

## The Future of Drones in Agriculture

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Agriculture drones offer numerous advantages over traditional methods, from precision and efficiency to cost savings and environmental benefits. Their ability to enhance farming operations is transforming the agricultural landscape. The future of drone technology in agriculture is bright, with ongoing advancements promising even greater capabilities. From improved sensors, to greater payload capacities, to autonomous flight systems, the potential for innovation is limitless. By integrating drones into agriculture operations, farmers can achieve greater efficiency, sustainability, and profitability, ensuring that agriculture meets both present and future needs

Drone farming leverages unmanned aerial vehicles (UAVs) equipped with sophisticated sensors and cameras to collect detailed leaf-level imagery of your fields. Combined with artificial intelligence (AI), data ranges from plant and soil health to pest infestations and yield potential, empowering farmers to make informed decisions that optimize their operations and boost their bottom line. The purpose, usage and benefits of using drones in agriculture operations are as under.

Sn	particulars	Details
1	Purpose and usage of drones in agriculture operations.	<ul style="list-style-type: none"><li>● Crop Monitoring: Monitor plant health, growth stages, and stress levels to identify potential problems early on.</li><li>● Precision Spraying: Apply pesticides, herbicides, and fertilizers with pinpoint accuracy, minimizing waste and environmental impact.</li><li>● Irrigation Management: Optimize water usage by precisely mapping soil moisture levels and tailoring irrigation accordingly.</li><li>● Yield Prediction: Forecast yields based on real-time data to improve planning and resource allocation.</li></ul>

2	Benefits of usage of drones in agriculture	<ul style="list-style-type: none"> <li>• Increased Yield and Quality: Precise insights into crop health and crop threats allow for targeted interventions, leading to improved yields and higher-quality produce.</li> <li>• Reduced Costs and Waste: Efficient resource allocation minimizes inputs like water, fertilizer, and pesticides, saving money and protecting the environment.</li> <li>• Improved Labor Efficiency: Drones automate time-consuming tasks like field scouting and monitoring, freeing up farmers for other critical activities.</li> <li>• Enhanced Sustainability: Data-driven insights enable farmers to adopt sustainable practices like precision irrigation and cover cropping.</li> <li>• access to hard to reach areas</li> <li>• Reduced Risk: Early detection of problems like pests and diseases helps prevent widespread damage and financial losses</li> </ul>
3	Usage of Drone technology	<p>Drone farming typically involves three stages:</p> <ul style="list-style-type: none"> <li>● Data Collection: Drones equipped with multi spectral cameras, LiDAR sensors, and other technologies fly over fields, capturing high-resolution images and data points.</li> <li>● Data Analysis: Specialized AI-powered software analyzes the collected data, generating detailed maps and reports that</li> </ul>

		<p>highlight crop threats, crop health, soil conditions, and potential issues.</p> <ul style="list-style-type: none"> <li>● Actionable Insights: Crop advisors and farmers use the insights to make informed decisions about crop inputs and crop management practices.</li> <li>● Technologies used: Multi spectral cameras, NDVI analysis, AI-powered assessment algorithms.</li> </ul>
4	Problems	<ul style="list-style-type: none"> <li>● Adverse weather and extreme temperatures may damage the drones.</li> <li>● High initial cost and repairs</li> <li>● license&amp; regulations etc</li> </ul>
5	Average price of drone	<ul style="list-style-type: none"> <li>● The average agricultural drone price in India ranges from INR 1.5 lakh to INR 12 lakh depending on model, payload capacity, range, battery life, and features such as AI guidance, precision spraying, and mapping.</li> </ul>
6	Factors to be considered before buying	<ul style="list-style-type: none"> <li>● <u>DGCA Certification</u>: Ensure the drone and its manufacturer are approved by the Director General of Civil Aviation (DGCA)</li> <li>● Quality and Features: Look for drones with robust build quality, sufficient flight time, battery efficiency, and relevant features like multi spectral sensors for crop management,</li> <li>● <u>After-Sales Service</u>: Partnering with companies that offer strong after-sales support, spare parts, and maintenance is crucial for reliable drone use.</li> <li>● <u>Cost-Effectiveness</u>: Consider not only the initial cost but also the long-term value and affordability for farmers, potentially through cooperative models or drone-as-a-</li> </ul>

