Other Fertility Demonstrations

In the early part of the 1989 growing season, symptoms of potassium deficiency were evident in many ridge-tillage fields in Iowa. The same phenomenon was reported by extension workers in Minnesota who examined ridge-till fields in that state. By late summer, most crops had grown out of the flamed leaf borders and irregular size that marked the fields in June. Still, there is some concern that yields were affected.

Why does this problem occur, and what can be done about it? Soil scientists around the midwest have offered several partial explanations to the first question. The problem appears to be worse in dry years and in reduced tillage systems. In reduced tillage, potassium leaching from the residue of the previous crop remains close to the soil surface instead of being stirred back into the tillage layer of soil. The same is true for broadcast applications of potassium. In dry conditions, crop roots do not grow well in this surface soil, and potassium ions are also less able to diffuse through the soil to the roots.

Some researchers around the midwest have seen evidence that crops in reduced tillage respond more strongly to band applications of potassium than they do to broadcast treatments. This is corroborated by PFI cooperator **Richard Thompson,** who ridge-tills. If the goal is to place the nutrient where the plant can get it, then where, exactly, is that? The answers may depend on a number of factors, including the weather, but cooperators have turned their attention to the problem.

In 1989, several cooperators compared rates or placement locations for P and K fertilizers. The trial results appear in Tables 3a and 3b. In one of eight trials was there a significant yield increase from the added fertilizer, and in one there was a decrease. Additional on-farm trials in succeeding years will be needed to refine these practices.

Three cooperators carried out field trials that directly involved livestock manure. These are shown in Table 4. The table gives the nitrogen applied as estimates of N available in the year of application. The exception is the comparison of manure and compost, conducted by Ron Rosmann, for which total N content of these two materials is estimated. The table also shows leaf nitrogen content (as percent) and crop yield for the two treatments in each trial. "Manure Only $ Benefit" is the financial advantage associated with the manure treatment. The () means that this return was negative, so the manure treatment had a lower return than the alternative. Positive numbers here indicate that the "manure only" treatment made more money than the "additional input" system.

The Dordt College Ag Stewardship Center injected dairy manure with and without DCD, a material which stabilizes the nitrogen. Corn yields were good both with the treated manure and the untreated, and leaf nitrogen was uniformly in the range that would be considered adequate. If additional N was made available by the treatment, it may have been unneeded by the crop.

Ron Rosmann grew corn with manure and with compost containing similar amounts of total nitrogen, in the third year of a comparison between those two amendments. In 1989, compost-treated corn yielded significantly less than the manured corn. Leaf nitrogen would appear to have been adequate in both treatments.

Dick Svoboda compared manure and UAN in 1989. The total nitrogen applied in the two treatments was similar, but only a fraction of the nitrogen in the manure was available to the crop. The corn that received the manure yielded significantly less than the corn that was fertilized with synthetic N. Judging from the leaf tissue results, nitrogen may have been limiting in both treatments. Under those conditions, the UAN would have fed the crop in a more timely fashion than the manure.