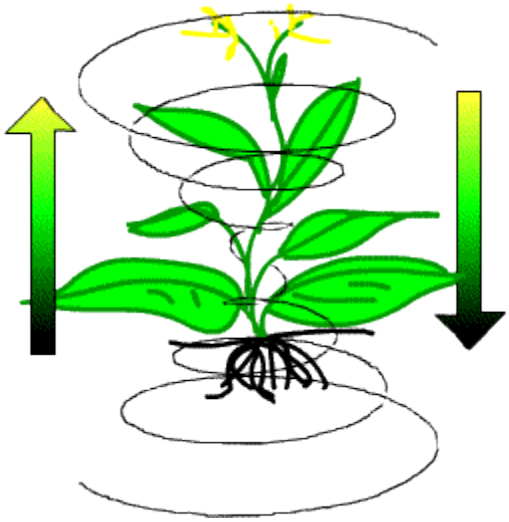
The Biodynamic Materials



Earth forces are concentrated, then dissipated -- life throws matter up, opposite to gravity. Cosmic forces are brought down to the material world.

Last class we described the plant existing within two streams of formative forces. From the earth, solid material is brought forth, against gravity, then dissipated as fragrance, pollen, color -- as close to insubstantial as it can get. From the outer world, insubstantial quantities, such as information, seasonal cycles and energy, are brought down to earth. For example, through photosynthesis the plant takes sunlight and atmospheric gas and condenses them into carbohydrates -- the source of the biological food chain.

Formative Forces in the Soil

Growth Factors

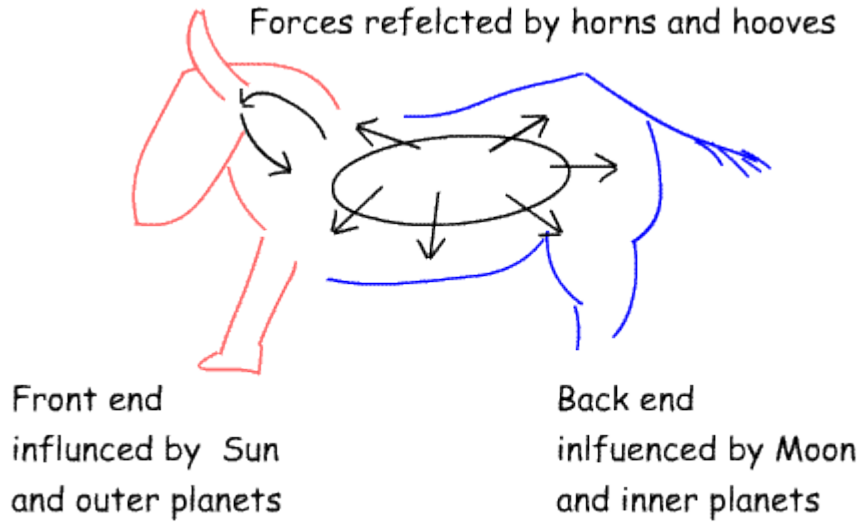
Terrestrial Influences	Cosmic Influences
Includes soil, fertility, water	**Includes** light, warmth, seasonal rhythms
Varies by soil texture, fertility, organinc mater, nutrient content, calcium level, water storage ability, temperature, rainfall	**Varies by** sunshine, altitude, seasonal weather, presence of silica
Influence on crops High yield, protein and minerals	**Influence on crops** Ripening, flavor, keeping quality, seed viability
Overabundance problems Lush growth, subject to diseases and pests, poor keeping	**Overabundance problems** Low yield, strong fragrance, bitter taste, fibrous parts
Management Practice liberal compost, legumes in rotation, correct mineral deficiencies, save moisture	**Management Practice** Use well-ripened compost, no overfertilizing, correct deficiencies
Use Horn Manure	**Use Horn Silica**

We mentioned earlier that biodynamics uses specific preparations to enliven the soil and bring vital forces to plants. We have to consider the two polar growth forces -- the earthy, expansive force and the airy, contraction and maturation force. How can we enhance these forces in our gardens?

If you want lush growth, it's hard to think of a better fertilizer than cow manure, Steiner pointed out the reasons why this manure is so effective at promoting growth -- it has already lost its original form. The manure has passed through an organic process in the animal's digestion. The carbon framework in the foodstuff has been broken down and those structural forces liberated. This leaves the living oxygen and nitrogen, bearers of life-ether and astral, at loose ends and ready to join into new organisms. Steiner says that this manure is just at

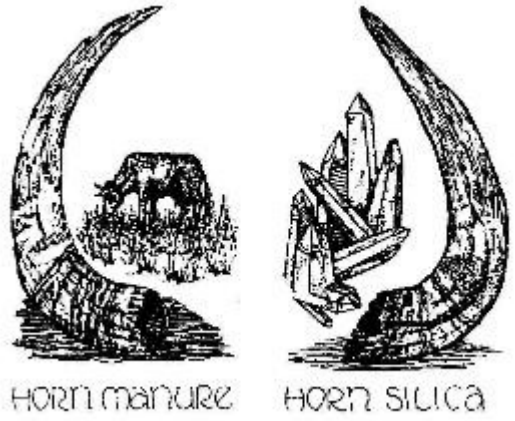
the point of dissolution and disintegration. Now we need to put this material in process to enhance and concentrate those formative forces.

For this purpose, Steiner suggests using the horn of the cow. Why is that? Because the cow is a creature that concentrates on the digestion process. The cow's horns and hoofs serve as a kind of mirror to reflect back the formative powers and concentrate them in the digestive process.



Formative Forces During Cow's Digestion

To explain, Steiner contrasts the cow's horn with the stag's antler. The horn arises from the skin; it contains both protein and silica. The antler arises from the interior and contains bony calcium. Horns reflect back the moon forces in the back end of the animal, while antlers are a kind of antenna, collecting outer forces. We can see this difference in the way the animals behave -- the stag is a nervous creature, always checking the environment for danger, ready to flee. The cow is a placid creature -- focused on chewing her cud, tuned in much more to the interior world and less anxious about her environment.



So we fill the horn with manure and let the forces concentrate within. We bury the filled horn so that it is surrounded by the earth, by all the forces that accumulate in the winter-time earth -- the time when the earth is most alive -- these are poured into the inner hollow of the horn. The result is a material that is more than just aged manure -- it serves as a concentrated source of the earthy growth forces and their pattern. When Steiner first experimented with making these preparations, he identified then by an identification number. This preparation is called 500 (after that original ID number) or Horn Manure.

It is not surprising that we do something similar for the other growth force. This time we fill the cow horns with finely ground quartz or silica. Instead of hibernating in the soil during winter, this preparation spends the summer in the earth. During this time, the expansive forces of the outer planets are streaming in and the soil is filled with light and warmth. The resulting preparation enhances the airy, maturing formative forces. It makes plants sensitive to cosmic nutritional stream, counteracts any tendency to rank or bulky growth, stimulates the absorption of homeopathic quantities from the air. This preparation is called 501 or Horn Silica.

Steiner also gave indications that there was a way to prepare clay as well, but he overlooked mention during his famous lectures. Other researchers have picked up the task and developed a horn clay preparation as well. Use of this preparation is not accepted by the entire biodynamic community yet and there are questions about how to prepare and utilize it. Based on theory, it seems appropriate to consider using horn clay that has gone through a spring-to-spring hibernation in the spring and a fall-to-fall hibernation in the fall. Practitioners who have tried this preparation believe that it adds an important mediation between the two opposing poles. Certainly this is consistent with what Steiner described as clay's role in the soil.

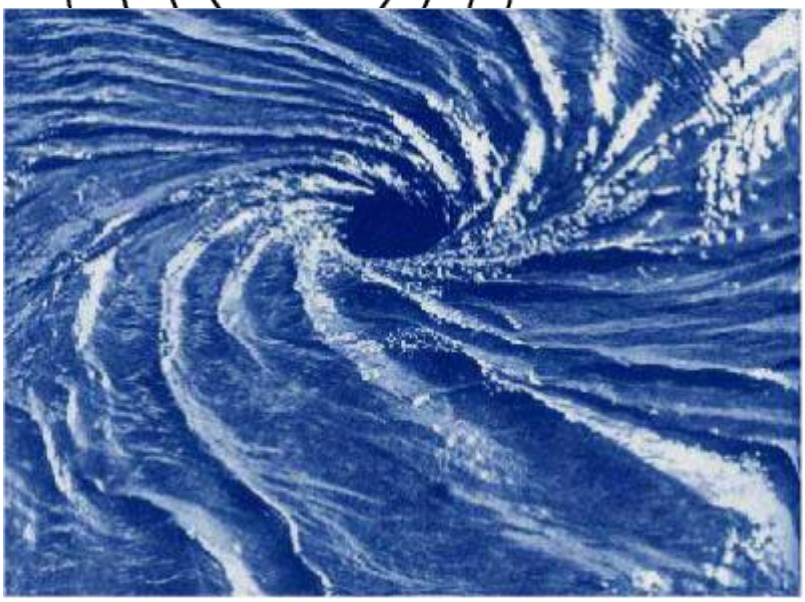
With these preparations, Steiner provided tools to encourage the two major growth polarities, and with the development of Horn Clay, a third preparation to mediate soil processes. Now how do we apply them to assist plants? To explain, we have to discuss the unique properties of water.

Water's Unique Characteristics

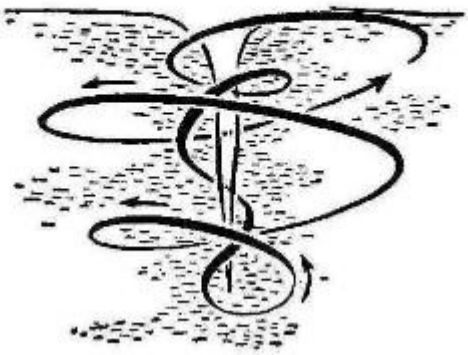
Water is such a common substance that we forget how special it is. Water's solvent abilities are what enable living bodies to absorb and transport the various substances needed for life. Water has the strange ability to easily adapt many different materials. With salts and ionic compounds, water easily forms ions and carries electric charges. But more importantly, water molecules are continuously engaging in a sort of weak "hand-holding" -- water easily forms hydrogen bonds with organic compounds and itself. Water doesn't have simple molecules, but instead water molecules link to each other, forming various chains and nets. The property of water to absorb pattern influences has been recognized in naturopathy medicine through homeopathy. This is a technique that enables very small amounts of a substance to impress its therapeutic forces into water.

Water is such a slippery liquid, it loves to arrange itself in flow lamina or layers. When water flows around a curve, it sorts itself into thousands or millions of thin layers. Each layer can flow at a different speed with little friction to the next layer. So we swirl water in a container, the outside layers, slowed by contact with the wall, are actually the layers moving slowest. The inner layers are the fastest. So responsive is water, that it can find the slightest little difference in friction, setup a laminar pattern and minimize any waste of

energy. This is what happens when water sets up a vortex while running down the bathtub drain.



