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NATURE'S INNOVATION

Composting

Composting involves all the complex biological reactions that make up the decomposition of organic material in aerobic conditions.

The ideal components to make compost can be:

- Animal origin, (solid and liquid defecation, leftovers from the butchery, tannery, fishing industries etc.).
- Vegetable origin, (dry sticks, grass cuts, dried vine fruits, wine residue, algae, olive press residue, vegetable water, market vegetable and fruit leftovers, remains from distilleries, bottling plants, etc.).
- Mixed origin, (urban waste remains from food industries, etc.)

During the decomposing process the injected micro-organisms alter organic matter and transform unstable substances. Depending on the organic material this creates compost ranging from a slow energy release (humic substance) to a very high energy ready-for-use one (proteins, sugars, cellulose, fats).

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The above-mentioned components return significant quantities of organic humus substances to depleted soil.

Technique:

Biotransformation occurs most efficiently when the raw material is placed in heaps. To prepare these heaps one must aim to aid the physical/chemical and enzymatic/micro-biological processes that change the mass into a homogenous material rich in fertilizing value.

To reach this objective within a reasonable time (3 to 4 months) it is vital to utilize an additive that contains very specific enzymes and bacteria.
For this purpose Ergofito Micromix was specifically developed.

Process:

One must find equilibrium in the size of the granules of the heaps. They need to be small enough to ensure a large contact surface area of reaction and big enough to ensure air circulation (oxygen is basic to maintain the high speed of biotransformation).

The heaps must not become compressed and so their height should not exceed 2.5 meters. The base can be 3 to 4 meters wide and there is no limit on length.

For the first 30 days of fermentation, the biomass must have humidity between 60 and 75%, and a carbon/nitrogen ratio of 25 to 30.
The carbon needs to be present in the form of sugars, starch, cellulose, lignin, with a ratio that is balanced to avoid nitrogen losses and to obtain a well fermented final product, which is crumbly, slow in mineralization with a high fertilizing potential.

The temperature, during the first 15 to 20 days, at the center of the heap must not go below 55° C. It is imperative to control the heap's aeration, Carbon/Nitrogen ratio and humidity.

Throughout the process there must be no escape of ammonia odour, which indicates that there is too much nitrogen or that carbon is not available.

The pH needs to be maintained between 6.5 and 7.5.
The composition of the heap must be as homogenous as possible to prevent bacteria from overpopulating any areas (e.g. certain points with excess protein develop an excess of proteolytic bacteria).

In the first month mulch every 5 to 7 days in order to ensure that the heaps are oxygenated and homogenized. In the following 2 to 3 months mulch every 15 to 20 days.
After the first month the height of the heaps can be increased to 3 meters and after the second month they can be from 4 to 6 meters high.

Composting:

Begin the composting process by diluting 0.5 to 1 kg Ergofito Micromix in water. The amount of water depends on how dry the heap is. Use enough water to provide uniform distribution and to humidify the biomass.

After the first week it may be necessary to add urea or saccharin substances depending on the progress of the biodegradation. For example if ammonia is expelled add molasses or other sugar rich substances to avoid nitrogen loss. If the bacterium has consumed the carbon add urea to avoid slowing down the process and carbon losses, which depletes the organic material.

In order to maintain optimum humidity spray water before it falls below the minimum value and take care that it permeates through the bio mass and does not run off the sides.

Should the pH radically fluctuate from the optimal values: ○ Add

calcium carbonate or hydrated lime if the pH falls below 5.5 ○ Add

mineral phosphate or saccharine substances if it rises above 8

Conclusion:

The compost obtained in this way is of a superior quality to that found in commerce. It is high in agronomic worth because it is void of phytotoxins with a high quantity of organic substances well composed with humus and rich in micro-organisms. Furthermore it is odourless and absent of invading plants.

The recycling of stabilized residue in agriculture by way of precise composting affords economic, energy, and material savings.
Companies will require 30 to 70% less synthesized fertilizers and 60 to 90% less microelements.

Plants are more resilient and require less treatment with phytopharmaceuticals. There is progressively less need to work the land accompanied by a lesser consumption of energy.

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The ecosystem benefits from less use of fuel, chemical fertilizers, and phytopharmaceuticals.
Organic humus substances returned to the soil results in a real quality to quantity ratio of improvement for agricultural produce.

Composting Details:

The key ingredients to efficient composting are the micro life-bacteria, fungi and other tiny organisms that inhabit the surfaces of organic material. Acting as an elaborate food chain within a pile of yard and garden waste, they decompose it as they eat and reproduce.

