



Food and Environment Summit  
Pohnpei State Conference Room  
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# Techniques in Compost Production and Use in Pohnpei

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# Outline

- Importance of Compost
- Composting basics
- Compost Experiments
- Compost as a Soil Amendment
- Experimental Results



# Composting

- Taking local organic materials and decomposing them in a controlled setting to produce natural fertilizer.
- Composting is a low tech practice that can convert waste into a useful soil addition for crop production.



# Benefits of Compost to Soil

## Soil Physical Properties

1. Reduces soil density
2. Increases porosity
3. Increases water infiltration
4. Increases water retention

## Soil Chemical Properties

1. Reduces negative effects of acidity
2. Increases nutrient supply
3. Increases nutrient retention



COMPOST

## Soil Biological Properties

1. Increases soil microorganism population and diversity
2. Reduces soil pest problems
3. Increases soil health and resilience

# Composting Process

**INPUTS**

Oxygen

Water

CO<sub>2</sub>

Heat

Water



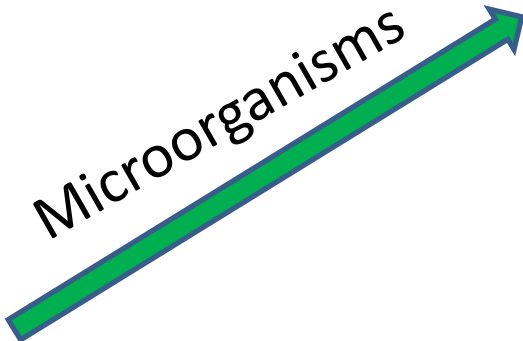
Brown (Carbon) Materials



Green (Nitrogen) Materials



Microorganisms



Finished Compost



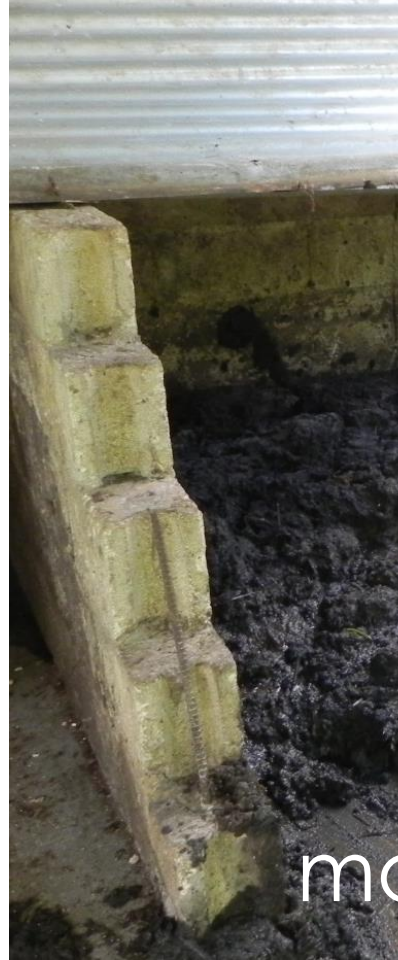
Humus  
Minerals  
Water  
Microorganisms

# Composting materials on Pohnpei.

Brown (carbon)



Nitrogen



Fish Waste



Green Leaves

# Compost Research

## 1. Recipe

- a. Brown+green+manure
- b. Brown+manure
- c. Brown+green+fish

## 2. Carbon Source

- a. Hibiscus wood
- b. Albizzia wood
- c. Coconut husk



# Design



## Data

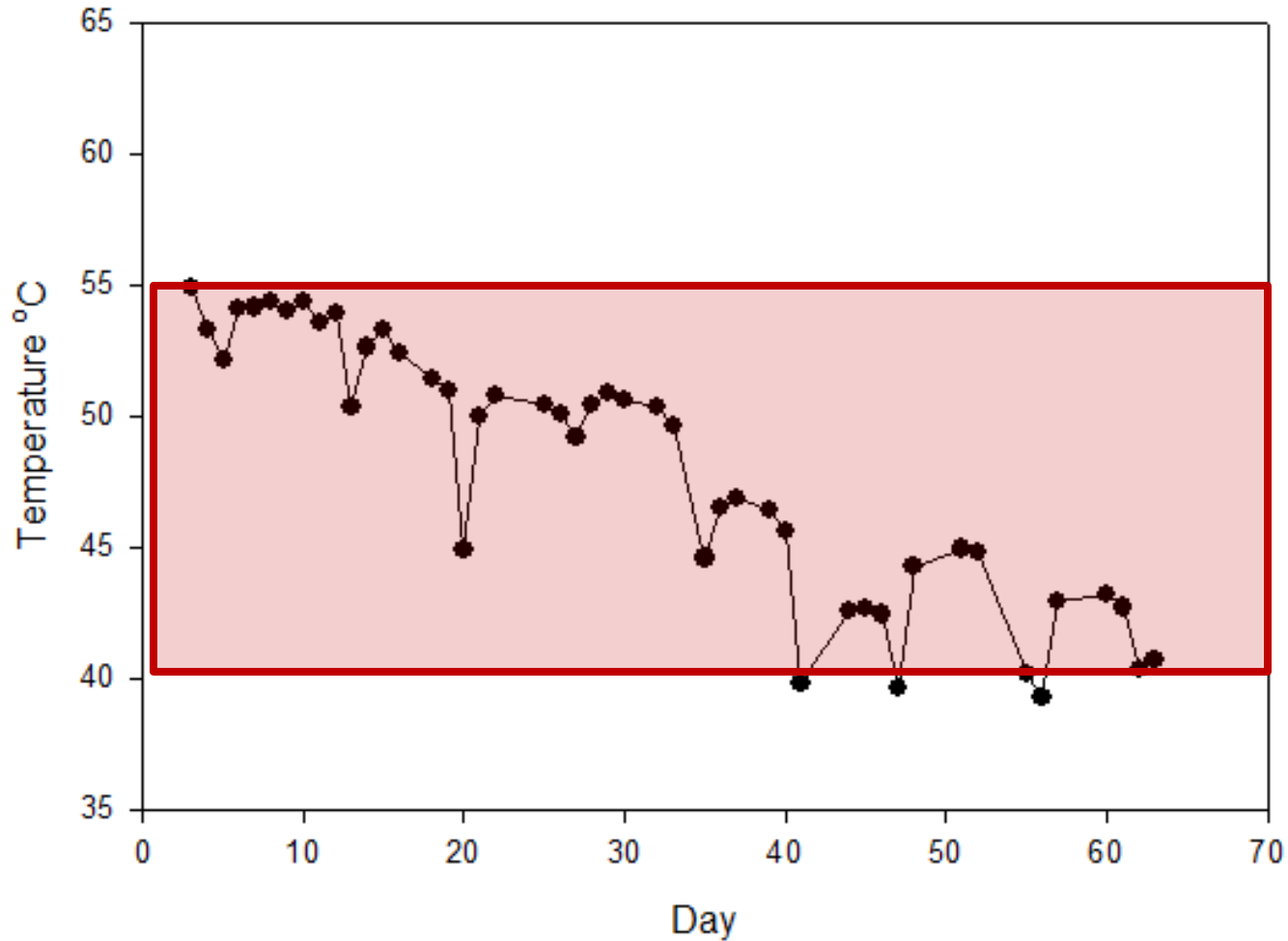
1. Temperature
2. pH
3. Maturity
4. Chemical properties





