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Commentary

Variable Rate Application in Precision Agriculture

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DESCRIPTION

Precision agriculture is also known as satellite crop management or site-specific crop management. For this reason, decision making support systems for overall operational management have been developed with the aim of periodically optimizing the inputs and outputs of various systems. This precision controlled farming practice is a GPS (Global Positioning System) based resource that takes into account; crop yields, water content, pH, and many other field-related variables. By organizing multiple sensors, multispectral imaging is also used to detect different characteristics and pathologies of plants. Remote sensing and short-range technologies show great potential in detecting various plant diseases by using advanced technologies to detect various factors such as epidemiology and the environment.

Precision agriculture is often defined by the technology that makes it possible and is often referred to as Global Positioning System Agriculture (GPS) or Variable Rate Agriculture. Equipment is important, but it is only a few thoughts to understand that information is the only most important factor for accurate agriculture. Managers who use information effectively generate higher returns than managers who do not.

Variable rate applications (VRA) in precision agriculture is a technical area focused on automated applications of materials in specific landscapes. The method of applying the material is based on data collected from sensors, maps and GPS. These materials include fertilizers, chemicals, seeds, etc., all of which helps to optimize crop production.

Variable rate application technology and fertilization

Zoning or management zones: Management zones are individual parts of the field where different materials need to be applied. When using variable rate application for precision agriculture, it is important to determine the zone in which a particular material is applied by the machine. Otherwise, problems may occur. Due to its importance, the first step in applying fertilizer with variable rate application technology is to establish the correct management zone. It is also important to make sure that this information is properly entered in the VRA system itself.

Map based or sensorbased VRA: The application of variable rate technology in precision agriculture can be map-based or sensor-based. The second step is to determine which format is more appropriate for the problem. This can also be affected by the limitations of the variable rate application technology used. Map-based VRT is when a landscape map is created and populated into the system before the system begins activity. Sensor-based means that variable-rate technology integrates the sensor which automatically detects the data that helps in determining which fertilizer to apply. For example, it could sense the crop health and make a decision based on that.

What data imagery should be used: After selecting map-based or sensor-based, the next step is to specify the type of data that the sensor collects or the type of image used for mapping. Many VRA technologies use drones and other imaging systems to get information about landscapes. Others include the sensors of the application hardware itself. The most common machine-based sensors are Yara's Nsensor, Fritzmeier's Isaria, and Trimble's Green Seeker. Information related to fertilization includes soil quality and materials, plant species, climate information, and vehicle speed during fertilization. All these and other information will be available through the variable rate application technology used.

VRA in precision agriculture focuses on many areas other than fertilization. Some of the other uses of VRA technology are the application of herbicides, lime and other chemicals, sowing, the detection of weeds and diseased plants.

Overall, VRA technology is primarily used to detect information about a particular landscape and let the system make decisions based on that information. The decisions made by the VRA technology system determine which materials should be applied to the land.

The advantage of the VRA system is that it helps to automate this part of the agricultural process. The more automation and precision a company implements in its business, the more money it can save through increased production and efficiency.

The various economic benefits of VRA are listed below

One of the important economic benefits is using the VRT to apply the right amount of nutrients combined with the ideal seeding rate, production can be more from every acre of land while reducing the amount of wasted product results in optimized yield quality and productivity.

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Crop production traceability: In addition to being an unparalleled tool for increasing productivity, VRT's digitized information makes it easy to trace the history of everything applied to the fields.

Environmental sustainability: The sustainability of the whole earth is not taken. Only the sustainability of specific farm is considered. Using VRT could reduce the level of chemicals putting out per acre, therefore reducing soil damage and increasing the lifespan of fields in the long run.