Water around a whirlpool moves in spirals



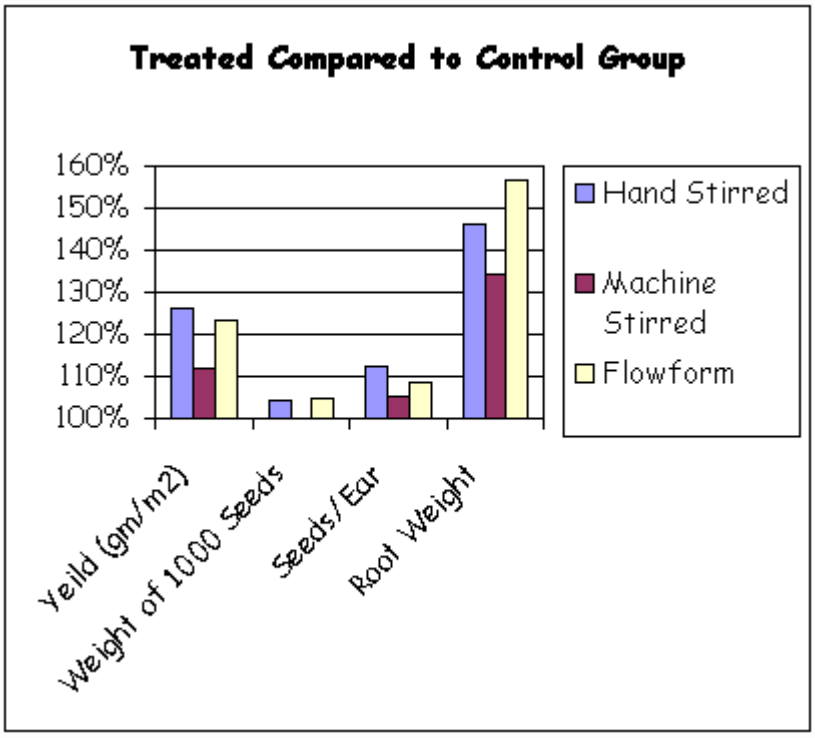
Small differences in the friction of twisting of the plumbing configuration give water the impetus to form a swirling vortex -- that is the most efficient way for water to move. And when it forms a whirlpool like this, water is drawn down in the center, later to return from the sides. Another example of the move-to-the-edge-and-return picture of natural forces.

We add small amounts of the preparations to water and impress the water with their active forces. We do this by stirring it in a circular fashion to create a vortex. Then we reverse direction, destroy the vortex to the point of chaos and recreate a vortex in the other direction. We repeat this stirring operation, first one way then another way, for an hour. As we do this, the water's lamina or membranes are flowing over each other, weaving in the influences from outside. Every time we bring the water to the point of chaos, we then give it a new pattern, over and over again. As we do so, we are opening up the water to the forces in the preparation. When we are done, we have water that has been vitalized by only a small amount of the preparation material.

Illustration: Flowforms America

For the small gardener, stirring the preps by hand is a good fit to small-scale operation and provides the all-important direct human involvement. But what if you want to cover a large area? Then stirring by hand just takes too much time. Over the years, practitioners have tried various machines to do the stirring. One concern has been that motors undermine the creative process by introducing mechanization. Recently, there has been some consensus that special design fountains, called flow forms, provide solutions with similar vitality to those that are hand stirred. The flow forms arose from the work of John Wilkes, a sculptor and biodynamics practitioner in England. He experimented for many years to sculpt flowing basins that would provide the same sort of swirling motion as done by the stirring. In addition, these fountains are aesthetically beautiful and can be included as architectural features.

A study comparing stirring methods by Freya Schikorr was reported in *The Stirring Stick* (British Columbia newsletter) Winter 1996. In this study, wheat seeds were treated with the preps; yields were measured and then compared to untreated controls. The improved effect of the preps was generally statistically significant. Hand-stirred and flowform preps were not significantly different from each other. The method of machine stirring came out poorly, but her method was rather primitive. The machine in this case consisted of a kitchen mixer -- others have since developed machines that are much more effective but measured results have not been published. Overall yield is a function of both the average weight of the seeds as well as the number of seeds produced per ear of grain. It is interesting to note that the preps increased both, but provided a larger increase in the number of seeds per ear. This study supports the method of using flowforms to produce the preps -- good news for farmers who must prepare large amounts of the sprays.

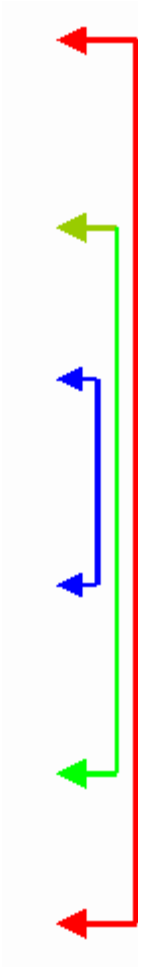


Source: F. Schikorr, "A Comparison of Stirring Methods", The Stirring Stick Fall 1996, p. 3.

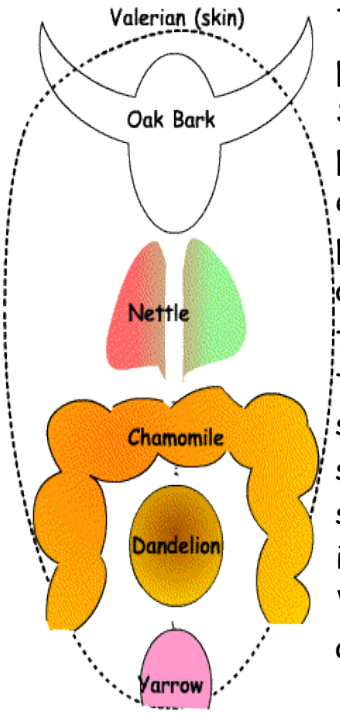
The Compost Preparations

We have already discussed how the soil is like a living organism for the plant. Steiner pointed out that, to be vital, the soil needs to be fed with compost that provides the same sort of living functions that we have in animals. What are those functions? Here is a table with a series of descriptions:

Broad Function	Organ in Animal	Secondary Influence -- (Derived From Primary)	Chemical Element	Works With Other Factors	Herb	Animal Sheath
Capture life force from outside, bring species pattern to the seed	Reproduction	Intensification (From Germination), contract rampant etheric growth, resist disease	C	Horn Manure, Water, Moon, Ca	Oak bark	Skull
Digestion -- break down food, rebuild with own life force	Intestine	Supporting Organs (From Sap Flow), stabilize N	O	Horn Manure Mercury, Humus, S manages Ca/ K	Chamomile	Intestine
Excretion -- remove life by-products, open life force to astral	Kidneys, Bladder	Excretion (From Nutrition), retains Si, corrects weak astral	S	Horn Manure, Venus, S manages Si/K	Yarrow	Bladder
Energize and distribute -- harmonize dynamic animal functions	Heart, lungs, circulation and breath	Protein (From Expansion In Space), heart-like rhythm and sensitivity	N	Horn Silica, Mars, Fe, Sand	Nettle	Itself
Regulation -- capture self-consciousness bring to physical body	Liver	Fragrance, Essential Oils (From Plastic Forces), draw in Si, transmutation	H	Horn Silica, Jupiter, Clay enlivens soil	Dandelion	Mesentery
Sensitivity -- develop animal nature into self consciousness	Skin, nervous system	Seed (From Archetype), brings warmth	P	Horn Silica, Saturn, K	Valerian	Water



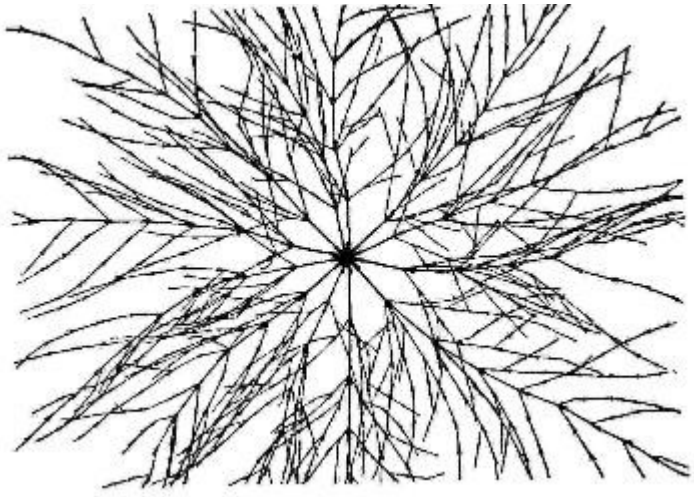
In the first column, we define a broadly defined function that we see in animal life. This is the sort of life process we want to duplicate in living soil in order to best nourish the plant. In the second column, we see the associated animal organ. The third column is an extension to outside influences that we are trying to guide (in refined form, these are a secondary intensification of the primary herbal material). The intensified influences are those after the herb material rests and "reverberates" inside the sheath material. It is these intensified influences that come the closest to the functions we are trying to introduce. Each function is associated with a specific nutrient and each works with a series of other partners. Finally, we see an herb associated with the function and an animal sheath that serves, like the cow horn, to concentrate and intensify the herb's characteristics. Note also that the functions form complementary poles, as indicated by the colored lines.



The Compost Animal

The table is divided according to the types of influences. The outer planet preparations can be seen as more subtle variations of the Horn Silica preparation, with nutrition and seed formation. The inner planet preparations are subtle variations of the Horn Manure preparation and enhance the growth and reproduction processes. Several herbs are prepared similar to Horn Manure-- the herb is encased in its sheath and buried to "hibernate" over the winter, gathering in stored forces from the earth. The oak bark preparation is linked to water and needs to be buried in a wet place. Other herbs are prepared to emphasize the summer forces. The nettle preparation is buried for a summer-to-summer period. The yarrow preparation spends the summer hung high in sunlight and air, then is buried for the winter. The valerian preparation is not buried at all -- it is the juice of the flower preserved by pickling. When placed in the compost pile, we are in a sense, creating a "compost animal", duplicating the functions that animals provide to healthy soil.

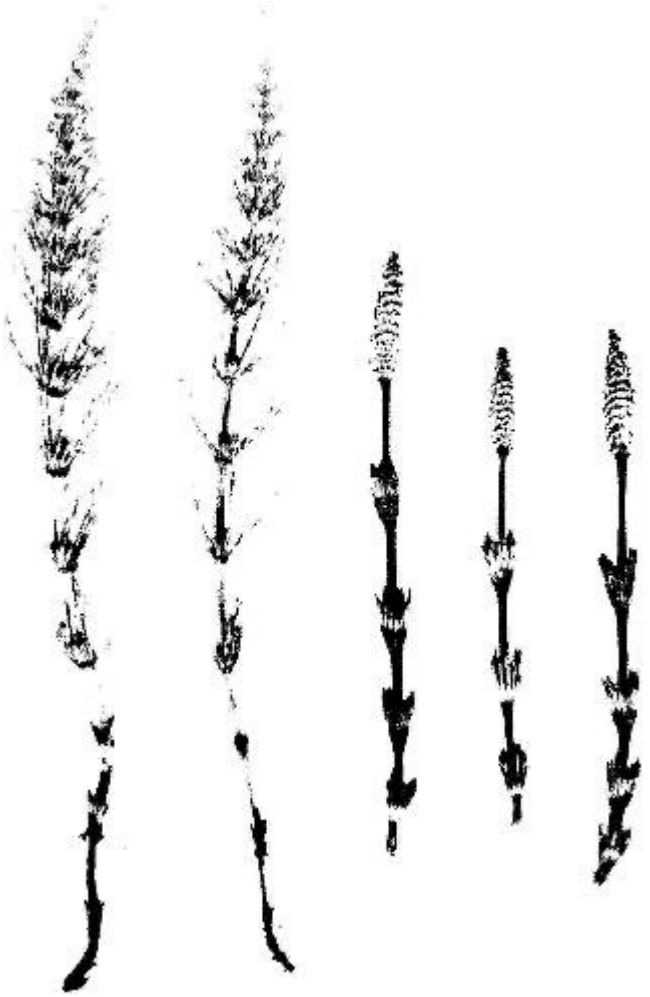
Horsetail (Equisetum) Herb



Finally, Steiner provided another herbal preparation -- this one a simple herb tea prepared from common horsetail (equisetum). The plant was called "scouring rush" by the old timers, and with good reason. Its skin is covered with sharp little scales, making it nature's scouring pad. These sharp scales are composed of silica. We also can see silica's influence in the finely divided, crystal-like structure of the leaves. Since silica is supposed to be insoluble, it is amazing that the plant is so effective at absorbing and transporting silica -- this plant is a treasure trove of soluble silica-organo compounds. When we make an herbal tea, we are dissolving some of this silica into a form that other plants can absorb and utilize.

