



APSHISHT MANAGEMENT AND ENVIRONMENTAL RESEARCH PRIVATE LIMITED

#Make a Green Step for Sustainability#

About AMER

AMER Technologies has been in business of Planning, Execution and Commissioning of Vermi- compost and is one of the pioneer researcher and producer of Vermi-compost in the North-East India. Our Motive is to make the environment clean and green and to build a healthy product for healthy environments. Vermi-Compost and Organic Compost is the solution to make the environment sustainable.

What is Vermicompost?

Vermicomposting is a bio-oxidative process which engages earthworms and microorganisms. The microorganisms, both in the earthworm guts and in the feedstock, are responsible for the biochemical degradation of the organic matter whilst the earthworms are responsible for the fragmentation of the substrate, which increases the surface area exposed to the microorganisms. Hence, the earthworms directly modify the physical properties of the material and indirectly modify its chemical properties. Vermicomposts have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than the organic materials before vermicomposting.

Why Vermicomposting?

Sustainable agriculture doesn't only mean improved crop yield but also other effects, such as crop quality, impacts on soil and surrounding environment etc. Indiscriminate use of chemical fertilizers and other agro-chemicals have resulted in increased yield of agricultural products for a short period at the expense of soil quality. Such unsustainable agricultural practices lead to reduced soil organic matter content, reduced helpful microbes in soil, degradation of soil physical and chemical properties and pollution of land as well as nearby surface and ground waters. The best alternative is the use of Vermicompost which also acts as organic amendment.

COMPOST QUALITY PARAMETERS AND THE SCIENCE BEHIND IT

Among a variety of elements needed by micro-organisms the composition, carbon and nitrogen ratio are the most important. Carbon nitrogen ratio is related with compost temperature. If the ratio of material is high that is carbon is more while nitrogen element is relatively deficient, bacteria and other microorganisms growth will be limited, decomposition rate of organic will be slow and fermentation process will be long. And high carbon nitrogen ratio of raw material will easily lead to high ratio of finished compost that will despoil the nitrogen in soil, making soil fall into nitrogen starvation and then affecting plant growth. However, if C/N ratio is too low, especially lower than 20:1, carbon element available for consumption is lacking while nitrogen element is relative surplus, which makes nitrogen of material become ammoniacal nitrogen to volatilise, causing fertiliser efficiency lowering due to lots of nitrogen loss. Therefore, in order to make sure microorganism nutrient of organic decomposition balance, composting carbon nitrogen ratio should satisfy the best ratio (25-35:1) required by micro-organism.

Carbon/Nitrogen Ratio

Salt Concentration

Soluble salts refers to the amount of soluble ions in a solution of compost and water. The concentration of soluble ions is typically estimated by determining the solution's ability to carry an electrical current, i.e., electrical conductivity. Plant essential nutrients are actually supplied to plants in a salt form. While some specific soluble salts, (e.g., sodium, chloride), may be more detrimental to plants, most composts do not contain sufficient levels of these salts to be a concern in landscape applications. Plant species have a salinity tolerance rating and maximum tolerable quantities are known. Excess soluble salts can cause phytotoxicity to plants. Compost may contribute to, or dilute, the cumulative soluble salts content of a growing media or soil. Most composts have a soluble salt conductivity of 1.0 to 10.0 dS/m.

pH is the measure of acidity (or alkalinity), of a soil or compost (on a logarithmic scale). Each specific plant species requires a specific pH range. The amount of compost and its pH can affect the pH of the soil or growing media. Therefore, to estimate the effect, which in turn will affect maintenance practices or system management, pH is a necessary parameter of which to be aware. A good compost should have a pH of between 6 and 8.

pH

Heavy Metal Content

Heavy metals concentration are regulated due to the potential for toxicity to humans, animals or plants. Limits for heavy metals have been developed for fertilizers and certain other horticultural and agricultural products. The quantity of these elements are measured on a dry weight basis and expressed as mg/kg or ppm. Many of these elements are actually needed by plants for normal growth, although in limited quantities. Therefore measuring the concentration of these elements can provide valuable management data relevant to requirements of plants.

