



Let's Make Our Ghaziabad

Clean, Green, Healthy and Prosperous

By- Satendra Singh
(Chairman)

What is Compost?



- ▶ Organic material from decomposition of carbon (*dried leaves*), nitrogen (*food scraps*).
- ▶ Happens naturally - certain techniques accelerate the process.
- ▶ Dark, crumbly, soil-like.



Compost Through History



- ▶ Reference to use of manure in agriculture on clay tablets, 23rd Century BC.
- ▶ Romans and Greeks used compost.
- ▶ William Shakespeare's Hamlet advised: *“Do not spread the compost on the weeds, to make them ranker.”*



Famous Composters



- ▶ Many of America's founding fathers were farmers. All used compost.
- ▶ George Washington Carver said, *"...a compost pile is essential and can ' had with little labor and practically no cash outlay."*



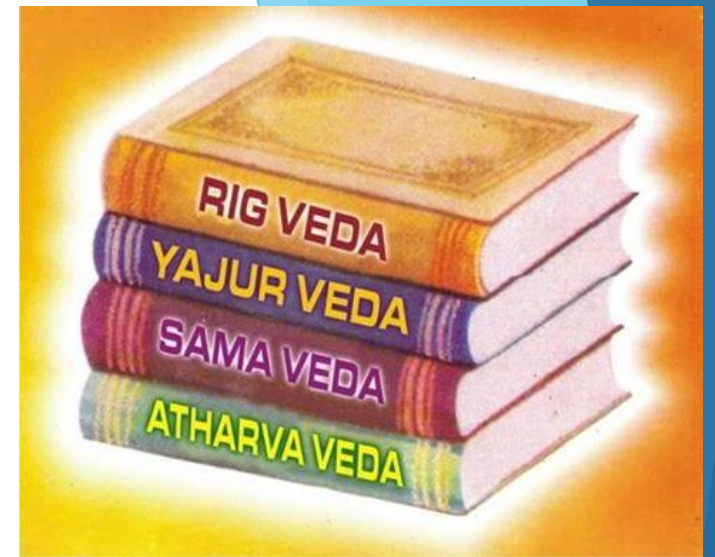
Compost importance grows



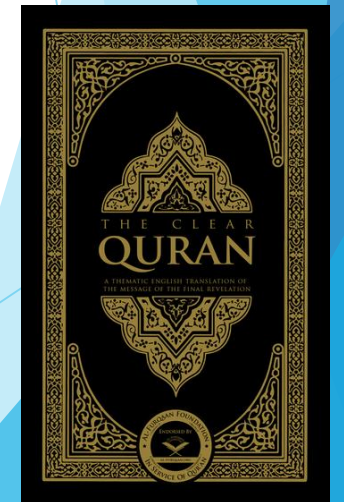
- ▶ In 1905, British agronomist learned best compost consisted of three times as much plant matter as manure.
- ▶ Rapid composting techniques developed in 1950-1960s.



Pre Green Revolution Era



- ▶ Ramayana
- ▶ Mentions of several manures like oil cakes and excreta of animal in Arthashastra.
- ▶ Mention of organic manure in Rig Veda, green manure in Atharva Veda etc.
- ▶ Mention of 'Kamdhenu' the celestial cow and its importance in soil fertility.
- ▶ At least one-third of what you take out from soil must be returned to it implying recycling or post harvest residue - Holy Kuran



Why Is It Important?



- ▶ Reduces waste stream.
Yard and food scraps = 30% of landfill
- ▶ Improves soil structure.
- ▶ Retains moisture, slows run-off from rain.
- ▶ Reduces need for fertilizer.



What goes in your Compost?



Carbon: dried leaves, straw

Nitrogen: food scraps, plants

Water: moisture

Oxygen



Carbon

BROWNS

- Dried leaves
- Straw
- Shredded paper
- Drier lint
- Newspaper
- Pine needles
- Sawdust
- Peanut shells



Nitrogen

GREENS

- Kitchen scraps
- Coffee grounds & filter
- Tea bags
- Fresh garden trimmings
- Pet hair
- Manure (from herbivores:
poultry, cattle, goat)



Top Reasons to Compost



- ✓ Reduces need for chemical fertilizers, mulch.
- ✓ Improves the structure of your soil.
- ✓ Reduces yard waste going to landfill.
- ✓ Slows storm water run-off, help protect Bav.
- ✓ Decreases water use in your landscape
- ✓ It's easy. Good exercise!



Different Methods of Composting



- ▶ Basic/Simple Compost Pit
- ▶ Vermicomposting
- ▶ Biogas Plant
- ▶ Sewage Sludge
- ▶ Using Machines
- ▶ Nadep Method



Basic/Simple Compost Pit



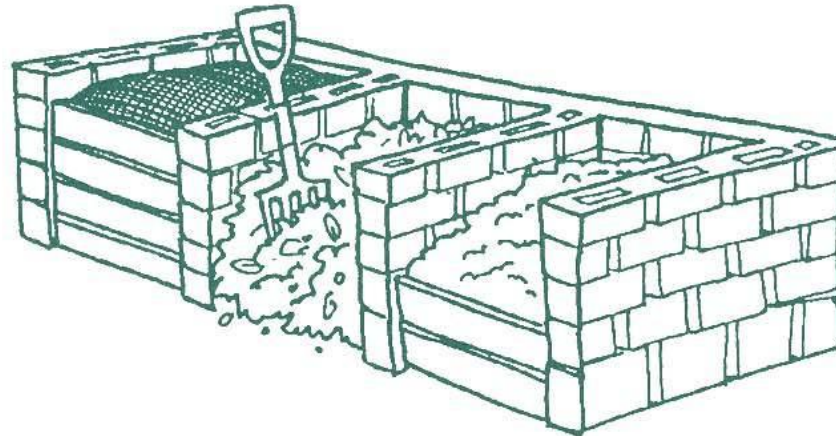
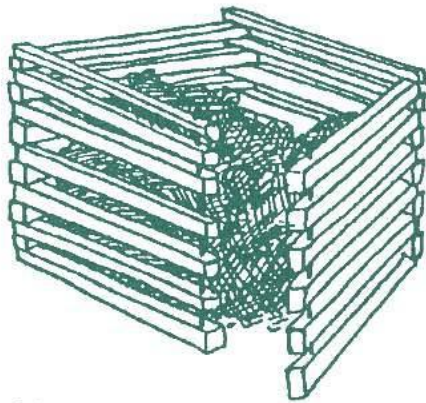
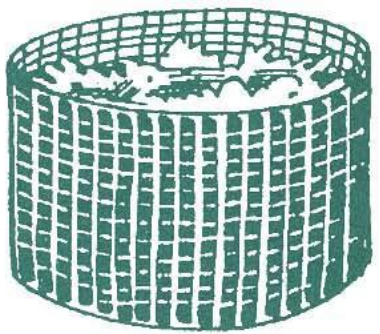
- ▶ It is the most basic and commonly used technique.
- ▶ It can be simply carried out with basic kitchen leftovers of fallen leaves etc.
- ▶ The pit can be easily be constructed in the ground/kitchen garden where we can put the organic waste material.
- ▶ The waste material can also be regularly collected and dumped in the pit.
- ▶ Different layer of organic waste and soil can be made.
- ▶ Animal excreta can also be used in this process.



