

Machine Learning for Crop Yield Prediction Market Forecasts to 2032 – Global Analysis By Component (Software and Service), Deployment Model (Cloud-based and On-premises), Farm Size, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Machine Learning for Crop Yield Prediction Market is accounted for \$900.56 million in 2025 and is expected to reach \$4175.42 million by 2032 growing at a CAGR of 24.5% during the forecast period. Machine learning for crop yield prediction leverages advanced algorithms to analyze large volumes of agricultural data—such as weather patterns, soil properties, satellite imagery, and historical crop yields—to generate accurate forecasts of crop productivity. Moreover, farmers and agronomists can make data-driven decisions, maximize resource use, and improve the efficiency of food production by using machine learning to find intricate patterns and relationships that traditional models might miss. Despite climate variability and rising global demand, these predictive models can adjust over time, becoming more accurate as new data becomes available, and eventually support sustainable farming methods and food security.

According to the Indian Council of Agricultural Research (ICAR), hybrid machine learning models, such as LASSO-SVR, have demonstrated high accuracy in predicting wheat yields across various Indian regions, with normalized Root Mean Square Error (nRMSE) values as low as 0.6% in Patiala.

Market Dynamics:

Driver:

Increasing food demand as a result of population growth

The demand for food is expected to increase by 60–70% by 2050 as the world's population approaches 10 billion. The agricultural industry is under tremendous pressure to increase crop yields without increasing the amount of arable land. By precisely forecasting crop yields, machine learning can be extremely helpful in enabling farmers to take preventative action to maximize output and reduce losses. Additionally, stakeholders can improve food availability and price stability by planning for distribution, logistics, and storage with the help of timely predictions.

Restraint:

Restricted availability of localized and high-quality data

Large amounts of high-quality, varied, and localized data—such as soil composition, crop type, planting schedules, pest incidence, and current weather conditions—are necessary for accurate machine learning predictions. In many places, particularly developing nations, such detailed information is unobtainable, out-of-date, or inconsistently documented. Furthermore, the accuracy of the model may also be impacted by the lack of resolution or frequency of satellite and drone data in rural areas. ML algorithms cannot function at their best without trustworthy data inputs, which restricts their applicability in yield forecasting.

Opportunity:

Combining satellite and remote sensing technologies

The precision and frequency of crop monitoring has increased due to advances in remote sensing and satellite imaging, such as those from NASA, ESA (European Space Agency), and private companies like Planet and Airbus. ML algorithms can process these large datasets to identify crop stress, growth patterns, and early signs of pest or disease outbreaks. Moreover, accurate and scalable yield forecasts across large and diverse geographies are made possible by the integration of ML with satellite data, and the opportunities for ML in agricultural forecasting will only grow as access to high-resolution imagery continues to improve.

Threat:

Monopolization of data by tech companies

Smaller startups and local players who cannot afford costly data subscriptions or proprietary platforms are threatened by the increasing dominance of large multinational technology firms over access to key agricultural data, such as satellite imagery, weather feeds, and farm analytics. This leads to a monopolistic environment where innovation becomes dependent on a few gatekeepers, making it difficult for smaller or regional ML service providers to compete or even survive. Additionally, excessive control over agricultural data by a few corporations may limit open access, reduce transparency, and impede the equitable distribution of technological benefits to farmers and public institutions, ultimately slowing down the spread of ML for crop yield prediction.

Covid-19 Impact:

The COVID-19 pandemic significantly accelerated the adoption of machine learning for crop yield prediction as disruptions in supply chains and labor shortages highlighted the need for more precise and automated agricultural management tools. Amidst the heightened uncertainty in food production and restricted field access, farmers and agribusinesses resorted to data-driven technologies in order to maximize resource utilization and more accurately predict yields. But there were drawbacks as well, like slower technology adoption, less money for R&D in some areas, and disruptions in data collection procedures. Furthermore, the market was pushed toward greater digital transformation overall by COVID-19, which also highlighted the vital significance of resilient, technologically enabled agricultural systems.