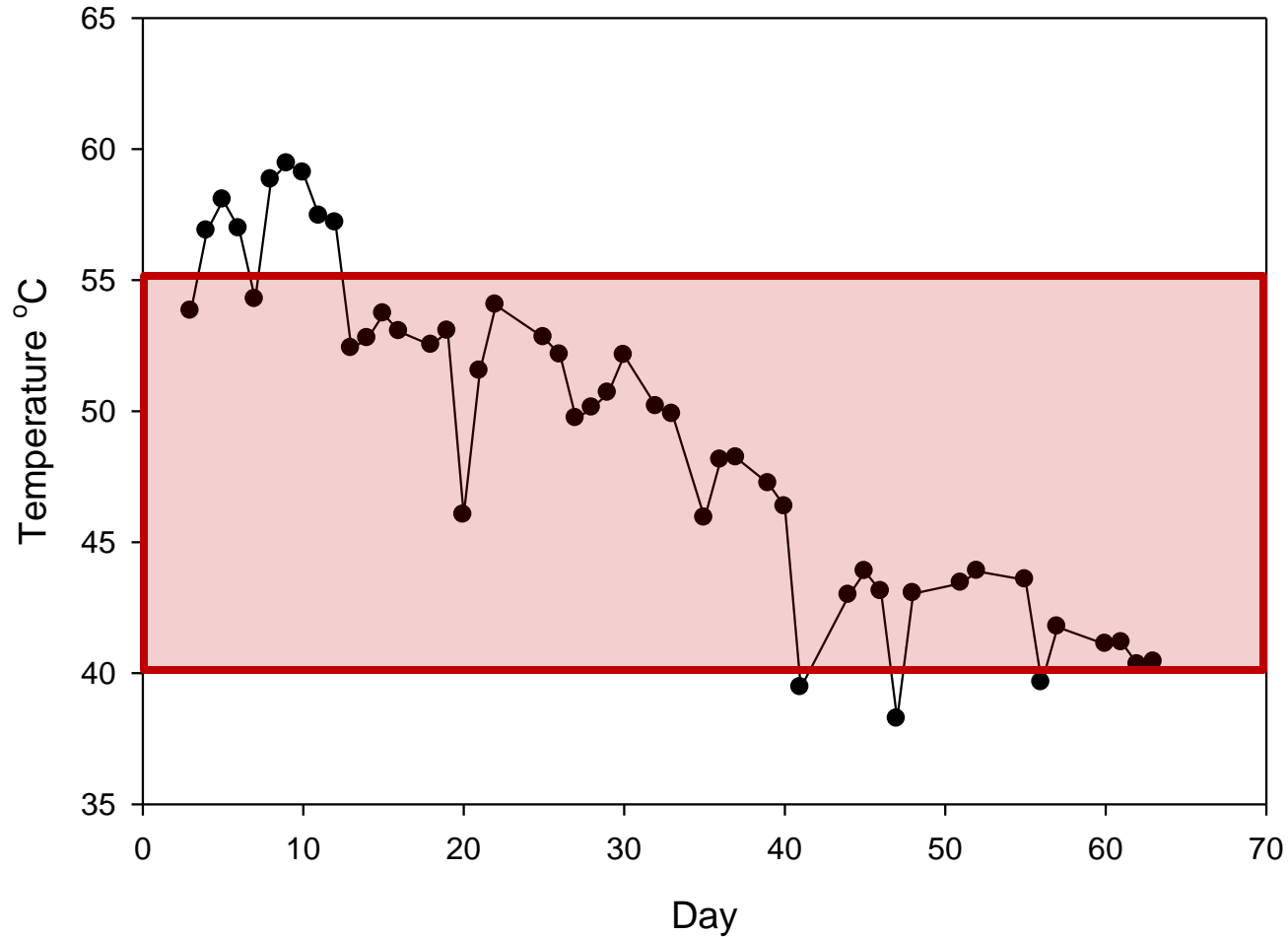
# Results: Recipe

## Brown+green+manure



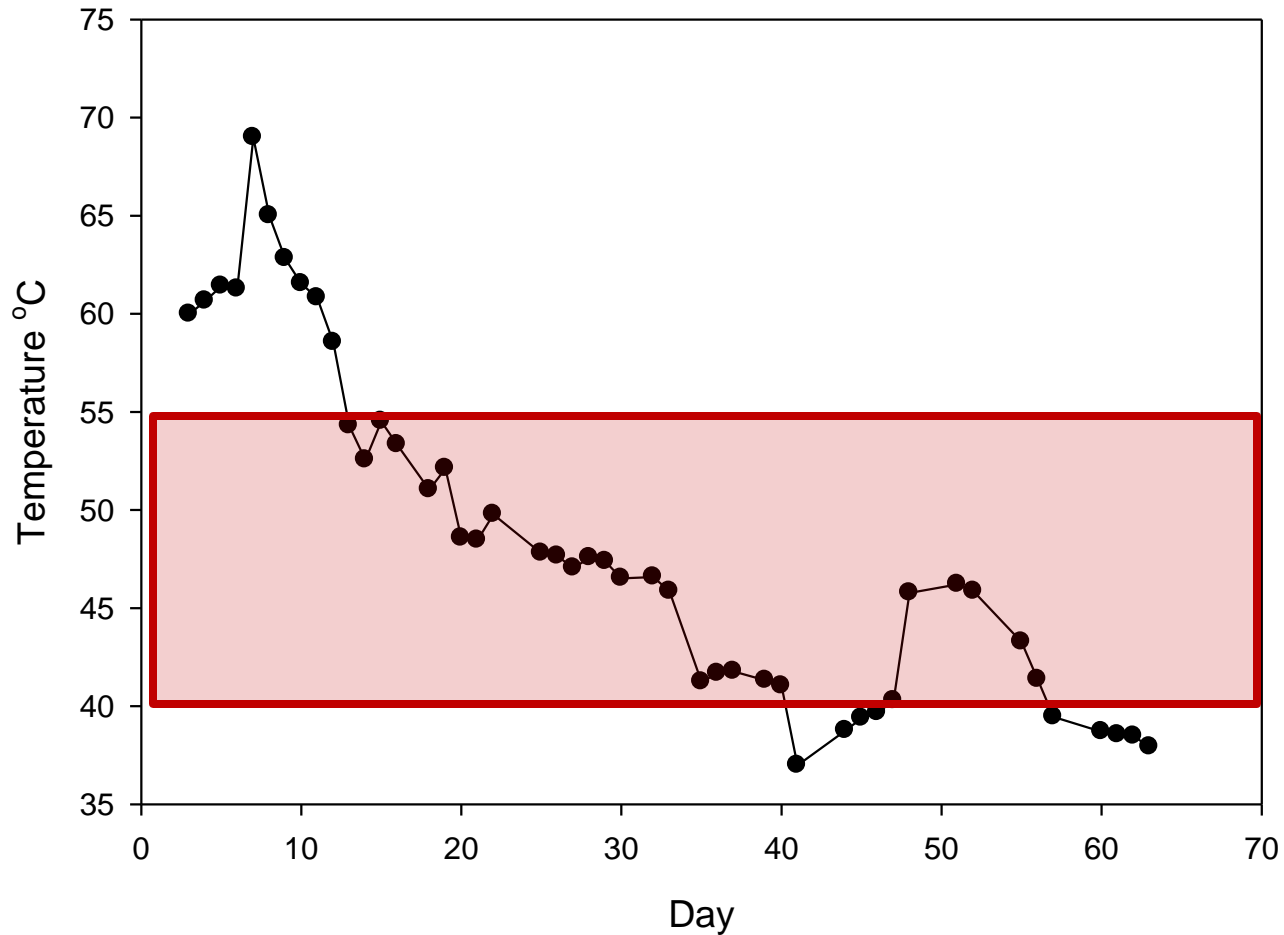
# Results: Recipe

## Brown+manure



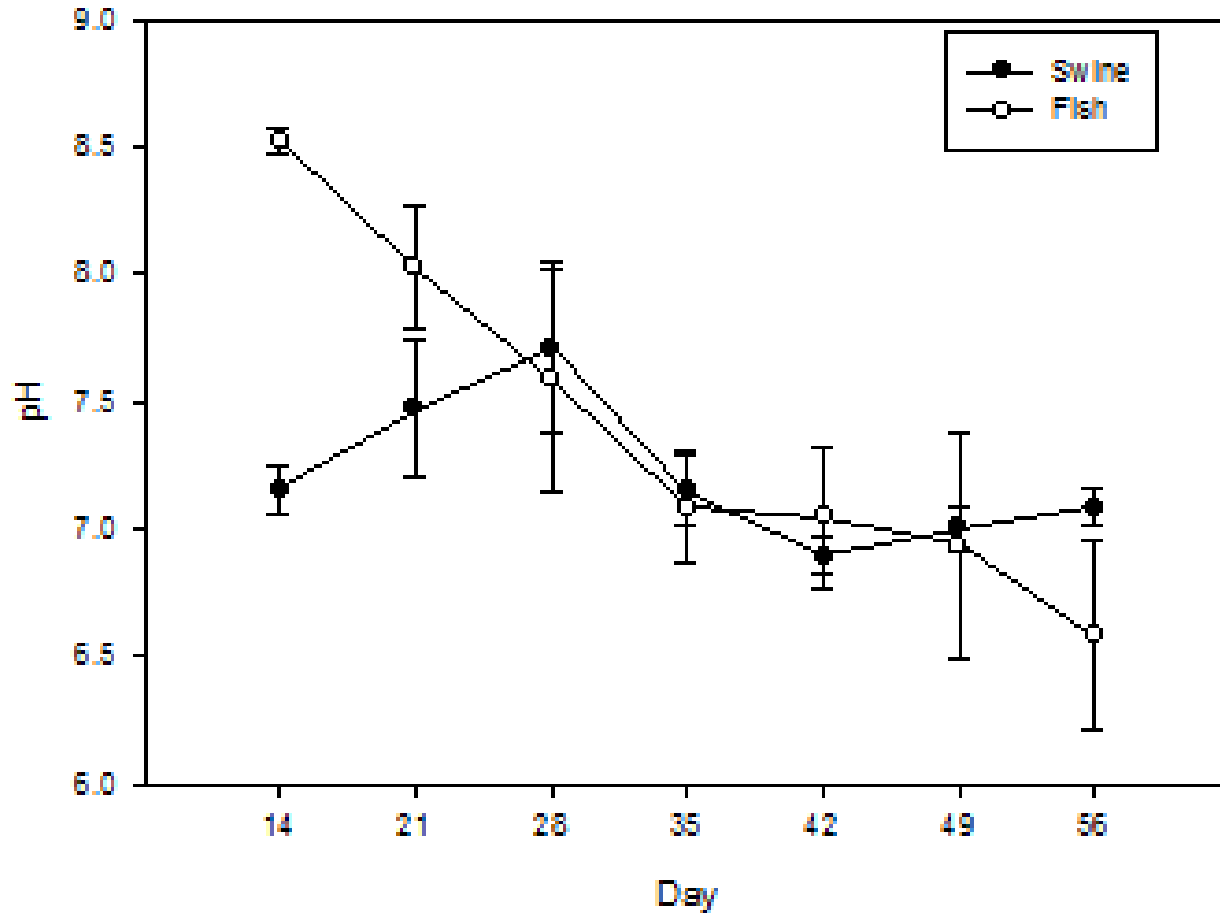
# Results: Recipe

## Brown+fish+leaves



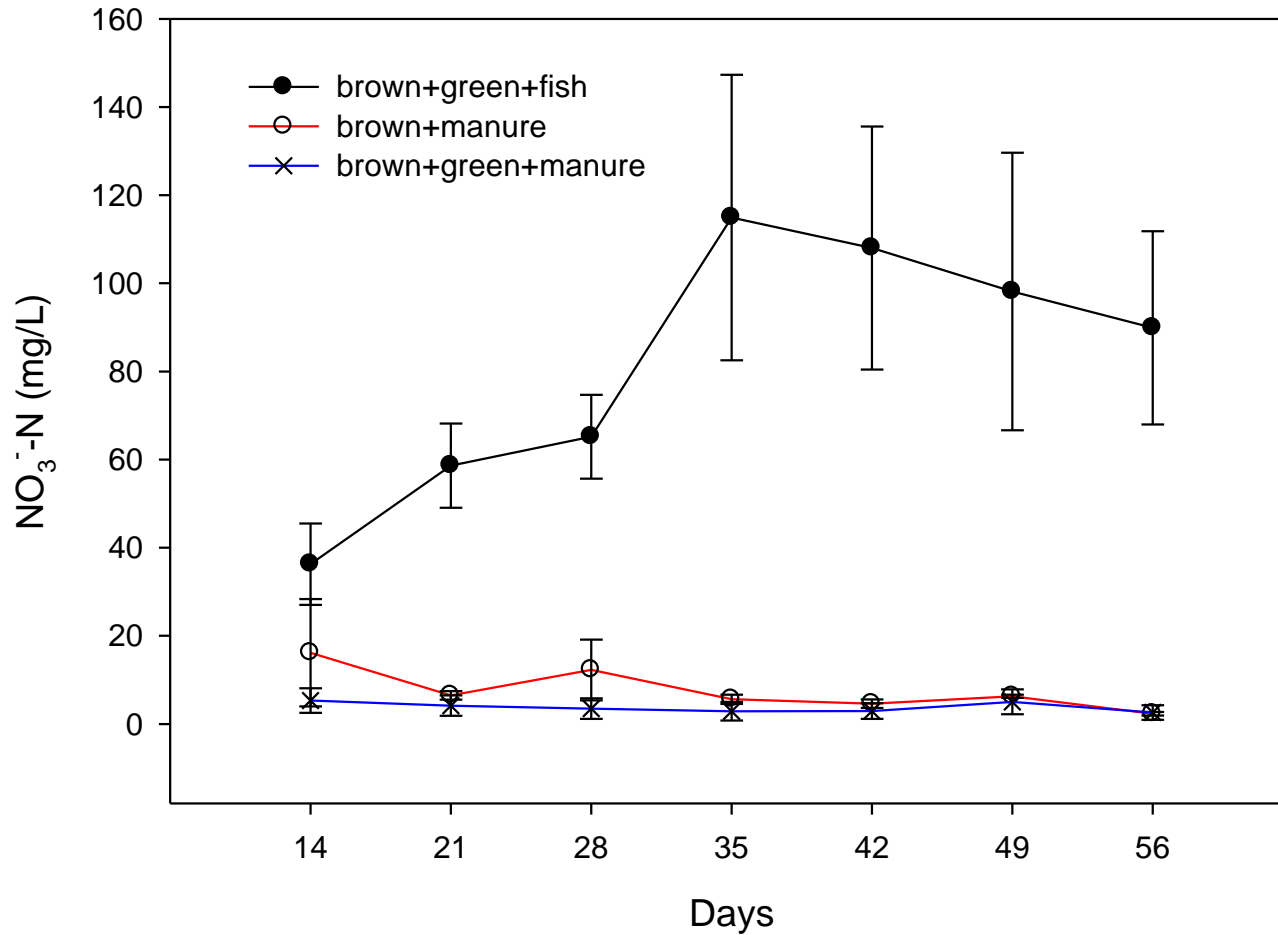
# Results: Recipe

pH



# Results: Recipe

## Nitrate



# Compost Nutrient Value at 8 weeks

Compost	pH	C:N	N	P	K	Ca	Mg	Fe	Mn	Zn	Cu	B
			-----%-----									
BGM	7.06	15.7	1.9	0.5	0.3	1.7	0.7	45699	557	465	78	11.9
BM	7.26	25.0	1.2	0.5	0.3	1.1	0.4	44521	401	252	50	4.0
BGF	6.80	12.5	2.9	0.8	0.6	2.1	0.8	25608	283	147	25	21.2

- Compost made with fish waste contains highest nutrient value
- Brown+manure (BM) recipe lowest nutrient value
- All composts low in P and K