This tea has is often used with Horn Silica to bring in maturing forces. But Horn Silica brings in growth forces from the outside, while equisetum operates differently. Equisetum "pushes back" overly rampant etheric growth, concentrating the life-forces within the plant's body where they belong. This concentration opens the plant to allow entry of the outer forces. This effect is similar to the oak bark preparation except that oak bark "pulls" the etheric back by emphasizing calcium's attractive force.

To use it, we first collect the herb in early summer and dry it for later use. Make sure to collect the stalks with finely divided leaves. Avoid the leafless spore-bearing stalks shown on the right side of the picture. To use, we boil some dried herb a good twenty minutes or so to make sure we dissolve the silica compounds. Then dilute about 10:1 and spray. Even in dilute amounts, this tea helps to harden off plants. We find it useful to combat attacks of aphids or damping-off fungus caused by the plant being overly soft and watery.



Keep It Easy -- Compost Starter

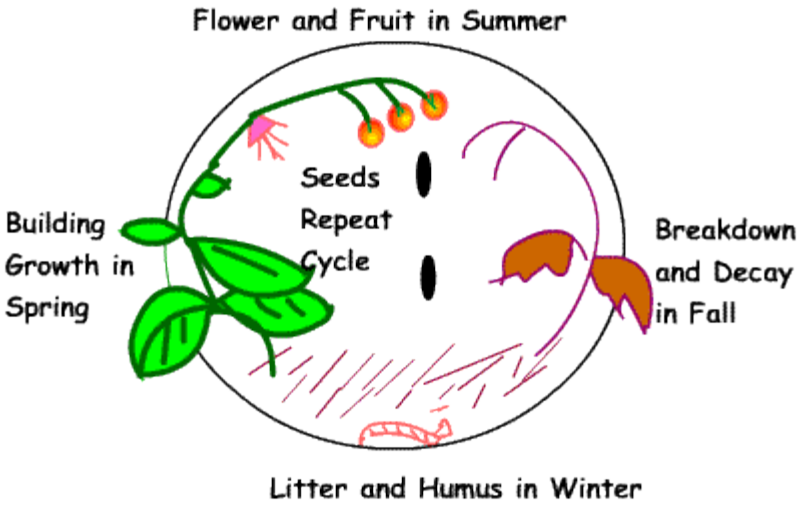
Using a number of herbal preparations fits for a large farm, where there is lots of animal waste to compost. But what works for the suburban gardener? A simplified form of the compost preparations was developed by Dr. E. Pfieffer so that usage would be easier. Dr. Pfieffer's compost starter contains elements of all the preparations, as well as special bacteria cultures that assist composting. For backyard operations, we are frequenting adding small amounts of compost material. It's easy to sprinkle a bit of the compost starter with each small addition. A scientist will tell you bacterial compost starters are not strictly necessary because all the garden debris already contains bacteria. That may be true, but Dr. Pfieffer's starter definitely assists. Piles quickly warm up and the resulting compost has the smell of good quality cow manure. It's easy to imagine this compost as being more "enlivened".

Barrel Compost

Maria Thun popularized another method useful for small-scale gardeners. She understood that we good develop a special, strongly energized compost. Thun's technique is to prepare a small batch of compost using cow manure with rock dust and ground egg shells for extra

minerals. This batch is treated to all the compost preps and carefully stirred to incorporate air. Then she incubates this compost in a partially -buried barrel -- hence the name "Barrel Compost". The final compost is fully cured compost with all the preps active. It can be stirred and applied like Horn Manure so that even a very small amount serves to activate a large area. This very concentrated compost can be used to bring vitality to those of us who do not have the opportunity to prepare large compost piles.

Compost Ingredients



The Cycle of Life

In the natural cycle, composting occurs at the bottom -- where the remains are recycled back into life processes. The cycle starts in spring, when dormant seeds spring into life. The plant growth increases until summer when the rapid buildup of carbonaceous material matures into the concentrated seed. After that, the leaves die and are eaten until they return to the soil. Over the winter, bacteria and fungi act on the fallen litter to break down the carbonaceous material. From a dynamic perspective, we see that part of the year, the plant builds a lush body of carbon material. During the other part of the year, the plant separates into a concentrated, but alive seed, and the dead and discarded mulch. These components will be reunited in the next cycle, thanks to the breakdown activities of the soil organisms. Some gardeners let nature take this course by merely mulching. However, we can assist nature by building the compost pile. The pile does the same job that nature would do eventually, but it does it faster and more thoroughly, so that the growth materials are ready in time for the next year.

The ingredients for compost should have a balanced ration of carbon to nitrogen, the C:N ratio. Sawdust, for example, is high in carbon with a ratio of about 500 to 1; whereas blood meal is high in nitrogen with a ratio of about 5 to 1. Ideally, the compost materials should start at a ratio of about 25 or 30 to 1. So if we are using sawdust, we need to make sure that we add some nitrogen material for balance. Here is a table of some common compost materials and their composition:

Sawdust 500:1

Paper 200:1

Straw 40-80:1

Corn stalks 60:1

Used Mulch 60:1

Dry leaves 60:1

Old Hay 30:1

Wilted Greens 20:1

Vegetable scraps 20:1

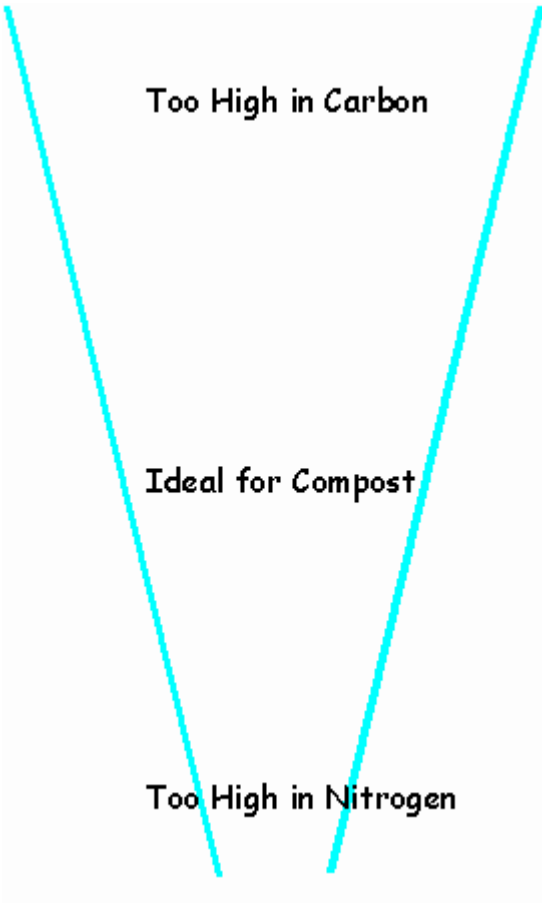
Grass Clippings 15:1

Legume Hay 15:1

Manure 15:1

Kitchen Scraps 10:1

Blood Meal 5:1



If the C:N ratio is too small at the start of the process, there will be losses of nitrogen. The pile will smell, often of ammonia, and may attract flies. A good compost pile should smell like good earth, never like anything rotting. In the spring, we often have lots of grass clippings but they are very green and lush. Unless we mix them with some carbon material, the pile will be smelly and slimy. On the other hand, too much carbon means that the pile will not break down quickly. The pile will stay cold and wet and acidic. This can happen in the fall, when we have large amounts of dead leaves and litter. In this case, we need to add some nitrogen material to balance the pile.

Besides the organic materials, we should add some source of minerals. As the compost organisms develop, the fungi in particular will extend their root-like hyphae over very long distances in order to find minerals. If we provide those minerals within easy reach, they will function more effectively. It is a good idea to add some soil with clay. You will observe that earthworms and their egg cases tend to cluster at the interface between soil and organic material. The worms like to have some rock particles in their gizzards in order to chew up the plant material. Adding limestone to the compost pile is better than adding it directly to the soil. In the pile, the limestone has more opportunity to form the humus colloids that act as nutrient sponges. The right amount of lime keeps the pile from going too acidic and benefits the cellulose-digesting bacteria. On the other hand, too much lime should be avoided least it

will discourage the ammonia-absorbing fungi. A sprinkle is all that is needed. Dolomitic limestone, containing some magnesium, is usually best since our soils tend to be leached of magnesium. Wood ash is another source of lime, as well as potassium and other minerals. It is caustic, though, like lye, and must be sprinkled sparingly. Avoid large lumps. Don't use ashes from burning coal or trash since these contain heavy metals. The compost pile is a good place to add phosphate fertilizers such as bonemeal or rock phosphate. These have to be broken down by bacteria before the nutrients are available to plants. So the sooner we start to get them incorporated into soil organisms, the better. Likewise, we can add other rock dusts such as ground basalt or greensand. These contribute minerals that need time to get into the food chain.

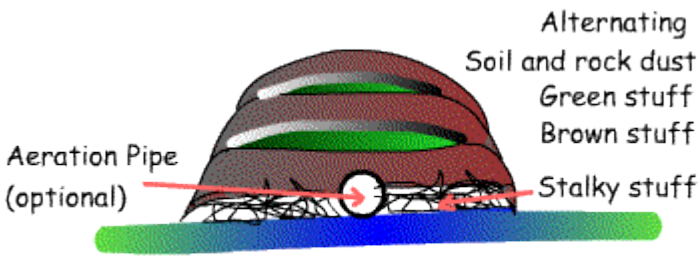
Since we aren't living on a farm, we have difficulty obtaining manure. Cow manure is the best type because the cow's digestive process creates the right kind of hormones and enzymes for composting. Bagged steer manure is not the same thing. Feedlot manure contains high salt levels and comes from unhappy cattle. Don't go out of your way in pursuit. Local dairies sometimes provided "washed cow manure bedding". These are the solids dipped out of their sewage lagoons. The soluble nutrients have already been leached out, leaving the carbon material behind. This material is a good carbon source to add to the compost and brings with it beneficial cow bacterial. But it is fairly devoid of other nutrients. Rabbit manure is high in nitrogen and good for developing foliage and stems. Poultry or bird manure is rich in both nitrogen and phosphorus as well as indole compounds that encourage flowers and seeds. Chicken manure, however, is overly rich, wet, heavy and odiferous. Raw chicken manure should never be applied directly but can be brewed into a manure tea.

Spent mushroom compost is widely available as a soil amendment material. This is prepared by an intensive and somewhat artificial composting process. Hay is fermented with artificial nitrogen fertilizer, then sterilized to develop a food source for the mushroom fungus. This is intensive monoculture, not a balanced ecosystem. After being used by the mushrooms, there is not much life force left. The material can be enlivened in the compost pile and then makes a good humus. Another application is to use the mushroom bedding as surface mulch. Exposure to the light and air is what the material needs to enliven it. But if used directly in the soil, it provides too much of the dead humus influence.

