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Nitrogen Application with Irrigation

Irrigated production has the advantage of fertigation as an option in nitrogen management. Fertigation is the process of applying fertilizer through irrigation water. Liquid 28% nitrogen is the most common product for fertigation, but urea and micro-nutrient solutions are also available to meet crop nutrient needs, with proper equipment.

Fertigation is often the last step in a three split nitrogen management plan, following starter and side dress applications. Starter allows quick access to nutrients to the newly germinated plants. Side dress applications usually account for the greatest portion of N budget, feeding the plant just prior to the rapid growth phase. Depending upon the equipment used, side-dressing can also aerate soil and improve water infiltration. Fertigation makes up the remainder of the budget supplying nitrogen to the crop just prior to tassel emergence. For efficient use, Nitrogen applications need to be made prior to tasseling to ensure that the nitrogen applied is in an available form for the plant to uptake and use during early grain formation.

From a management standpoint, fertigation allows producers the opportunity to evaluate crop stands, N losses due to wet conditions or heavy rains and the current market situation to make adjustment to the nitrogen plan to meet the crops needs and maximize profitability.

As an example, let's say that a producer has a 200 bu. Yield goal on an irrigated field that calls for 230 lbs. of nitrogen. At planting he applies 30 lbs. of nitrogen, followed by 120 lbs. applied at cultivation in early June. This leaves a nitrogen need of 80 lbs. The producer decides to apply the remaining 80 lbs. split into two 40 lbs. applications through the irrigation. We get about 3.1 lbs. of actual nitrogen for each gallon of 28% N applied. He calculates that he needs to apply just short of 13 gallons per acre. Knowing that his system irrigates 2 acres per hour, he calculates that he needs to inject 26 gallons of the fertilizer per hour.

Knowing the actual amount of fertilizer the equipment will inject is essential. It is also important to know that the system applies water uniformly across the field. Center pivot systems of good design and repair will have uniformity co-efficient of greater than 85%. Many systems have uniformity co-efficient in the 70 to 75% range allowing the misapplication of a quarter of the water and fertilizer going through them. Information on evaluating irrigation system uniformity (along with training opportunities) is available through the irrigation section of the St. Joseph County Michigan State University Extension web page. http://www.msue.msu.edu/portal/default.cfm?pageset_id=28706

The inherent risk of injecting fertilizer into a water system dictates the need for backflow protection. Both Indiana and Michigan have resource protection rules that require the use of Chemigation valves for the protection of both surface and ground water sources. Chemigation valves create an air gap in the pipe line downstream from the pump when

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the pump is shut down. The air gap breaks the suction created by water retreat back to groundwater or surface water. Chemigation valves for most irrigation application are available from local irrigation dealers for less than \$700. Installation cost is much less at the time of pump installation and should be included in almost all new irrigation pumping installations.

In some situations producers may choose to dribble or broadcast nitrogen on the field by air or Hi- tractor and use the irrigation to incorporate the Nitrogen if dry weather follows. This technique is quick, requiring no irrigation equipment modification, but is dependent on the availability of aerial applicators or in row high clearance application equipment

Detailed information on injection pumps, backflow protection, safety interlocks, and procedures for calibrating an injection system is available in bulletin E-2099 available from the Michigan State University Extension bulletin system or electronically at the irrigation section of the St. Joseph County MSU Extension web page. http://www.msue.msu.edu/portal/default.cfm?pageset_id=28706