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AGRONOMY UPDATE

On-Farm Product Trialing

Agronomic products generally fall into one of the following categories: pesticides, fertilizer blends, and biologicals (such as inoculants or soil additives). Pesticides are heavily regulated with registration meaning that the pesticide not only passes safety standards but has extensive data and trials that accurately depict the effect of the product. Alternatively, fertilizer blends and biologicals registration is purely based on safety standards, with no burden of proof related to how the product works. This means that the burden of proof is put onto agronomists and farmers since there is no public standard or research for performance of these products. Often buzzwords like enzyme activation, testimonials, or selective data are used in place of real non-biased agronomic data to sell a product, leaving farmers to wade through an infinite amount of product claims.

On farm product trialing is the only way for producers to properly assess a product's value on their farm while mitigating economic risk of onboarding a new product. There are several things to keep in mind when it comes to selecting and trialing products. The first is that what might work on a farm in one region or area might not work on another farm or area because there are so many factors affecting the outcomes of the product, such as soil properties, weather conditions, and ecological interactions. Therefore, it is important to trial a product even if extensive data is provided, as the context the data was collected from would be different from your farm. Second is that not all data or data analysis is created equal. The best data is randomized within and between sites over several years and data evaluation needs to be selected carefully for a credible analysis, as the data can be manipulated for a specific outcome, so it is important to not just look at the data, but how the data was gathered and analyzed as well.

When setting up a trial it is best to design the trial on the type of evaluation that will be conducted as it is easy to go out of scope creating misleading or useless results. Therefore, it is important to address only one element at a time while all other factors remain the same to ensure the results are based on the element that is looked at and not impacted by other factors. For example, if you want to test different rates, only assess one product at a time. If you want to assess multiple products, only assess one rate for each product. In addition, it is important to have an expectation of results, which will guide your evaluation and trial setup. Just saying a product will increase yield is usually not enough, you need to think of how you expect it to impact the crop, such as increase seedling vigor or reduce bertha

armyworm damage. This will inform how you determine a product will be evaluated. Yield is an end point summary assessment that can relate to the tested variable, but often another direct measurement such as seedling emergence, tillering, vigor, or grain quality is also needed to ensure that there can be a direct cause and effect correlation. Next, consider the conditions that need to be met for the trial to work, this includes costs and manpower, especially at harvest. How are you going to ensure the test strips are treated with the correct product or rate? If testing different products, how are you going to clean equipment between products to ensure that there is not cross contamination between treatments? How many fields are you going to assess? The best strip trials are uniform in size and randomized across the field with at least 2 years of assessment. Finally, determining the economic threshold where this product would be considered successful to maximize the return on investment. Making a clear "cut-off" point where a product is not economically viable when planning a trial makes decisions based on the data a lot easier and prevents bias.

Figure 1 shows an ideal setup in a field where the strips maintain the same sample size and are randomized throughout the field. In this example there are two products, "Mixture" and "Source" being tested and a control of "none" for comparison. A control is necessary to establish a baseline which the products will be compared to. This specific field is an odd shape, so only strips that maintain the same sample area are being used to ensure that the data is comparable across the strips. In addition, historically this field has better yield on the south side, so it is important to include both the higher yielding area and the lower yielding area to fully grasp how the product performs. The strips are randomized to ensure that uncontrollable variables, like overlap or interaction between products, do not impact the data. Finally, during data analysis the strip area that will be analyzed will be slightly smaller than the strips to account for drift or leaching, so we ensure that the data we are looking at is only impacted by the product.

Figure 1: Example of a randomized strip trial on the BRI training ground with two products, "mixture" and "source" with a control of "none."

With the development of precision agriculture technology and digital tools, the ability to conduct trials is becoming easier than ever with the capacity to create the trial beforehand and ensure proper placement of product with GPS and section control. This example trial was set up in the John Deere Operations Center and could be imported into a machine to ensure accurate placement and work plans. In addition, collecting data during harvest is a lot easier with combine yield data automatically uploaded to Operations Center allowing for data analysis without any manual labor aside from initial calibration. If you have any questions surrounding trial setup, Operations Center, or statistical data analysis, please contact me and I will be happy to assist you.

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