Starting your Compost Pile



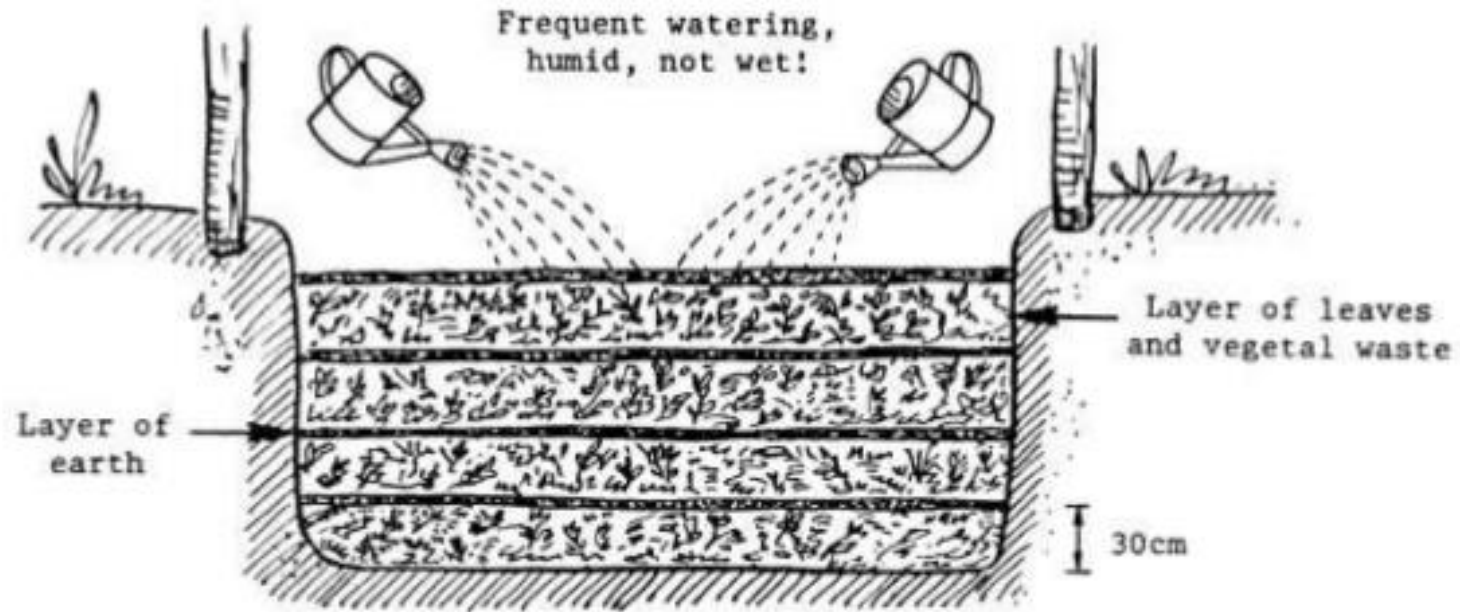
- Ideal size is 3 ft. x 3 ft. x 3 ft. (27 cubic ft.)
Easier to turn, maintain aerobic action
- No larger than 5 x 5 x 5
Can be anaerobic if too large



