

by Michael J. Mainz

Fine-tuning for Ridge-till

Illinois scientist evaluates placement methods and “weed and feed”, using fluid fertilizers in ridge-till systems.

Summary: *Application of starter fertilizers in ridge-till systems at our plot location in Monmouth, Illinois, increased corn yields from 0.2 to 8.1 bu/A, for full and reduced fertilizer programs, respectively. Preplant injected nitrogen and 100 percent weed and feed treatments produced identical results. Yields were reduced in the 50/50 weed and feed/side-dress treatments. Mixing PK and N for the weed and feed application may have reduced N losses. PK placement did not significantly affect corn yields. DRIS analysis revealed N, K and Zn to be limiting, with nitrogen the most limiting. Weed control was excellent for all treatments. P and K levels in the soil were sufficient for optimum yields, making all PK application methods acceptable.*

The Northwestern Agricultural Research and Demonstration Center near Monmouth, Illinois, was the site of our project. Our objectives were to: 1) study the effects of a starter in a ridge-till, continuous corn system, 2) develop a program to produce optimum yields in the same system, 3) evaluate “weed and feed” using UAN as a herbicide carrier, and 4) compare effects of N and PK placements on yields.

Predominant soil type was Sable silty clay loam. This soil has inherent fertility and previously has been managed for maximum production, both through the use of livestock wastes, fertilizer, and crop rotations.

Since acquiring the farm in 1980, the

University of Illinois has managed it to maintain productivity while drawing down the fertility levels. Initial pH was 7.1, Bray P1 at 92 lbs/A, K test at 292 lbs/A and organic matter at 3.5. Fertilizers were clear 2-6-12 (PK source) and 7-18-6-2S-0.5Zn (starter source), and 32-0-0. Total fertilizer applied in the full-rate treatments was 170-45-60-2S-0.5 Zn. Fall PK was surface stripped on the ridge top within three inches of the old corn row. All spring N and PK treatments were applied shortly after planting and before crop emergence. The top 1 to 1.5 inches of the ridge top were removed at planting, creating a 6- to 8-inch band, free of residue for the new corn row. Planting was done at 26,100 kernels/A. Weather problems delayed planting until May 18 in 1990. Planting was done on May 5, 1989 and April 26, 1991, which was more timely. Sidedress N treatments were applied when corn was in the 4- to 5-leaf stage. Ear leaf

samples were taken at early pollination all three years.

Starters

Starter fertilizer increased continuous corn yields as shown in Figure 1. Generally, starters increased yields 1 to 2.5 bu/A on soils testing at or above recommended levels for P and K. Interactions between N or PK placements and starter are shown in Figures 2 and 3. The greatest positive yield response occurred when N was applied 100 percent weed and feed. Grain moisture decreased very little with starter—0.01 percent over three years.

Weed and feed

Preplant inject, 100 percent weed and feed treatments produced the highest three-year yields. Only in 1991 were they significantly higher yielding than the 50/50 weed and feed/sidedress treatment. Grain moisture was lowest

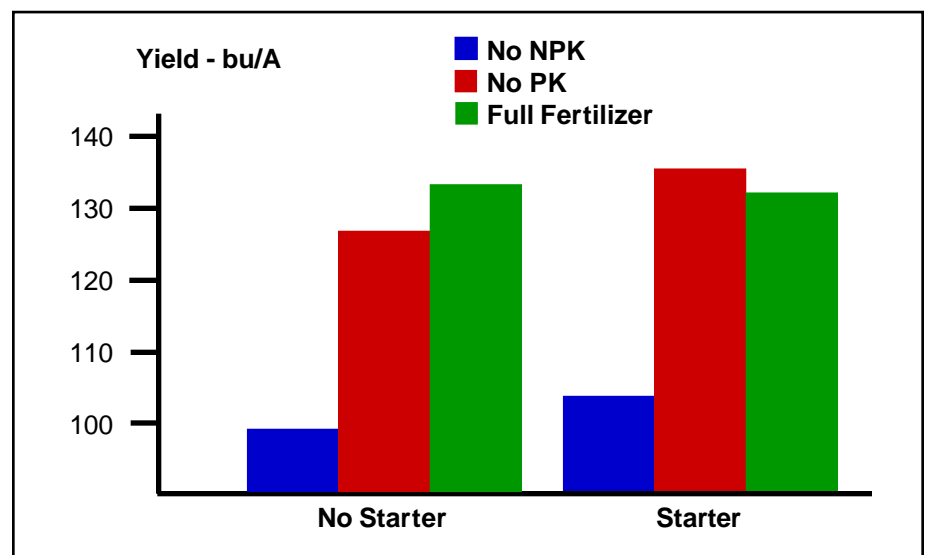


Figure 1. Effect of starters on corn yields, ridge-till (three-year average).

