Field-Scale Variability for Corn Economically-Optimal Nitrogen Fertilizer Rate

Farmers are interested in knowing how much nitrogen (N) fertilizer to apply to crops, taking into account both annual climate differences as well as within-field soil differences. There are two compelling reasons generating this interest. First, N fertilizer prices have greatly increased in recent years. This causes many farmers to worry that they are applying too much N. Concurrently, they don't want to under-apply N fertilizer, because it is very important to yield. Secondly, possible loss of N in fertilizer or manure also causes environmental concern. Nitrogen from agricultural sources has been shown to affect streams, rivers, and the ocean. Research was conducted to determine the need for variable corn N fertilizer among and within full-sized production corn fields. The amount of N that was needed to grow corn was found to be highly variable among fields. Some fields needed on average only 50 lbs of N/acre, while others needed on average about 200 lbs of N/acre. This work showed a need to manage N fertilizer differently for different fields. However, even within each field the correct amount of N to apply greatly varied. On average the amount of N needed within fields ranged about 100 lbs of N/acre. In a few fields, some areas needed almost no N while other areas needed more than 200 lbs/acre. *Our findings strongly indicate that these conditions require N management systems that address spatially variable N needs.* These results are being used to evaluate both the economic and environmental benefits for different management approaches for applying N fertilizers. Farmers will benefit because they can reduce excess N applications, which with increasing N fertilizer cost, should save money. If fertilizer can be better matched with crop need, N loss to lakes and streams will be reduced and the environment will be improved.

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