Typical backyard composting bins



Basic/Simple Compost Pit



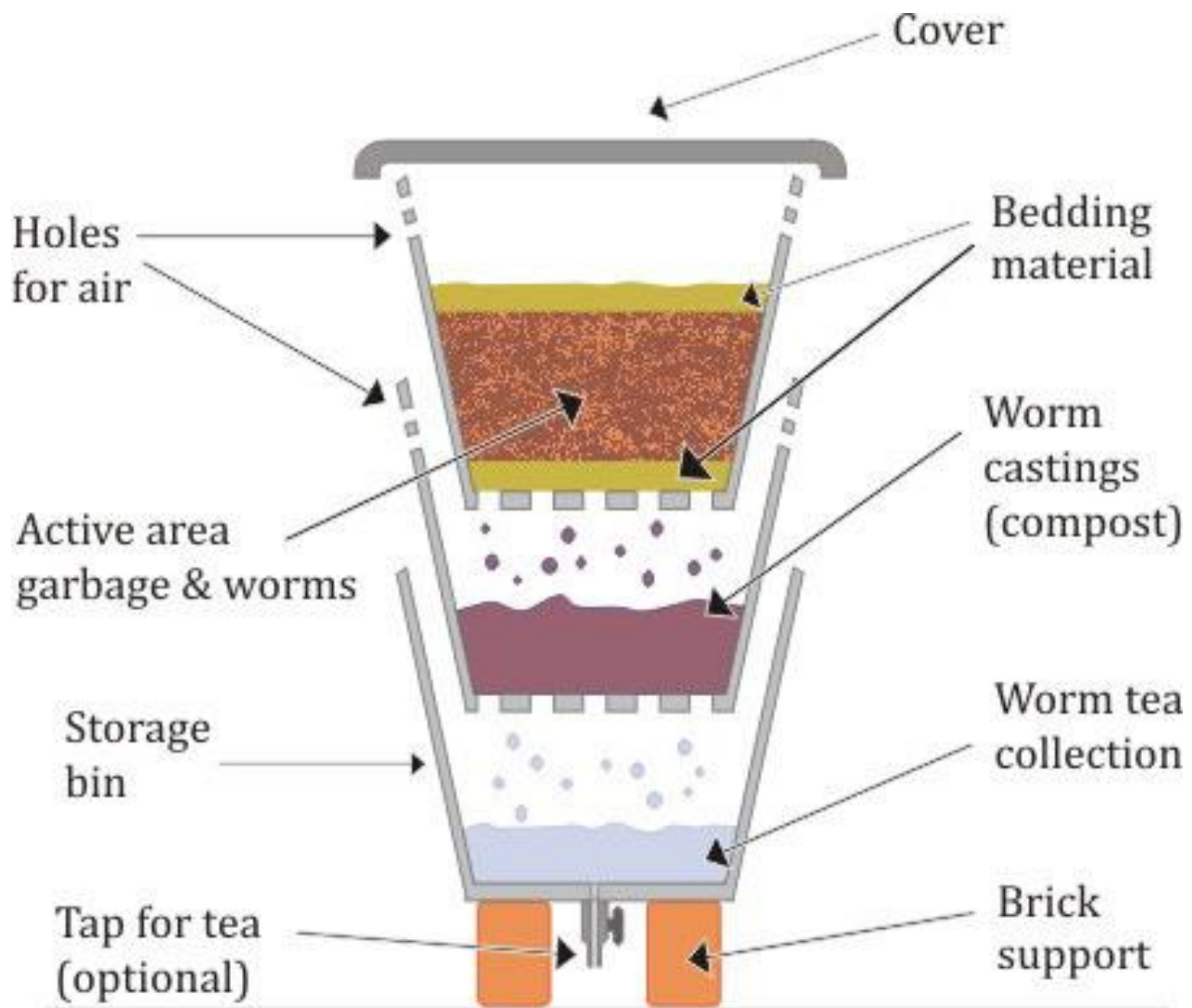
Vermicomposting



- ▶ It is just another type of compost pit but is more efficient and fast.
- ▶ It also uses basic kitchen leftovers and fallen leaves etc.
- ▶ It is also constructed in a pit where all the waste is dumped.
- ▶ The only difference between compost and vermicompost is the use of 'Red Worms'.
- ▶ The use of these worms speeds up the process of compost making.



Vermicompost



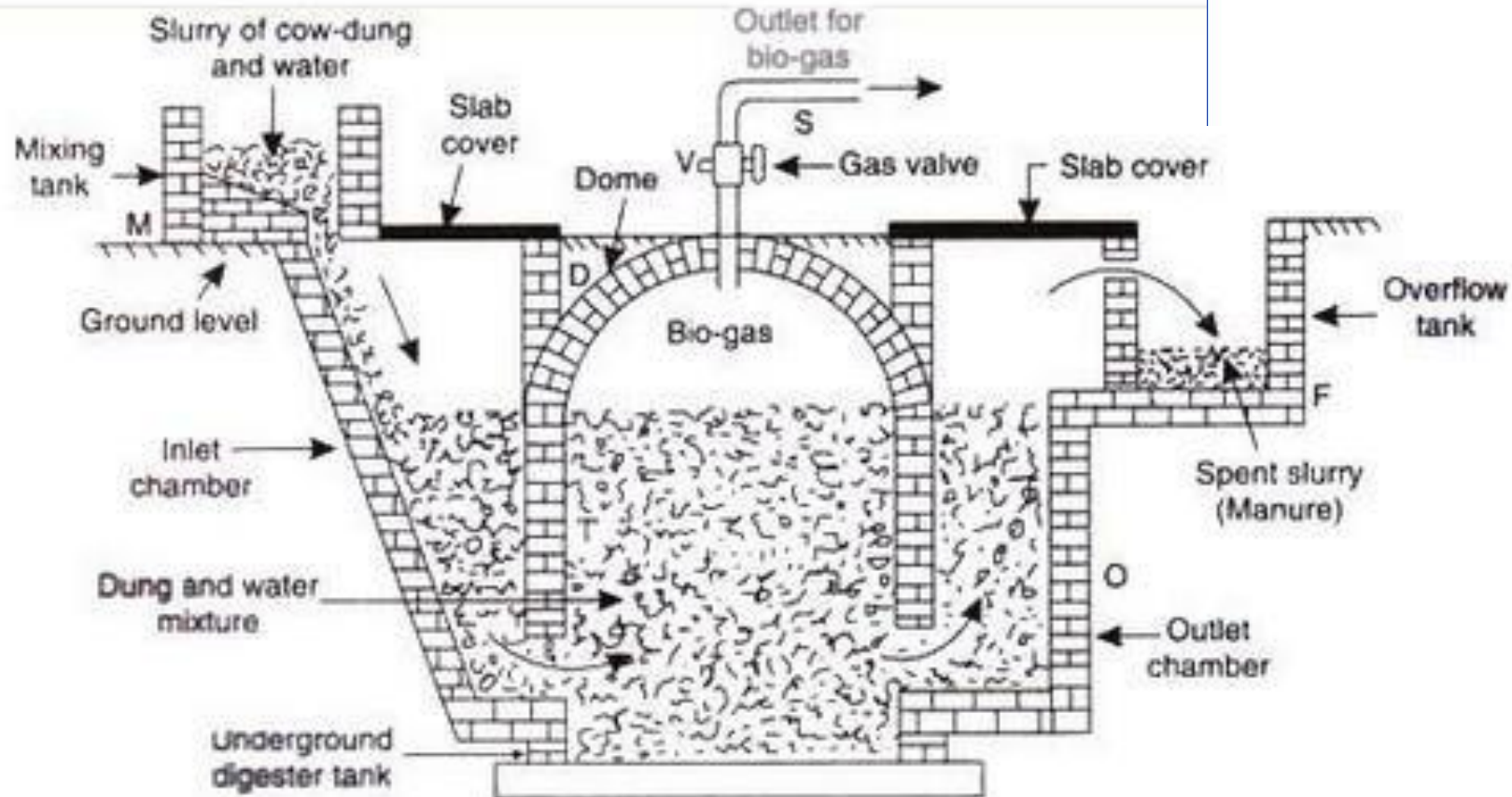
Biogas Plant



- ▶ It is a little advance method of composting.
- ▶ It uses any kind of organic waste produced in our homes.
- ▶ The waste is used in the form of slurry.
- ▶ This slurry is dumped into the digester tank where anaerobic bacteria acts on it.
- ▶ The slurry gets converted into Biogas and Manure.
- ▶ The main constituents of biogas are - Methane, Carbon Dioxide, Nitrogen, Hydrogen.



