

# THE ART OF COMPOST



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# DEFINITIONS

**ROTATIONAL GRAZING:** A system where a large pasture is divided into smaller paddocks, concentrating grazing animals in a small area for a short amount of time, mimicking natural herd animal behaviors.

**SOIL CARBON:** A measurable component of soil organic matter, the source of energy for most soil microorganisms and animal life.

**CHELATION:** A biochemical process that bonds metal ions crucial for plant growth (like copper, zinc, iron, manganese, and magnesium) with larger organic molecules, helping deliver them to the plant where needed.

**NUTRIENT CYCLING:** Healthy soil cycles nutrients through a biogeochemical process involving animals, plants, fungi and bacteria; this includes the movement of nutrients from the environment to living organisms and back.

**AEROBIC DIGESTION:** The breakdown of organic materials by microorganisms in the presence of oxygen; most common digestion method for composting.

**ANAEROBIC DIGESTION:** The breakdown of organic materials by microorganisms in without the presence of oxygen; most commonly used to produce biogas - not in pile compost methods.

**FEEDSTOCKS:** The raw, decomposable ingredients for composting; these influence the composting process and determine the characteristics of the finishes compost.

**MESOPHILES:** Organisms that grow well in moderate temperatures, from about 68-113°F - the initial decomposers in a compost piles.

**THERMOPHILES:** Organisms that grow well in high temperatures, from about 106-252°F - the decomposers that take over in a compost pile after the mesophiles.

**STATIC PILE (HAND PILE):** Any composting system that does not utilize physical manipulation (turning) during the primary decomposition process.

**WINDROW:** A composting system that piles organic matter in long rows and is aerated periodically either manually or mechanically.

**DRILOSPHERE:** The area of soil impacted by earthworms, including their secretions, burrows, and castings.

**VERMICAST:** The final product of the breakdown and digestion of organic matter by earthworms.



# CHAPTER 1: SOIL HEALTH

There are over 20 pastures across Apricot Lane Farms' 234 acres. We utilize a rotational grazing system, which imitates the way herd grazing animals moved quickly through prairies. Tightly packed together fearing predators, herd animals didn't over consume grasses, and often trampled large portions before they could graze. They would eat some grass, trample some, and leave the rest behind as they continuously moved - which is also known as the rule of thirds.



## SOIL HEALTH = PLANT HEALTH = ANIMAL AND HUMAN HEALTH

- Compost applications to the soil help build soil carbon & organic matter
- Higher soil carbon leads to greater water retention, increased microbial functionality, mineralization, nutrient cycling and fire resilience.
  - For every 1% increase in soil organic matter, there is an increased water holding capacity of 20,000 gallons in the top 12 inches of soil.

## SOIL HEALTH - VISUAL INDICATORS

- Darker soils = more carbon!
- Aggregate structure
  - “Rasta roots” indicate root exudates, meaning the plant is photosynthesizing and drawing down carbon.
- Other indicators of soil health:
  - Red nodules on legumes = Nitrogen fixation
  - Plant species diversity
  - Presence of worms, arthropods etc.



## RUMINANTS HAVE A MICROBIAL POWERHOUSE OF A GUT.

- Ruminants (cows, goats, sheep, etc.) are critical to the health of the soil in many systems. Planned rotational grazing helps cycle nutrients, clears older growth for new plants to grow, and provides the right kind of concentrated soil disturbance to stimulate healthy soil life and plant growth.
- Ruminants have 4 stomach chambers! They ingest and ferment grasses in their rumen to feed microbial populations that they cultivate in their gut, mostly anaerobic bacteria.
- Those microbes are the protein that provide the animal with nutrition. They don't actually derive nutrition directly from grass!
- Those anaerobic decomposing microbes contribute to healthy soil through the ruminants manure—and the manure feeds our compost!



## ANIMAL IMPACTS - MANURE STATIC PILE

- We age collected cow manure from our pastures in a static pile covered in straw to allow for excess ammonia to burn off, while ensuring its vitality as a feedstock for our worms.
- Some animal manures don't need stabilizing, because they are naturally pelletized (sheep, goats, alpacas, rabbits).



