

Compost Trials

Inputs

It is becoming apparent that direct positive responses to mineral nitrogen will only occur if the soil system has adequate carbon at the time of fertilization.¹ Excess N in carbon-limited soils has negative effects on microbial biomass (Beck, 1984). It is for this reason all fertility recommendations should be carbon based.

The recommended fertility program for the Sudbury organic potato plots is an adaptation of peat based mineral fertilizers. Peat Ammonia Mineral Fertilizer (PAMF) is composed of milled peat and minerals (nitrogen, phosphorous and potassium). The mineral fertilizers are applied on the peat before extraction. Liquid nitrogen is added to the mass after extraction. PAMF is much more than a mixture of peat and minerals because the added ingredients are combining with active fractions of the peat hydrolyzing with water and forming new components. The organic components in PAMF are there to promote plant and soil microflora development and the assimilation of plant available mineral nutrients. This type of fertilizer increases soil's fertility by improving its physical, chemical and biological properties. Unlike mineral nitrogen fertilizer PAMF fertilizers, which are composed of 90% organic substances, effectively transform added nitrogen into forms which are not detrimental to soil biological systems.

The complex compounds are broken down to simpler ones referred to humic substances. Humic substances have been classified into three chemical groupings based on solubility: (1) fulvic acid – soluble both in acid and alkali environments, most susceptible to microbial attack; (2) humic acid – soluble in alkali but not acid, intermediate resistance to microbial

attack and (3) humin insoluble in alkali and acid attack, most resistant to microbial degradation. It is recognized that the benefits of humus will accelerate water uptake, enhance germination of seeds, stimulate root growth, enhance growth of plant shoots and stimulate growth in plants and microorganisms. PAMF fertilizers, supplies the soil with degradable carbon, sufficient quantities of humic substances and nutrients to stimulate microflora, which in turn enhances plant growth. The move to agricultural and horticultural practices, which are harmonious within sustainable crop production ecosystems, will result in a move to PAMF or comparable compost fertilizers.

The fertility program was tailored after PAMF but instead of a peat base and the addition of soluble fertilizer, cattle compost and agrominerals were substituted. Agrominerals is a term to describe natural minerals that can be used and have agronomical benefits. Examples of agrominerals are limestone, rock phosphate (apatite), biotite mica (potassium source), clays and rock flours containing broad-spectrum micronutrients. Unlike soluble fertilizers agrominerals not only supply plant nutrients but through the weathering process breakdown to positive secondary soil minerals which play an important role in nutrient cycling and forming soil aggregates. Locally quarried Boreal Agromineral TM was used. No additional inputs will be added to these fields for a minimum of five years. Successive crops and soil quality will be monitored to evaluate effectiveness of original fertility inputs over an extended period of time.

Initial Observations

1 Domsch, K.H. (1985) Influence of Management on Microbial Communities in Soil, Department of Soil Biology, Federal Agricultural Research Centre, Braunschweig (FRG).

Yields and quality were comparable or out yielded conventional potatoes grown in Blezzard Valley. Under organic management final results are excellent. These northern soils in

a pathogen-limiting climate produced a superior potato that required limited weed and pest management. In fact the plants were chopped to stop growth.

NORDC 2005 Potato Crop Data - Blezard Valley

Location	Soil type	Cultivar	Days	Area(acres)	Graded Harvest(lbs)	Yield(cwt/acre)
Field # 1	light	Chieftain	105	0.89	24000	270
Field # 2	medium	Kennebac	105	1.01	24000	238
Field # 3	heavy	Kennebac	105	0.53	12000	226

Inputs - all plots

20 tons/acre composted cattle manure,
2 tons/acre Boreal Agromineral

Management - all plots

Mech planted- June 15
Mech hilled - July
Manually weeded - August
Vines Chopped - End of September
Harvested - Mid October
Mech windrowed and manual grading in field

Ongoing Research

Compost research will commence over the winter. The purpose of the research is to develop composted manures where peat and agrominerals are utilized in the process. There are a number of key attributes peat possesses which no doubt will expand its use and are:

- CEC - peat has an exceptionally high CEC value, (60 to 160), making slightly to moderate humified peat excellent bedding and composting additive.
- Absorbing Capacity – the ability to absorb and retain water is essential for good compost.
- Biodegradable Carbon – slight to moderately humified peat is an excellent source of carbohydrates resulting in soil microflora stimulation and composting qualities.
- Humic Content – moderate to highly humified peats are very high in humic substances. Applications of mineral rich, peat-based compost is a better way of crop fertilization.

These compost blends will be utilized in 2006 organic plots, which will include root crops, garden vegetables, forage and pastures. The test work will encompass composting, greenhouse potting soils, sprouting media, biological and geochemical analysis.