Pile some moist carbon material (dried brown materials such as fallen leaves or straw) either alone or with a small amount of nitrogen material (moist, green matter such as vegetable peelings, fresh weeds or grass clippings), and allow to decompose. The reason for this is because the decomposition happens fastest when the carbon to nitrogen ratio is 25:1.

With sufficient air the organisms thrive, generating heat within the pile. Eventually, the assembled yard waste is reduced to soft, dark humus. Encourage even more feverish microbial activity by shredding the material before piling it, turning or stirring the pile more often, or adding more organisms such as worms.

In this document we will be going through the procedures for composting: Trees, Wine Pressings, Straw, Rice and Other Cereal.

The concept always remains the same and the only variances come from adding different amounts of mineral additives based on the make-up of the organic material being composted.

Tools and equipment common for any type of composting operation are:

Heavy Duty Plastic Sheets, Temperature, pH & Moisture Probes, Earth Moving Equipment, Wood Chippers, Air Compressor (optional)

Each case described below will have a list of ingredients that must be mixed with water in the sequence of the list.

Always mix the urea with water first and allow it to return to ambient temperature. The final ingredient is always Ergofito and once added mix for 20 minutes to complete the process.

In order to reach a production level of 1 ton/day approximately 0.25 hectares of open land is required. The area needed depends on how much the various raw materials reduce in volume during decomposing.

Compost from Chopped Tree Cuttings Ingredients per Ton of Material

Product	Quantity
Water	70 Liters
Urea	10 kg
Molasses	40 kg
Mono Ammonium Phos- phate	5 kg
Zeolite	5 kg
Calcium Carbonate (or Gypsum)	5 kg
Ergofito Micromix	0.3 kg
Total	65.7 kg

Instructions:

The tree cuttings should be ground up as finely as possible (the chips should not exceed the dimensions of 1cm with a moisture level of between 65 and 75%). Mix the solution with the wood chips so that it comes into contact with most of them. Now the raw material is ready to be formed into compost heaps. (An initial height of not more than 3 to 3.5 meters and a length as long as required).

To prepare a heap, one needs at least 2 to 3 tons to have sufficient mass to avoid rapid thermal dispersal that would impede heating.

After 5-7 days from the time of preparation, the heaps must be mixed again and oxygenated. This operation must be repeated after another 7-10 days. Afterwards repeat again every 15 days for two operations then every 20 days until the heaps begin to cool down (70-80days). From the beginning of the process, a period of 100-

120 days will elapse. Correctly composted heaps will have a characteristic “earthy” odour. The compost is ready to be distributed at a rate of 2-3 tons per hectare.

From the third day and for the first 30 days, the internal temperature of the heaps should be above 50° C and the moisture content should not be less than 60%. If necessary irrigate. In order to avoid suffocation the humidity should not exceed 75%.

During the maturation period from the 45th to 60th day onwards a slow dehydration will occur, which indicates that irrigation can be stopped. The heaps must be covered with plastic sheets to avoid rainfall, particularly in the initial phase. The pH level should always be kept between 6.5 and 7.2.

Compost from Wine Pressing Residues Ingredients per Ton of Material

Product	Quantity
Water	25 Liters
Urea	5 kg
Molasses	12 kg
Mono Ammonium Phos- phate	2 kg
Zeolite	2 kg
Calcium Carbonate (or Gypsum)	2 kg
Ergofito Micromix	0.2 kg
Total	23.2 kg

Instructions:

The wine residue must be heaped not higher than 3 meters, with a maximum width of 3 meters. Ensure that the overall humidity is not below 60% but not higher than 80%. The pH must be between 6.5 and 7.2.

The temperature is very important the first few days and will be higher in the centre of the heap. In the first 40 cm the temperature should not be below 50°C and it may reach 65°C.

Mould should form on the surface within 20 days. In the first month the heaps must be turned at least once a week, the second month once every 15 days and afterwards once a month.

The final product should be ready in 75 to 90 days. At this stage the humus has reached a degree of excellent humification and can be immediately utilized to fertilize the ground.

Compost From Straw, Rice and Other Cereals Ingredients per Ton of Material

Product	Quantity
Water	2000 Liters
Urea	25 kg
Ergofito Micromix	0.2 kg
Total	25.75 kg

Instructions:

Apply this mixture to the straw so that the water is all absorbed and form compost heaps with a height of 4 meters. Rework the raw material every fortnight for one month. At the end of the first month the volume should be reduced by half and the heaps can be joined together forming piles 4 meters in height.

For the next 3 months rework the heap once a month. The following two to three months are the final maturation phase and the compost can be left alone and monitored.

From the third to thirtieth day the inner temperature (50 cm into the heap) should increase to 50°C with the moisture not dropping below 65%. In the next phase the moisture must be above 55% and in the final two to three months the moisture content should be decreasing slowly and consistently.