Biogas Plant



Sewage Sludge



- ▶ Sewage Sludge refers to the by product of industrial or municipal waste water.
- ▶ It can also be used to produce biogas and manure.
- ▶ It also make gas and manure with the help of bacteria.
- ▶ Sewage Sludge is either landfilled, incinerated, applied on agricultural land or, in some cases, retailed or given away for free to the general public.



WASTEWATER TREATMENT PROCESS

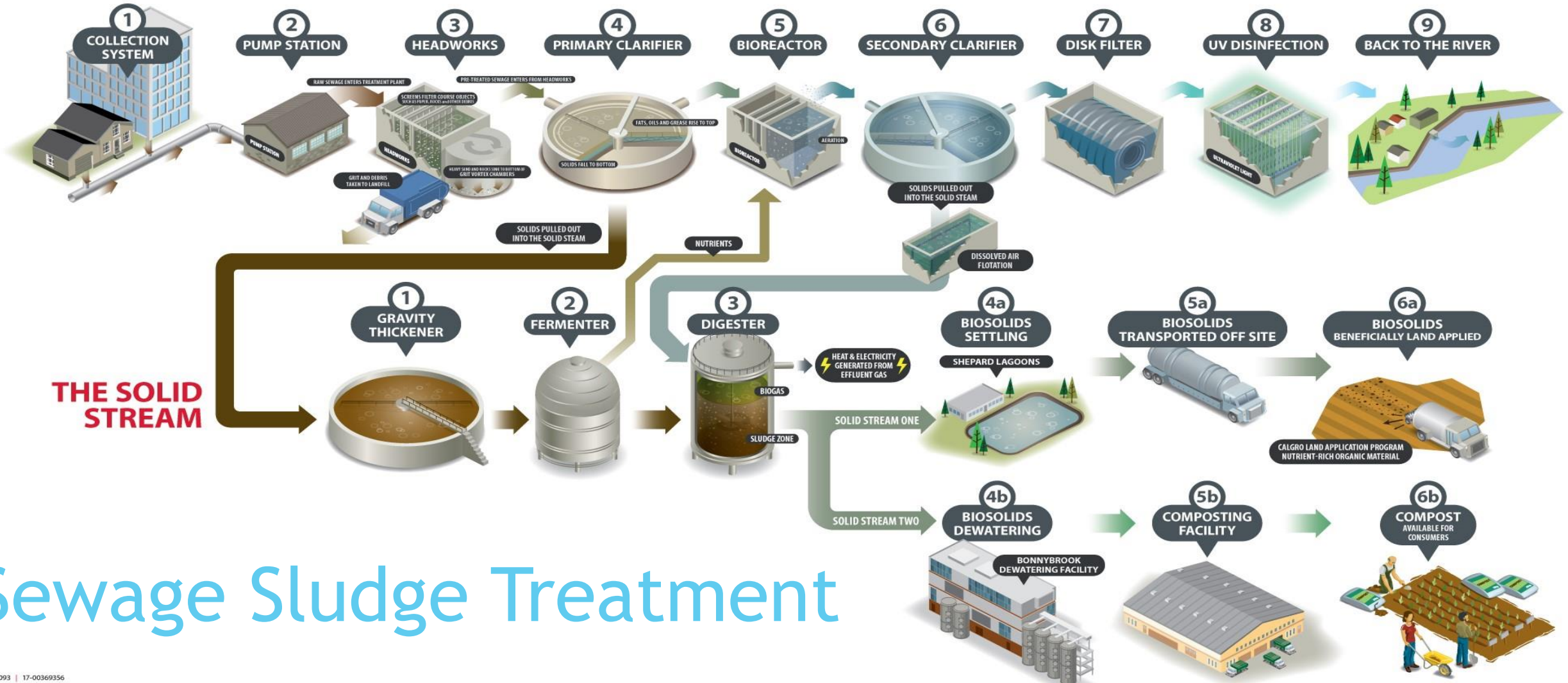


PRIMARY TREATMENT

SECONDARY TREATMENT

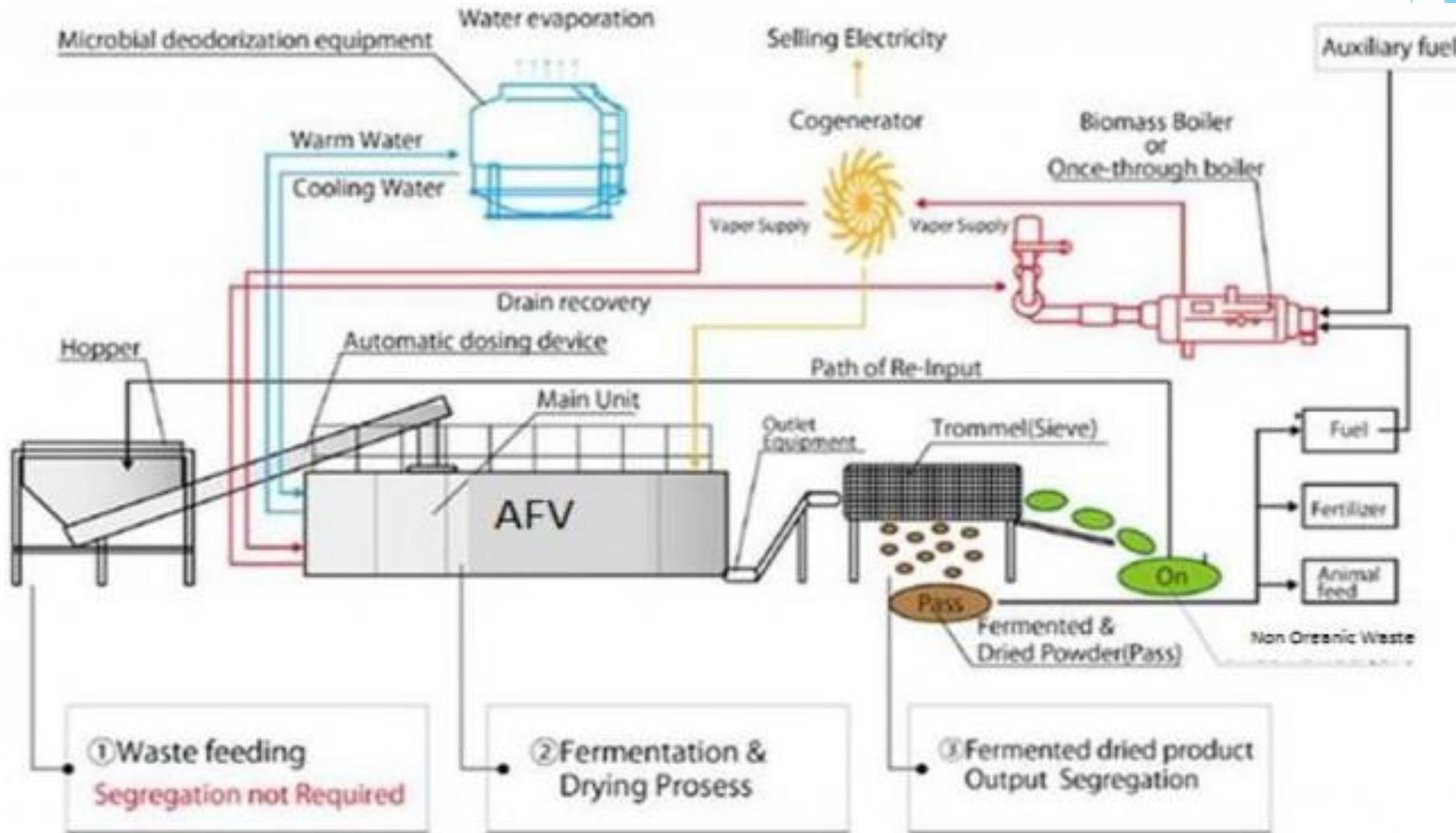
TERTIARY TREATMENT

THE LIQUID STREAM



Sewage Sludge Treatment

Using Machines



Nadep Method



NADEP METHOD OF COMPOSTING

Narayan Deotao Pandharipande

Description

brick tank rectangular
(length) x 5' (breadth) x 3' (height). 10'
6^u vents
after the height of 1ft. from bottom



