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From Scientific Staff of the
International Plant Nutrition Institute (IPNI)
3500 Parkway Lane, Suite 550
Norcross, Georgia 30092-2844 USA
Phone: 770-447-0335 Fax: 770-448-0439
E-mail: info@ipni.net Website: www.ipni.net

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SAMPLING SOILS WITH A HISTORY OF FERTILIZER BANDS

Soil sampling done properly often forms the basis for successful crop nutrition. But what's proper when your soil has had a history of fertilizer applied in bands? Will soil samples still mean anything?

Many nutrients are indeed rather immobile in the soil. Thus you can expect that a sample taken from a band location will differ sharply from one taken only a few inches away. You can also expect variations in soil concentrations of these nutrients in patterns matching the band spacing at which they were applied. Nevertheless, there are guidelines for effectively sampling soils with a history of band application. The guidelines differ depending on whether the band locations are known or not.

If the band locations are known, and the band itself is narrow—as occurs in a V-trench associated with single or double coulters as openers—a ratio of 1:20 in-band cores to between-band cores should be used for bands spaced 30 inches apart. If the banded zone is wider, as in strip tillage, or if the band spacing is different, the ratio should be the ratio of the band width to between-band width. In a recently published Illinois study—involving a strip-till corn-soybean rotation with P applied in strips 6 inches deep in the fall—a 1:3 ratio of in-row to between-row samples seemed adequate to estimate soil fertility.

If the band locations are unknown, a paired sampling approach can be effective: one sample consisting of cores taken at random, and the second consisting of cores each taken at a distance of half the band spacing from each of the first cores, perpendicular to the direction of the bands. Since the greatest deviation from the 'true' soil test level occurs when the band location is over-sampled, the sample with the lower soil test level is most likely to be representative. This approach was validated in a 1990 paper published in Soil Science Society of America Journal.

Nutrients differ in mobility. Bands of K may not remain as concentrated in soils over time as bands of P. There are at least three reasons for this. First, crops like corn and soybean take up much more K than P during the season. Secondly, a greater proportion of the K taken up is returned to the soil in crop residues because much of the P taken up ends up in the grain. Third, K moves more in soils than does P, causing bands of K to become more diffuse over time relative to P. So, greater uptake and recycling combined with greater mobility limits the longevity of concentrated bands of K. Micronutrients differ in mobility as well. Boron is usually much more mobile than zinc.

Band application offers many benefits, particularly for P. Bands located close to the seedlings supply P at a critical time of need for cereals like corn, wheat and other small grains. For soils with high P fixation capacity, or with soil test P lower than critical levels, band placement provides higher P use efficiency, since a given amount of applied P produces a larger yield response when banded compared to broadcast. Band placement reduces accumulation of high P levels at the soil surface (stratification) in no-till and conservation-till systems, particularly those using tillage implements that maximize crop residue cover and minimize vertical soil mixing. If the field has tendency to discharge surface runoff water, placing P below the soil surface also helps reduce the risk of P losses that potentially harm water quality.

Soil sampling strategies can effectively deal with a history of bands applied to the soil. While some extra effort may be required, you shouldn't need to fear losing the ability to track your soil's fertility depending on the choice you have made for the "right place" for nutrient application in your cropping system.

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For more information, contact Dr. Tom Bruulsema, IPNI Northeast Director, Phone: (519) 835-2498. E-mail: Tom.Bruulsema@ipni.net.

Abbreviations: P = phosphorus; K = potassium.