# Compost Field Experiment



## Treatments

T0 = no amendment

T1 = 16.5 lbs

T2 = 33 lbs

T3 = 66 lbs

T4 = 172 lbs

T5 = 344 lbs

T6 = 1.8 lbs 10-20-20

24 lbs coral sand

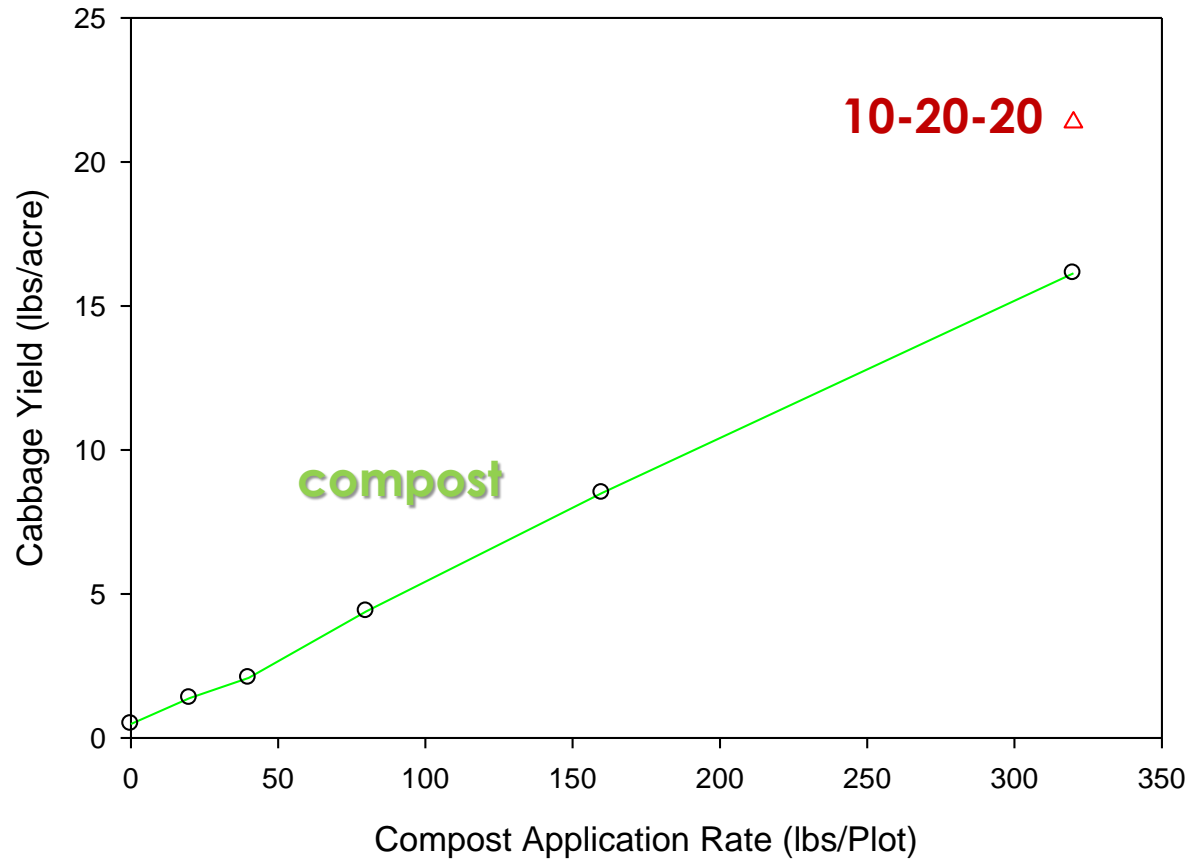
} Compost

