Program 1PA-2

Using Yield Maps To Manage A Field's Production

Presented by Dennis Burns

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The incorporation of harvest yield data and soil zones to develop comprehensive soil sampling plans is the first step in creating management zones. Management zones are one method a producer uses to obtain the maximum profitable production from a field. In some cases maximum profitable production is not necessarily the highest yield in the field. A typical field has several different potential yield levels based on soil types, irrigation availability, elevation, or other external factors. Using Veris Electrical Conductivity data to delineate soil texture zones is one way to develop these management zones. If Ec data is not available, digital soil type maps are available through the USDA Soil Data Mart website and can be used. Soil maps are usually more general than Ec maps but are a good place to start. Yield data alone can be used to define management zones, but the more information about a field available the better the definition of a field. Using all the information available, soil type, Ec, irrigation, elevation, and yield, the greater the profitability of individual zones can be achieved.

Starting with zones based on soil type or Ec data is a good beginning. From this point, overlay yield maps to see how well the yield matches up to the zones. Uniform yields across the same zone simplify management decisions. This is actually what you are striving for with your management plan for a particular field. Uniformity makes it easier to decide yield goals, seeding rates, fertility rates, plant growth regulators, and other production decisions. Variety selection is another decision which can be assisted thru management zones. If a field has a history of high yield production, selecting a high producing variety is simple. The confounding dilemma is when the field has highly variable yields across several zones. At this point, past yield data ensures that the producer can select the best variety suited for the field. A producer has to ask several questions in this process: what is the field's yield goal, how much of the field is high, average or low yielding, and how are those areas defined in management zones. These questions help a producer decide do they want a super high yielding variety which requires high inputs and consistent growing conditions or is a variety which doesn't require high inputs, can take inconsistency during the growing season and still make reasonable yields. Profitability potential for that particular field becomes the end decider.

Developing a soil sample plan based on the management zones is the next step. These soil samples would be made up of numerous soil cores taken from all parts of the zone to insure the most uniform results. Acreage per composite sample will vary but should not exceed 10 acres. There may be smaller areas within a zone that have extreme high or low yields and these should be sampled separately to determine if the cause is soil related. These individual point sample's locations should have gps coordinates taken for ground-truthing when the results are returned. While this method is more time consuming, the results are one of the best ways to reach a field's production and profitability goals.

Using precision agriculture practices as part of a producer's management is a long term process. Accurate yield data is the best measurement of a field's potential yield and profitability. Collecting, analyzing and developing management zones from yield data takes

time and each year is different. Additional information such as: crop rotations, soil sampling, crop sensing and irrigation add to the time involved in developing the management zones. A popular misconception about precision agriculture is about saving money, but precision agriculture is about managing money, balancing inputs to yield goals for maximum profits.

Program 3PA-2

The Use Of NDVI Sensors To Apply Variable Rate Nitrogen To Crops In Northeast Louisiana

Presented by Ralph Frazier

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Nutrient management of crops has been identified as a critical challenge affecting the quality of our nation's water resources in agricultural and rural watersheds. Water conservation and protection have become important parts of agricultural stewardship. Moreover, proper management of nitrogen can improve the soil and protect the environment without negatively impacting crop yield. Over-application of nitrogen fertilizer can serve as a potential non-point source of pollution for surface and ground waters. Excess amounts of applied nitrogen not utilized in the yield production of a crop can be leached from the soil to adjacent water sources such as farm ponds, recreational lakes or wetlands. Loss of nitrogen creates a negative financial impact on the farm through unnecessary expenditures, and changes the natural ecosystem in nearby water bodies causing excess vegetative growth with the potential for causing a negative impact on wildlife.

The adoption of precision agricultural techniques requires the use of specialized equipment and technology, some of which may already be on a producer's existing equipment. Understanding how to use the available precision agriculture equipment or to justify the purchase of equipment is a major factor in being able to realize any gains from having the equipment. As producers use the equipment more, it is only natural they would want to expand its use, thereby lowering the cost/return on the equipment.

Crops in Northeast Louisiana are grown in fields with many environmental variables, including soil type, soil fertility levels, temperature fluctuations, humidity levels and sometimes-inadequate rainfall. To maximize production across these variable environments without over or under application of nitrogen inputs, the use of precision agriculture equipment is vital.

An innovative approach to best management practices (BMPs) for fertilizer is the Right Source, Right Rate, Right Time, Right Place concept. This practice is also known as 4R nutrient stewardship. Precise management practices for fertilizer applications allow the farmer to manage crop fertilizer needs by selecting the right source-rate-time-place combination of the 4R Nutrient Stewardship practice. This project has demonstrated the 4R concept to help farmers understand how the right management practices for nitrogen fertilizer contribute to sustainability goals for agriculture. Active light sensors are used to measure NDVI, normalized difference vegetative index, which measures the health and vigor of plants. NDVI is a measurement of the relationship of red light which is absorbed by the plant and near infrared which is reflected back to the sensor. The greater the biomass and health of the plant the more red light is absorbed and the more NIR is reflected. The use of crop sensors mounted to fertilization equipment can aid the farmer in applying various rates of nitrogen and can significantly increase the efficiency of nitrogen-based fertilizers.

Site specific application of nitrogen based on crop sensor measurements is the next step in on-farm applications of research being currently conducted by LSU AgCenter scientists. The demonstrations were conducted in coordination with the producers' normal operations. The producer planted the crop in the demonstration field according to his normal operating plan, during the recommended planting window, and treated according to Best Management Practices. The producer applied nitrogen fertilizer to the demonstration field at the normal time. The sensor controlled portion of the field was treated with 50% of the farmers' standard