6-1980

Delayed Nitrogen Applications on Corn

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Soil Science News & Views

Vol. 1, No.2 June 1980

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A method of fertilizer application that was standard practice 30 to 50 years ago has become important once again, and for the same reason. When nitrogen fertilizer was expensive and corn was cheap, it was considered prudent to save back some of the nitrogen fertilizer and apply it when the corn was "knee-high." This was thought to be safer because some of the nitrogen added at planting might be lost before the corn was big enough to take advantage of it. The increasing cost of nitrogen fertilizer has made efficient use of this product important again.

After more than 10 years of work by several soils extension and research workers, we have concluded not only that the old idea was right but also when and why it is right. Delaying at least half the nitrogen fertilizer until 4-6 weeks after planting ("knee-high") has been shown to be particularly effective on soils where drainage is (1) less than perfect, (2) under no-tillage, and (3) <u>especially</u> with no-tillage on imperfectly drained soils.

Nitrogen applied at planting is subject to loss from leaching and from denitrification. It appears that in Kentucky, denitrification is more serious than leaching on imperfectly drained soils. On well-drained soils, leaching can be serious under no-tillage but is not a problem under conventional tillage. The reasons that nitrogen applied at planting is more likely to be lost are that (1) an acre of corn uses only about 5 lbs. of nitrogen in the first month of its growth and (2) there is usually more rain and less evapotranspiration during the first month of growth than later so that soils are wetter. Thus, they are more likely to lose nitrogen by leaching and denitrification during the first month than at any other time.

Our results show improvements in nitrogen efficiency from delayed application ranging from none to 100%. The soils that show no effects are always well-drained and usually planted with conventional tillage methods. The soils that show the largest response to delayed application of nitrogen are nearly always imperfectly drained and this response is even larger when no-tillage is practiced. We have tested the commonly available nitrogen fertilizer sources for this purpose, and have found them all to be generally acceptable, even though our results with urea have been somewhat variable.

In summary, if corn is grown on soils with restricted drainage, especially if it is grown under no-tillage, we recommend that at least half the nitrogen fertilizer be applied a month after planting. The fertilizer can be applied with a "cyclone" spreader, by air, ammonia applicator, dribbled on between the rows or using a sidedressing attachment. The damage to the corn is small compared to the benefit received from delayed application of the nitrogen fertilizer.