# Yield Results

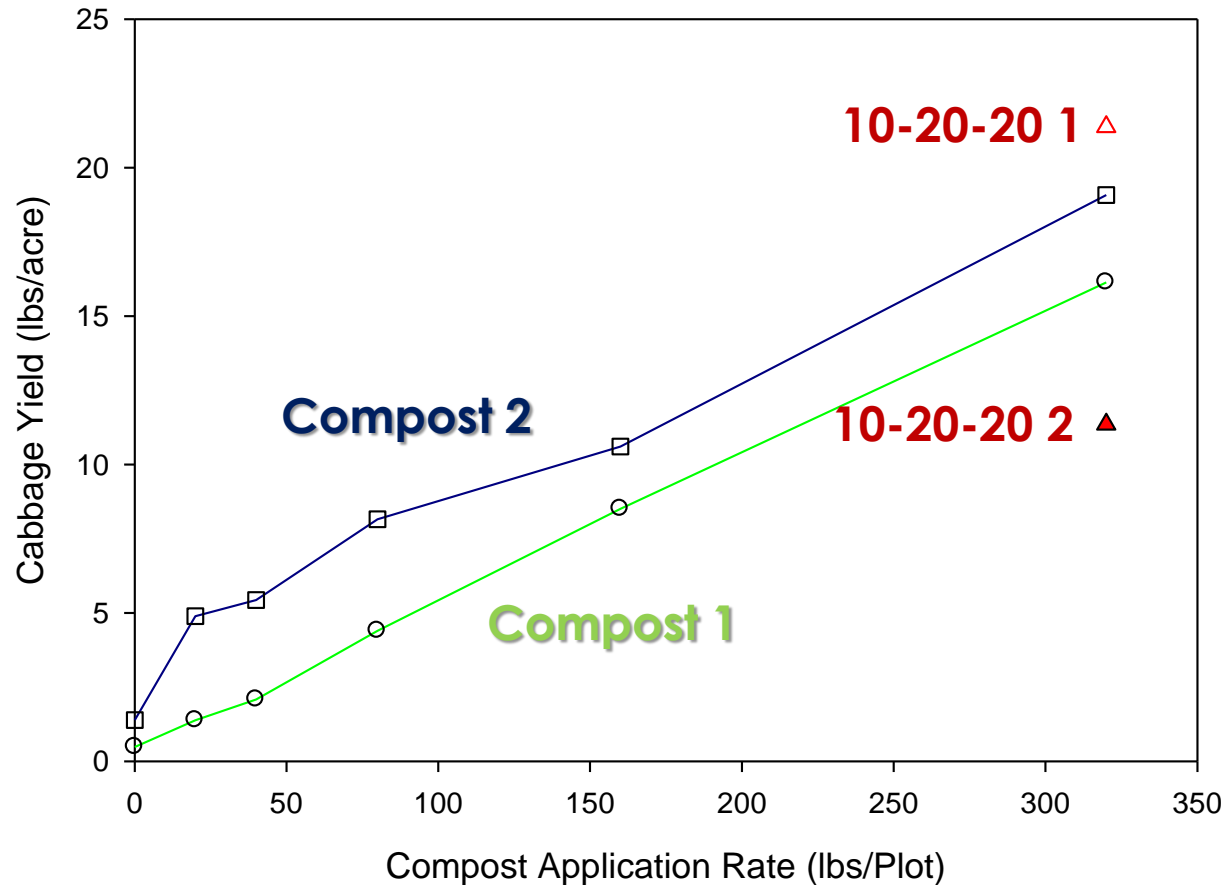




# Cabbage Growth: Crop 1

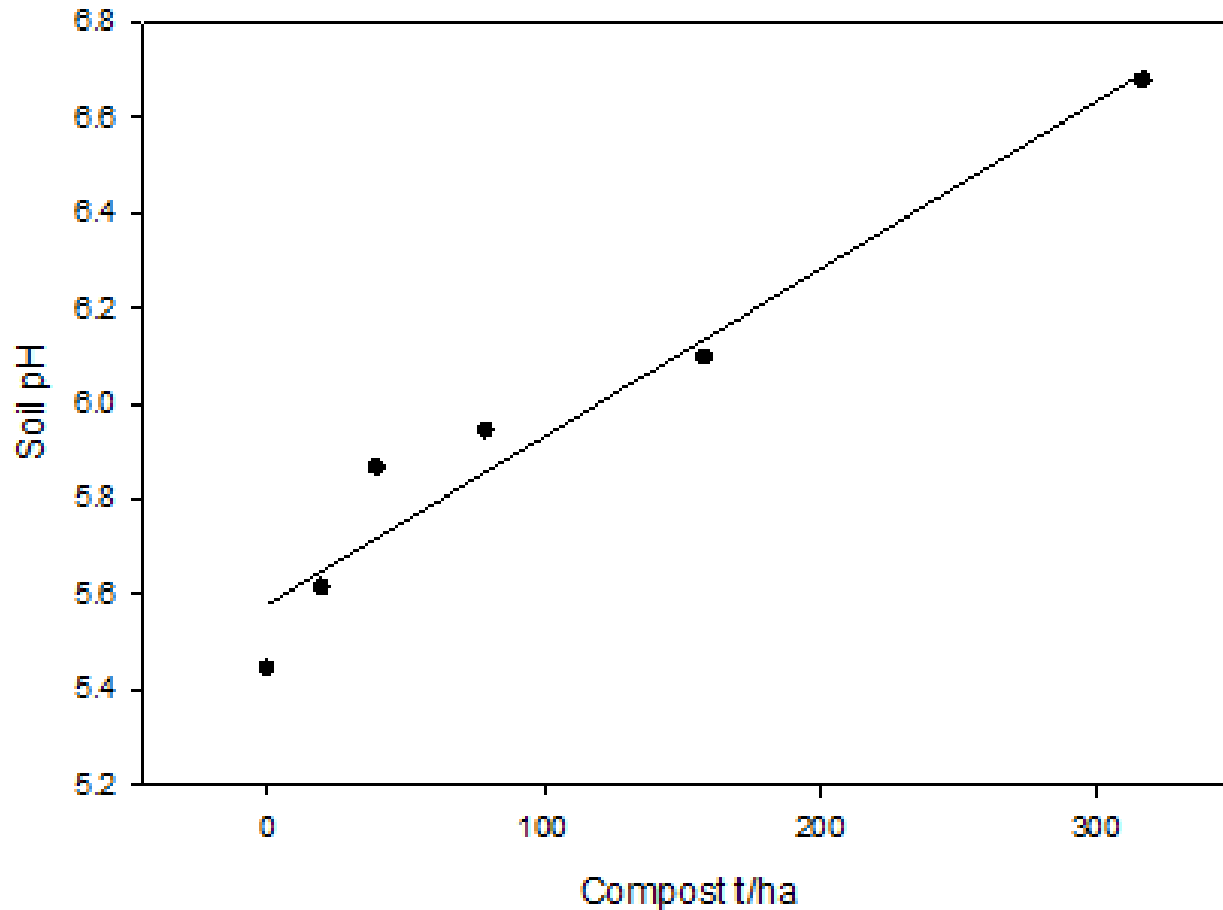


# Cabbage Growth: Crop 2



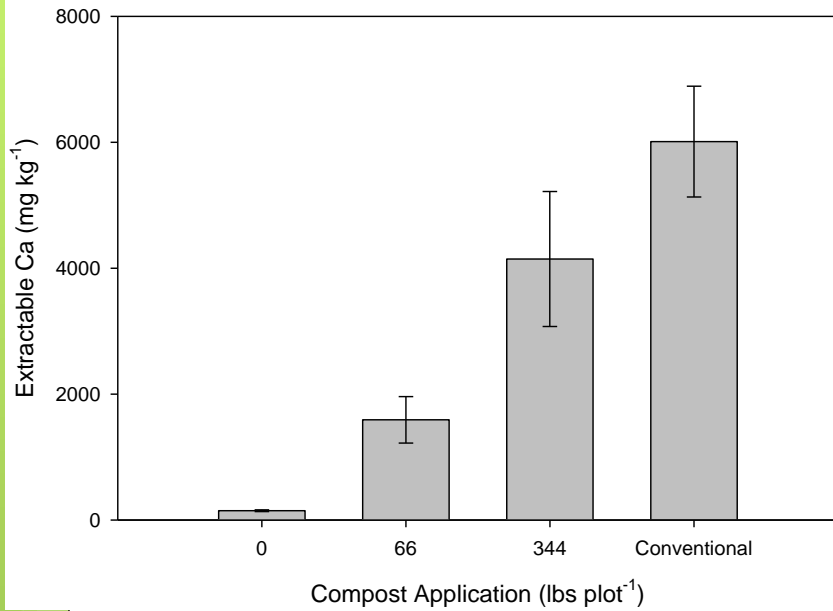
- Compost has a residual value
- Conventional fertilizer value short-lived

