



Road to Smart and Precise Agriculture

This editorial is based on [“Precision farming needs to be promoted to get more output with less exploitation of natural resources”](#) which was published in The Indian Express on 03/09/2022. It talks about the status of Agriculture in India and sustainable measures for its development.

For Prelims: Biosecurity, Soil Health Card Scheme, NABARD, Minimum Support Price, E-NAM Portal, Paramparagat Krishi Vikas Yojana (PKVY), National Mission For Sustainable Agriculture (NMSA), AgriStack, Micro Irrigation Fund, Biosecurity

For Mains: Significance of Agriculture in the Indian Economy, Recent Government Initiatives for the Development of the Agriculture Sector, Blending Traditional and Frontier Technologies in Agriculture

The [Green Revolution in India](#) that started in the **1960s** enabled the nation to make great strides in **domestic food production** and significantly contributed to progress in agriculture and allied sectors. It transformed India **from a food-deficit nation to a food-surplus, export-oriented country**.

In India, **70% of rural households still depend primarily on agriculture** for their livelihood, with 82% of farmers being small and marginal.

However, now India is facing second-generation problems, especially related to sustainability, nutrition, the **adoption of new agricultural technologies** and income levels of the population dependent on farming.

What is the Significance of Agriculture in the Indian Economy?

- **Food Security and Induced Growth of Industrial Sector:** Flourishing Agricultural production in India is the main factor behind the food security of the large Indian population.
 - Agriculture supplies raw materials to various agro-based industries like **sugar, jute, cotton textile and vanaspati industries**. [Food processing](#) industries are similarly dependent on agriculture.
 - Increase in rural purchasing power is very necessary for industrial development as two-thirds of the Indian population live in villages.
 - After the **green revolution the purchasing power of the large farmers increased due to their enhanced income**.
- **Source of Government Revenue:** Agriculture is one of the major sources of revenue to **both the central and State government** of the country. The government is getting a substantial income from **rising [land revenue](#)**.
 - Some other sectors like railways, roadways are also deriving a good part of their income from the movement of agricultural goods.
- **Contribution to International Trade:** Agriculture plays an important role in international trade.

Jute, tea, coffee and spices are the country's well known conventional exports.

What are the Current Challenges Confronting Indian Agriculture?

- **Degrading Soil Health:** Due to wind and water erosion, deforestation, and **urbanisation**, removal of natural vegetation, converting forests to farms is degrading soil health to a large extent.
 - The analysis of the [Soil Health Card Scheme](#) shows alarmingly **low levels of soil organic carbon (SOC) across India** (an important indicator of soil health).
- **Shrinking Farm Size:** Labour productivity is constrained owing to land sizes. The **average farm size in India has been consistently becoming smaller**, hampering labour productivity, and limiting economies of scale.
 - Farm size of the majority of the rural household has declined to unviable levels inducing **farmers to leave land and look for better job opportunities in cities**.
- **Per Drop More Crop:** At the national level, only **52% of India's [gross cropped area \(GCA\)](#) is under irrigation coverage**.
 - Despite significant strides since independence, a large proportion of farms in India still depend on the [monsoon](#) for irrigation, limiting their ability to increase cropping intensity.
- **Lack of Convenient Access to Credit:** A convenient line of credit is not available to small and marginal farms. As per the [NABARD 2018 survey](#), **farmers with smaller plot sizes took a greater share of loans from the non-institutional lenders** than did farmers with larger plot sizes (> 2 hectares)
 - This indicates that more **small and marginal farmers rely on (expensive) informal sources of credit than large ones**.
- **Crop Insecurity:** Despite the rapid [commercialisation of Indian agriculture](#), most farmers, especially small and marginal farmers, tend to **place cereals at the centre of their cropping system** (because of **Minimum Support Price**) and neglect [crop diversification](#).
- **Ineffective Percolation of Policies:** Land leasing laws in India have taken forms that discourage formal leasing contracts between the owner and the tenant.
 - There are a **large number of unofficial tenancies in the country**. Due to the lack of identification of tenants, benefits intended for tenant farmers such as [disaster relief](#) and [direct benefit transfers](#) are at risk of being distributed to the land owner who appears to be the cultivator on official records.

What are the Recent Government Initiatives for the Development of the Agriculture Sector?