Building the Compost Pile

By now you should have got the message that compost is a critical step for healthy plants. We should all be thinking about how best to recycle garden and yard debris into rich, powerful compost. First, locate the compost pile in the best place. In a small yard, you may not have much choice. But if you can, build the pile where it is shaded by non-invasive deciduous trees. Europeans prefer elder, hornbeam or hazel. In the Northwest, an alder tree is great. Maples and their relatives are second-choice because their roots are invasive. Douglas fir would also be a second choice -- the terpenes of conifers are hard for compost bacteria to attack. Last choice would be trees like cedar, with hard to digest needles, or walnut, which exude

alletrophic chemicals to discourage growth from other plants.

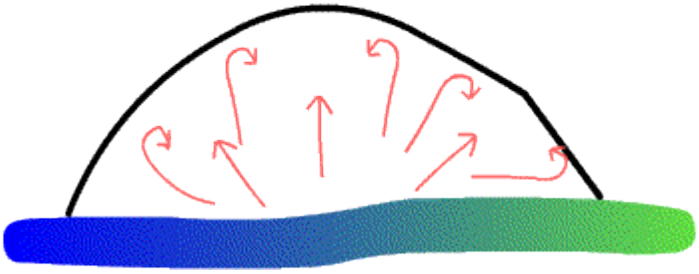


Building the Compost Pile

The next step is to build the compost pile itself. It helps to break up the area first so there is good entry by soil organisms. Then put down a layer of stalky residue, say like sunflower stalks. These materials take a while to break down but allow for air circulation under the pile so that things stay aerobic. You could use woody branches but then you have interference when you try to dig out the finished compost. If you have the opportunity, you can add a perforated pipe for aeration.

Then add alternating layers of brown stuff (high carbon debris) and green stuff (high nitrogen debris). Brown stuff could be old leaves or grasses --3 to 6 inches is good. Green stuff could be lawn clippings or nitrogenous waste like old coffee grounds. (These are considered green even if roasting has turned them brown.) After each green layer is a good time to sprinkle with a bit of Pfieffer starter dissolved in a sprinkling can of rainwater, if desired. Then top the green stuff with a thin layer of garden soil.

The Compost "skin" keeps forces within.



Our soil contains a good amount of clay so you don't need to add too much. You can also add rock dust, limestone or mineral fertilizers. The soil band serves a number of purposes -- it traps any ammonia gas given off by the green stuff, so it preserves nutrients. The soil layer serves as a source of trace minerals for the compost organisms. And the soil provides an inoculation source for various soil-living organisms. Biodynamics tells us that clay has an important role in mediating between the complementary poles of the growth forces. Then repeat adding layers for as much material as you have. When the pile is done, add covering layer that serves as a "skin" or boundary. Steiner made a point that the life forces within the pile are reflected from the edge and build up in the middle.

When building in layers like this, you can always add more layers later. This sequence works well in the backyard because we gain compost materials, say like lawn clippings, in small amounts each week. If the material is dry, you may have to add some water. Usually, we have the compost going during the rainy season so that isn't a problem. In fact, that's why I don't worry about flattening the top to absorb rain. Too much rain is more likely to be our problem. Ideally, the compost materials should be about as wet as a wrung-out sponge. Too wet and there's not enough air. Too dry and breakdown takes longer.

In order to keep the backyard looking neat, you may want to compost in a bin. No problem -- just follow the same guidelines to build the layers. I use old lumber salvaged from pallets to

make slatted bins. Make sure you have plenty of room between slats for air to enter. A bin should be at least a cubic yard in order to generate enough heat to compost well. You can buy ready-made plastic bins or even use wire cylinders of chicken wire or concrete reinforcing wire.

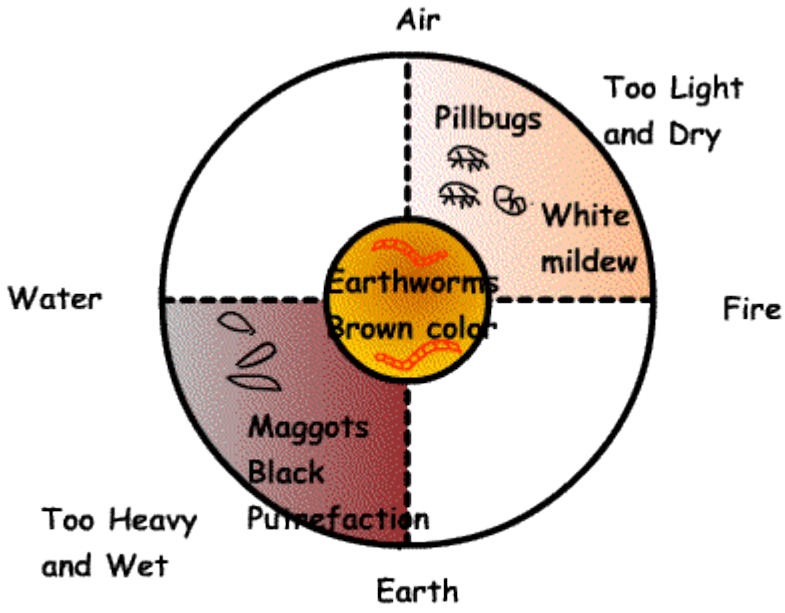
Compost enthusiasts want to add all kinds of stuff -- like kitchen waste. Consider this carefully. Near the city, we have to worry about attracting rats and undesirable vermin. I prefer to not use any foodstuff in the compost. It's true that I could generate a bit more compost with kitchen waste but the additional amount would be small. I can do a lot better by persuading my neighbors to give me their grass clippings and fallen leaves. Maria Thun reports that citrus and banana peels don't break own easily. She soaks them in a bucket of water until partly decomposed, then adds them to the compost pile. This would also serve the purpose of keeping vermin away.

In case you didn't know, wastes from dogs and cats are not recommended either. Their wastes can spread parasites to humans. We hope that the compost pile will eliminate disease organisms but it's best just to avoid them entirely. Dump the Pooper scooper in the trash can, not the compost pile!

If you want to compost kitchen waste, then you should think about vermiculture. This means raising worms in special bins. The advantage is that the waste is shielded from undesirable animals and the worms quickly clean it up. You will want to start with some "red wiggler" worms; this species is well adapted to eating rich worm food. Like any other compost pile, they will benefit from an occasional treatment with Pfieffer compost starter but will be on their way quickly even without it.

How Compost Develops

For optimal composting, think about the four elements: earth, water, air and fire. Earth is the solid element, providing minerals. Try to have about 5% earth, which can be coming from plant roots as well as added soil. Too much earth will slow the process. Water is a critical element; ideally, the compost should feel like a wrung-out sponge. Too dry and the compost will be musty, mildewy and full of pill bugs. Too wet and the compost will be heavy, slimy, smelly and may attract fly larvae (maggots). To manage air, it helps to shred the materials and turn the pile occasionally. The fire element appears as the pile warms up. Depending on the materials, the pile can heat up to as much as 140-160 degrees for the initial period. After it cools down a bit, you a good pile will generate earthworms. Pill bugs are not as effective at breaking down plant material. If you see pill bugs, it's a sign that the pile is too dry and the breakdown is being retarded.



Compost Elements

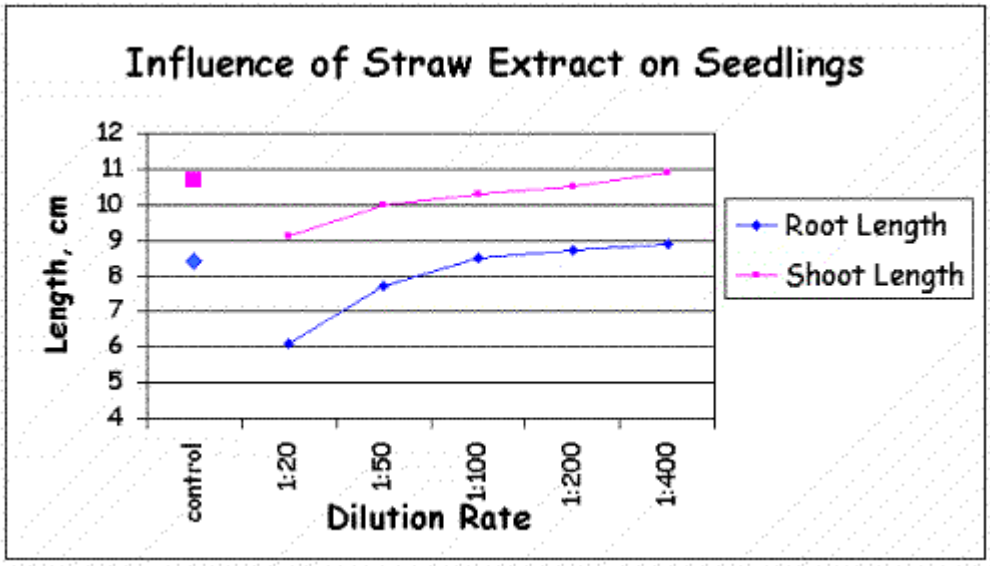
The primary plant material is cellulose. In effect, this is a surprising substance to be the plant's building block. Cellulose is a polymer of glucose molecules -- who would think that sugar can be used to build a tree? Long ago, plants figured out that this material, being produced to store energy as food, could be used as a structural material. The plant actually uses it in two ways. Cellulose is a long chain of sugar molecules -- imagine it as a chain of pop-it beads. It may serve to build long fibers, but what will hold them rigid? For that purpose, the plants cross-link the sugar molecules into a matrix like a plastic resin. This substance is called lignin. To form a structural material like wood, the plant takes long fibers of cellulose and embeds them in lignin. The covering creates a problem for bacteria. One can imagine that when a bacterium finds a cellulose end, it can pop off the last molecule and eat its way down the chain. But the lignin is a network and the molecules cannot be broken off easily. So the indigestible lignin becomes humic acids. Plant materials that are cellulose provide energy for the compost bacteria and lead to quickly recycled nutrients, while woody materials with lignin produce stable humus. Obviously, the compost will contain both sorts of material but it can be fine-tuned by selecting the starting materials.

Composting proceeds through three stages. First, during the bacteria-fungus stage, the simple, readily-accessible compounds are digested. Bacteria break proteins into amino acids and finally ammonia. Carbohydrates are broken into simple sugars and organic acids and finally carbon dioxide. At the same time, fungi develop that capture ammonia and start to rebuild amino acids in their mycelium. Some of the intermediate decay compounds would be harmful to plant roots, so it is important that this stage be completed before the compost is used. During this stage, oxygen is consumed and a lot of heat is generated. If you look inside the pile, you will see how the thermophylic bacteria are active in the center, followed by the white threads of fungal mycelia. During this stage, moisture content is critical and should be watched.

Composting shows oxygen depletion as microbes consume carbonaceous material faster than air can diffuse into the material. Sometimes compost is turned mechanically to bring in air and speed decomposition. However, that is not necessary. The oxygen/carbon relationship is dynamic and indicates the extent of decay, not the amount of aeration. Compost requires a certain length of time to go through its decay and reordering cycle. The second stage is the earthworm stage. The pile cools off and the heat-loving bacteria form spores. The fungi have pre-digested the plant material. Now the earthworms and actinomycetes are active. If the

first stage has left undigested areas, now is a time to turn the pile and get it mixed. Populations of protozoa and beneficial nematodes grow during this time and begin the process of cycling nutrients. The earthworms love the presence of bacteria colonies. They will chew up cellulose-containing material in their gizzard and create humus. The humus acts like a sponge to soak up nutrients for plants. Incidentally, worms also destroy pathogenic bacteria. Dr. Ingham reports "Worm castings are perfect habitats for the growth of a host of beneficial bacteria, because the worm surrounds the casting with slime material that apparently is a mixture of very moist carbohydrate, polysaccharide and a little protein. This is a select food resource for just "good guy" bacteria, as far as a plant is concerned." At this stage, the compost can be used as a mulch for heavy feeders, like corn or squash.

