

## Agriculture - Modern farming practices

Sn	Method of farming	Details
1	Precision Farming	Precision farming, also known as precision agriculture, utilizes technology such as GPS, sensors, and drones to gather real-time data on soil conditions, crop health, and weather patterns. This data-driven approach enables farmers to optimize the use of resources such as water, fertilizers, and pesticides, reducing waste and environmental impact.
2	Hydroponics	Growing plants in nutrient-rich water solutions instead of soil. There are six separate types of hydroponic systems- Wick system, water culture, Ebb and flow( flood&drain), Drip, NFT( Nutrient film technology) and aeroponic systems.
3	Aeroponics	Aeroponics is an advanced method of soil free cultivation where plants are suspended in air and their roots are periodically misted with a fine, nutrient-rich solution. Aeroponic enables higher growth rates, better nutrient uptake, and significantly reducing the need for water and fertilizers.
4	Aquaponics	Aquaponics is a symbiotic farming system combining aquaculture (fish farming) and hydroponics (soil-less plant cultivation). The waste produced by fish is utilized as a nutrient source for plants, while the plants purify the water for the fish. This closed-loop system ensures efficient resource utilization and high yields of both fish and vegetables.

5	Vertical farming	Vertical farming is a revolutionary approach to agriculture where crops are cultivated in stacked layers, often within urban environments. This method maximizes land usage and optimizes resource efficiency using artificial lighting, controlled climate, and precise nutrient delivery systems. Vertical farms can grow various crops, including leafy greens, herbs, and certain fruits, providing fresh produce year-round.
6	Organic farming	With the increasing awareness of the importance of healthy and chemical-free food, organic produce farming has gained immense popularity. Organic farmers avoid synthetic pesticides and fertilizers, focusing on natural methods to enhance soil fertility and pest control. The demand for organic fruits, vegetables, and grains continues to rise, presenting an excellent opportunity for farmers to cater to health-conscious consumers.
7	Vertical Farming and Controlled Environment Agriculture (CEA):	Vertical farming and controlled environment agriculture (CEA) involve growing crops in vertically stacked layers or controlled environments such as greenhouses or indoor facilities. These technologies optimize land use, reduce transportation costs, and enable year-round crop production while minimizing the need for pesticides and herbicides. By providing precise control over temperature, Humidity,light, and nutrient levels, vertical farming and CEA allow farmers to create ideal growing conditions for various crops.
8	Robotics and Automation:	Robotics and automation technologies are revolutionizing various aspects of farming, from planting and harvesting to weed control and crop monitoring. Autonomous vehicles and robots can perform tasks with precision, reducing labor requirements and minimizing the use of chemical inputs. These technologies enhance efficiency, productivity, and worker safety while also reducing

		environmental impact. Robots equipped with sensors and artificial intelligence can identify and selectively remove weeds, minimizing the need for Herbicides. Automated harvesting machines can improve efficiency, reduce post-harvest losses, and ensure timely harvests.
9	Big Data and Analytics	<p>Big data and analytics enable farmers to make data-driven decisions, optimize crop management, and predict and prevent potential issues.</p> <p>By leveraging historical and real-time data, farmers can enhance productivity, reduce waste, and make more sustainable choices. Advanced analytics can provide insights into crop health, pest and disease outbreaks, and climate patterns, allowing farmers to take proactive measures to protect their crops and optimize resource utilization.</p>
10	Genetic Engineering and biotechnology	Through genetic modification, crops can be developed with enhanced traits, such as drought tolerance, disease resistance, and increased nutritional value. Biotechnology techniques like marker-assisted selection and gene editing allow scientists to precisely manipulate plant genomes to improve crop traits.
12	Smart Irrigation Systems:	Smart irrigation systems utilize sensors and weather data to provide accurate information on soil moisture levels and crop water requirements, minimize water wastage, conserve resources.
13	<i>Biofortification</i>	Biofortification is the process by which the nutrient density of food crops is increased through conventional plant breeding, and/or improved agronomic practices and/or modern biotechnology without sacrificing any characteristic that are preferred by consumers or most importantly to farmers. The biofortified varieties are rich in important nutrients, such as zinc, iron, calcium and protein, among others.
14	<i>Digital Technology</i>	Adoption and diffusion of digital technologies in agriculture can help in transforming agricultural systems

		towards sustainability. Adoption of technologies such as artificial intelligence, robotics, remote sensing image analysis, optical sensors and equipment design for monitoring have huge potential for sustainable development
15	<i>Drone technology</i>	use of drone technology in the agricultural industry has the potential to revolutionize crop management practices and increase yields. Facilitate real-time monitoring, identifying well-watered areas of their farm, prevent issues arising from soil erosion, used for aerial topdressing, which involves spreading fertilizer over the field, crop dusting, which involves spraying crops with crop protection products
16	Regenerative Agriculture	A holistic approach that focuses on restoring soil, land, and ecosystem health. Key techniques include composting, rotational grazing, and reduced tillage.
17	Hydroponic Greenhouses	Hydroponic greenhouses utilize water-based nutrient solutions to grow plants without soil. This technology gives farmers complete control over the growing conditions, including temperature, humidity, and nutrient levels.
18	Vermicompost	Vermicompost is the process of using earthworms to convert organic waste into nutrient-rich compost. This natural and eco-friendly composting method enhances soil fertility, making it invaluable for organic farming.
19	Solar-Powered Farms	Solar-powered farms are an innovative approach to sustainable agriculture. By installing solar panels on agricultural land, farmers can generate renewable energy while continuing regular farming practices. This energy can power farm operations and even be sold back to the grid, providing an additional revenue stream. Solar-powered farms contribute to reducing carbon emissions and help

		combat climate change.
20	Bee Vectoring Technology:	Uses commercially reared bees to deliver targeted crop controls through pollination, replacing chemical pesticides with an environmentally safe crop protection system.
21	Agro forestry	Agro forestry Integrates trees and shrubs into agricultural landscapes to improve soil fertility, prevent erosion, and enhance biodiversity.
22	Tissue culture	Tissue culture is a special way of propagating plants. It allows plants to be <u>asexually reproduced</u> at a large scale and low cost. Most of the techniques for culturing are based on the source material used, some of which are: seed culture, embryo culture, proplast culture and callus culture
23	Algae Farming	Algae farming involves cultivating different types of algae for various applications. Algae can be used for food, bio-fuel, pharmaceuticals, and wastewater treatment. Algae are highly efficient at photosynthesis, making them a promising source of sustainable biomass. Algae farming has immense potential, especially as industries seek eco-friendly and renewable resources.
24	Green house farming	growing crops year-round in controlled structures made with transparent materials to regulate the temp, humidity, light.

Compiled by G Rajender Reddy General secretary TIA