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Compost-- What is it and its benefits

Once finished its Mineralisation process, compost has the following massive benefits:

- ☐ Moisture holding capacity increases (1% organic matter in soil increases water holding capacity by up to 170,000 litres per Ha) (80 to 90% of its composted weight)
- ☐ Leaching of nutrients is minimized and fertility storage maximized -- in this stored form easily available for plant uptake!)
- ☐ While these nutrient cations are accessible to plants, they are held in the soil safe from being leached by rain or irrigation.
- ☐ Disease suppressing microbes (Actinomycetes etc) abound in humus (Aerobic verses Anaerobic processes)
- ☐ Aeration improves, nutrient storage capacity increases , soil compaction decreases as soil structure improves.
- ☐ Plant diseases decrease--- many diseases are associated with anaerobic conditions
- ☐ Humus is a colloidal substance, and increases the soil's attraction exchange capacity, hence its ability to store nutrients by binding.
- ☐ The biochemical structure of humus enables it to moderate – or buffer – excessive acid or alkaline soil conditions.
- ☐ Soil ph becomes more neutral--- Good compost has ph of +/- 7

The composting process:

There is no magic, no shortcuts. There is only MANAGEMENT.

Composting is simply a matter of making the indigenous microbes and fungi very, very happy.

If these bacteria are kept at their optimum environmental conditions: plenty to eat, good room temperature, and lots and lots of fresh air, they will perform their natural work – making finished compost, in record time without odours.

PLEASE: If you want high numbers of indigenous microbes and fungi in your compost, give them time to multiply while composting your bulking. Straw is good for composting, but will decompose very quickly. This will give you a fair count of microbes and finished product within 2 weeks or so. But if you use wood chips, and other more bulky organic material this will decompose slower and will allow your microbes to really multiply 100 fold more, this will ensure the microbes have food during this process which could take up to 12 weeks. In my mind it is all about the numbers!!

Below is our attempt to explain how a compost turner helps create this near perfect environment. The following cross sectional drawing illustrates the concept of Windrow Dynamics for all of us laymen. It is not designed to be a technical presentation. Windrow Dynamics is basically the natural or unassisted airflow and subsequent bacterial activity of an undisturbed windrow caused by the rising of heated air.



- Zone #3** Zone 3: represents what I call the "Dead Zone", or the anaerobic spot that normally begins immediately in a newly formed windrow-- This will grow rapidly if there is no turning, temperature control, fresh air control, moisture control.
- Zone #2** Zone 2: which is the most active zone, becomes the hottest and has the most biological activity. This zone is the ideal zone. It can be the "Sweet Spot" of composting. However, temperatures will rise too high in this zone and begin to destroy beneficial bacteria-- Hence turning is essential
- Zone #1** Zone 1: is the least compact zone in the entire row. It is cooler than Zone 2 but warmer than Zone 3. Bacterial activity in this zone slows down rapidly as the moisture evaporates and cool air penetrates it.

Preparation of new rows in my mind should consist of:



- Your wood, bush, tree, leaves, grass waste from your area all chipped down to about 1 to 3cm wide chips
- Collect some Clay from your river bed, soil from a good area of your farm etc -- this to make up some 5% of your new row (I am trying to assure that a good and healthy diversity of local Microbes and Fungi are introduced into your mix.
- If possible get hold of some local manure and urine be it cattle, pig or poultry again some 5% of new row-- here again I am trying to collect diversity of local microbes and fungi.
- Once you are happy with your first row mix then prepare it in long straight rows of some 3 meter wide and 1,7 meter high. Start turning and controlling temperature, moisture, fresh air (Oxygen) etc-- You will see bellows of white "Smoke" coming from row when turning-- this is release of high temperatures, release of the trapped Carbon Dioxide (Poisonous to beneficial microbes) and the replacement of fresh air with oxygen as well as mixing the moisture throughout the row (Ideal 60%)
- Turning frequency is controlled by temperature and moisture distribution (70 deg and you must turn which will bring temperature down to about 45 deg)
- Typically:-First 2 weeks 3x turns--- Next 2 weeks 2x turns--- Next 2 weeks 1,5 Turns--- Next 2 weeks --1 turn (Please this must be managed!!)
- When you have your first row done and made into compost--
- Use 80% of this row on your crops, fields, trees etc and
- Use the other 20% to germinate and populate your new compost row with all your local microbes and fungi which you collected and prepared with your row No 1.

- Zone #3** Zone # 3 begins to form immediately and increases in size rapidly. The little oxygen that exists is consumed rapidly, and the relatively high moisture content of the material begins to settle here.
- Zone #2** Zone # 2 is basically undefinable yet but begins to form as a result of an active Zone # 1, which remains small but active. If the row is not mixed and aerated soon it will all become Zone # 3. This is the most critical point because the odours generated can be the cause of site closing ODOURS. These Zones must be refreshed promptly. All the material must change places and preferably must change zones.

