

Soil Sampling for No-Till and Conservation Tillage Crops

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Research has shown that when fertilizer is surface applied, and no-till is used, nutrients accumulate in the surface inch or two of soil. Continuous use of acid-forming nitrogen fertilizers on the surface quickly lowers the pH of surface soils, particularly those which are sandy and have relatively low buffering capacities (Table 1). Seed germination may be reduced under highly acid conditions. Some herbicides, especially the triazines, such as atrazine, simazine (Princep), cyanazine (Bladex) and metribuzin (Sencor and Lexone), may be de-activated. This results in a serious breakdown in the effectiveness of chemical weed control.

After several years of applying nitrogen to the surface of a no-till field, standard sampling procedures do not accurately show the pH of the surface soil. In samples collected to a depth of 8 or 9 inches, the acidity of the surface 2 inches is diluted by the higher pH soil material from the 3-to-8-inch depth. Thus, it is apparent that a special sampling procedure is required to diagnose this situation.

Take Two Samples

We suggest that in no-till fields where surface applications of high rates of nitrogen fertilizer have been used (for example, 200 pounds of N in 2 years) that two soil samples be collected from each area sampled. One sample to a depth of 2 inches will be used for pH evaluation and lime recommendations only; another sample collected to a standard sampling depth (including surface 2 inches) will be used for phosphorus and potassium soil tests and fertilizer recommendations.

Fields that have been only chisel plowed or disked and have received surface nitrogen applications should be treated as no-till fields because

neither implement is effective in uniformly incorporating surface-applied fertilizers. The two-sample approach is recommended for most fields where conservation tillage methods have been used.

For fields where anhydrous ammonia has been used, or N solutions have been injected, the acidity will be located deeper in the soil. While



Figure 1. Two composite samples, each representing 20 subsamples, should be collected from no-till fields. The two-inch sample will be used for pH evaluation and lime recommendation only. The second sample will be used for the remaining tests. Note the use of the rubber band on the probe as a guide to control sample depth.

acidity is still produced which may eventually require a lime application, the acidity is not as great a concern because the surface will not be as acid. Therefore, standard soil sampling procedures (to plow depth) are adequate to handle this situation.

How to Submit

The MSU Soil Testing Lab will analyze the extra soil samples for pH only, at no extra charge — when doing the regular test. The extra soil sample should be in a bag or box other than a regular soil sample box. Any sample in a regular box will get a regular test at the regular price. The amount of soil needed for the pH test is the same as for a regular test and should represent a composite of 20 cores.

Samples for pH and lime index only should be clearly labeled "FOR PH ONLY". On a sepa-

rate sheet of paper, include all the information requested on the regular sample boxes and enclose with the sample so it is clear which 2-inch and regular samples are from the same field. The depth of sampling should be clearly indicated. The lime recommendation for a 2-inch sample is 2/9 of the recommendations shown in Table 1 of Extension Bulletin E-550, Fertilizer Recommendations for Vegetable and Field Crops.

Table 1. The effect of four years of no-till corn production upon soil test levels in an irrigated Tedrow loamy sand soil (Gratiot County).

Soil Sample Depth (in)	Soil pH	Soil Test P (ppm)
0-2	5.6	220
2-4	5.9	104
4-6	6.4	47
6-8	6.6	35

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