



# Kick-Off the Fall Season with Fertilization Management / Fall 2005

Fall 2005 – A Great Time to Improve Your Soil Sampling

**Dr. Adrian Johnston**

Northern Great Plains Region Director, PPI/PPIC



**S**oil testing...if you feel as though you have heard enough about soil sampling, you are in for a big surprise. With the increased focus on nutrient management planning of intensive livestock areas, and farm planning programs to manage fertilizer nutrients, we are on the verge of major soil sampling promotional campaigns in most states and provinces. For the average grower, fertilizer cost is also becoming a major challenge in budgeting for crop inputs. Soil testing is an excellent way to minimize the 'guess work' associated with seeding a crop for maximum economic yield. This fall fertilization article reviews some of the common questions we get each year from crop advisers who take and interpret soil samples.

## Collecting a good soil sample – why is it still a challenge?

As you have heard a thousand times, soil sampling practices are where the vast majority of errors occur. When you think about it, we often send some of the least experienced staff out to do custom sampling, with little advanced training on what can go wrong with sample handling. If you consider that the sample is subject to accepted North American handling protocols once it reaches the soil testing lab, any problem that affects the sample ahead of time will impact the results obtained and thus the recommendations made. For the sake of keeping a customer, and getting them used to the best science-based soil fertility planning tool, be sure you are getting good samples.

## Why is it important to consult with, or take along, the farmer when soil sampling?

Imagine yourself, in the fall, in a field you have never been in before, trying to decide the best location to collect your soil cores...the potential for sampling the 'wrong' location is very high. With the farmer riding along, or providing clear direction on paper ahead of time, the sample operator has clear guidance as to where not to sample in the field. This becomes critical when you consider the time and effort required to collect soil samples, and the need for composite samples to be representative of the dominant production area in the field. Once these preferred sampling areas have been identified, marking them with GPS allows for future reference when sampling again.

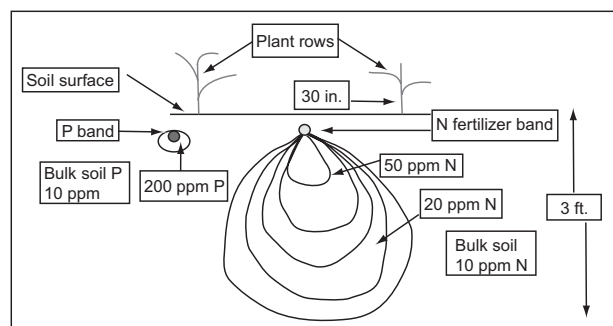
*A hypothetical diagram shows the influence of N and P fertilizer bands on nutrient availability.*

## Why do we insist that for a composite sample the operator collect 15 to 20 sample cores?

When composite sampling, getting a representative sample is critical. While a composite sample will not provide any insight into the variability found in a particular field, picking the right spots to represent the average production areas is critical. In collecting the sample, imagine what happens to the average value when one bad core (i.e. saline) ends up mixed in with the rest. The more samples collected, the more dilution will occur to this one bad core. For example, there are saline areas in many fields in semiarid regions. However, when you get a soil sample back saying the field is saline, not just the 3 acres at the base of the hill you have always known about, you know that it is a poor representative sample for the field. One bad core mixed in with 8 to 10 others is a far bigger problem than one bad core mixed in with 15 to 20 cores. If the differing areas of the field are large, they should be separated into a sub-region and a sample collected from that particular region. This will aid in fertilizer application rate management. Sample number, or intensity in a field, should increase with the amount of rainfall received, or where irrigation is used.

## Sampling around last year's fertilizer bands – how do you avoid high residual nutrients?

Selecting a sampling location to collect your soil cores also requires asking the farmer about how fertilizer P and K were applied the year before. While most N and S are mobile in the soil and move away from the band location in soil water, P and K additions will remain very close to their original band location. If applied in the seed row, or in a side band, these are areas to avoid sampling. Sometimes growers will apply P and K in the mid-row band with their N and S, so these areas should also be avoided. A few simple questions when consulting with the



farmer can avoid excessively high soil nutrient levels which end up reducing confidence in the sample collected.

