

Homemade Fertilizers at Tobacco Road Farm

By Bryan O'Hara

With the intensity of vegetable production at Tobacco Road Farm it is critically important to maintain the health and vitality of our crops and soils. One of the ways in which this is achieved is through the careful preparation of fertilizer materials. Though fertilizers are no substitute for proper tillage, drainage, irrigation, cropping, mulching, etc, they are significant in healthful crop growth. The need for appropriate fertilizers is certainly exacerbated by the tremendous pollution facing us today. The pollution in its many forms has upset the biological and chemical balance of our soils and leaves us as farmers needing to develop practices to reestablish this balance if we expect to grow high quality pesticide free crops. However, fertilization is a tricky business, the soils, environment and crops are in a constant state of change requiring different approaches and material at different times. An understanding of the materials and what one is trying to achieve with them is critical. The variables presented by fertilization need guidance through: study of materials, trialing of materials, observation of their impacts, soil and tissue testing, and intuition. The qualities of lack of pestilence, vigorous, sturdy growth, thick leaves, plump seeds, healthy roots, proper coloration/pigmentation, and tastiness are the signs of success. To this end fertilization needs to be carefully balanced; over fertilization can be as detrimental as under fertilization.

Most of the fertilizer recipes presented here are from Korean Natural Farming (Cho Han-Kyu manuals available through Acres) or Biodynamics, though they are modified somewhat to our local conditions. Both KNF and BD are farming methods known for a thorough understanding of forces at work in natural fertilization. It is significant to remember that all soils are different and fertilization may have very different impacts in different situations. Therefore though specific recipes are presented in this article they should be used carefully and with trials and observation of their results.

An important concept in fertilization is that seed contains the nutrients and forces for seedling growth, so quality seed is your first fertilizer. Most other fertilization materials are applied as the crop is growing either alongside as a solid or liquid side dress or as a liquid foliar application. Excess pre-plant fertilization often makes for weak seedlings prone to insect disease.

Since the biology of the soil has been disturbed by pollution, tillage, and intense cultivation, the use of IMO cultures (Indigenous Micro Organism) have been thoroughly utilized. In this process microbes are gathered from nearby forest areas then dramatically multiplied on the farm through various culturing steps. This results in a compost-like material brimming with activated local biology. Here are the culture steps briefly outlined; a more in depth study can be accessed through Korean Natural Farming.

- IMO #1: Take a wooden box, 2/3 full of partially cooked rice, and bury it in an undisturbed area of forest leaf litter. Allow to set for a week, more or less, until covered with a primarily white fungal growth. Remove it and bring it back to the farm.
- IMO #2: In a crock, mix IMO #1 with organic brown sugar at a 1:1 ratio by weight. Cover with paper secured by a string and allow to sit for 1 week or more. This material can be stored in a root cellar to hold it until you're ready for the next step.
- IMO #3: Dilute IMO #2 with water at about 1:100 or so, and add to bran pile (usually several hundred pounds, from rice, wheat, etc) until the moisture level is at 65-70% (barely drips when squeeze). The water may also contain other preparations (OHN, FPJ, ACV, all at 1:500) and seawater at 1/30 dilution. Lay out this material evenly, 1 foot deep or less, right onto the soil in

partial sun, and cover it with leaves. A very explosive, odiferous growth quickly occurs. Keep the pile under 120F by turning and lowering if needed. Also check moisture level and add water if needed to keep at 65% moisture content.

- IMO #4: Mix IMO #3 with farm soil at 1:1 ratio. Use liquids, as with IMO #3, to attain 65-70% moisture content. Allow to sit 4-5 days, and cover with a tarp for storage or to keep rain off.

IMO #4 is then applied to the field in the evenings; 5 gallons or more per 500 square feet. After applying we often mulch over the culture and water if it's too dry. The white mycelium of the IMO can then often be observed growing into the mulch and soil. IMO #4 can also be added (stirred in and strained) to foliar sprays and irrigation water. It can be mixed into potting soils and compost preparations. Once the IMO is applied to the field it is best not to till or its growth will be significantly disturbed.

On the farm most mineral amendments are added into the composting system for better biological activation and less disturbance of the field soil biology. The basic materials in the compost are: cattle manure, farm residue, vegetable scraps from our food coop, clay subsoil, trap rock (basalt), quarry dust, aged sawdust, straw, wood chips, and leaves. The routine minerals added include 300 lb gypsum, 500 lb talc, 500 lb soft rock phosphate, 50 lbs sea salt, 25 lb hydrated lime, 20 lb manganese sulfate, 10 lb elemental sulfur, 5 lb zinc sulfate, 5-10 lb molybdenum sulfate, 1 lb sodium borate, 1/4 lb cobalt sulfate. Various composts are prepared and applied at appropriate times of growth, which include:

- Pre-plant weed control compost/mulch: This compost contains higher levels of carbon and quarry dust and is used to control weeds and feed the soil biology (esp. fungus). It is used young and often contains any mineral amendments in need of general application.
- A leaf growth enhancing sidedressed compost containing more Nitrogen in the form of cattle manure, coffee grounds and such, along with some added molasses. This compost is applied along the side of a crop harvested in the leaf stage such as cabbage. It is also used in the early stage of other crops which are grown more to fruition.
- A flowering stage sidedressed compost is prepared for use when crops are beginning or in flower and generally before fruiting. This compost is also side dressed along a growing crop. It is a well aged high carbon compost base with additional rock phosphate, gypsum, diatoms, seaweed, liquid magnesium, wood ash, molasses, and Solubor added.