The cloud-based segment is expected to be the largest during the forecast period

The cloud-based segment is expected to account for the largest market share during the forecast period. In contemporary agricultural technology landscapes, cloud-based solutions are the preferred option over traditional on-premises systems because they enable real-time data processing, remote monitoring, and integration with IoT devices, improving predictive accuracy and decision-making. Additionally, cloud services facilitate collaboration across various stakeholders and enable continuous updates and improvements. These platforms enable farmers and agribusinesses to access powerful analytics and machine learning models without the need for significant upfront infrastructure investment.

The research institutions segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the research institutions segment is predicted to witness the highest growth rate. Governments and private organizations have made significant investments in agricultural research and development, which is driving this growth. For example, the National Mission on Interdisciplinary Cyber-Physical Systems, which focuses on AI and ML applications in agriculture, has received ₹3,660 crore from the Indian government. In order to improve productivity and sustainability, partnerships between organizations like Punjab Agricultural University and BITS-Pilani also seek to incorporate robotics, AI, drones, and Internet of Things sensors into agriculture. Moreover, the importance of research institutions in developing machine learning applications for crop yield prediction is highlighted by these initiatives.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share. This dominance is explained by the region's large-scale agricultural data collection from weather stations, IoT sensors, and satellite imagery, all of which greatly improve machine learning model accuracy. Furthermore, significant public and private sector investments—including a noteworthy \$200 million investment by the US government in AI technology for agriculture—have accelerated the development of data-driven agricultural practices and precision farming. North America is positioned as a leader in the adoption and application of machine learning technologies for crop yield prediction due to these factors taken together.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR. Governments in nations like China and India are making large investments in agricultural technology in an effort to improve food security and sustainability, which is what is driving this growth. India's Digital Agriculture Mission and China's unveiling of a 20-story AI-powered vertical farm, for example, demonstrate the region's dedication to incorporating AI into agriculture. Moreover, these programs are promoting innovation, speeding up the region's adoption of machine learning technologies, and enhancing crop yield forecasts.

Key players in the market

Some of the key players in Machine Learning for Crop Yield Prediction Market include BASF SE, International Business Machines (IBM), Keymakr Inc., Microsoft Azure, Raven Industries Inc., FarmWise Labs Inc., Bayer AG, Agrograph Inc., Ceres Imaging

Inc., Aerobotics Ltd., Cropin Technology Solutions Pvt. Ltd., Sentera Inc., Trace Genomics Inc., Xyonix Inc, Corteva Inc, AgriWebb Pty Ltd, CropX Inc., IUNU Inc. and Terramera Inc.

Key Developments:

In May 2025, Tech Company IBM and Deutsche Bank DB have expanded their long-term partnership with a new agreement that gives Deutsche Bank more access to IBM's wide range of software tools. This includes IBM's automation software, hybrid cloud services, and its watsonx artificial intelligence (AI) platform. Deutsche Bank will also get the latest version of IBM Storage Protect, which will improve how the bank protects and manages its data.

In April 2025, BASF and the University of Toronto have signed a Master Research Agreement (MRA) to streamline innovation projects and increase collaboration between BASF and Canadian researchers. This partnership is part of a regional strategy to extend BASF's collaboration with universities in North America into Canada. This is a great achievement for BASF, as it marks the company's first MRA with a Canadian university.

In September 2024, FarmWise™ and RDO Equipment Co., a dealer of intelligently connected agriculture, construction, environmental, irrigation, positioning, and surveying equipment from leading manufacturers, including John Deere, announce an exclusive partnership to deliver FarmWise's Vulcan precision weeding and cultivation implement to vegetable growers in the Southwest regions of the United States.

Components Covered:

Software

Service

Deployment Models Covered:

Cloud-based

On-premises

Farm Sizes Covered:

Small

Medium

Large

End Users Covered:

Farmers

Agricultural Cooperatives

Research Institutions

Government Agencies

Other End Users

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

What our report offers:

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2024, 2025, 2026, 2028, and 2032
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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