# Compost is a liming material

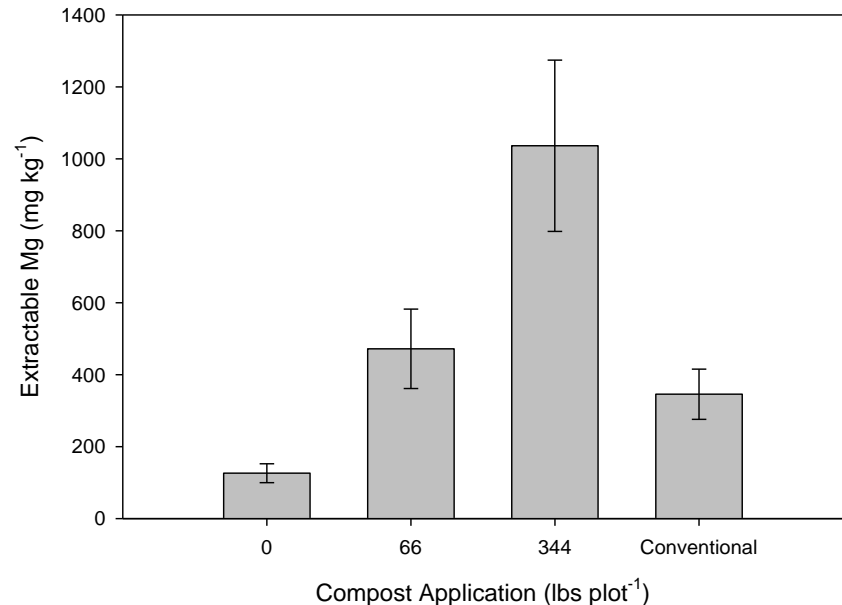


- Compost effectively increases soil pH

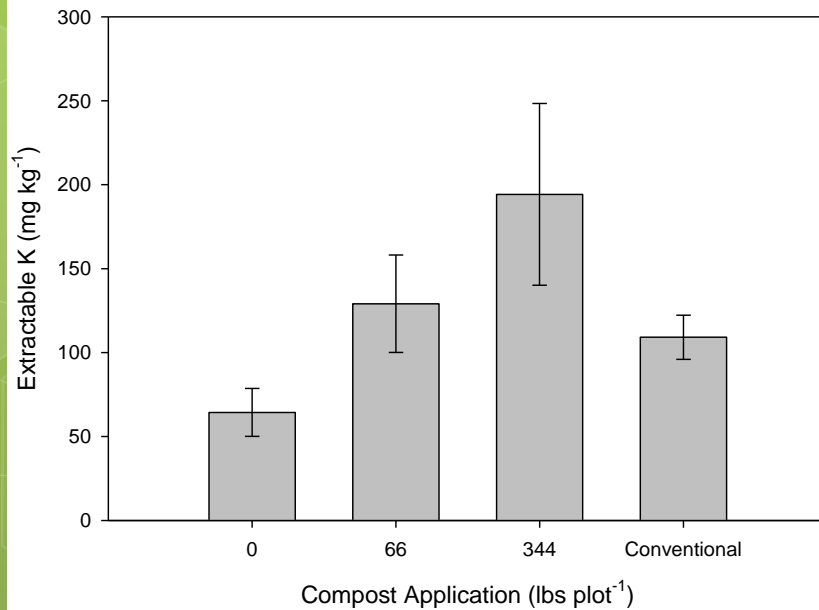
### Calcium



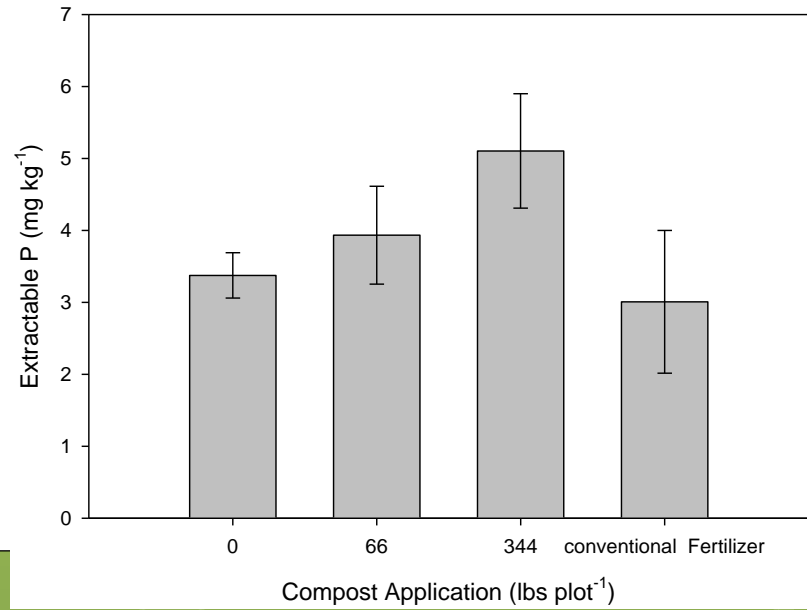
### Magnesium

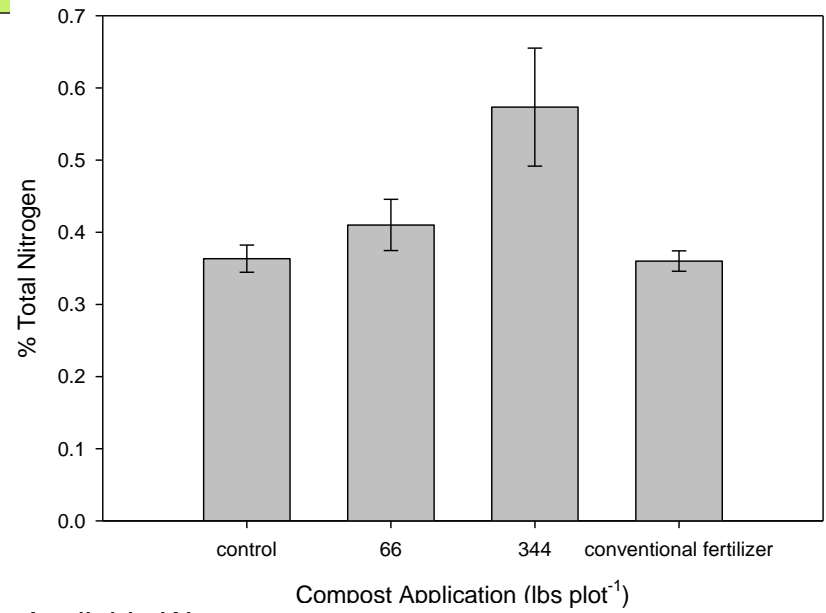
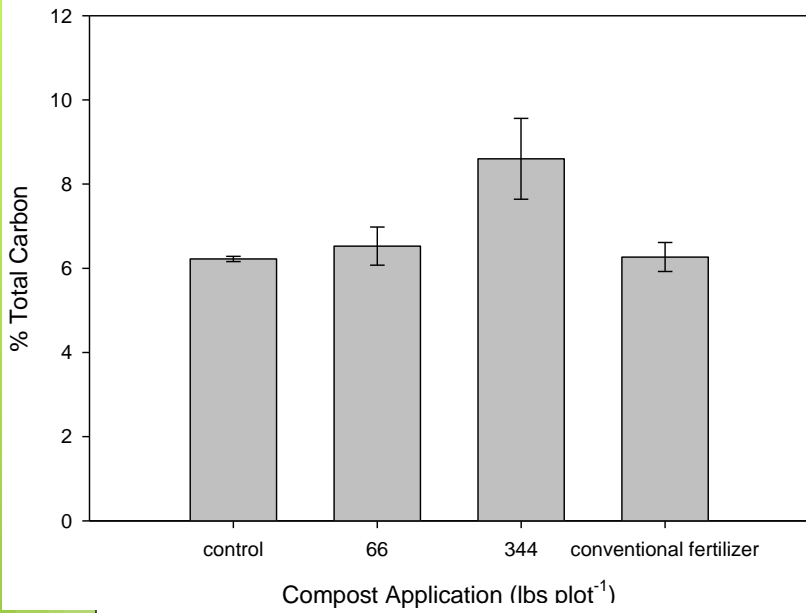


