

Get the Edge on Fertilization Management

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Nutrient Mining—Soil Abuse that Leads to Profit Abuse



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GOOD YIELDS are long-remembered and are frequently the topic of coffee shop discussions at the end of the season. But recollection of the yields on less-outstanding fields seems to fade rapidly over time. This fall, as you record the 2004 yields on your fields, consider comparing or graphing past yields with current yields, to explore trends over time.

Fall brings favorable conditions to collect soil samples for fertility evaluation. As with yields, soil fertility trends over time can be valuable indicators of performance, or lack of performance. Trends in soil pH, phosphorus (P), and potassium (K) should be evaluated on each field on each farm, as well as yield trends. Simple graphs of fertility trends and yield trends can be quite revealing.

Unfortunately, the majority of fields get soil sampled only once every 3 years. Such a sampling frequency provides only three points in a 10-year record. If one year happens to be abnormally dry or wet, only two of the records from previous years may be reliable. With only two points, it is nearly impossible to establish a trend line in a 10-year period. It would be more helpful if soil samples were collected every 2 years. That would provide five points in 10 years...if one year was abnormal, then four points could be used to establish a trend line.

Neglect of fertility maintenance, or failure to build low soil fertility levels to more productive high ranges, leads to negative nutrient budgets, reduced soil fertility, reduced soil quality, and reduced productivity. Such neglect is considered **soil abuse**, and better farmers recognize that it results in **profit abuse**.

If soil samples are not collected frequently enough to accurately evaluate fertility trends, one should at least estimate the impact of crop harvest removal on the nutrient balance in individual fields. By tracking the average P_2O_5 and K_2O removal values for each bushel of crop harvested and comparing with nutrient inputs, a balance (positive or negative) can be estimated. Continued harvest removal without nutrient replacement results in **nutrient mining**, or a negative balance.

There is no "free lunch" when it comes to soil fertility. **Figure 1** and **Figure 2** represent typical corn and soybean responses to soil P and K levels on medium textured soils. Notice that maximum yields

for both crops are achieved when the soil P levels are above 40 to 50 lb/A (20 to 25 parts per million [ppm]) Bray-1 P and above 240 to 260 lb/A (120 to 130 ppm) ammonium acetate-extractable K.

Assuming the yield potential of corn at 190 bu/A and soybeans at 55 bu/A...and the current soil test levels are 30 lb P/A and 180 lb K/A...one can use the curves in the two figures to estimate the potential yield loss if no P and K fertilizer is applied. The lost corn yield might be about 80 bu/A (46 from lack of adequate P, 34 from lack of adequate K), and the soybean yield loss might be 14 bu/A (6 bu/A from lack of P, 8 bu/A from lack of K). Multiplying these potential yield losses by the crop values of \$2.60/bu for corn and \$8.20/bu for soybeans results in a gross return loss of \$323/A (\$208 loss for corn and \$115 loss for soybeans). Note: Since soil test calibration curves vary with region and soil type, these calculations should be viewed only as examples.

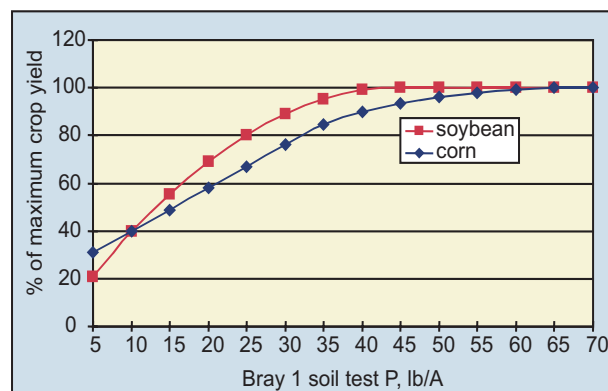


Figure 1. Example crop response to soil test P.

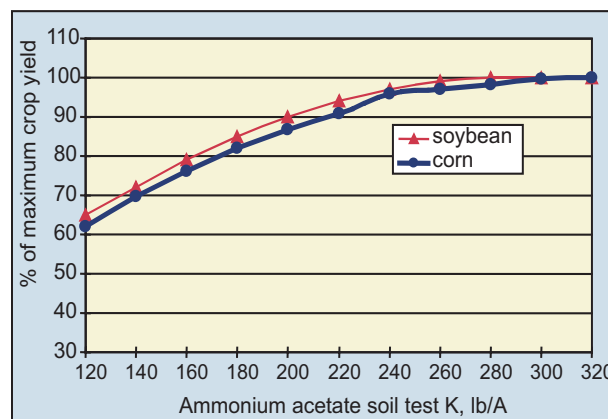


Figure 2. Example crop response to soil test K.

With this kind of an economic loss, the first question asked should be: "How much P and K are removed by harvesting a 190 bu/A corn crop and a 55 bu/A soybean crop"?

The answer is: 56 lb P/A (128 lb P_2O_5) and 110 lb of K/A (132 lb K_2O). From these removal estimates, it is easy to understand the toll that good yields can take on soil fertility levels if fertilizer needs are neglected.

Don't be guilty of nutrient mining that leads to **soil abuse** and **profit abuse**. Plan now by collecting soil samples this fall, and compare the crop harvest removal of P and K with the fertilizer inputs. **Ratchet-up your program to capture the yield and profit potential that are within reach on your fields, by providing adequate P and K for crops.** ■



***Fall** is prime time for soil testing.*



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