The third stage is when compost fully ripens and turns into crumbly, fragrant humus. At this point the organisms are humus bacteria and actinomycetes. All the easy-to-digest compounds have been processed by bacteria, leaving the stable humus compounds. Dr. Ingham tailors the compost to the type of crop -- for tree crops, she uses more woody, high-lignin material and produces a compost high in fungi. For vegetables, she uses more nitrogenous material and produces a compost high in bacteria and readily assimilated nutrients.



Dr. H. Koepf reports experiments that demonstrate how dead plant residues can inhibit the growth of new plants. Here an extract of wheat straw slowed the growth of both root and shoot. A 1:20 dilution of the straw noticeably halted seed growth and growth did not return to normal until the 1:400 dilution. Digestion of the plant residues in the compost pile eliminates this problem.

Will Brinton has conducted analyses that show the transformation during composting. During the first stage, we may see the temporary accumulation of Volatile Organic acids (VOA). These are the sorts of compounds formed during silage making, such as lactic and acetic acids. These substances act as natural food preservatives; they inhibit further decomposition and are toxic to plant roots. For that reason, it is important that the compost process continue long enough to break down these waste products. In proper compost making, these substances are consumed early, with the absorption of oxygen. Other substances toxic to plants -- ammonia, hydrogen sulfide and ethylene -- are also produced in the first stage but are safely neutralized as the compost ripens.

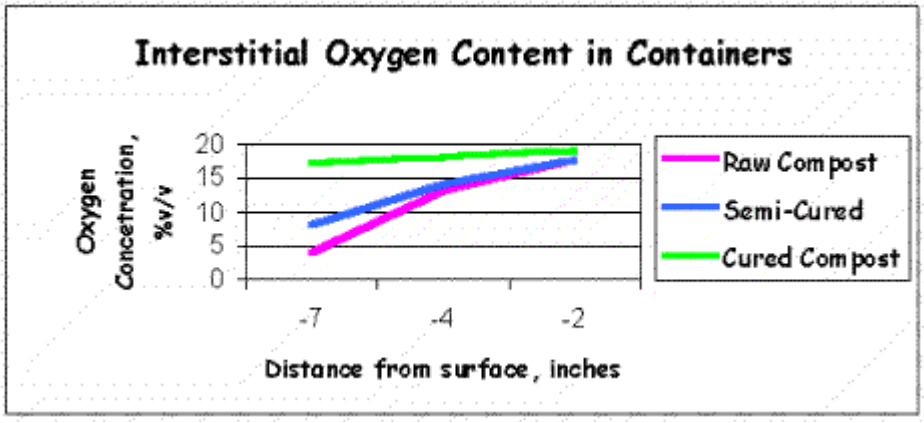
Analysis of Ripening Compost

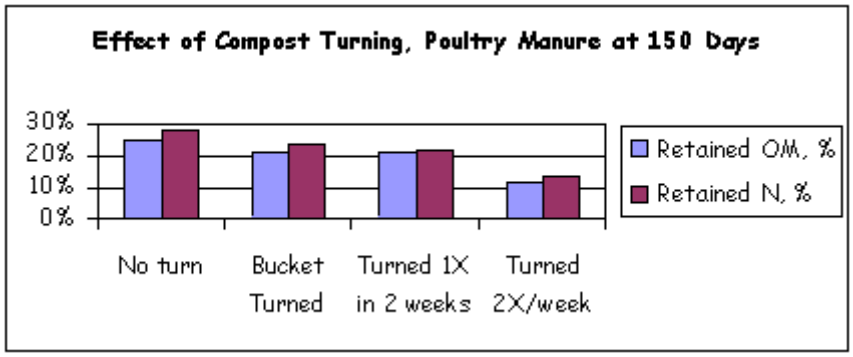
Compost	pH	OM %	N %	C:N Ratio	NH3 ppm	NO3 PPM	VOA PPM
Raw	7.54	73	1.97	20.0	4872	1	2109
Semi-cured	7.44	73	2.21	17.8	3295	1	993
Cured	6.10	57	2.95	10.4	16	1734	319

Source: William Brinton, How Compost Maturity Affects Plant and Root Performance, www.woodsend.org.

In the table above, we can clearly see a transition as the compost changes from high carbon, high ammonia to stable humus with balanced carbon. Note in particular how the dangerous waste products ammonia and VOA are transformed. These are the growth inhibitor chemicals that we want to get rid of.

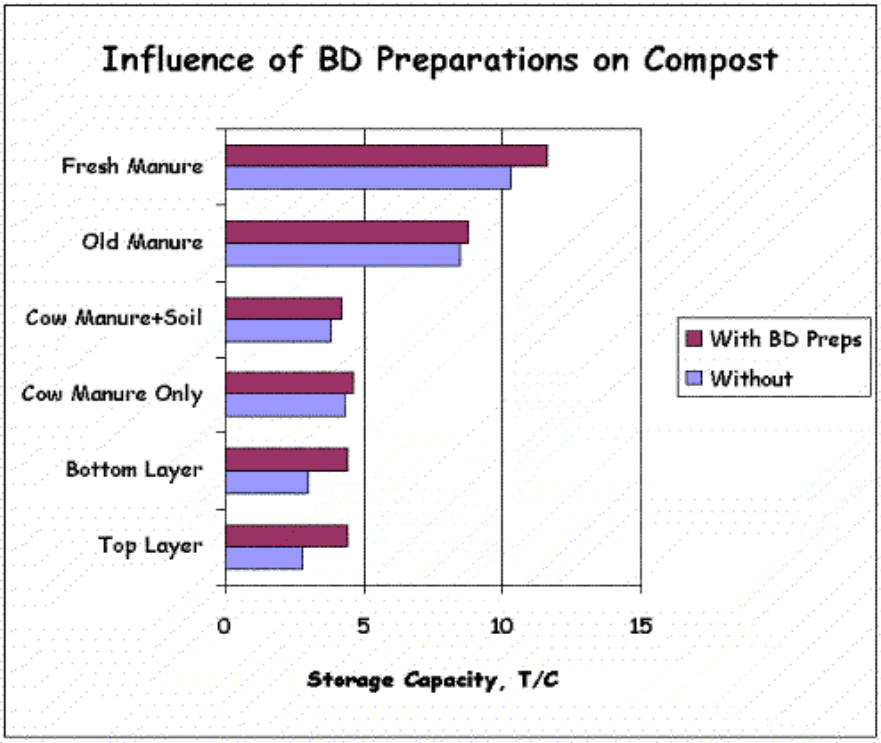
If the compost is added to plants too soon, the bacterial action competes with the plant roots for oxygen. Oxygen content is critical to good root development. Immature compost causes oxygen depletion in the soil. The graph shows measured oxygen levels and the photo shows the corresponding effect on plant growth. Fully ripe compost has little reduction on soil oxygen.



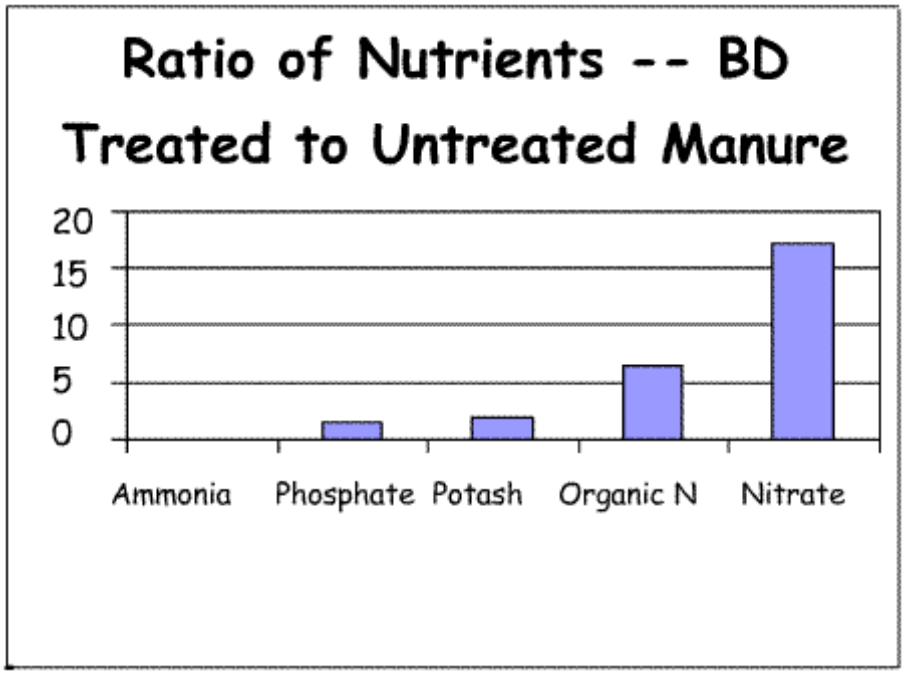


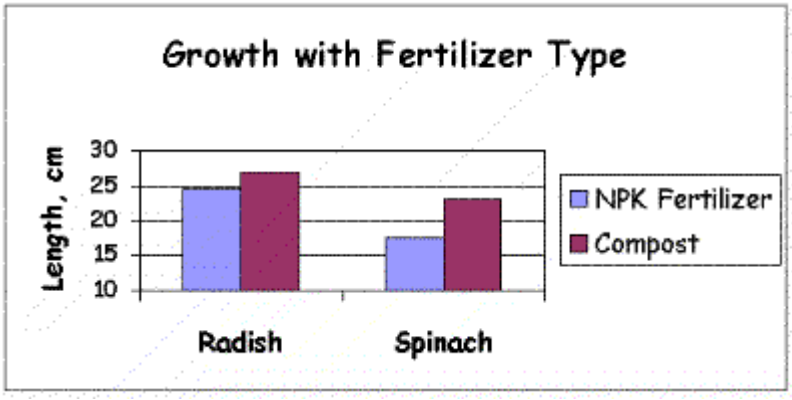
It is not necessary to turn the compost pile frequently to add oxygen. Research by Will Brinton has shown that the oxygen content of the pile stays low thorough the ripening process and increases only when all the fermentable material has been consumed by bacteria. So even if you turn the pile, it quickly reverts back to the same oxygen level. Furthermore, turning allows volatile nutrients to be escape. The graph shows that turning lowers the amount of Organic Material (OM) and nitrogen.

Koepf reports that when the preparations are used, the finished compost has more nutrients as measured by the exchange capacity to carbon ration (T/C).