Total Organic Carbon

Total organic carbon is the measure of Organic matter content of a compost. It is typically expressed as a percentage of dry weight. Organic matter is an important ingredient in all soils and plays an important role in soil structure, nutrient availability and water holding capacity. It is useful for estimating the age and physical properties of the compost.

Because micro- organism proceed activities through organics pellet surface, so lowering size of pellet materials will increase the surface area and promote micro-organism activity and accelerate the composting speed. But on the other hand, too thin materials also prevent the flow of air and reduce oxygen content in composting, thus bringing down micro-organism activity speed. Thus, raw material size should be reduced under the premise of air ventilation.

Particle Size

Moisture

Moisture is one of the necessary conditions in composting process and nutrient materials can be absorbed by microorganism only when they are blended in water. The best water content of composting raw materials is usually around 50% to 60%. Too low moisture (less than 30%) would affect microorganism activity and make organics hard to decompose while too high would bring down the composting speed and lead to anaerobic decomposition, stench generation and bleeding of nutrient substances

Porosity helps to understand the availability of oxygen within the compost matrix.

Porosity

Water Holding Capacity

It initiates the retention of the water which is helpful for the proper growth of the plants.

Humic acid is a group of molecules that bind to, and help plant roots receive, water and nutrients. High humic acid levels can dramatically increase yields. Humic acid deficiency can prevent farmers and gardeners from growing crops with optimum nutrition.

Humic Acid



Eisenia Fetida



Perionyx Ceylanensis



Eudrilus Eugeniae

Earthworms used in Vermicomposting

STANDARD QUALITY PARAMETERS

| Sl. No. | Parameters | Recommended Values by FCO |
|---------|--|--|
| 1 | Moisture Content, % by weight | 15-25 |
| 2 | Odour | Absence of Foul Odour |
| 3 | Colour | Dark Brown to Black |
| 4 | Particle Size | Minimum 90% material passes through 4.0mm IS sieve |
| 5 | Bulk Density (g/cc) | 0.7-0.9 |
| 6 | Total Organic Carbon, % by weight, minimum | 18.0 |
| 7 | Total Phosphorus, % by weight, minimum | 0.8 |
| 8 | Total Nitrogen, % by weight, minimum | 1.0 |
| 9 | Potassium, % by weight, minimum | 0.8 |
| 10 | Heavy metal content (mg/kg), maximum | |
| | a) Cadmium | 5.0 |
| | b) Chromium | 50.0 |
| | c) Nickel | 50.0 |
| | d) Lead | 100.0 |

*FCO: Fertiliser Control Order, administered by Department of Agriculture Cooperation, Govt. of India.

ADDITIONAL USEFUL PARAMETERS

| Sl. No. | Parameters | Recommended by US EPA |
|---------|--|-----------------------------------|
| 1 | pH | 6.5-7.5 |
| 2 | Salt Concentration (mg/kg) | <2000 |
| 3 | Porosity, % | 80-90 |
| 4 | Water Holding Capacity, % | 90-100 |
| 5 | C/N Ratio | <20 |
| 6 | Maturity Index, % | >90 |
| 7 | Humic acid (as a % of Fulvic acid) | 5-25 |
| 8 | Microbial Consortia | |
| | (i) Total Bacteria (<i>Bacillus spp.</i> , <i>Rhizobium</i> , <i>Azotobacter</i> , <i>Pseudomonas</i> , <i>Nitrosomonas</i> , <i>Nitrobacter</i> , <i>Phosphate solubilizers etc.</i>) | >10 ⁵ CFU/g dry weight |
| | (ii) Total fungi | >10 ² CFU/g dry weight |

*US EPA: United States Environmental Protection Agency, an independent agency of US government for environmental protection

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