- [E-NAM Portal](#)
- [Paramparagat Krishi Vikas Yojana \(PKVY\)](#)
- [Pradhan Mantri Fasal Bima Yojana \(PMFBY\)](#)
- [Micro Irrigation Fund \(MIF\)](#)
- [AgriStack](#)

What Should be the Way Forward?

- **Blending Traditional and Frontier Technologies:** Traditional technologies in the field of [rainwater harvesting](#) and [recycling of organic waste](#) for **plant nutrient, pest management, etc.** have been found to be very useful and relevant.
 - In order to bring a **synergistic impact**, traditional technologies should be blended with the modern frontier technologies like [tissue culture](#), [genetic engineering](#), to achieve higher productivity.
- **Input Intensive to Knowledge Intensive Agriculture:** India is known for its **diversity of farming practices**. It is important to **get diverse points of view engaged in a national-level dialogue** to find suitable solutions for the future.
 - Also, the **Advanced world is moving towards [precision farming](#)** using sensors and other

scientific tools for exact practices and application of inputs.

- A **smart and precise move towards high-tech farming in India** will reduce average cost, raise farmers' income, and address many other challenges of scale.
- **Investing in Research and Innovation:** In order to **offset the [impact of climate change on agriculture](#)** and work towards **[sustainable agriculture](#)**, an increase in research and innovation in the agricultural sector is necessary.
 - For instance, **the livestock sector contributes the greatest amount of carbon emissions within the agriculture sector in India**, therefore, assessing their impacts is crucial to finding sustainable solutions.
 - Innovative Technologies like **[GIS \(Geographical Information System\)](#)** and **[AIML \(Artificial Intelligence and Machine Learning\)](#)** are all bursting out to provide the basis for a revolutionary epoch in agriculture.
- **Towards Biosecurity:** Since, **India is susceptible to pest and weed attacks**, there is a need for a strategic and integrated approach to deal with the risks posed to animal and plant life and their health along with food safety of consumers.
 - **M S Swaminathan**, chairman of the **[National Farmers Commission](#)**, had also recommended establishing a **National Agricultural [Biosecurity Program](#)**.
- **Upgrading Agricultural Surplus Management:** An infrastructure upgrade and development program are needed for **[post-harvest handling](#), seed, fertiliser and agrochemical quality regulation**.
 - Additionally, it is necessary to promote **grading and standardisation of procurement centres**.
- **Harvesting Rich Returns Through Market Integration:** There is a need to streamline domestic markets and put in place the infrastructure and institutions to **connect local markets with national and global markets**.
 - To facilitate smooth integration between domestic and world markets, and to manage trade liberalisation more effectively, India needs a **nodal institution that can monitor world and domestic price movements** closely and take timely and appropriate measures to avoid major shocks.

Drishti Mains Question

Trace India's transformation from food-deficit to a food-surplus nation. Highlight the challenges confronting agricultural growth.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q.1 How is permaculture farming different from conventional chemical farming? (2021)

1. Permaculture farming discourages monocultural practices but in conventional chemical farming, monoculture practices are predominant.
2. Conventional chemical farming can cause an increase in soil salinity but the occurrence of such phenomenon is not observed in permaculture farming.
3. Conventional chemical farming is easily possible in semi-arid regions but permaculture farming is not so easily possible in such regions.
4. Practice of mulching is very important in permaculture farming but not necessarily so in conventional chemical farming.

Select the correct answer using the code given below.

- (a)** 1 and 3
- (b)** 1, 2 and 4
- (c)** 4 only
- (d)** 2 and 3

Ans: (b)

Q.2 Which of the following is the chief characteristic of 'mixed farming'? (2012)

- (a) Cultivation of both cash crops and food crops
- (b) Cultivation of two or more crops in the same field
- (c) Rearing of animals and cultivation of crops together
- (d) None of the above

Ans: (c)

Q.3 With reference to micro-irrigation, which of the following statements is/are correct? (2011)

1. Fertilizer/nutrient loss can be reduced.
2. It is the only means of irrigation in dry land farming.
3. In some areas of farming, receding of ground water table can be checked.

Select the correct answer using the codes given below:

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (c)

Mains

Q.1 What are the present challenges before crop diversification? How do emerging technologies provide an opportunity for crop diversification? **(2021)**

Q.2 How has India benefited from the contributions of Sir M. Visvesvaraya and Dr. M. S. Swaminathan in the fields of water engineering and agricultural science respectively? **(2019)**