other vocations.

Also, farmers get more money from selling their land to builders, malls and factories than they would ever get from farming. This has put more pressure on farmland, thereby requiring technologies to increase productivity so that the shrinking acreage can feed the billion-plus people of India in the future.

India, though one of the biggest producers of agricultural products, has an average farm productivity of only 33 per cent of that of farms the world over. This productivity needs to be increased so that farmers can get more remuneration from the same piece of land -- with less labour.

Precision agriculture (PA) may provide a way to do it. PA is the application of precise and correct amount of inputs like water, fertiliser, pesticides, etc., at the correct time to the crop, to increase productivity and maximize yields.

It originated in the US and European countries where the use of Global Positioning Satellite (GPS) allows precise mapping of farms. This, together with appropriate software, informs the farmer about the status of his crop, which area of the farm requires water, fertiliser and pesticide, etc. It includes the practice of sub-surface drip irrigation for precise water and fertiliser application to the crops, the use of heavy farm machinery for sowing, harvesting, weeding and baling. Heavy farm machinery currently uses a significant quantity of fossil fuel which may not be economical for small farmers.

With the help of robots and autonomous farm machinery -- also called IOT (Internet of things) -- PA will make perfect sense in small farms as they can also run on renewable fuels like bio-oil, compressed biogas and electricity produced on farms by agricultural residues. Autonomous farm machinery capable of no-till sowing, weed removal, harvesting and other farming operations are ideal for small farms in India.

Similarly, drones have started being used in Japan and the US for insecticide application to the crops. Many of these robotic machines and drones are small in size and are excellent for small farm applications.

The application of PA in the US and other countries has shown tremendous increase in productivity, lowering of inputs and, thereby, increased remuneration to the farmers. It has also helped to improve the quality of land with no-till farming and less use of water.

Critics of mechanisation and PA need to open their eyes to farm machinery leasing agencies in rural areas. These companies or enterprises lease mechanised drones for spraying, robotic crop harvester equipment, including drip irrigation systems, to the farmers. They also provide trained manpower to run these machines.

These already exist on a limited scale in India. A few agencies undertake wheat harvesting using combines and spraying of crops and charge farmers on a per hour basis. With the unavailability of farm labour, agriculturists find this concept economical and attractive. In Western Maharashtra, more and more farmers are depending on mechanisation offered by such agencies.

With increasing demand, these leasing enterprises will increase and as PA develops and increases, they will get more structured and available on demand. In the days to come, these leasing companies may form the backbone of Indian agriculture by providing the necessary advice and manpower to the farmers on PA.

Critics of mechanisation seldom recognise that traditional farming requires timely availability of labour, water and fertiliser. These things are no longer predictable. Thus, PA can help in this matter.

The most important component in taking PA forward will be in creating a huge resource of engineers, scientists and agriculturists to develop various components of the technology. Without excellent manpower and consequently good R&D, PA will not succeed.

There is need for excellent engineers from institutions like IITs and NITs to design machinery like robots and drones for PA. This can be facilitated by establishing a new branch of engineering called agricultural mechatronics or robotics where faculty and students from almost all branches of engineering will interact and collaborate to develop smart systems for PA.

Another way forward is when scientists from Indian Council of Agriculture Research institutes, engineers from the academic world, industry and farmers work together in developing PA. Industry can develop the machinery and set up leasing agencies. This will result in more job creation and more students will join the agricultural mechatronics stream.

PA will also provide a platform for industrial corporate social responsibility (CSR) activity, since improving the livelihood of India's rural poor through high-tech farming can qualify as a CSR activity. The Indian government can facilitate in this process by giving soft loans and sops to the industry to incentivise agriculture and PA activities.

High-tech PA can, therefore, help in bringing the next Green Revolution to India and can produce tremendous rural wealth in a sustainable and environmentally sound way. Farmers and farms are the backbone of any country as they are producers of food, fuel (agricultural residues) and wealth from the land. They should be helped by all members of society and developing PA is a step in the right direction.

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