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PLANT AVAILABLE NUTRIENTS AND CROP GROWTH ARE AFFECTED BY LONG-TERM NUTRIENT MANAGEMENT

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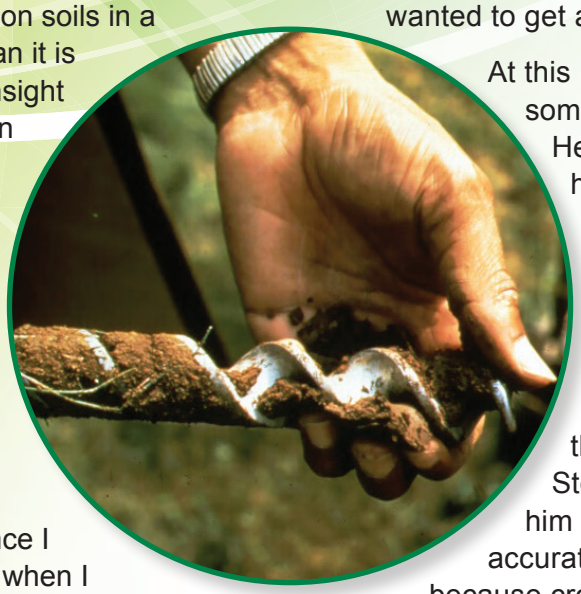
It is amazing how past crop and nutrient management can leave so-called "footprints" on soils in a field. By this I mean it is possible to gain insight into what has been done in a field by analyzing the concentrations of nutrients, especially less soil mobile nutrients, in samples taken from a field. To illustrate this, I'll relate an experience I had with a farmer when I worked as regional agronomist in southcentral Alberta.



One day a farmer (Steve) called me and said "Hi, you don't know me, but I farm just 10 minutes west of where you live." "I was told that you are an agronomist and have experience in making fertilizer recommendations, is that right?" He proceeded to tell me that he was a bit disappointed with some recent advise he had received from his local ag. retail location after they took soil samples from his fields.

Steve had not soil tested previously and normally just applied fertilizer rates close to what he had done in the past. Usually this was a certain rate and blend of nitrogen (N), phosphorus (P) …but no potassium (K) for each of his crops. When he and his adviser had first met, Steve had been encouraged to try soil testing in order to help decide what rates of fertilizer to apply. He related that he was unhappy with the initial advice that he had received and wanted to get a second opinion.

At this point I could sense some frustration. He told me that his adviser could not come up with fertilizer recommendations unless Steve gave him accurate yield targets for the crops he grew. Steve said, "I told him I couldn't give him accurate yield targets because crop yields are so variable year to year. **Who knows how much and when rain is going to fall!**" Steve's adviser made a big mistake by replying, "If you can't give me yield targets, I can't come up with very good fertilizer recommendations." Steve then said, "I'm not sure I want to use soil sampling at all."

So, what did I say to Steve?

First, I reassured Steve that you do not need to know the exact crop yields. I reassured him that all he needed to do was give an estimate of what were reasonable crops yields …a bit above average yields for his area. By applying fertilizer rates for a slightly better than average crop year, the rates should be close to what is needed.

Secondly, I asked Steve how many fields he farmed, how many had been soil sampled and the results of the tests discussed with him. The answer was

