



## Nitrogen Fertigation of Organic Tropical Fruit Orchards with Liquid Tankage

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Meeting the nitrogen requirement for mature, organic fruit orchards can be difficult, with the only options being side-dressing of solid fertilizer (which has potential loss to volatilization) or fertigating. This handout evaluates fertigation using a liquid bone meal (a.k.a. tankage) recipe.

### Liquid Tankage Recipe

Details of this liquid tankage recipe by Dr. Amjad Ahmad can be found at <https://vimeo.com/245473495>.

In summary:

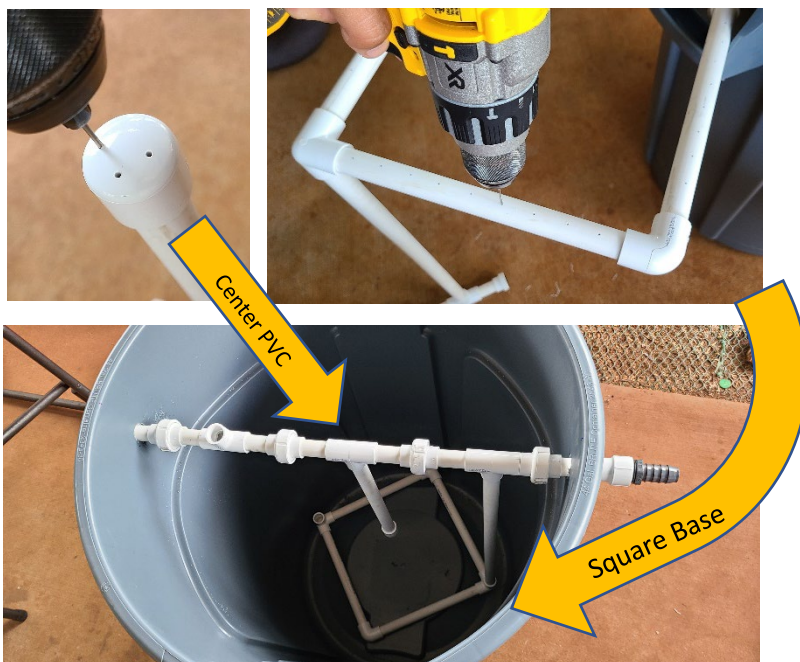
- 1.5 lbs tankage + 1 oz vermicompost in 10 gallons of water
- Brew with aeration for 24 hours in cotton bag or shirt
- Strain/Filter before using



### Brewer Setup

Adapted from Oregon State University plans for compost tea brewer<sup>1</sup> and discussion with a local farmer. Includes:

- 30-gallon trash can
- ½" slip PVC fittings
  - 90° x4 Tee x3
  - Cap x2 Union x4
  - Female adapter to appropriate hose size (e.g. ½" to ¾" adapter)
- Drill 1/16" holes for aeration
  - Four holes in cap for center PVC
  - ~9 holes about ½" apart on each side of square base (~36 holes total)
- Drill ¾" holes on opposite ends of the trash can for ends of PVC setup
- Cap opposite PVC end from hose adapter
- Place tankage bag for brewing around center PVC
- Can add another PVC perpendicular to main line to hold weight of tankage bag



1. <https://www.scribd.com/document/35269216/Plans-for-a-home-made-25-gallon-compost-tea-brewer-Oregon-State-University>



### Nitrogen Produced from Liquid Tankage Recipe

Lab analyses are pending, but total nitrogen (N) exceeds 100 ppm. From previous research, this liquid recipe is ~0.5% N or 0.042 lbs N/gal (Ahmad, personal communication). Accordingly:

- 30 gal mixture= **1.2 lbs N**
- 275 gal mixture= **11.5 lbs N**

*\*Pending analyses/data will be shared for future updates, recommendations*



### Nitrogen Requirements of Tropical Fruit Trees

The following table has nitrogen requirements of tropical commercial fruits (see references), as well as the number of fertigation events to meet that need if using a 275-gallon tote (e.g. 11.5 lbs N).

Type	Lbs N/acre/yr	# of Fertigation Events Needed (@275 gal mixture)
Avocado	200	17
Banana	350	31
Breadfruit	75	7
Mango	170	15

If fertigation events will be at a regular occurrence (e.g. weekly, biweekly), then injection rates and amounts can be calculated using the following steps (Liu et al. 2021), using avocado fertigated weekly as an example:

- Determine total N needed for the event.**  
200 lbs N / 52 weeks = 3.8 lbs N
- Calculate pounds of liquid tankage needed.**  
3.8 lbs N / 0.005 = 760 lbs liquid tankage (aka 0.5% N)
- Calculate gallons of liquid tankage needed.**  
760 lbs LN / 8.3 lbs per gal = 91.3 gallons LN needed (density of liquid tankage)

**Tankage= \$0.48 / lbs**

### Cost Comparison

In the following table is the breakdown of pounds of tankage, nitrogen, and cost for varying volumes of liquid tankage made. However, keep in mind that bags of brewed tankage can be reused, although the nitrogen content of reused material needs to be further analyzed.

Volume	Lbs Tankage	Lbs N	Cost
30 gal	5	1.2	\$2.40
195 gal	32	7.8	\$15.60
275 gal	45	11.5	\$22.00

#### References

Liu, G. et al. 2021. How to Calculate Fertigation Injection Rates for Commercial Blueberry Production. IFAS Extension. HS1197.  
 Morales-Payan, J.P. 2022. Managing breadfruit yield with soil-applied nitrogen and biostimulants. Acta Hort. 1333: 359-362.  
 Panwar, R. et al. 2007. Mango fruit yield and quality improvement through fertigation along with mulch\*. Indian J. Ag. Sci. 77(10): 680-684.  
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 Sun, J. et al. 2020. Effect of Different Rates of Nitrogen Fertilization on Crop Yield, Soil Properties and Leaf Physiological Attributes in Banana Under Subtropical Regions of China. Frontiers in Plant Science 11:1-11.  
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