Nadep Method



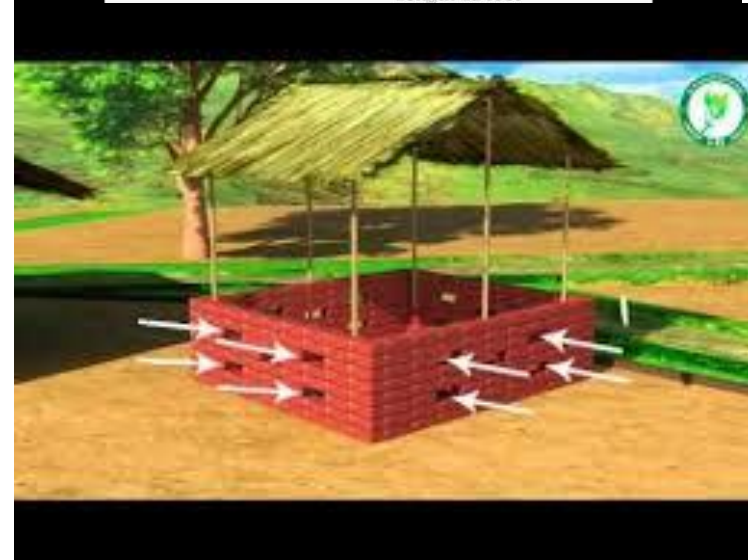
एनेडीईपी विधि NADEP METHOD OF COMPOSTING

NADEP Method

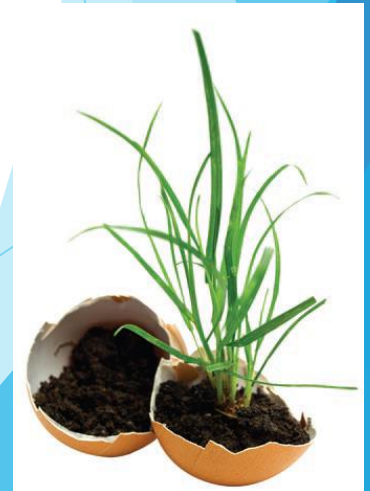
प्रसन्नकरा नाडेप टांका निर्माण की विधि

टांके का आकार

लम्बाई - 12 फीट
चौड़ाई - 3 फीट
ऊंचाई - 5 फीट



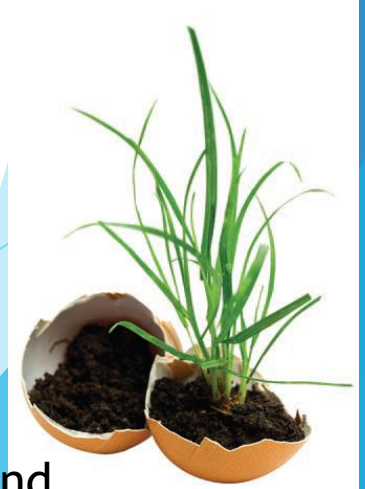
NADEP



Turn it to add Oxygen



- ▶ Keep the worms, bugs, microbes happy and eating your browns and greens. Use a pitch fork to turn the pile.



The garden centers or farm supply stores offer a variety of pitch forks. Something that lifts and separates your compost while you turn it.

Few Things to avoid



- Meat, bones
- Dairy products
- Fats and oils
- Pet feces (*dog, cat, other carnivores*)
 - Wood ashes

These can attract critters you don't want, may create odd odors, or contain harmful bacteria/parasites.