for the 50/50 treatments and lower (significant) than the preplant inject to the extent of 0.5 percent in 1991. A grain moisture response to N placement was not significant for the three-year average. Lodging problems occurred only in 1991 and over the three years were not affected by fertilizer placement.

parameter, except lodging in 1991 and plant height in 1989, and then only slightly. Yields were statistically the same for all PK treatments, including check plots with N, but without PK. Soils with these PK levels generally do not respond to surface or shallow PK placement, unless compaction was a problem.

in NPK. DRIS analysis found N, K and Zn to be the most limiting nutrients in 1989, 1990, and 1991. Depending on the plot, other nutrients, including S, Mn, and P were occasionally deficient. Calcium and Mg levels were usually high. Nutrient concentrations in full-rate plots were usually above the critical plant nutrient values found in the Illinois Agronomy Handbook. Only boron and zinc were below critical levels some years.

PK treatments

Phosphorus and potassium applications did not significantly affect any plant

Leaf tissue analysis

Leaf tissue analysis found a few treatments, usually the check, deficient

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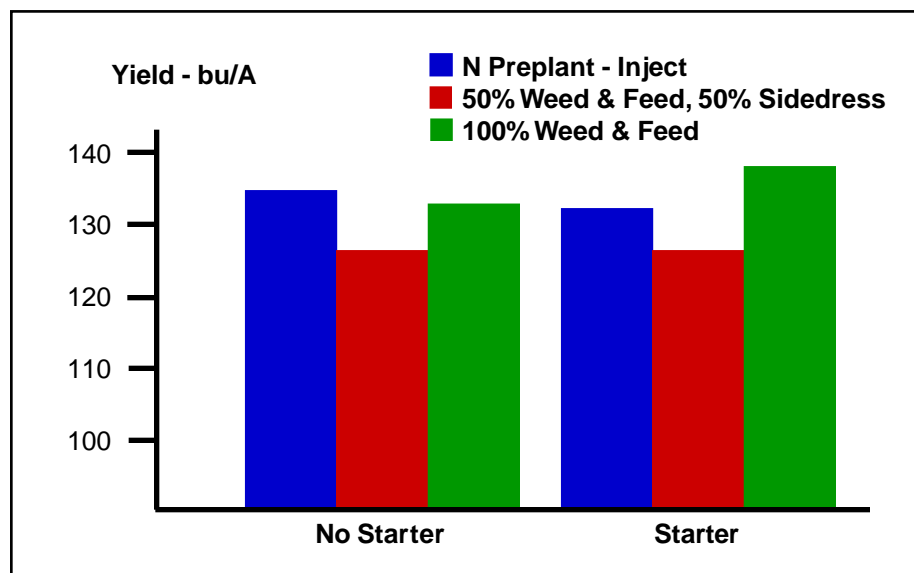


Figure 2. Effect of starters and nitrogen placement on corn yields, ridge-till (without check plots, three-year average).

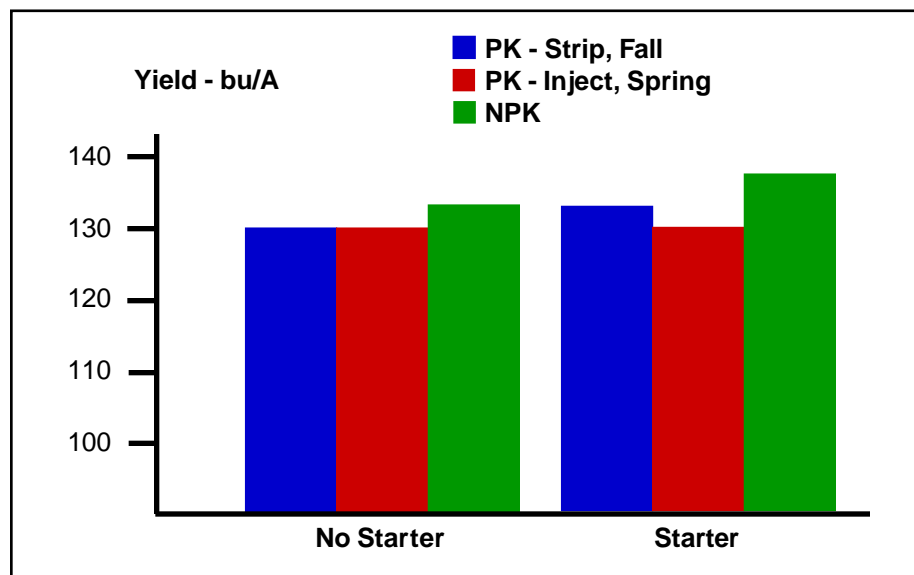


Figure 3. Effect of starter and PK placement on corn yields, ridge-till (without check plots, three-year average)