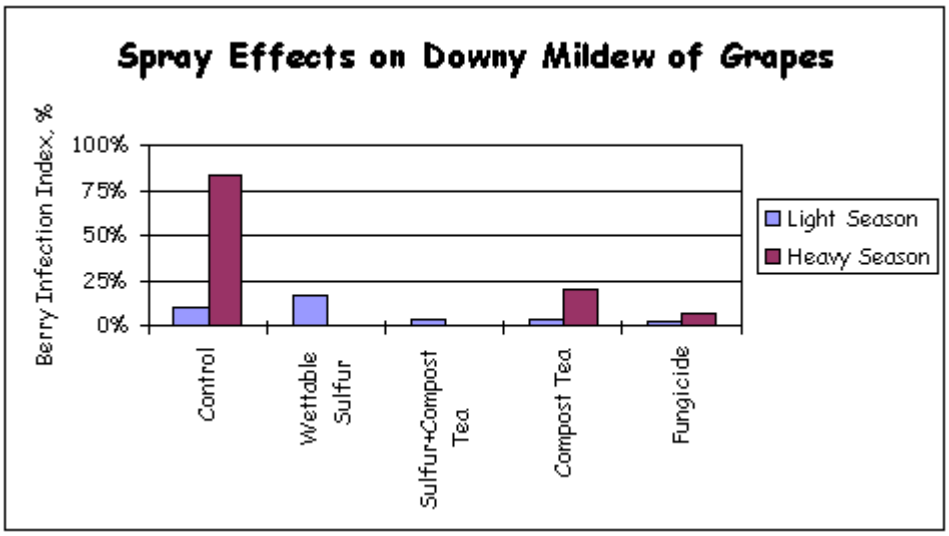
Pfeiffer reports test that show manure composted with the herbal preparations retains more nutrients, particularly nitrogen, in a form plants can readily use.





A number of experiments have verified the benefit of compost. Koepf reports on one experiment comparing conventional NPK fertilizer to compost. When the equivalent nutrients were supplied, the compost soil still stimulated more growth. Part of the reason may be the more favorable soil food web that develops with compost organisms.

Compost reduces the incidence of diseases, partly by inoculating plants with a population of beneficial micro-organisms. Will Brinton introduced this idea to the US. The graph shows that compost tea is about as effective as chemical fungicide in combating mildew on grapes.

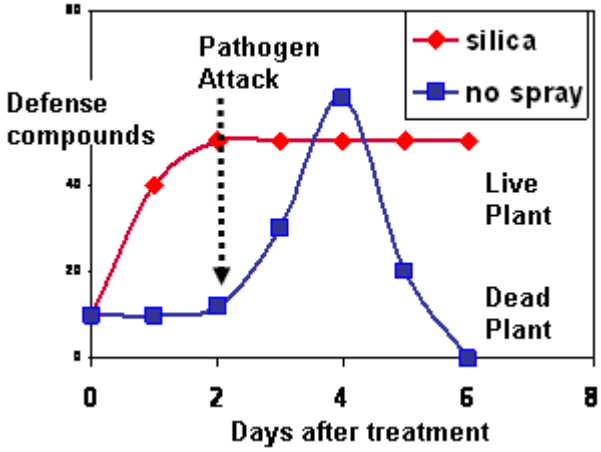


Dr. Ingham reports: "Consider some work done by Dr. W. Mahaffee now at Oregon State University (published in the American Journal of Phytopathlogy). Basically, a minimum of 12 species of bacteria were required to control one species of pathogen on cucumber foliage during one summer. One could extrapolate that for each disease-causing organism, there are probably at least 12 different species of bio-control organisms that need to be present through a single summer in order to prevent that disease. That's just one cultivar of plant, just one summer. Consider that the same thing is probably the case for each pathogen, for each part of the plant, for each set of environmental conditions. Diversity is most probably critically important." With compost, we are restoring a diverse microbiology to the soil in ways far beyond our awareness.

Dr. Lynne Carpenter-Boggs, Center for Sustaining Agriculture and Natural Resources, Washington State University has also attempted to develop theories for how BD works. She suggests several interesting ideas. One is microbial signaling. "Microorganisms communicate with each other by several means, including through volatile or diffusible molecules. Individual microbes can release tiny amounts of hormones, signals, and other chemicals that may induce a change in the activities of neighboring microbes. Antibiotics are a well-known example, and are produced by many soil and compost microbes to reduce the growth of other populations. The chemistry and complexity of microbial signaling is a new frontier in microbiology."

Dr. Lynne Carpenter-Boggs also quotes recent work on disease inhibiton. "Some materials can also induce “systemic resistance” in plants. This is similar to a plant vaccination or overall immune system stimulation. Typical plant responses to pathogenic attack such as production of chitinase (an enzyme that breaks down fungal cell walls) and thickening of plant defensive

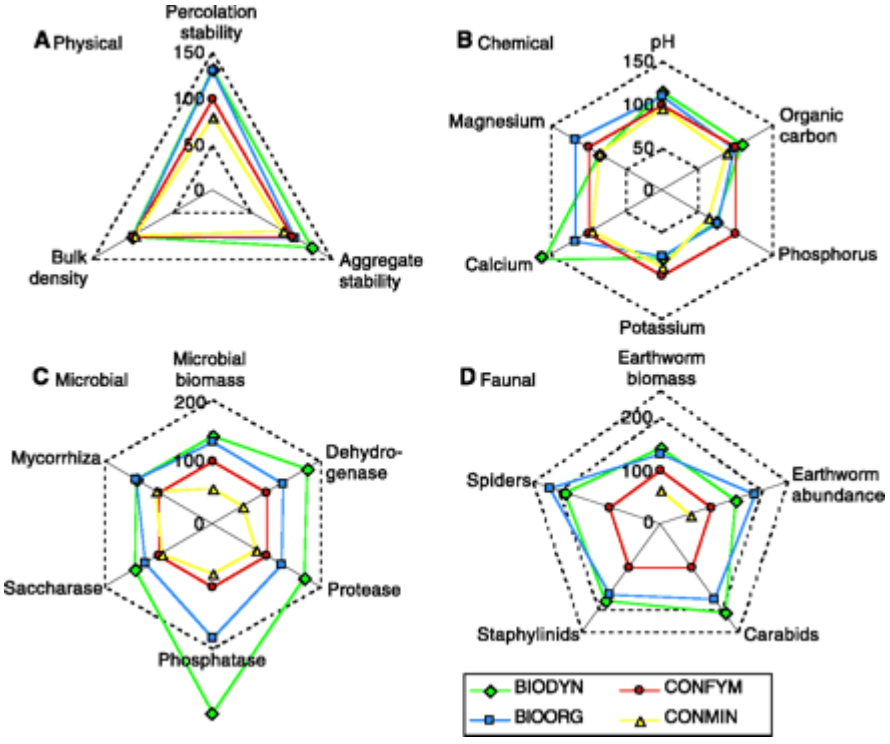
cell walls can be stimulated PRIOR to actual attack by a pathogen. When and if a pathogen does attack, the plant is primed for defense, and stands a much better chance of survival. This systemic resistance has been found to be induced by many materials such as soluble silica solutions (Chérif et al. 1994; Fauteux et al., 2005)."



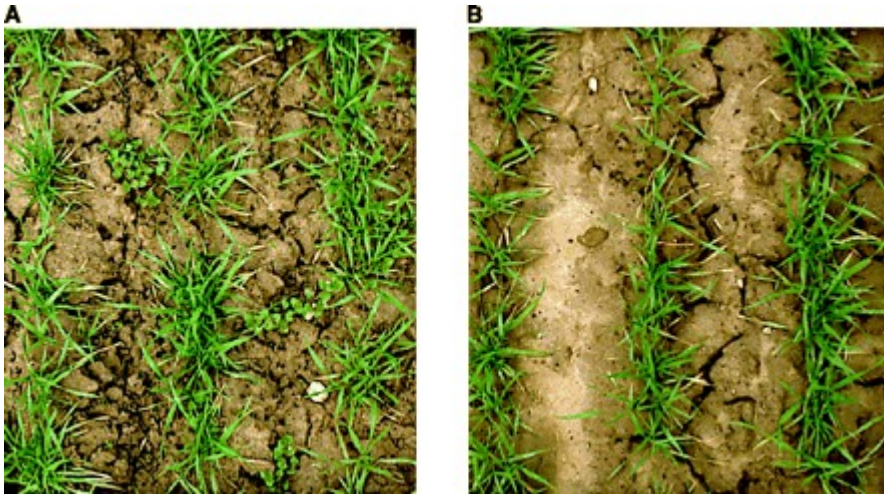
Plant immunity stimulation after treatment with silica spray. Figure credit: Lynne Carpenter-Boggs, Washington State University.

BD Compared with Conventional "Organic"

Mäder et al. report in the magazine Science research comparing four different farming systems. These were conventional (CONMIN), convential with manure (CONFYM), organic (BIOORG)and biodynamic (BIODYN). The organic methods provided somewhat less yeilds although with less purchased inputs so that profits remained comparable.

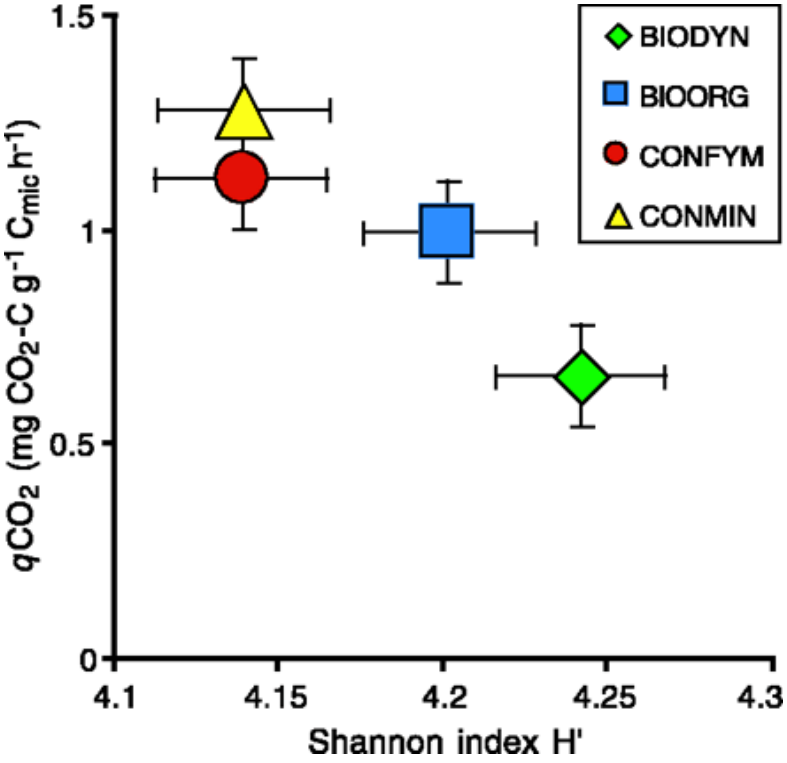


What is of interest is the difference in the level of soil activity and microbiota. As one would expect, the organic methods provide more organic matter in the soil and better soil stability. But look at the difference in the soil activity! Graph B shows higher Calcium; Graph C shows higher enzyme activity in the biodynamic soil. The photos below show improved soil structure. Source: Paul Mäder, et al., "Soil Fertility and Biodiversity in Organic Farming", Science.



Biodynamic (A) and conventional (B) soil surface in winter wheat plots. Earthworm casts and weed seedlings are more frequent in the biodynamic plot. Disaggregation of soil particles in the conventional plots leads to a smoother soil surface. Wheat row distance is 0.167 m. Source: T. Alföldi, Research Institute of Organic Agriculture [Forschungsinstitut für biologischen Landbau (FiBL)].

"Soil pH was slightly higher in the organic systems. Soluble fractions of phosphorus and potassium were lower in the organic soils than in the conventional soils, whereas calcium and magnesium were higher. However, the flux of phosphorus between the matrix and the soil solution was highest in the BIODYN system. Soil microorganisms govern the numerous nutrient cycling reactions in soils. Soil microbial biomass increased in the order CONMIN < CONFYM < BIOORG < BIODYN. Phosphorus flux through the microbial biomass was faster in organic soils, and more phosphorus was bound in the microbial biomass. Evidently, nutrients in the organic systems are less dissolved in the soil solution, and microbial transformation processes may contribute to the plants' phosphorus supply. Mycorrhizae as members of the soil community ameliorate plant mineral nutrition and contribute to soil aggregate formation. Root length colonized by mycorrhizae in organic farming systems was 40% higher than in conventional systems. Biomass and abundance of earthworms were higher by a factor of 1.3 to 3.2 in the organic plots as compared with conventional. Healthy ecosystems are characterized by high species diversity. The DOK trial shows that organic farming allows the development of a relatively diverse weed flora."