Troubleshooting



Materials not decomposing:

Add water, turn pile to add oxygen, add more greens

Ammonia odor:

Add browns such as leaves, straw

Rotten odor:

Turn pile, add coarse dry materials.
Bury food scraps



OK, when is it done?



When:

- ▶ material is even color, texture and has an earthy smell.
- ▶ temp of pile is at outdoor temp.
- ▶ a small amount in sealed plastic bag creates no condensation inside bag.



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Nutrient value of compost



Theoretical value of compost application :

- ✓ Increase organic matter
- ✓ Improve aggregate stability
- ✓ Reduce bulk density
- ✓ Increase water holding capacity
- ✓ Increase cation exchange capacity
- ✓ Enhance the soil microbial community
- ✓ Suppress soil pests
- ✓ Provide nutrients



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Reality check :

- 1) Compost application should increase soil organic matter and improve tilth; the practical significance of these and other effects varies on a case-by-case basis
- 2) Nitrogen contribution likely to be modest, whereas the P and K contribution may be excessive



General nutrient properties of composts :

Nutrient content (dry weight basis) :



Type	% nutrient content		
	N	P	K
Poultry manure	2 - 4	1 - 3	1 - 3
Feedlot manure	2 - 3	1 - 1.5	1 - 2
Dairy manure	1 - 2	0.5 - 1.5	1 - 2
Urban yard waste	1 - 1.5	0.2 - 0.5	0.5 - 1.5
Crop residue	1.5 - 2.5	0.2 - 0.5	1 - 2

Forms of N present :

Organic N > 90%

Mineral N ($\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$) < 10%



How much plant-available N do composts provide ?



UCD N mineralization studies :

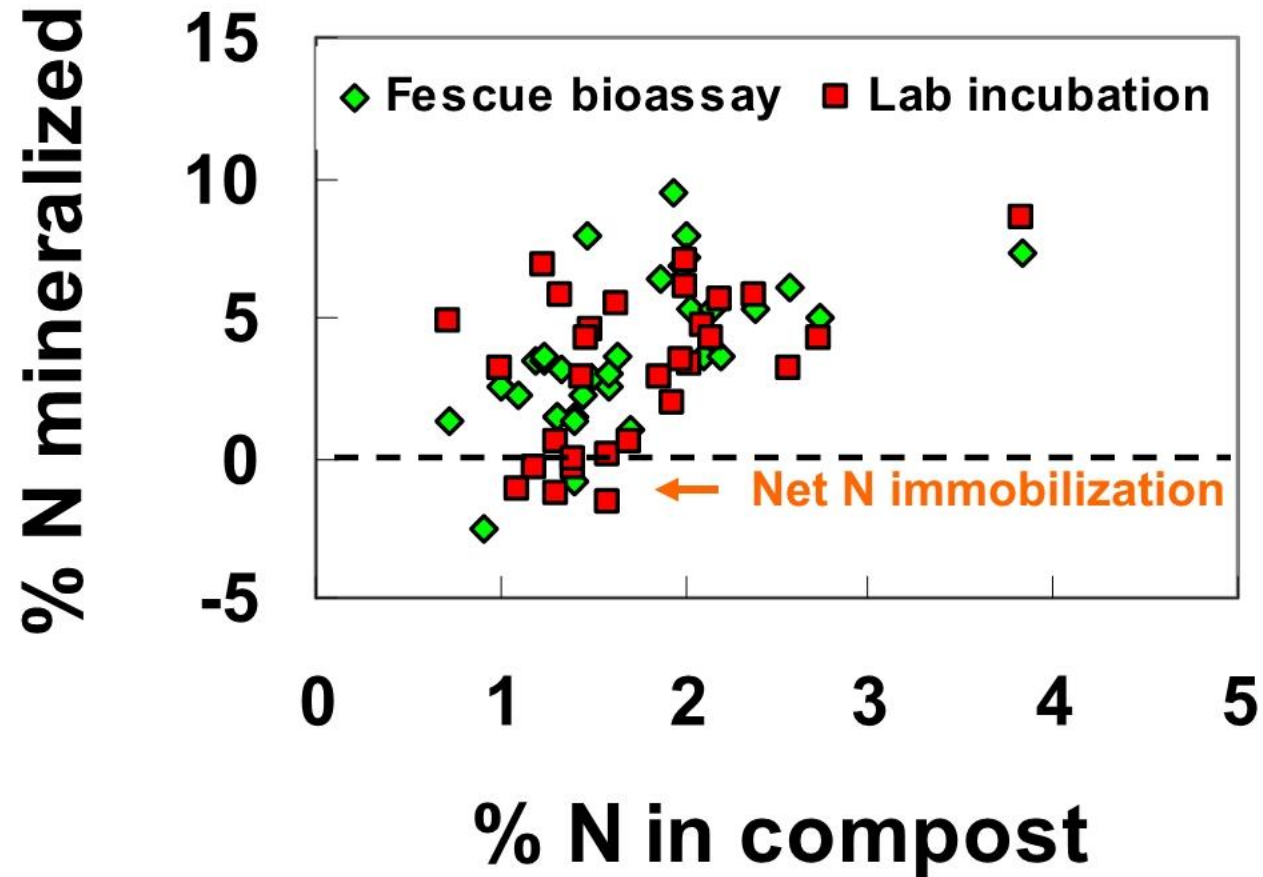
25 composts tested

- Poultry manure
- Feedlot manure
- Dairy manure
- Crop residue
- Urban green waste

Blended with moist soils, and net N mineralization was measured by :

