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IS IT WORTH COMPROMISING NUTRIENT USE EFFICIENCY TO IMPROVE FIELD OPERATION LOGISTICS?

Planting season in the Northern Great Plains (NGP) is always a bit of a race against time. It is amazing how well crops grow in the short growing season characteristic of the high latitudes of North America. The ideal time to plant crops in central Saskatchewan for example is the first two weeks of May. In some springs, planting may begin as early as the last week of April and if there is a late spring, or excessive rainfall in the first half of May, planting may need to continue into the first week of June. However, for most crops there is a point where it is too late to plant so that the crop has time to grow, set seed and mature before killing frosts in the fall. As a result, the month of May is a very busy time for farmers.

When fertilizers were first used in the NGP the only method of application was broadcasting fertilizer using pre-plant or post-planting applications. It was soon discovered that seed-row applying low to moderate rates of P-based fertilizers helped crops emerge and establish well under cool seedbed conditions. As a result most planters were soon manufactured with separate fertilizer boxes, to hold and meter out P-based starter fertilizers, along with seed in the seed furrow. The majority of N fertilizers were pre-plant broadcast applied and incorporated using tillage before planting. However, research in the late 1970s and early 1980s indicated that there could be improved N fertilizer use if the N fertilizer was also banded in the soil. This banding of N fertilizer was done as either a pre-plant operation in the late fall or in the spring just prior to planting.

Over the past few decades as no-till or direct seeding became common, there was development of planting equipment capable of planting and fertilizing in one operation. Side-banding fertilizer to the side and below the seed furrow usually accomplishes this. For example when planting spring wheat it is advised to have at least a 1.5 to 2 inch separation of the N fertilizer band away from the seed. There are many different configurations of planting equipment, with some units placing most of the P, K and S fertilizer in the seed-row and the majority of the N in the side-band or mid-row bands, while other units may side-band all the fertilizer in one common band. For the units applying seed-row fertilizer, the amount of fertilizer in the seed-row can't be excessive or it causes poor germination.

As average farm size increases there is a growing need to be more efficient, as far as time, in order to plant all fields within the limited planting window. In the 1970s average farm size in much of the NGP was 640 to 1,280 acres. Now average farm size is 3,000 to 4,000 acres and there are many farms in the 15,000 acre size or even larger. More acres planted per day can be accomplished in a few different ways. One is to have larger and specifically wider planting equipment, and this has been a solution on many farms. Another is to spread out the field operations, and return to the practice of pre-plant fertilizer applications. By handling less fertilizer while planting, equipment can be filled with more seed, covering more acres between stops. Also, there is less need of a separate truck and truck driver, to haul fertilizer to the field to fill up fertilizer tanks. There is a trend back to pre-plant broadcast applications of fertilizer as a way to reduce steps and time. Broadcasting N in the form of urea does this, but surface banding liquid urea ammonium nitrate solutions is also used. In some areas broadcast fertilizer equipment had almost become non-existent, as the majority of farmers are one-pass seeding and side-banding all fertilizer at planting. However, there is a growing demand for retail fertilizer dealers to offer broadcast fertilizer services.

The important question is whether or not the time saved in order to plant more acres during the ideal planting window is of greater benefit than the decreased efficiency of broadcast applied N fertilizer compared to side-banding N fertilizer. There is on-going research to answer this question. It initially appears that in the semi-arid regions of the NGP, pre-plant broadcast applications compare reasonably well to side-banding at planting under no-till cropping. The farmers that are using pre-plant broadcast applications feel that the amount of fertilizer incorporation as a result of the no-till planting operation is helping to reduce potential losses of surface N applications compared to subsurface band placement. They stress the importance of planting within a few days of broadcast applying the N fertilizer. Hopefully on-going research will confirm if this is correct or not. It is clear that the improved logistics of quickly applying N fertilizer using broadcast applicators and freeing up time for earlier planting is appealing to more and more farmers.

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For more information, contact Dr. Thomas L. Jensen, Northern Great Plains Director, IPNI, Phone: (306) 652-3535. E-mail: tjensen@ipni.net.

Abbreviations: N = nitrogen; P = phosphorus; K = potassium; S = sulfur.