One of the particularly remarkable findings was a strong and significant increase in microbial diversity in the order CONMIN, CONFYM < BIOORG < BIODYN, and an associated decrease in the metabolic quotient (qCO2). The lower qCO2 in the organic systems, especially in the BIODYN system, indicates that these communities are able to use organic substances more for growth than for maintenance. Source: Paul Mäder, et al., "Soil Fertility and Biodiversity in Organic Farming", Science.

Natural Nutrients

There are several arguments for why natural materials, like compost, are the preferred way of feeding the soil. First, the saltiness of chemical fertilizers destroys some of the soil micro-life. Second, un-digested plant material gives off growth inhibiting compounds. And third, the type of nutrition that plants need is not necessarily what chemicals give them. In the natural world, plants give carbohydrates to soil fungi and receive back nitrogen as digested amino acids. This is very different from giving the plants nitrogen in the form of nitrate salts.

Animals differ from plants in having more nitrogen-containing protein. Except for the seed, plants are mostly composed of carbohydrates with little nitrogen. Steiner identified nitrogen as the carrier of astral forces. The plant's nitrogen is derived from animal excretions and bacteria in the soil. The roots, in close association with mycorrizal fungi, absorb the nitrogen to form amino acids and then proteins. The protein is found in fast growing tissue and the embryonic seed, where it interpenetrates with the insect world. Otherwise, the nitrogen is generally in transit, flowing to the places where it will be needed.

If the plant, for some reason, holds on to nitrogen, it becomes more animal-like. Often that leads to a distorted astrality, the production of poisonous compounds and protein breakdown products. Without any way to excrete such compounds, substances such as alkaloids accumulate in such plants. Alkoloids influence the nerves or soul life of man and animals, causing hallucinations, nerve paralysis, etc. Some common alkoloids are morphine or strychnine, but also caffeine and nicotine. These plants often have bright colored berries, strong smells hairy surfaces or unusual growing habits. For example, poison hemlock smells

strongly and has purple blotches on its stem. These plants may withdraw into the earth, as do protein-rich mushroom mycellia. An interesting group of plants are the insect-trapping carnivorous plants, like sundew or the Venus fly trap. The plants can respond almost as if they have nerves and muscle systems.

Another special case is the legumes, often used to capture and provide nitrogen within the ecosystem. These plants form a symbiotic relationship with nitrogen-fixing bacteria to provide nutrients. As a result, they tend to be profligate with their use of nitrogen. The characteristic signature shows up with flowers beloved by butterflies and bees, rapid tendril growth, deep green color and the exceptional habit of flowering at the same time that it is growing.

How Much Compost to Use

General rules:

About one pint or one pound covers two square feet

A half-gallon container then would cover about eight square feet

One wheelbarow load covers an area seven feet square, or about 50 square feet

You want to use more the first year, and it can be less in subsequent years. You don't need to add as much for some crops. Root crops, for example, don't need extra nitrogen but may need compost as soil amendment to keep the soil loose.

Compost Requirements

Annuals	Biennials	Perennials	Shrubs	Orchard Trees	Forest Trees
Example: lettuce	Example: beet	Example: asparagus	Example: forsythia	Example: apple tree	Example: Oak tree
Needs plenty of soil food to grow quickly	Needs steady supply each year	Needs a new supply each year, rhubarb and peonies like a bushel per plant	Needs only a light sprinkle	Fertilize annually in a ring under the drip line, use compost sparingly when transplanting, treat roots with Horn Manure paste	Minimal amount, no raw manure or raw organic matter

Sequential Sprays

So far we have mentioned using the Horn materials as field sprays. How exactly are these applied? The first rule to remember is that we generally want to apply both -- they represent

complementary poles of the growth forces and we need both poles. Horn Manure is related to earth and water; so we apply it in the evening so that the dew helps to carry it down into the soil. The solution can be applied in large drops; one approach is to use a fir branch as a wisk broom to scatter the drops. Horn Silica is applied into the air above the plants, in a fine spray and at just after dawn. This way the morning sun helps to carry silica up into the air. Make sure that the sprayer is only used for biodynamic materials and never herbicides. In a similar way, the Barrel Compost solution is applied in the evening onto the ground and the equisetum spray is applied upward into the air in the morning. So one sequence is to start with Horn Manure in the evening, Horn Silica the next morning, Barrel Compost the next evening and equisetum the last morning. This sequence finishes with equisetum, a silica spray. Hugh Cortney feels that it helps to bring about drying influences in the weather -- which may be what we need in an Oregon spring. On the other hand, if we want to encourage rain during a dry summer, we can start with Horn Silica and finish with Barrel Compost.

Using the Biodynamic Materials

Let's summarize the materials for suburban gardeners. Biodynamic practitioners usually refer to the preparations by their numbers, but these are arbitrary names. It is more important to know when and how to apply the proper remedy. Only small amounts of the preparation material are needed. Rhythmic stirring is a key component for most of the preparations. The Pfieffer compost starter comes in ounce packets that are sufficient to treat 10-15 tones of compost. Of course, we don't usually have that much material. So just a small sprinkle can be added to a sprinkling can of warmed water. That way the packet will last for an entire gardening season. The equisetum material is one that we can easily obtain for ourselves -- no preparation is needed.

Summary of BD Materials

Preparation Number	Material	Unit Size	Procedure	Effects
500	Horn Manure	1 oz. sufficient for 1 acre	Stir for 1 hour	Promotes roots, stimulates soil, encourages lush growth, aids germination.
501	Horn Silica	1 gram sufficient for 1 acre	Stir for 1 hour	Promotes photosynthesis, flowers and fruits, aids flavor, color, aroma, keeping quality.
--	Horn Clay	5 gm sufficient for 1 acre	Stir for 1 hour	Mediates between growth poles, promotes balance
502 to 507	Compost	1 oz each for 10-	Insert into pile,	Builds digestive and

	Preps	15 T compost	sprinkle diluted valerian over pile	formative properties of soil when compost is added
--	Pfeiffer Compost Starter	1 oz. sufficient for whole season, add in small amounts	Sprinkle in warmed water, let incubate for 20 minutes	Adds vital forces to compost, enhances digestive ability of soil
BC	Barrel Compost	1 oz sufficient for 1 acre	Stir for 1 hour	Adds vital forces, enhances digestive ability of soil
508	Equisetum	1 oz in 1 quart	Make boiled tea, dilute 1:10, may stir 20 minutes	Prevents fungus, toughens plant tissues

Other Uses

The preparation materials can be applied in various ways to enhance a specific process that needs attention. For example, the valerian preparation provides a protective "skin", adds warmth and can be sprayed onto plants to shield from a sudden frost.

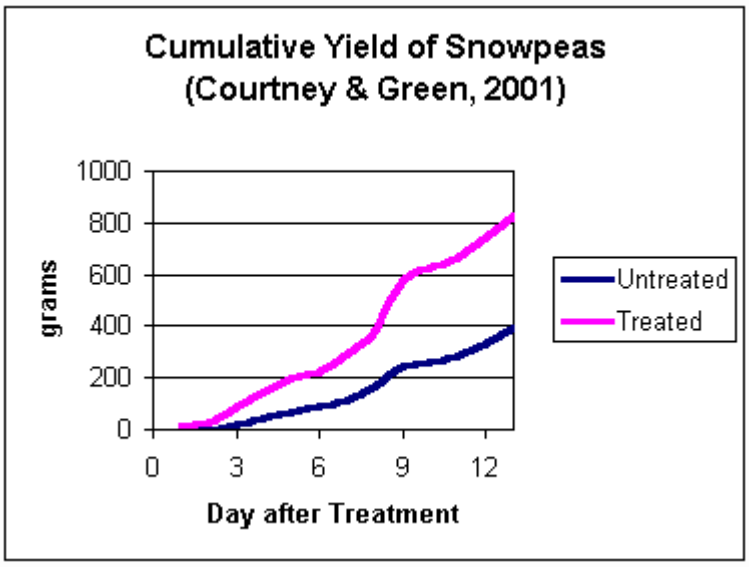
Some materials are used a seed soaks or baths to encourage better germination and growth of seedlings. The solution can be mixed with the seeds, just enough to wet them, and then the seeds are allowed to dry a bit. This way the seeds can still be used in seed drills or other planting equipment.

Seed Baths

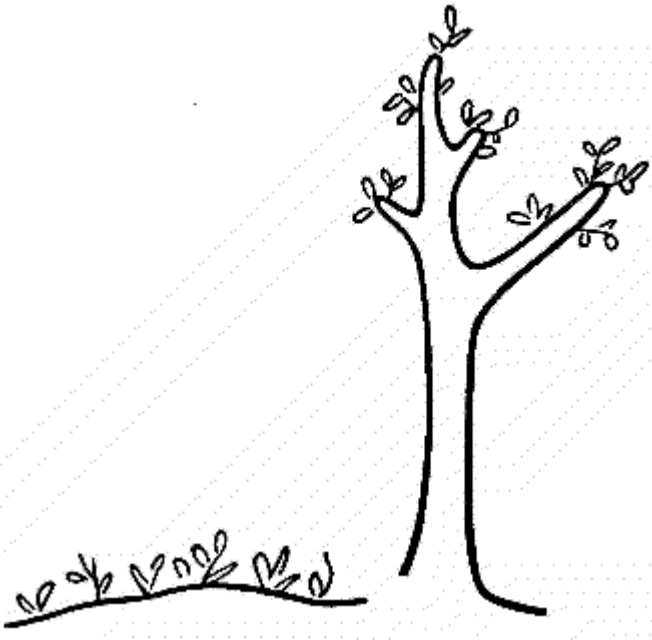
Material	Seed	Instructions
Horn Manure	Spinach	Stir prep for 1 hour.
Barrel Compost	Root crops	1 part BC+ 4 parts rainwater +5 parts milk, leave 24 hours, stir 5 minutes before use
Valerian	Beet, onion, tomato, potato	1 tablespoon/10 liters, stir 15 minutes
Yarrow	Grain, grasses	1 portion (1-2 ml) in 3 liters rain water, stir vigorously 5 minutes, leave 24 hours, stir before use
Chamomile	Legumes, radish,	Same as for yarrow

	brassicas, tulips	
Nettle	Barley	Same as for yarrow
Oak Bark	Oats, lettuce, potato, dahlia	Same as for yarrow

As an example of the preparation's effect, Hugh Courtney and Michael Green report on an experiment they conducted. Michael was interested in a way to demonstrate the effect of the preparations. Hugh suggested spraying a solution made from 506, the dandelion prep, on snowpeas. This preparation relates to Jupiter and the expansion of the fruit. Their results are shown in the figure. After only three days, the treated plants were showing more pods. After two weeks, the cumulative yield had increased by about a factor of two. (Applied Biodynamics, #34, Fall, 2001).



Tree Paste



Steiner was asked how to apply these biodynamic materials to orchard trees. In response, he asked us to visualize the tree as an extension of the soil. The tree's twigs and leaves grow out of the trunk like stems growing out of the ground. The bark is no longer living tissue; it is like the ground. What is alive inside the tree is the cambium layer, lying underneath the bark. This corresponds to the roots in the soil. So to have health trees, we need to treat the trunks as we would for healthy soil. Steiner suggested a tree paste, containing manure, clay and the Horn Manure preparation. This material is painted onto the trunk in winter. As well as stimulating the trunk to be healthy, it also smothers some insect pests. Some growers also spray a solution of clay onto the leaves in

spring. The clay provides some control over insect pests.