## CHAPTER 2: COMPOST PAD

At Apricot Lane Farms, we have a year-round compost program that utilizes three methods: static manure piles, hand piles, and windrows. This complements our vermicompost (worm composting) program. While our composting system is conducted on a large scale, these methods can be scaled down for a single household or community needs.





## RAW MATERIALS (FEEDSTOCK) & PILE COMPOSITION

- The most important part of a pile's composition is the surface area you create - more surface area (smaller particles) = more uniform and healthy decomposition.
- Pile Composition — 30:1 Carbon:Nitrogen or “Browns and Greens”
  - Browns (Carbon):
    - Newspaper
    - Sawdust
    - Unbleached paper products
    - Dried leaves
    - Mulch
    - Straw
  - Greens (Nitrogen):
    - Raw food waste
    - Grass clippings
    - Garden prunings
    - Coffee grounds
    - Poultry bedding

These feedstocks are applicable in both aerobic systems and in vermicompost.

TIP: Explore community resources for organic waste (i.e. coffee shops, breweries, etc); there are more opportunities out there to divert organic waste than you think.



## HAND PILE

- Most translatable form of aerobic composting at home due to its small scale. We blend our browns and greens in direct contact with the Earth, add air and water, and turn 2-3 times over ~2 months.
- We don't go for full maturity on our farm as this is a "pre-composted" feedstock for worms, but at home you can cure, sift and apply after 6-8 weeks.
- ALF Hand Pile Feedstocks: Straw, poultry bedding/manure, unbleached paper products, coffee filters, kitchen scraps, crop residues, comfrey leaves (help with compost activation), old fruit.
- Water: 30-50% moisture in a pile — use the "squeeze test" to tell:
  - If droplets come out of a handful of compost when squeezed, it's too wet.
  - If it crumbles, it's too dry.
  - If it holds its form, it's just right.
- Heat
  - After composing the compost pile, we look to reach a temperature of at least 130 degrees, but no higher than 160 degrees, for 2 to 3 weeks.
  - Temperature is driven by the metabolism of the microbes working hard at transforming and decomposing organic material. These microbes are referred to as Thermophiles, because they can thrive in high temperatures.



## WINDROW

- Large scale system that requires heavy machinery (turner, bucket loader, hose reel, compost spreader implement).
- ALF Windrow Feedstocks: Horse manure/bedding from our neighbors, mulch, azolla from our Wildlife Pond.
- We produce 800+ tons/year of this compost, and apply at ~3 tons/acre once a year.



## CHAPTER 3: FERTILITY CENTER

Our Fertility Center (FC) is the beginning and end point of the lifecycle of everything on the farm; the foundation of everything we do is focused on building healthy soil, and it all happens here. The FC consists of three primary components: the vermicompost center (40 foot worm bin), compost tea brewer, and biodynamic workshop. What is created here touches every part of the farm, boosting not only the soil's fertility, but the immunity and resilience of the entire ecosystem we steward.



## THE VERMICOMPOST CENTER

- Worms eat organic matter and produce manure or “vermicast”, which is the finished product in this method of composting
- Worm microbiome drives decomposition
  - Amount of aerobic and anaerobic bacteria in the worm gut is 12-20 and 10-4000 fold HIGHER than that of soil!
  - Higher concentration of nutrients and minerals than that of soil
  - These concentrations mean a little goes a long way in application
- The Drilosphere: Worms work in concert with a team of decomposers. The presence of springtails, pillbugs and mites is a sign of a thriving, active ecosystem.
- Most rewarding method of home composting: creates the most dense concentration of beneficial microbes, fungi, and available nutrients/minerals
- Red wiggler earthworms (*Eisenia fetida*) are our worms of choice due to their wide range of temperature tolerance, reproductivity, and accessibility
  - *Other composting worms include Lumbricus rubellus and L. terrestris (nightcrawler).*
- ALF Vermicompost Feedstocks: juice scraps, coffee grounds, azolla/duckweed, horse bedding, nearly-mature compost (hand pile) and aged manure
  - What not to feed?
    - Citrus in high quantities due to acid sensitivity
    - Garlic, onions
    - Meat, dairy



