Farm Scale Composting

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Potomac Vegetable Farms

- Northern Virginia (DC area)
- 2 Farms
- 4 owners: Hana, Hiu, Ellen, Carrie
- 2 permanent FT staff
  - Many seasonal staff
- Ecoganic Methods
- $1 million gross sales

PVF West in 1992

 PVF – West in Loudoun County,
50 miles NW of Washington, DC

- 180 acres total
  - 50 acres inside 8’ deer fence
  - 10 acres cash crops, some double cropping
  - 10 acres on “vacation” = active green manuring
  - We grow vegetables and herbs and make
  - 150-250 tons of compost per year

Compost Defined

- Composting is the aerobic bio-degradation of organic materials under controlled conditions, resulting in a rich humus-like material.
  
  http://www.compostguy.com/composting/composting-defined/

- Composting = recycling organic materials and wastes through the genius of microbial design, organization and synthesis to produce rich materials that create humus, a complex mix that is integral to good soils
  
  John Todd, PhD, Ocean Ark Institute

What’s so great about compost?

- Nutrient delivery system – doles them out as the plants need them
- Organic matter addition – stable humus
- Inoculates soil with beneficial microbes
- Helps neutralize soil toxins and harmful compounds
Ellen Polishuk
Plant to Profit

**Reasons To Compost**

- Use on-farm for soil building
- Salable product
- Farm waste handling
- Profit from tipping fees?

**How does compost fit into your whole farm management plan?**

- Nutrient delivery
  - Most biologically effective method
- “waste” conversion
  - Using your own
  - Using your neighbors
- Humus addition

**Basics of Composting**

- **Air** – O₂ specifically
  - Turning machine
- **Water** – not too much, not too little
  - Watering unit on turner
  - Compost covers
- **Food**
  - Materials, achieving 30:1 C:N ratio
- **Shelter**
  - Compost covers
  - Covered composting area
  - Materials that provide structure (plenty of fiber)

**Specifics of Controlled Microbial Composting**

- **Leubke method**
  - Our Goal = The best, most stable compost, made quickly
    - Windrows
    - Turning machine
    - Compost covers
    - 5-10% soil
    - Temp and CO₂ readings
    - Finished compost isn’t ready until it’s below 90 degrees
    - Total Time = 8-10 weeks
What equipment do you need to do this?

- Turning machine
- Composting pad/site
- Monitoring equipment (thermometer, CO₂ meter)
- Skid loader or tractor with bucket to build piles
- Compost Covers

Compost Pad

- Flat from side to side
- 3% slope along the length of the windrows
- Something to help you have traction: gravel, pavement
- Easy access to water
- Materials storage area
- Easy truck access
Keep the rain off

Piles are covered with a breathable polypropylene fabric (Top-Tex) to regulate moisture and control leachate.
**Materials**

**Goal of pile is 30:1 C:N**

**“Brown” or dry, carbon rich**
- Hay – poor quality grass/weed
- Straw
- Paper
- Leaves
- Woodchips (tub ground!)

**“Green” or wet, Nitrogen rich**
- Manure
- Hay – High quality/legume
- Green chop
- Food waste
- Really good hay (alfalfa)
- Fresh Grass clippings
- Carcasses

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**woody materials? Need a tub grinder**

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**Building the Pile**

1. unroll round bales of hay
2. scoops of manure

**TURN the Pile**
3. scoops of leaves, soil and compost, any stray food waste

**TURN the Pile – twice**
4. put covers on and wait for 24-36 hours

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**My recipe – by the one yard loader bucket**

**Carbon**
- 1 scoop hay
- 1 heaped scoop leaves

**Nitrogen**
- 1 scoop dairy manure

**Other:**
- Subsoil/fill dirt – ¼ scoop

**Finished Compost – ¼ scoop**
Tend the Pile
Keep it tidy

- Air – measure the CO₂
- Water
- Temperature

Measure CO₂

Adding O₂, removing CO₂ = Turning the Pile
Farm Scale Composting

Temperature Goal is 150°F, or 66°C

Too Hot?  Too Cold?

Add water if needed

Success 😊

Compost extras

- Microbial inoculants
- Rock powders and other mineral amendments
  - Rock phosphate, greensand, Kmag,
  - Azomite
  - Kelp

- Putting other amendments into the compost will make them biologically “charged” and even more plant available.

Azomite on piles
When is the compost done?

- When temperature is below 90°
- When CO₂ remains steady at 3-6%
- When you can’t tell what the starting materials were!

Rates

- Base, bare minimum rate: 2 tons/acre
- Max rate: 60 tons/acre
- My rate: 10 tons/acre

- You can’t/shouldn’t spread compost at a rate to fulfill your Nitrogen needs!

My Costs of Production for 50 tons

**Labor**
- Pile building: 12 hours
- Turning: (42 x .75) = 32 hours
- TOTAL: 44 hours x $20 = $880
- Equipment: 44 hours x $25 = $1100

**Materials**
- Hay = $50
- Leaves = free
- Soil = free
- Manure = $700

Labor + equipment + materials = $2730
$2730 divided by 50 tons =
50 tons = 83 yards, $2730/83 =

- $55 per ton
- $33 per yard

Benefits of increasing OM

- ↑ Nutrient holding capacity
- ↑ water holding capacity
- ↑ soil aggregation and thus friability
- ↑ drainage
- ↓ bulk density, meaning ↑ soil air
- ↑ biological activity

Using Compost vs other fertilizers?

**Pros**
- It’s simply a wonderful fertilizer
  - Biologically
  - Chemically
  - Physically

**Cons**
- Cost to make
- Cost to get infrastructure in place
- Cost to spread
- Materials unavailable or costly
- Labor
- Temperament
Not All Compost is Created Equal

- It wasn’t really aerobic!
  - Disease inducing vs. disease suppressing qualities
- Unfinished compost can be toxic to plants
  - Disease inducing vs. disease suppressing qualities
- Inefficient conversion of nutrients
  - They washed or wafted away

How to Evaluate Purchased Compost?

- Compost Analysis
  - From the supplier
  - You get one done
- No Analysis
  - Can you see the parent materials?
  - Is it warm to the touch?
  - Smell?
  - Can the maker describe the process?

Legal considerations

- County regs – waste handling facility?
- Tipping fees
- Water (nutrient) management

Go Forth and Compost!