

Looking at fertility from the ground up

by Allison Arkinstall

During wintertime, when the ground is usually covered by a blanket of snow, the living world lying dormant beneath the soil tends to be forgotten. But Gerald Poechmann, a poultry, beef and cash crop farmer from Hanover, Ontario, rates the soil as the primary consideration for all farming practices and that the living organisms within the soil are omnipotent in their function of recycling nutrients to keep the soil productive.

Poechmann farms 400 acres and share-crops another 200 acres with his family and his parents. The rolling land, mostly sandy loam with patches of heavier loam or clay, used to be in continuous corn production. Since the early 1980's, however, Poechmann has dropped this 'intensive,' approach to farming and has become more ecologically sensitive in designing his cropping options.

Poechmann believes that the customary focus in farming is fertility management. The theory is that farmers can't control the weather so by ensuring that nutrition is optimal for crops then at least a fair yield can be expected.

However, regardless of what one believes about crop nutrition and fertilizer management, there can never be complete control over fertility in the soil. The microorganisms that transform unavailable plant nutrients into those nutrients that plants can actually utilize are the lords of fertility management. Since very little is understood about how many there are, how many different kinds and their working schedules, it makes it even more difficult for farmers to know how they can maintain/ enhance fertility.

Gerald Poechmann and family admitting soil was in bad shape was the first step away from intensive approach to farm management.

So Poechmann has undergone a management transition on his farm following the rule that nature is constantly changing, and diversity is key; and so it must be with the farm.

After several years of continuous corn, Poechmann admits that his soil was in bad shape and he knew that he had to immediately increase soil filth and organic matter content. He took 200 acres out of corn production and seeded alfalfa hay and in doing so it forced him to think about a 5 year plan and decide on what he thought the soil really needed.

Improvement

Effective crop rotation has definitely improved the condition of his soil. He recalls a soil test on a corn field (that was taken several years ago) and H reported organic matter content of 1.5%. Two years later, after the same field had been rotated with winter wheat interseeded with red clover and barley, the soil test reading indicated 2.5% organic matter. Even taking all field variability into account, Poechmann believes that "the regenerative ability of the soil is so powerful, you can only depress it for awhile (ie. without chemicals) and then when it is relieved, it will function again."

The key is effective crop rotation and Poechmann has learned that there isn't one perfect rotation. "One system may seem to be working for a particular field, but 2 years down the road, it may turn out to be not so perfect," he says.

Emphasizing that he was not giving a recipe, Poechmann outlined a rotation that he uses on his farm. He emphasizes that starting a rotation with a sod crop, a farmer should capitalize on this field that has the highest soil filth and available nutrients and follow it with a crop that will capture as much of these nutrients as possible, a heavy feeder such as corn, wheat, spelt, or a brassica.

Following this with a medium-feeding cereal crop like oats, then perhaps another cereal interseeded with a legume and end the rotation with a low-feeding crop (in other words a crop that does not require a load of available nutrition to yield well) like barley underseeded to alfalfa again.

No chemicals

Poechmann uses no pesticides or commercial fertilizers on his farm. Some of the fields have been chemical free for 7 years and in 1991, his last 100 acres will be certified organic (chemical-free for 3 years). He says that weed control is something that he does within his crop rotation and through use of green manures.

"If you can balance your on-farm resources, weed control can pose less of a problem," advises Poechmann. He has found that by growing more cereals and by keeping the soil covered with green manures, the intraplant competition has kept weeds at bay. A heavy-set disc, chisel plow and heavy-duty cultivator are the tillage implements that he has come to favour for both residue incorporation and weed control. Winter rye has been used extensively on the farm to add carbon and build up the soil, as well as for weed control. "Rye has been on just about all of the lighter soil acreage in the last 3 or 4 years," he adds.

Fertility

Just as fertility is the most important consideration when switching to low-input systems, it is also the biggest hang-up. Because the activities of the soil microorganisms are so difficult to measure, it is hard to know what the status of soil fertility is during the growing season.

Temperature and moisture content of the soil both contribute to fertility status and the activity of the soil inhabitants: bacteria, fungi, viruses, nematodes, earthworms, insects. So compromise and trade-off become part of management vocabulary and practice.

Soil types that vary from light to heavy on the same farm also make H difficult to understand fertility requirements for each. Poechmann spreads broiler manure from his poultry barn that has not been properly composted and he feels that he is "short circuiting" his schedule; however, the manure has to be used somewhere within the rotation.

Research has shown that rye has several allelopathic (weed suppressing) properties and Poechmann has found that this does not allow certain crops to follow in the rotation without suffering some kind of damage. However, all compromise is done with a mind to maintain a cropping system that remains fairly productive, after all this is farming. As Poechmann phrased H. "I don't claim to have maximum yield, but I can claim that I'll have maximum sustainability."

Poehmann's Rotation (not a recipe !)

Year 1 Fertility builder	sod
Year 2 Heavy feeder	corn, wheat, spelt, brassica
Year 3 Medium feeder	spring cereal-oats (composted manure may be applied after cereal harvest)
Year 4 Medium feeder	winter cereal - spelt, rye
Year 5 Low feeder	spring cereal - barley underseeded to alfalfa