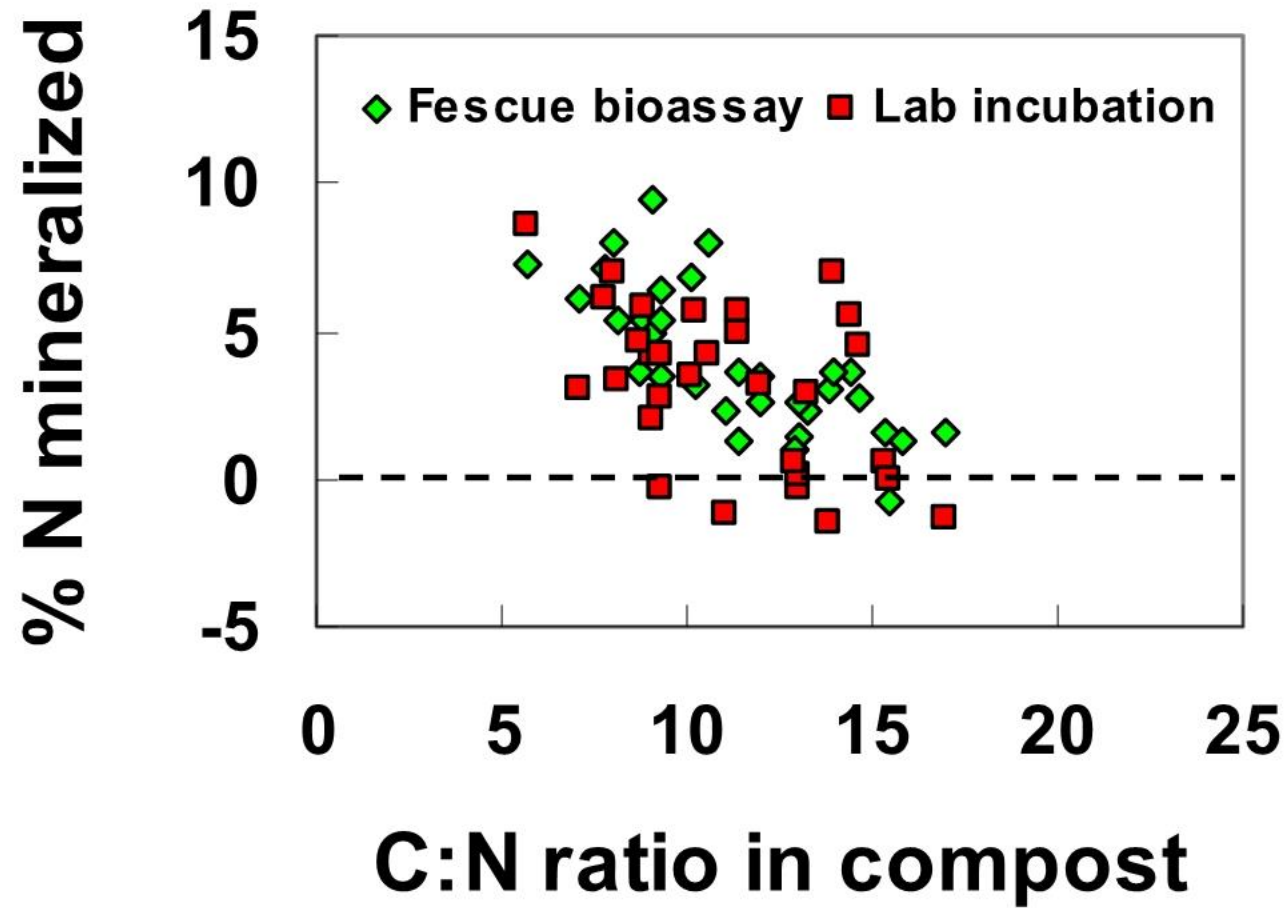
- incubation for 12 weeks @ 77 °F constant temperature
- 18 week greenhouse bioassay measuring N uptake by fescue





Seasonal net N mineralization no more than 10% of initial organic N





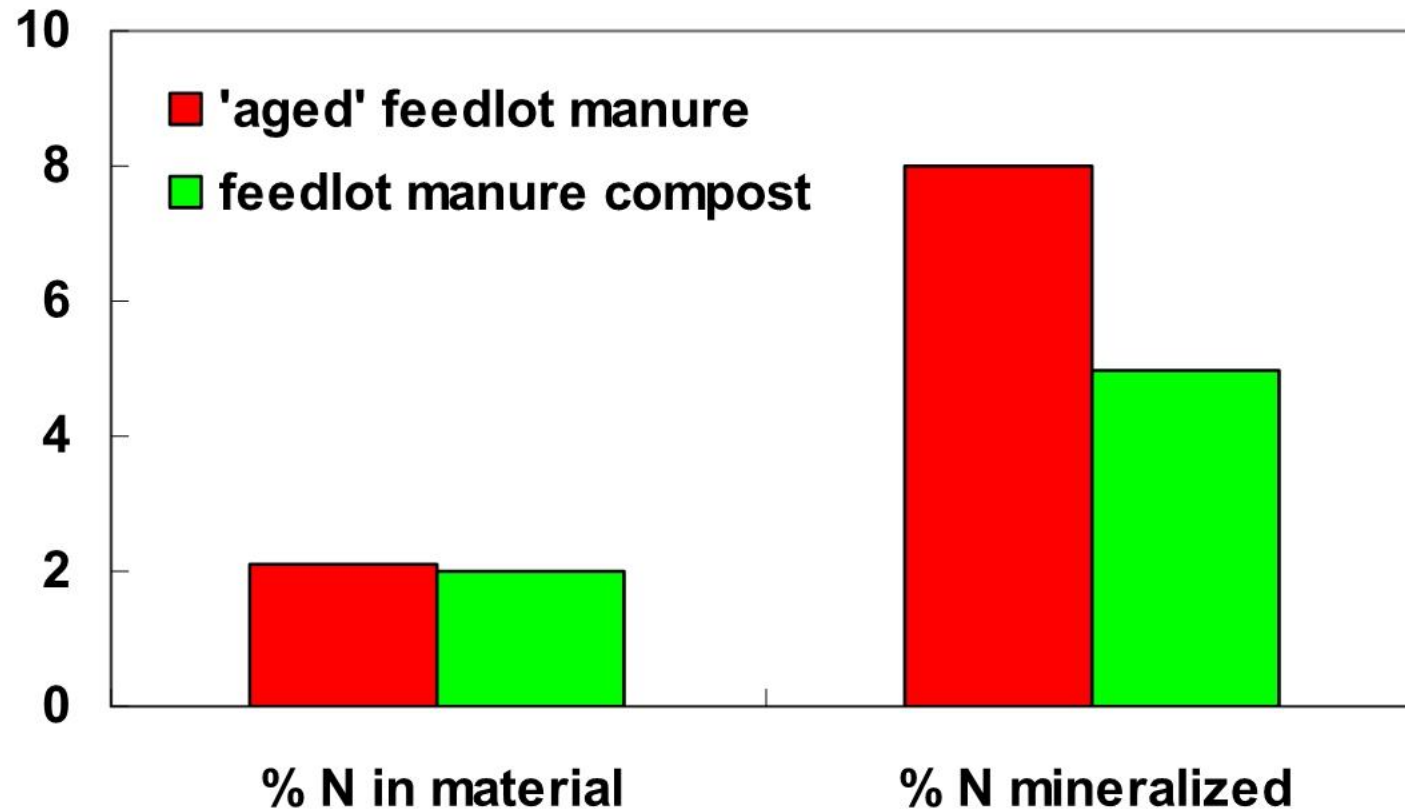
Do other researchers agree?