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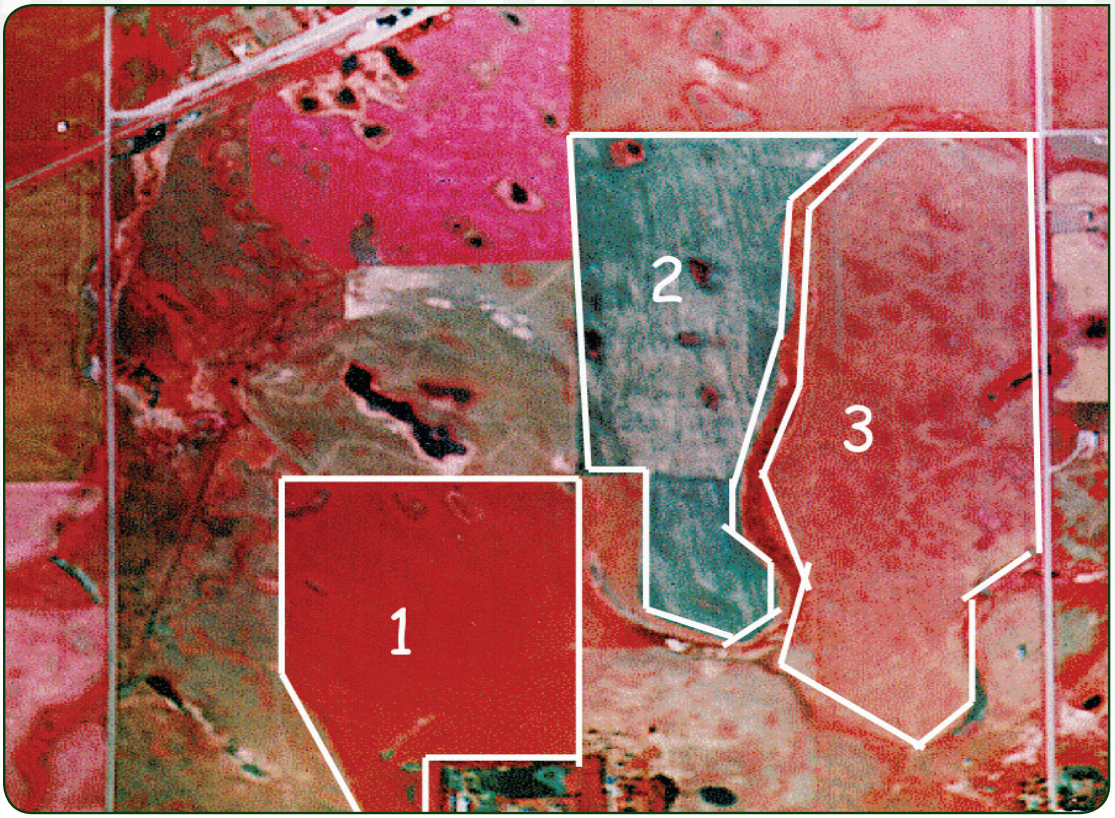

Infrared air photo of fields near Steve's small feedlot.

that only two of his fifteen fields had been sampled, and none of his 1,000 acres of pasture land used for grazing his cow-calf herd were sampled.

Lastly, I told Steve that soil sampling can be part of a whole decision-making system to improve crop yields and get more effective use of his fertilizer inputs. I suggested we have all 15 of his cropped fields soil sampled, and I would review the results with him and help develop a set of fertilizer recommendations. Steve hesitantly agreed, and said "I'm not convinced soil sampling is all that effective, but I'll give you a chance this coming Fall to show me."

So, what has this got to do with past field management and the so-called "footprints" left in the soils of a field? Well, our soil sampling was done on the cropped fields, and after we received the results back from the lab I met with Steve to discuss his options. He was still skeptical that I was going to come up with new useful information. However, I started out by asking Steve some questions about three fields close to his farmstead. I'll refer to them as Field 1, 2, and 3, as illustrated in the aerial image.

I can tell you something about the three fields near your farmstead," I said. "What is that?" Steve replied. I told him, "You have spread feedlot manure almost every year on Field 1, some years but not too often on Field 2, and never on Field 3." But you have added moderate rates of phosphorus fertilizer as a seed furrow application on all of the fields. Steve was surprised, but said "Your right, how did you know that?" I replied that it was due to differences in residual N, P, and K in the fields, and it gave an accurate indication of past manure and fertilizer applications (**Table 1**). Or, in other words the management **"footprints"** left in the soil.

TABLE 1: Soil test results (lb/A) from three of Steve's cropped fields.

Field Number	N	P_2O_5	K_2O
1	33	>100	>1,000
2	9	43	821
3	12	34	587

To make my story short, Steve was favorably impressed, he trusted what we discussed about soil test nutrient levels, and was comfortable with the fertilizer rate recommendations we developed, using his estimated "good crop target yields."

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