## SMALL-SCALE VERMICOMPOST AT HOME

- Vermicomposting is one of the easiest way to divert food scraps from the landfill in a small space, while creating nutrient-rich vermicast to use at home.
- A worm bin can be set up in as little of space as an apartment patio, or in a larger backyard area. For a single family, a 12-20 gallon worm bin is large enough to manage most all food scraps.
- Worms do best between 55-77°F, in a slightly acidic environment, with a moderate amount of moisture.
- Worms need an organic substrate, or bedding, to live in and digest feedstocks.
- What will worms eat on a small scale?
  - Remember worms have very small mouths - the finer the feedstock the better! Shredded paper, crushed eggshells (as fine as possible - an espresso grinder works well), fruit and vegetable waste, coffee grounds, and ground yard waste.
- What shouldn't you put in a small worm bin?
  - Meat, dairy, pet excrements, and oily foods should be avoided. While earthworms can digest these products, the odor and pest problems they will likely create will outweigh their benefits in your worms' diets. Citrus can be added to active compost piles; start with very small quantities a little at a time, allowing your worms and the system to build a tolerance to limonene, a chemical component found in citrus.



## COMPOST TEA

- 24-48 hour aerated brew time for microbial proliferation
  - *1 ml of tea can have up to 1 billion microorganisms!*
- We use compost tea to colonize leaf surface in foliar sprays, which can also provide nutrients, suppress disease and increase plant resilience.
- Compost tea brings microbial diversity to the soil, and allows a little vermicast to have a bigger impact.

## TEA OR SLURRY APPLICATION

- If not using a tea brewer: Mix in a 5 gallon bucket and stir/aerate for 15 minutes-1 hour. Oxygen levels should be sufficient for 24-48 hours before application. Strain out solids and apply to seedlings, root drench, or foliar sprays on trees.
- Slurry works best on soil as both liquid extract and solid biomass are applied.
- *Don't foliar spray on any leaf surface that will be consumed within 90 days!*



## TOOLS FOR COMPOSTING AT HOME

- Chipper/Shredders/Mulchers for more surface area and yard waste management
- Tabletop food cyclers
- Home-scale vermicompost bins
- Bokashi for meat, dairy, and oil

## COMPOST APPLICATION: HAND SPREADING

- Top dress beds with several inches of sifted compost before planting
- Side dress heavy feeding plants such as tomatoes with ½" of compost
- Mix 15-20% compost into potting mix for an added boost
- Vermicompost is more concentrated than other aerated finished composts and should be applied at a smaller rate.





## COMPOST/SOIL TESTING EQUIPMENT & METHODS

- microBIOMETER: At-home microbial biomass soil testing kit.
- REOTemp Thermometer: High quality thermometers used to accurately measure temperatures within compost piles.
- Squeeze Test: An easy way to monitor the moisture of your compost pile. First, grab a handful of compost and squeeze it into a ball - the material should hold the shape of a ball. If you squeeze the material and water drips out, the compost is too wet. If the material does not hold its shape as a ball and no water drips out, the compost is too dry.

## SOIL TESTING LABS:

- ReGen Ag Lab: Laboratory services focusing on regenerative agriculture.
- NEWAGE Laboratories and Agronomical Services: Agriculture, food safety, and environmental services.
- Ward Laboratories: Agricultural and soil testing.

# HELPFUL RESOURCES

## BOOKS

- "Rodale Book of Composting" - our #1 pick for beginners
- "The Worm Farmer's Handbook" - Rhonda Sherman
- "Earthworm Ecology" - Clive Edwards
- "For the Love of the Soil" - Nicole Masters
- "Teaming with Microbes/Nutrients/Fungi" - Jeff Lowenfels
- "The Living Soil Handbook" - Jesse Frost
- "The Secret Life of Compost" by Malcolm Beck

## PODCASTS

- Community Composting Podcast
- The Composter
- The No-Till Growers Network
- Regenerative Agriculture Podcast with John Kempf

## ONLINE

- [Backyard Composting Cheatsheet \(Rodale\)](#)
- [5 Uses for Sifted Compost Application \(LAC\)](#)
- [How to Brew Compost Tea \(LAC\)](#)
- [Dr. Elaine's Soil Food Web School](#)
- [US Composting Council](#)
- [Cornell Waste Management Institute](#)
- [DIY Compost Bin Guide](#)