		service offerings etc
7	Subsidy component	<p>subsidies for financing agriculture drones are available in India through several government schemes, such as the Sub-Mission on Agricultural Mechanization (SMAM), the Kisan Drone Scheme, and the Namo Drone Didi scheme for women's groups. The following beneficiaries are eligible.</p> <ul style="list-style-type: none"> <li>● <i>FPOs &amp; CHCs</i>: Farmer Producer Organizations (FPOs), Cooperative Societies, and Custom Hiring Centres get 40% subsidy (up to ₹4 lakh per drone).</li> <li>● <i>Agricultural Graduates</i>: Eligible for 50% subsidy (up to ₹5 lakh per drone) when setting up Custom Hiring Centres.</li> <li>● <i>Individual Farmers</i>: Small, marginal, women, SC/ST, and Northeast farmers can benefit from <b>50% subsidy</b> (up to ₹5 lakh per drone); others get 40% (up to ₹4 lakh).</li> <li>● <b>Agriculture Infrastructure Fund (AIF)</b>:</li> <li>● Offers loans up to ₹2 crore for drone purchases and related infrastructure, featuring a <b>3% interest subsidy</b> and collateral-free options.</li> </ul>
8	Drone manufacturing companies	<p>AeroFarm Technologies</p> <ul style="list-style-type: none"> <li>• Location: Bengaluru, Karnataka</li> <li>• Founded: 2017</li> <li>• Flagship Drone: AeroFarm Pro-X8 (AI-enabled, multispectral)</li> <li>• Key Features: Offers advanced AI-based analytics, seamless integration with agri-</li> </ul>

		<p>management platforms, and bulk pesticide spraying solutions.</p> <ul style="list-style-type: none"> <li>• Clients: Large agri-businesses, government projects, FPOs.</li> </ul> <p>Agrosmart India</p> <ul style="list-style-type: none"> <li>• Location: Pune, Maharashtra</li> <li>• Founded: 2018</li> <li>• Flagship Drone: Agrosmart Eagle 4</li> <li>• Key Features: Focused on real-time crop health monitoring, custom-built for Indian crop types, and well-known for data-driven advisory.</li> <li>• Clients: Regional cooperatives, research institutions, and large commercial farmers.</li> </ul> <p>CropX India</p> <ul style="list-style-type: none"> <li>• Location: Hyderabad, Telangana</li> <li>• Founded: 2016</li> <li>• Flagship Drone: CropX HyperScout</li> <li>• Key Features: Provides end-to-end digital integration, multispectral imaging, and strong AI-driven analytics for irrigation, soil, and input optimization.</li> <li>• Clients: Top agriculture companies in India, export firms, agri-tech startups.</li> </ul> <p>Garuda Aerospace</p> <ul style="list-style-type: none"> <li>• Location: Chennai, Tamil Nadu</li> <li>• Founded: 2015</li> <li>• Flagship Drone: Kisan Drone</li> <li>• Key Features: Known for affordable spraying drones for small and marginal farmers, rapid deployment, and strong</li> </ul>
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		<p>training support.</p> <p>Marut Drones</p> <ul style="list-style-type: none"> <li>• Location: Hyderabad, Telangana</li> <li>• Founded: 2019</li> <li>• Flagship Drone: AG-365 Pro</li> <li>• Key Features: Specializes in AI-based crop disease detection, scalable drone fleets, and mapping services for land records.</li> </ul> <p>IoTechWorld Avigation</p> <ul style="list-style-type: none"> <li>• Location: Gurugram, Haryana</li> <li>• Founded: 2018</li> <li>• Flagship Drone: Agribot</li> <li>• Key Features: Robust drones for pesticide spraying and large-scale field coverage, plus dedicated farmer training programs.</li> </ul> <p>General Aeronautics</p> <ul style="list-style-type: none"> <li>• Location: Bengaluru, Karnataka</li> <li>• Founded: 2016</li> <li>• Flagship Drone: GA Agribot-X5</li> <li>• Key Features: Enhanced flight stability, remote diagnostics, and advanced imaging for research farms and agribusinesses.</li> </ul> <p>Skylark Drones</p> <ul style="list-style-type: none"> <li>• Location: Bengaluru, Karnataka</li> <li>• Founded: 2014</li> <li>• Major Focus: Providing high-resolution data and aerial analytics for farm management, compliance, and project planning.</li> </ul>
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Compiled by G Rajender Reddy, General secretary TIA