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FACTSHEET ON SOIL FERTILITY AND NUTRIENT MANAGEMENT

Some Nutrient Management Considerations on No-Till Corn Versus Conventional Tillage

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No-till corn planting in Michigan generally involves planting seed in cold and wet soils. A thick residue cover on a no-till soil surface contributes to a delay in the spring soil warm up. Organic matter mineralization and initial root growth will be sluggish, limiting early season nutrient availability and uptake to plants. Under these conditions, no-till corn and soybeans will respond well to starter and pop-up fertilizers. Unlike on a conventional till seed bed, positioning the seed and fertilizer band at a precise depth may be difficult when heavy surface residues are present, so right adjustments of planting tools are required to ensure good seed to soil contact and proper starter fertilizer distance from the seed.

Phosphorus (P) and nitrogen (N) and are the key nutrients in starters, but including some potassium (K) can be beneficial on cool wet soils with heavy residue. However, because of toxicity to seed, the total salt level (N plus K20) in the starter should not exceed 100 lb./A. Phosphorus does not contribute to salt injury. Recently there has been a trend toward incorporating secondary and micronutrients, such as sulfur (S), zinc (Zn,) manganese (Mn) and copper (Cu), with starter bands. Liquid ammonium polyphosphate (10-34-0) and dry Monoammonium phosphate (MAP; 11-52-0) are popular starter fertilizers on no-till fields. Some farmers apply both starter and pop-up fertilizers. With pop-up, salt injury due to fertilizer in direct contact with the seed is a primary concern, so the safe application rates of N plus K20 is much lower than for starters and should not exceed 10 lb./A for silt loam and clay loam and 5 lb./A for sandy and sandy loam soils. The 10-34-0 used as pop-up at 8.6 gal/A (weighing 11.6 lb./gal) will supply 10 lbs. of N and 34 lbs. P_2O_5. Liquid pop-ups have some advantages over solids, because it is easier to regulate lower application rates. Also, based on the label, options are available for pesticides to be mixed with liquid pop-up.

A challenge with continuous no-till as opposed to conventional till is the development of an acid layer in the top 2 to 3 inches of soil, especially if N fertilizer has been applied on the surface. No-till fields may require more frequent liming compared to conventional tillage. It is best to check the surface pH annually. Ideally, this can be done by taking two soil samples, one 2 to 3 inches from the surface for pH and lime recommendation, and another from the conventional 8 to 9 inches depth—including the surface layer—for P and K recommendations.

Nutrient stratification is also a concern on no-till fields, where surface applied nutrients such as P and K build up in the surface layers and not in the entire root zone. For this reason, no-till is best suited on high fertility soils. Otherwise, soil fertility levels should be built up before starting no-till. Alternatively, the fields should be plowed every three to four years to mix lime and fertilizer. No-till is not recommended on low fertility and strongly acid soils.

Another factor to consider on no-till is the use of urease inhibitors where urea or urea-ammonium nitrate (UAN) solutions are surface applied. Urease inhibitors will temporarily block the function of the

urease enzyme and reduce ammonia volatilization losses. Anhydrous ammonia and UAN solutions that are injected on no-till fields has no such concern.

An overall sound nutrient management strategy based on a comprehensive soil testing program in combination with appropriate fertilizer sources, application rates, planting equipment and other best practices would enable no-till corn producers to improve their net returns to fertilizer investment, which may cost up to $150 per acre this year.

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