### How does sampling to a uniform depth avoid disappointment?

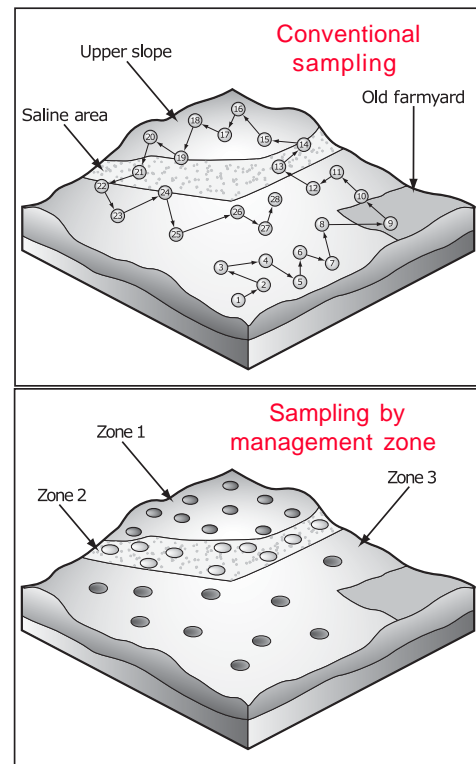
Nutrient concentration in the soil can vary significantly with soil depth. Care must be taken when collecting a composite sample to ensure that the sampling depth is uniform, and if different from the option provided on the sample bags, this is noted. For example, if the lab suggests a sampling depth of 0 to 6 in. and 6 to 24 in., but you actually have samples that are 0 to 4 in. and 4 to 16 in., noting this on the sample bags will ensure that the lab uses the appropriate conversion factors when estimating the supply of available nutrients. A change in the depth you submit to the lab is not a problem, it is just ensuring that you note on the sample bag what depth the sample was collected.

### Sample timing – Why is it important to sample at the same time each year?

One of the advantages that soil sampling provides is the opportunity to monitor soil nutrient changes and trends over time. However, to make a good comparison it requires sampling from the same areas from year to year, and sampling at the same time of year. Taking samples for spring seeded crops after fall harvest is ideal. Sampling in the fall prior to any tillage helps to minimize field variability and ensures uniform sample core collection. Canola and pulse fields should be sampled later in the fall once soil temperatures drop below 50° F (10° C), while all cereal stubbles can be sampled after crop harvest. Where possible, avoid sampling frozen soils. Spring is also a good time to sample, with the labs offering rapid turnaround in sample handling.

### Composite versus site-specific sampling – what are the advantages?

One of the ways in which some farmers have changed their soil sampling practices to minimize variability from year to year is to move to site-specific sampling. Using GPS, they establish a series of 4 or 5 coordinates in their fields which they believe best represent the field average. These are then provided to the sample operator, who drives to these locations using a truck-mounted GPS receiver. Once in these locations the operator drives in a tight circle and collects 4 to 5 samples for the composite of 15 to 20 total cores from the field. This avoids sampling areas where problems are known to exist, such as salinity, old yard sites, and areas where manure was previously applied. With this site-specific information the farmer can then make his own changes to application rates, based on his past knowledge of crop response in specific areas of the field. Also, one trip to the field by the farmer can provide your soil sampling agent with the GPS coordinates for future sampling activities.



### Grid sampling – Is it for your farm?

Grid sampling has been proposed as a means of obtaining the most accurate picture of soil nutrient variability within fields. This variability can then be managed with nutrient additions to increase field uniformity and uniformity in crop response. Grid sample cells vary in size, ranging from a low of 1 acre to a high of 5 acres. In many cases, grid sample results are used to manage less mobile nutrients like P and K. Areas low in P and K can receive more fertilizer, while those areas high in P and K will receive little or no fertilizer addition. From a cost of sampling perspective, grid sampling can be very expensive. While it is not conducted on an annual basis, a 5-acre grid on a 160-acre field would require 32 separate analyses...cost prohibitive for many semi-arid cropping regions. While grid sampling has been shown to be profitable in areas where building soil P and K play a major role in increasing yield level and uniformity, it is not likely to be popular with growers in areas where P and K are applied annually at rates similar to crop removal. ■

For more information, contact:

Dr. Adrian Johnston, Director  
Northern Great Plains Region  
Potash & Phosphate Institute/ Potash &  
Phosphate Institute of Canada (PPI/PPIC)  
Suite 704, CN Tower, Midtown Plaza  
Saskatoon, SK S7K 1J5, Canada  
Phone: (306) 652-3535  
E-mail: [ajohnston@ppi-ppic.org](mailto:ajohnston@ppi-ppic.org)