THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
March 2024 Vol.4(3), 1049-1052
Popular Article

Precision forming a futuristic approach

Dr Rahul Kumar, Mohit Kumar, Sweta Singh
College of Agriculture, Bhusawar Bharatpur, SKNAU, Jobner
https://doi.org/10.5281/zenodo.10851619

Abstract

Precision agriculture is an emerging technology that uses advanced techniques to optimize crop production and reduce waste. To give farmers real-time information on their crops and land, the system integrates sensing, mapping, and data analytics. This article discusses the potential benefits of precision agriculture, including increased efficiency and reduced environmental impact, and its role in the future of agriculture.

Introduction

A method of farming called precision agriculture, sometimes referred to as precision farming or site-specific farming, uses technology to increase crop yield and decrease waste. The technology gives farmers access to real-time data about their crops and soil through sensing, mapping, and data analytics. Making decisions about planting, fertilizing, and growing crops can be done so using this knowledge.

Precision agriculture is a farming management strategy based on observing, measuring and responding to temporal and spatial variability to improve agricultural production sustainability.[2] It is used in both crop and livestock production. Precision agriculture often employs technologies to automate agricultural operations, improving their diagnosis, decision-making or performing. The goal of precision agriculture research is to define a decision support system for whole farm management with the goal of optimizing returns on inputs while preserving resources.

Among these many approaches is a Phyto geomorphological approach which ties multi-year crop growth stability/characteristics to topological terrain attributes. The interest in the Phyto geomorphological approach stems from the fact that the geomorphology component typically dictates the hydrology of the farm field.

The practice of precision agriculture has been enabled by the advent of GPS and GNSS. The farmer's and/or researcher's ability to locate their precise position in a field allows for the creation of maps of the spatial variability of as many variables as can be measured (e.g. crop yield, terrain features/topography, organic matter content, moisture levels, nitrogen levels, pH, EC, Mg, K, and others). Similar data is collected by sensor arrays mounted on GPS-equipped combine harvesters. These arrays consist of real-time sensors that measure everything from chlorophyll levels to plant water status, along with multispectral imagery. This data is used in conjunction with satellite imagery by variable rate technology (VRT) including seeders, sprayers, etc. to optimally distribute resources. However, recent technological advances have enabled the use of real-time sensors directly in soil, which can wirelessly transmit data without the need of human presence.

1. Increased Efficiency

Precision agriculture has the potential to increase efficiency in crop production by reducing waste and optimizing resource use. Farmers may increase yields and cut expenses by using real-time data to help them decide when to plant, fertilise, and harvest their crops. The technology can also help farmers identify areas of their fields that are underperforming, allowing them to take corrective action.

2. Reduced Environmental Impact

Precision agriculture can also help reduce the environmental impact of agriculture. By using real-time data to optimize resource use, farmers can reduce the amount of fertilizer and pesticides they use, which can help reduce pollution and soil degradation. The technology can also help farmers identify areas of their fields that are prone to erosion, allowing them to take steps to prevent soil loss.

3.Data Analytics

Data analytics is an important component of precision agriculture. By analyzing real-time data, Farmers can recognize themes and relationships that can aid in their decision-making regarding crop output. The technology can also help farmers identify potential problems before they become serious, allowing them to take corrective action before it is too late.

4. Role in the Future of Agriculture:

In the future of agriculture, precision agriculture is anticipated to be crucial. By 2050, the world’s largest population is projected to exceed 9 billion, causing a greater need for food and placing pressure on farmers to grow additional crops. Precision agriculture can help farmers increase efficiency and reduce waste, which can help meet this demand while reducing the environmental impact of agriculture.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 21.03.2024

Precision Agriculture and Predictive Farming

According to McKinsey, the invention and adoption of Precision Agriculture is shaped by the following trends-

Big Data and Advanced Analytic Capabilities, and Robotics — aerial imagery, sensors, and sophisticated local weather forecasts. In simple words farming that collects and uses data from plots for managing and optimizing the production of crops is known as predictive farming.

Predictive farming is analogous to taking a pill to target an ailment. The solutions are highly tailored from the type of crop suitable for a plot to the use of pesticides in targeted regions only. Adopting precision agriculture and modern farming reduces production costs and wastage, as the tailored needs of each plot are catered to.

Precision agriculture is practiced by adopting crop management software and technical equipment. Rigorous data collection is done on soil testing, plot measurement, weather pattern analysis, and crop analysis through sensor-equipped devices placed on the fields. The data is calibrated to devise conclusions, and based on those results, a detailed and precise set of practices can be adopted.

Scope of Precision Agriculture

Examples of Precision Farming include the adoption of the same set of practices that use smart farming technologies to cater to the needs of individual plots and crops. Big data analytics software such as Cropin Grow (SmartFarm) or robots such as drones can get detailed information on the plot, soil type, suitable crops, irrigation, and fertilizer needs. The information obtained is used to tailor a very unerring selection of crops, fertilizer quantity, and watering needs. Precision agriculture helps farmers live a debt-free life as production costs and losses are reduced and overall environmental impact is also minimized.

Advantages of Precision Agriculture

By using precision ag technologies and practices, farmers can target their inputs (such as seeds, fertilizers, and pesticides) to specific areas of the field that need them the most, rather than applying them uniformly across the entire field.

This targeted approach can help farmers save on inputs, as well as increase crop yield and quality. In addition, precision ag technologies can help farmers monitor and manage their crops more effectively, allowing them to respond to potential problems (such as pests or diseases) more quickly and effectively.

Farmers can leverage sensors and mapping tools to precisely apply fertilizers at the right rate and location. In addition, precision ag technologies can help farmers optimize their irrigation practices, which can save water and energy.

Since details of areas in a single farm can be traced, precision agriculture benefits farmers

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 21.03.2024

in several ways.

Discussed below are some of its key advantages:

- A refined set of cultivation practices and choice of crops based on the suitability of land
- Elimination of volatility and risk
- Waste management
- Reduced production costs
- Minimum environmental impact
- Optimized use of fertilizers
- Water management with optimized irrigation practices
- Improved soil health

Conclusion

Precision agriculture is an emerging technology that has the potential to transform agriculture. By using advanced sensing, mapping, and data analytics, farmers can optimize crop production and reduce waste. The technique can boost productivity, lessen agriculture's negative environmental effects, and aid in meeting the rising need for food. Precision agriculture is set to become a vital tool for farmers all around the globe as technology improves.

References

Lowenberg-DeBoer, J., & Swinton, S. (2015). Precision agriculture and sustainable intensification. Global Food Security, 4, 39-43.

Scholten, H., Groenwold, J., & Bach, H. (2019). Precision agriculture: A challenge for crop protection research. Journal of Pest Science, 92(2), 343-353.

Schirrmann, M., Gerhards, R., & Völker, L. (2015). Precision agriculture on the rise: Farm-level economic implications. Land Use Policy, 45, 225-232.

Swain, K. C., Nanda, S., & Rout, B. (2019). Precision agriculture: A boon for sustainable agriculture. In S. Das, S. Mohapatra, & S. K. Mohanty (Eds.), Advances in agricultural machinery and technologies (pp. 119-139). Springer.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Published 21.03.2024