Particle Size:

There are three basic operations of the Compost Turner: The first is continued particle size reduction without creating anaerobic pockets, in fact it crumbles these pockets. It does not grind or pulverize the material. However, as the structural integrity of the material weakens due to bacterial activity the collisions caused by the vortex action within the tunnel begins shattering the weakened particles into smaller jagged shaped pieces. This increased surface area dramatically accelerates microbial activity. It is widely known that bacteria work only on the surface of the material. The more surface area that can be exposed, the more bacteria the material can support. Thus accelerating material breakdown resulting in a higher percentage of finished product. This brings us to the next basic operation of the compost turner

Air Flow:

Our Manufacture TM3 compost turner works at a ground speed of 300 meters per hour turning 450cu meter compost per hour. With the specially designed rotor with its spatula type blades which work to the centre from both sides allows phenomenal volumes of fresh air flow (Oxygen) through the row, and at the same time expels the CO2 buildup. Forcing air in the material which is very important, keeping it there is vital. To retain as much of this fresh air as possible is critical NOT to squeeze the material like a sausage maker as it comes out the rear of the tunnel.

The throwing action of the rotor forms and shapes the discharge pile, not the shape of the tunnel. This action creates a porosity unequalled by any other turning device. Virtually every study on odours shows a direct correlation between lack of oxygen and the presence of odours. It's only "Common Sense" to introduce as much oxygen as possible to ensure maximum Windrow Dynamics.

What is composting?

- ➔ Despite some losses, composting does retain most of the nutrients provided by the raw material, and stores them as stable organic compounds
- ➔ During the composting process, micro-organisms (Aerobic) convert raw organic materials into a stable, humus-like product. Also during this time and process, while they have food-(Raw organic material.), they really multiply to literally billions --- Ideal to get these guys into your lands!!!

- NB.> I have come across a number of farmers who do not manage the moisture content! -- Please like you, microbes also need moisture!-- Ideal some 60%
- NB.> Management of Temperature, Moisture content, Introducing Fresh air (Oxygen) , Expelling of CO2 and stale air, expelling high temperatures etc-- is all very important!-- All done with compost turner!
- ➔ Composting is the aerobic (meaning it requires oxygen) decomposition of organic matter that begins with a diverse mixture of organic material
 - ➔ During the process, nitrogen is lost to the atmosphere as ammonia (NH3). In addition, the greenhouse gases carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) are emitted.
 - ➔ Compost's real agronomic value lies in the gradual release of nutrients that are slowly converted from stable organic compounds into available inorganic nutrients, and in its properties as a soil amendment.
 - ➔ **Turning Compost:-** The amount of times compost needs to be turned is regulated by TEMPERATURE. When temperature up to some 70deg it needs turning which will bring down temperature, expel the CO2 and unwanted gasses, distribute the microbes more regularly, distribute the moisture, break up all anerobic clusters etc. (In average depending on content of row!-- 1st 2 weeks 3 times, next 2 weeks, 2 times, next 2 weeks 1 time-- until temperature stabilises and humus / compost ready to apply!)
 - ➔ Composting is a biological process that involves the aerobic decomposition of organic matter to produce a humus-like product called compost. During the composting process, heat, various gases and water vapour are released, greatly reducing the volume and mass of the pile.

Composting your pure Kraal Manure!

Common problems of raw manure:

Present	In raw manure you find -- Salmonella, Pitium, E-Coli etc --- These are NOT killed in the rumen
Seed Bank	This can be high due to lack of control of thermal processes
Toxins	from Leachate --this is detrimental to the health of the soil and obviously detrimental to the plants that grow in this soil
Imbalance	Due to the imbalance state of raw manure, Tests have shown losses of up to 65%N, 75%P and 50%K
Mineralisation	Generally very high (organism produces an inorganic substance)



The nitrogen in manure is not all available to growing plants as it is tied up in organic forms. Organic nitrogen becomes available to plants when soil microorganisms decompose organic compounds, such as proteins, and then convert the released N to NH4. This process is known as mineralization.

Flies These are attracted to the anaerobic stench

Humus or Compost is very easy to spread in fields simply with lime spreader without any wastage-- All clumpy material has been broken up with the compost turner. --- Also:

- Amongst other improvements, It Highly Improves the quality of fodder and has proved to be more nutritious in high humus soils.
- During the humification process, microbes secrete sticky gum-like mucilages; these contribute to the crumb structure (tilth) of the soil by holding particles together, and allowing greater aeration of the soil.
- Toxic substances such as heavy metals, as well as excess nutrients, can be chelated (that is, bound to the complex organic molecules of humus) and so prevented from entering the wider ecosystem.

Soils require HUMUS and not just organic matter

- 1 Ton of well composted raw manure is equivalent to approximately 7 tons of uncomposted raw manure (Organic Matter)
- Raw manure in average is spread at 40 tons per H/A whereas **composted manure** which is many times more beneficial is easily spread with lime spreader at some 7 tons per H/A
- Correctly composted organic matter is a stable, aerobic, microbial, eco-friendly and well balanced nutrient source

