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Use of GIS, GPS and Remote Sensing for Fertilizer Recommendations

Amit Kumar*, Shabnam, Priyanka Sanwal

Departement of Soil Science, CCS Haryana Agricultural University, Hisar, Haryana, 125004

*Corresponding Author
Amit Kumar*

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INTRODUCTION

The use of Geographic Information Systems (GIS), Global Positioning System (GPS), and Remote Sensing (RS) technologies for fertilizer recommendations can help farmers improve their crop yields and profitability while also reducing input costs and protecting the environment. These technologies allow for the creation of detailed maps and spatial data that can help farmers accurately target specific areas of a field for fertilization. By using GIS and GPS to guide the application of fertilizers, farmers can apply the right amount of fertilizers to specific areas, reducing the risk of over- or under-application. This can help save money and reduce the risk of fertilizers leaching into the environment, protecting water quality and reducing greenhouse gas emissions. Additionally, GIS and RS technologies can provide a wealth of data that can help farmers make informed decisions about fertilization and other management practices. Overall, the use of GIS, GPS, and RS technologies can help farmers optimize fertilization practices and improve crop yields. Precision agriculture is a method of managing natural resources in agriculture that has the potential to increase crop yields and economic returns. It involves customizing agricultural management to the specific conditions of each field, including the use of fertilizers, which must be applied efficiently and carefully to maximize returns. Precision farming techniques, which use GPS and other technologies, are used to optimize the use of soil resources, increase yields, reduce production costs, and minimize negative impacts on the environment. GIS analytical capabilities can be used to evaluate various factors that can impact agricultural production, such as yield variability, soil chemical and physical properties, and variations in management practices. These factors include crop density, height, and nutrient and water stress, as well as weed, insect, and disease infestations and wind damage.

Additionally, physical parameters of the field and tillage, seeding, fertilization, and irrigation practices can also be analysed.

Geographic Information System (GIS)

Geographic Information System (GIS) is a technology used to capture, store, manipulate, analyse, and present geographic data. GIS allows users to visualize and understand data in the context of location, making it a powerful tool for understanding spatial patterns and relationships. GIS can be used to analyse and map a wide range of data, including demographic data, land use patterns, and environmental data, among others. It is commonly used in fields such as geography, urban planning, natural resource management, and agriculture, among others. GIS technology includes hardware, software, and data and can be used to create maps, analyze data, and perform spatial analyses.

Global Positioning System (GPS)

Global Positioning System (GPS) is a satellite-based navigation system that allows users to determine their precise location, speed, and direction of movement. GPS technology uses a network of satellites orbiting the Earth to transmit signals to GPS receivers on the ground. By receiving and analysing these signals, GPS receivers can determine their location, speed, and direction of movement with high accuracy. GPS is commonly used for a wide range of applications, including navigation, mapping, surveying, asset tracking, and location-based services. It is also used in precision agriculture to help farmers more accurately apply agrochemicals, irrigation water, and other inputs to crops.

Remote Sensing

Remote sensing is the use of sensors on aircraft, satellites, or other platforms to measure and analyze the characteristics of the Earth's surface and atmosphere. Remote sensing allows scientists and analysts to collect data about the Earth's surface and atmosphere without physically being present on the ground. This data can be used to study a wide range of phenomena, including land cover, land use, vegetation, water resources, and natural disasters, among others. Remote sensing technology includes sensors that measure different wavelengths of the electromagnetic spectrum, such as visible light, infrared, and microwave, to gather data about the Earth's surface and atmosphere. Remote sensing data can be used to create maps, monitor changes over time, and perform spatial analyses. It is commonly used in fields such as geography, earth science, natural resource management, and agriculture, among others.

Objectives:

- Using the crop yield data and foliar analysis to create a map of variable fertilizer rates.
- Utilizing a decision support system to develop foliar nutrient maps from foliar analysis.
- Determining specific fertilizer rate requirements for a site.
- Optimizing crop production by increasing yield and efficiently using fertilizers.

Benefits:

There are several benefits of using GIS, GPS, and remote sensing (RS) technologies in fertilizer recommendation:

1. Improved precision: These technologies allow for the creation of detailed maps and spatial data that can help farmers accurately target specific areas of a field for fertilization.
2. Increased efficiency: By using GIS and GPS to guide the application of fertilizers, farmers can apply the right amount of fertilizers to specific areas, reducing the risk of over- or under-application.
3. Reduced input costs: By applying fertilizers more precisely, farmers can save money by using less fertilizer while still maintaining or improving crop yields.

4. Environmental benefits: Precise fertilization can help reduce the risk of fertilizers leaching into the environment, protecting water quality and reducing greenhouse gas emissions.
5. Improved crop yields: By using these technologies to optimize fertilization practices, farmers can improve crop yields and increase their profitability.
6. Enhanced decision making: GIS and RS technologies can provide a wealth of data that can help farmers make informed decisions about fertilization and other management practices.

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