The flowering compost is generally the last solid compost applied, because at that stage the plants are quite large and it becomes more difficult to side dress. At this stage we use more liquid preparations. For liquid side dressing the materials are generally applied either through the irrigation system or with watering cans alongside the crop.

- For leaf growth a mixture of 4 fluid oz Nitrogen source (homemade fish liquid, sodium nitrate, etc), 8 fluid oz. molasses, ¼ fluid oz Solubor, 1 fluid oz worm leachate, 8 fluid oz sea water, with water so the mixture can cover 120 square feet.
- For flowering periods: 6 lb bone char, vinegar to cover, 2 lb sulfur, 4 gallons water. Simmer in a pot for 30 minutes while stirring. Dilute 1:12 with water.
- For fruiting periods and silica needs: 4 gallons of water, 6 lb of silica-rich ash (burnt rice hulls, etc, OR you can also use diatoms or potassium silicate), 4 fluid oz Solubor. Simmer 30 minutes while stirring. Use 1 cup with 1 quart of worm leachate (vermiwash), and then dilute the resulting mixture 1:12 with water.

The last 2 recipes are adapted from Hugh Lovel and are presented in his new manual Quantum Agriculture. Both recipes contain potentially damaging minerals (Solubor and sulfur) and so should be used very cautiously and with observation of results in various circumstances. Also, Nitrogen and Potassium applications should be carefully watched in order to avoid overgrowth which is weak and prone to disease.

Vermicomposting bins are maintained on the farm. Various minerals such as calcium and Molybdenum are added along with the regular worm diet. The bins are 55 gallon drums cut open with a mesh covered drain hole in the bottom. The bins are covered but when worm leachate is required water is added to the top of the bin and the leachate is collected with buckets underneath the drain hole. This material is a liquid humate-like material useful for buffering liquid mineral fertilizers.

The Biodynamic preparations are all utilized on the farm but a particularly useful one for fungal disease control is horsetail tea. 10 fluid oz of dried horsetail herb in 1 quart of water is simmered for 20 minutes. Strain, and then add 2 gallons of water, stir for 15 minutes and use as a foliar. Sea water is also a common foliar ingredient. This is used at 1:30 dilution with water.

The following seven preparations are taken from Korean Natural Farming with some slight modifications for local conditions:

- FPJ (Fermented Plant Juice): Chopped plant material (examples are nettle, plantain, comfrey; used separately) gathered in the early morning, 2:1 with brown sugar layered in a crock, weighted and covered. Ferment 7 days, strain and dilute 1/500 with water, use as a foliar.
- OHN (Oriental Herb Nutrient): Angelica, cinnamon, licorice, garlic, ginger (use these separately), 2 kg dried herb with 6 to 8 liters fresh beer or saki. Use a paper cover secured with string, cover 1 to 2 days. Add brown sugar 1:1 by weight and let sit a further 4 to 5 days. Add 4 to 5 quarts of vodka, change out the cover to a plastic sheet secured with a rubber band and let sit for another 2 weeks; stir the mixture once daily during this time. Strain and store; for foliar use dilute 1/1000 with water.
- ACV (Apple Cider Vinegar): Live vinegar and unpasteurized apple cider mixed at a 1:3 ratio, let sit in a crock for 1 month. Bottle and store; for foliar use dilute 1/500 with water.
- FAA (Fish Amino Acid): Fish waste mixed 1:1 by weight with brown sugar. Layer in a crock or barrel with a bit of IMO#4. Ferment for at least a few weeks and for use as a side dress, dilute with water.
- LAB (Lactic Acid Bacteria): Raw milk whey, dilute 1/1000 with water for a foliar. You can also use raw whole milk this way.
- WCA (Water Soluble Calcium): Roast egg shells for 30 to 40 minutes. Grind them up and add them to vinegar at a 1:10 ration. Let this mixture set for 7 days. For foliar use dilute 1/1000 with water.
- WCP (Water Soluble Calcium Phosphate): Charred bones mixed 1:10 with vinegar, let it set for 7 days. For a foliar dilute 1/1000 with water.

All of these materials use very high quality starter ingredients and utilize natural biology to enhance their activity. The foliars are created using edible ingredients and are very powerful at enhancing sturdy disease free growth.

Here is a general foliar example: 3 gallons water, ½ fluid oz OHN, 1 fluid oz FPJ, 1 fluid oz ACV, 1 fluid oz LAB, 1 fluid oz liquid seaweed, ½ fluid oz WCA, 1 pint sea water, all mixed with 2 quarts IMO #4 (stir well and strain out the solids). For use at the flowering stage, add WCP (1:1000). With high rain conditions (fungal disease) we add WCP, horsetail tea, and increase the ACV.

These materials are presented here in short to give an idea of their usefulness. We have found them to enhance the high quality growth of the crops on our farm.