- ✓ These results on the lower end, but recent research generally showed net N mineralization of common types of compost to be $< 10\%$ of initial N in the first growing season after application
- ✓ The exception is very high-N manure-based compost ($> 3\%$ N), especially if not well composted



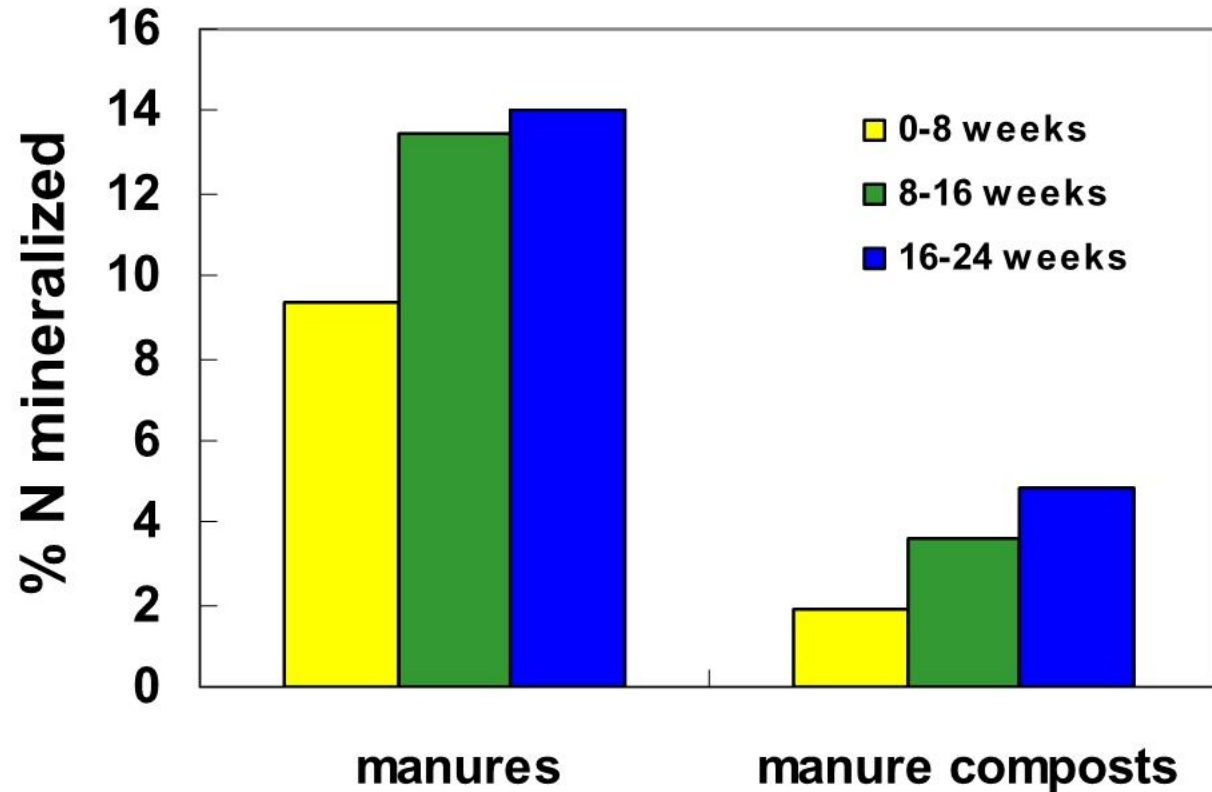
Composting slows down N mineralization :

Average of 4 materials of each type :



18 week UCD lab incubation

N mineralization over time :



- ✓ N mineralization starts fast, slows over time
- ✓ By the end of one season after field application the remaining compost N behaves much like soil organic matter





Calculating the N 'credit' from compost :

Example: Feedlot manure compost @ 2% N

If the application is 5 dry tons/acre = 200 lb total N/acre

5 to 10% of 200 lb = 10 to 20 lb available N for this season's crop



Manure compost application can result in excessive P and K :



- ✓ 5 dry tons/acre of compost with 2% P \approx 450 lb P_2O_5 equivalent
- ✓ 5 dry tons/acre of compost with 2% K \approx 250 lb K_2O equivalent



How available is P in animal manures and composts ?



Material	% of P content in	
	organic form	inorganic form
Feedlot manure	25	75
Composted manure	16	84
Dairy manure	25	75
Poultry litter	10	90
Swine manure	9	91

Studies show that manure or compost P can substitute nearly 1:1 for synthetic fertilizer; the limitation is that it cannot easily be banded unless the material is pelleted



How about K availability ?



**K is not incorporated into organic compounds in plants or animals, so
K in compost is readily available**





**Nutrient contribution from
surface-applied compost ?**





- ✓ **N contribution will be slowed due to surface drying, but heavy rate or repeated application can still cause excessive N availability**
- ✓ **Excessive P and K loading an issue if the compost is manure-based**





Is compost tea a significant nutrient source ?

- ✓ Most teas contain a range of essential nutrients, but at **very low concentration**
- ✓ At typical application rates the nutrient effect is insignificant - a spray application of a typical compost tea @ 30 GPA would apply **< 0.1 lb N / P / K per acre**





THANK
YOU