Root paste

When we are transplanting trees or shrubs, we want healthy roots to develop as quickly as possible. The roots are dipped in a paste, prepared from a slurry of clay, cow manure and Horn Manure solution. This paste encourages fine root hairs and may also provide a starting culture of beneficial mychorizal fungi symbionts for the root hairs.

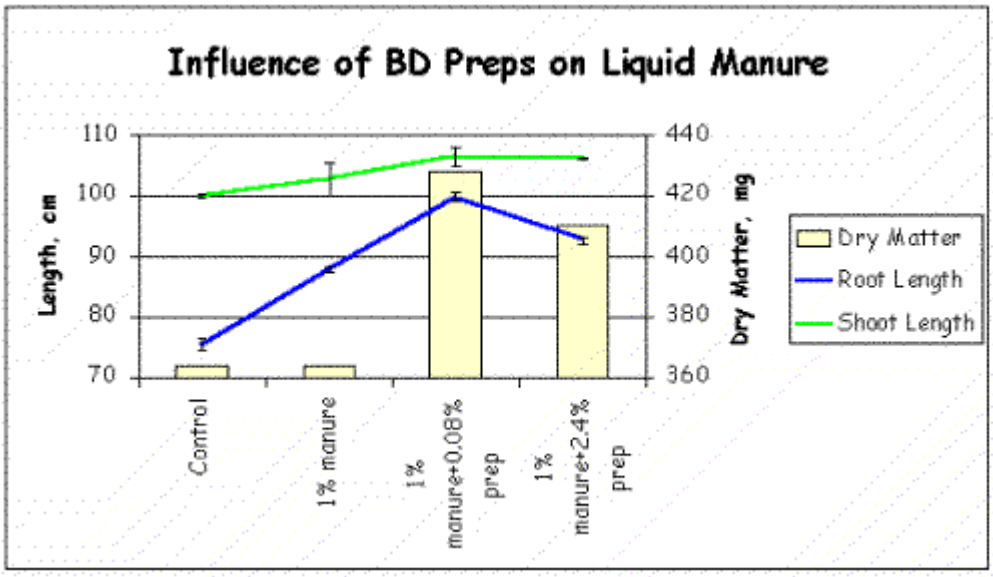
Liquid Manures and Teas

The compost prep plants are useful as herb teas, even without any preparation. Chamomile tea can be sprayed onto seedlings to protect from damp-off fungus. In biodynamic terms, we would say that it strengthens the plant's life-force to hold off fungus that is an aberrant excess of the fruiting impulse. Liquid fertilizer can be helpful for heavy-feeders or for special needs. The general formula is to add one part manure or fertilizer to ten parts water in a fermentation barrel. The mixture is left to ferment for a few weeks and is then ready to use. Fermented nettle tea has long been a favorite of gardeners. Nettle has a high nitrogen content itself and helps harmonize plants that are not assimilating fertilizer nutrients appropriately. To make it, one merely soaks nettles in a pail of water until the mixture is smelly and decomposed. Then dilute and spray onto plants that need a boost. Nettle boosts the plant's circulation and flow of sap -- 24-hour nettle tea, before it ferments, contains formic acid and is effective against aphids.

Slurry made from cabbage leaves aids in sulfur metabolism. Comfrey tea is rich in various minerals and vitamins. Maria Thun likes to make fermented teas from the weeds in the same way. Many weeds are good at accumulating minerals and trace elements, so their tea is rich in nutrients and can be poured around the garden plants. Furthermore, weed tea has an inhibiting effect on other weeds.

Wormwood and tansy herb (Chrysanthemum vulgare, NOT tansy ragwort which is a toxic weed) are used to make an insect repellant. The powder is used against carrot root fly and as a spray by fruit growers. Pour boiling water over 3 kilos of the power, leave to stand for a short while, then dilute up to 100 liters with water. A sticker such as bentonite or soap is added. The bitter taste of the herbs repels the flies.

Liquid chicken manure is high in nitrogen and potassium for heavy feeders like peppers. Sometimes the compost preps can be added to the manure barrel; one floats a wooden cross with the herb preps in little bags underneath. These liquid manures involve anaerobic fermentation so they produce strong odors. Stir the barrel occasionally. A cover of straw will help absorb the smells. Sometimes the long-tailed larvae of hovering flies (Eristalis) develop, feeding on the decaying substances. These are not harmful and indicate that the fertilizer is ready to use. Koepf reports experiments showing that liquid manure benefits from the herbal



preparations. The liquid prepared with only a trace (0.08%) of the preps were even more effective than larger amounts. This shows that even very small amounts of the preps provide can still provide vitality.

Do the Preps Work?

Can we show a relationship between analytical data and quality that is consistent with the perspective of formative vital forces? When we analyze something in the laboratory, we take a snapshot of one moment in time. We lose sight of how that substance behaves in a dynamic system. The following table is not a complete picture of the dynamic process but does show that Horn Manure is a different substance from ordinary manure or compost. In this case, Will Brinton analyzed the results of manure prepared with cow horns, but also prepared in a glass jar that would not have the same biodynamic accumulator effect.

Influence of Horn Container on Manure Preparation

Item	pH	Total N, %	NH3, %	NO3, %	ORP	C:N Ratio	CO2/C
Raw Manure	7.80	3.13	2.06	0.34	-77	15.9	3.77
Poor Horn	7.98	1.89	0.18	0.01	-122	24.1	1.25
Glass Jar	7.80	1.83	0.24	0.01	-120	24.3	1.29
Good Horn	5.61	3.60	0.72	0.65	239	13.2	0.64

Source: William Brinton, Dynamic Chemical Processes Underlying BD Horn Manure Preparation, Journal of Biodynamics, vol. 214, pp. 1-6.

Good Horn Manure preparation has very unusual characteristics compared to the usual composting operations. The Horn Manure retains much of its carbon and nitrogen in a stable form with a balanced pH. This is not seen in normal compost and decomposition of manure. ORP is a measure of the organic respiration rate of the sample -- the manure and other containers are anaerobic as shown by a negative reading. The Horn Manure has a positive reading. CO2/C is a measure of the amount of CO2 still being given off by the sample -- the

manure and other containers are not stable but are still releasing CO2. The stabilized result does not occur in other types of containers, but only in the good cow horns.

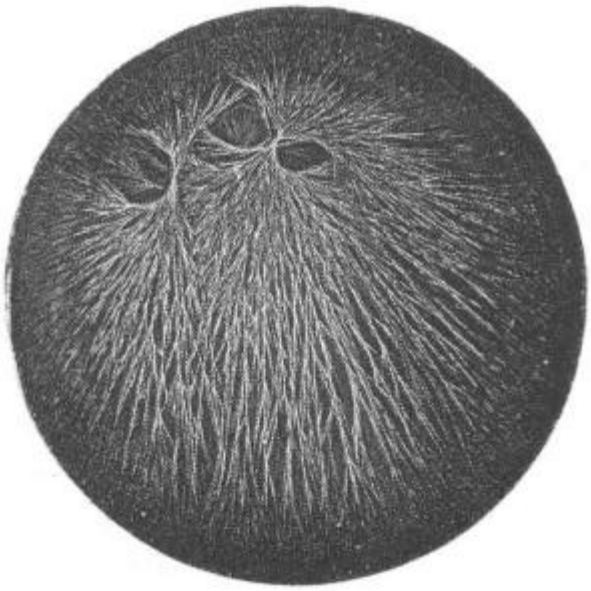
To investigate the effect of vital forces, one approach is to look for effects on living animals. A number of such experiment were conducted by Kolisko and others. Dr. Wolf reports on one nutrition study. He fed rabbits on either conventional or biodynamic feed. He observed that pregnancy rates were similar for the first generation but for the next generation "the pregnancy rate was 59% with the conventional feed and 86% with the biodynamic". There were also distinctive differences in the number of young per litter. The conventionally fed rabbits were more susceptible to disease and their dung showed more fungal growth. The researcher concluded that feeding with "biodynamicaly produced fodder increases fertility, while intensive mineral fertilizers exert a negative effect." (Dr. Otto Wolf, "Fertility and Nutrition, Star and Furrow, reported in Applied Biodynamics, 13, Fall. 1995.) The important point here is that the differences in quality do not show up right away, but are apparent over the generations.

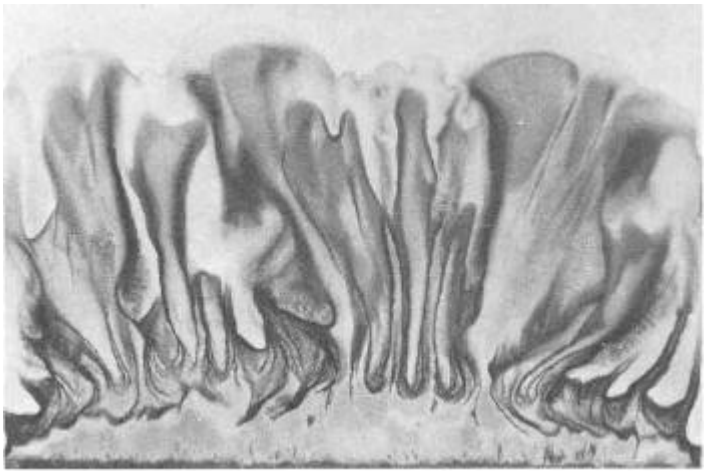
Another approach is "picture forming" methods wherein we try to quantify the amount of formative forces present in the preparation by the effect it has on producing a pattern in other materials. Examples are sensitive crystallization, circular chromatography, or water drop pictures. These tests are designed to show forces that do not show up in ordinary chemical analysis.

Three examples of methods to test for formative forces.

First, the water drop test. Strobe light photography catches the water drop in the process of splattering. Energized water shows a stronger pattern.

Second, a crystallization test. A super-saturated salt solution crystallizes out in the presence of the prep material. Formative forces influence the crystal development.





Third, paper chromatography. Here the prep solution wicks upward through filter paper, carrying colored substances with it. The pattern of the fluid movement shows the extent of forces present.

Philippe Coderey published some interesting pictures in the Fall 2009 issue of Biodynamics. Note how the treated product shows an organizing pattern compared to the conventional product.

BIODYNAMIC WINE

CONVENTIONAL WINE

BIODYNAMIC VINEYARD
WITH
IRRIGATION WATER

BIODYNAMICVINEYARD
WITH
IRRIGATION WATER
AFTER FLOWFORM

The results of these tests are visual and qualitative -- substances that are active and vital produce pictures that show active formations. Substances that are inert and dead show amorphous patterns lacking the active formations. The elusive goal of these procedures is to derive scientifically reproducible methodology that will reveal the level of vitality in biodynamically prepared substances.

Summary

In this chapter, we jumped from conceptual thinking to practical applications. The conceptual models are not really to prove or disprove -- they are merely ways of interpreting observations about the plant world. The practical applications are more of a leap. They are derived from theory but verified with empirical evidence. The primary treatments are the Horn Manure and Horn Silica, distributed as sprays. The vortex stirring method potentizes

the water in forming the spray. A series of herbal preparations provide special vitality to compost and the soil. Other applications include tree paste and herbal teas. Equisetum tea has a special place for holding back earthy forces that would otherwise lead to fungus and pest problems.

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