### Potassium

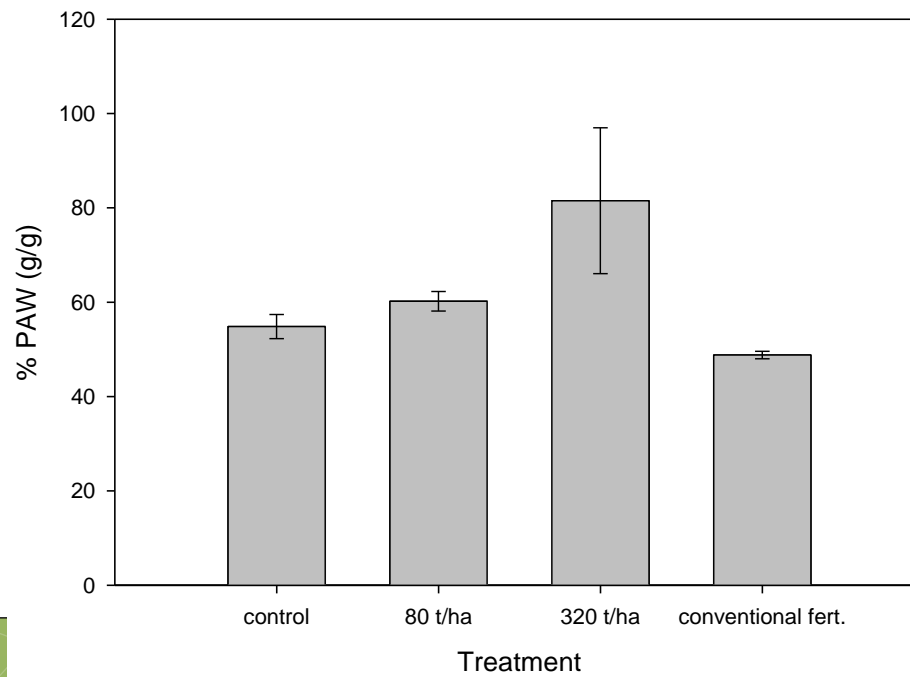


### Postharvest Orthophosphate





Plant Available Water



# Compost Carbon Source

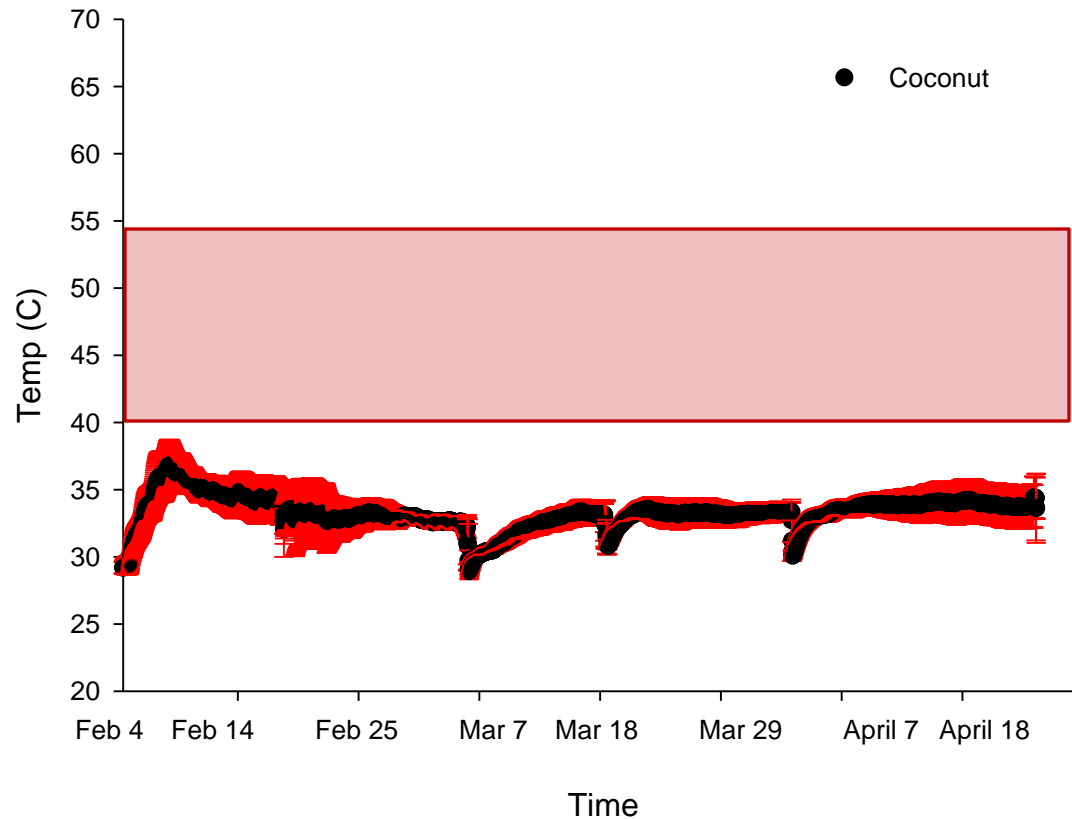


T1 = Coconut husk

T2 = Hibiscus wood chip

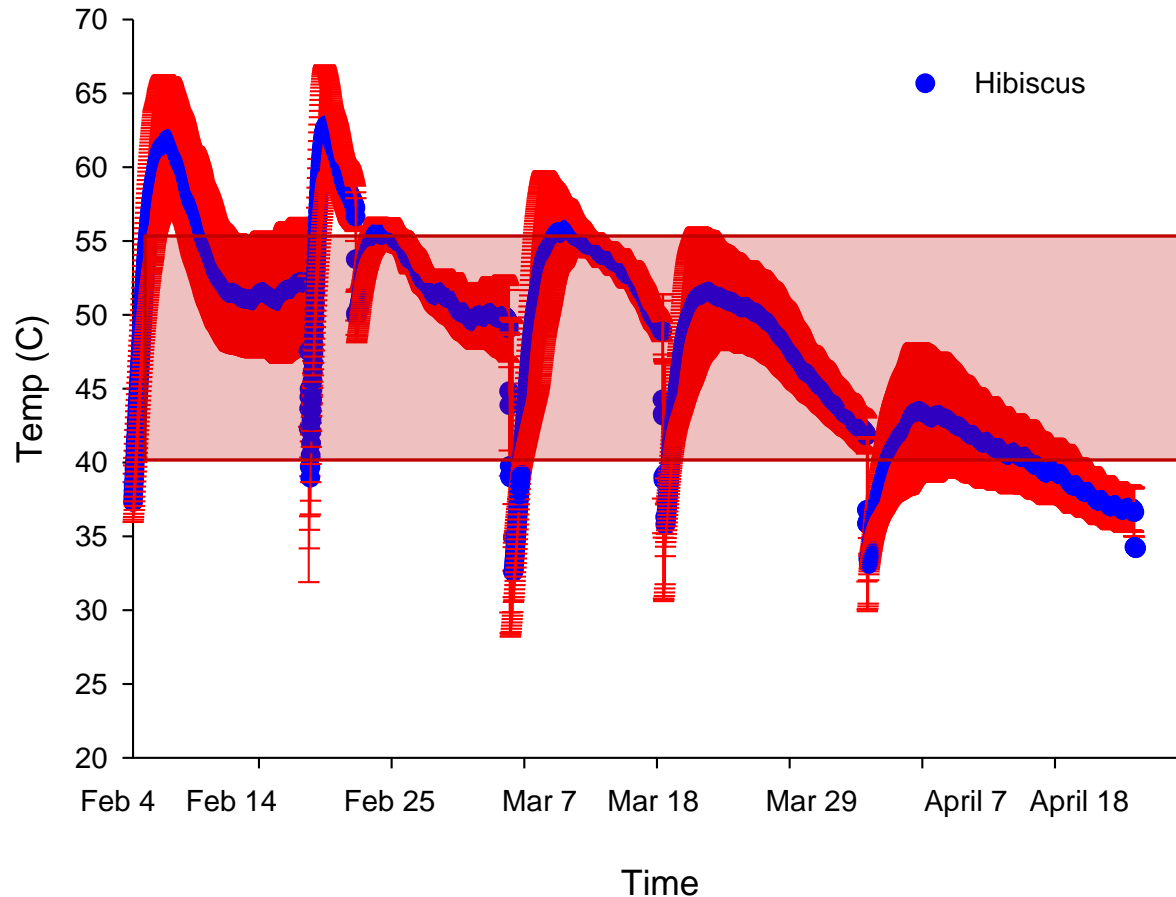
T3 = Albizzia wood chip

# Results: Coconut



- Coconut pile did not reach thermophyllic phase

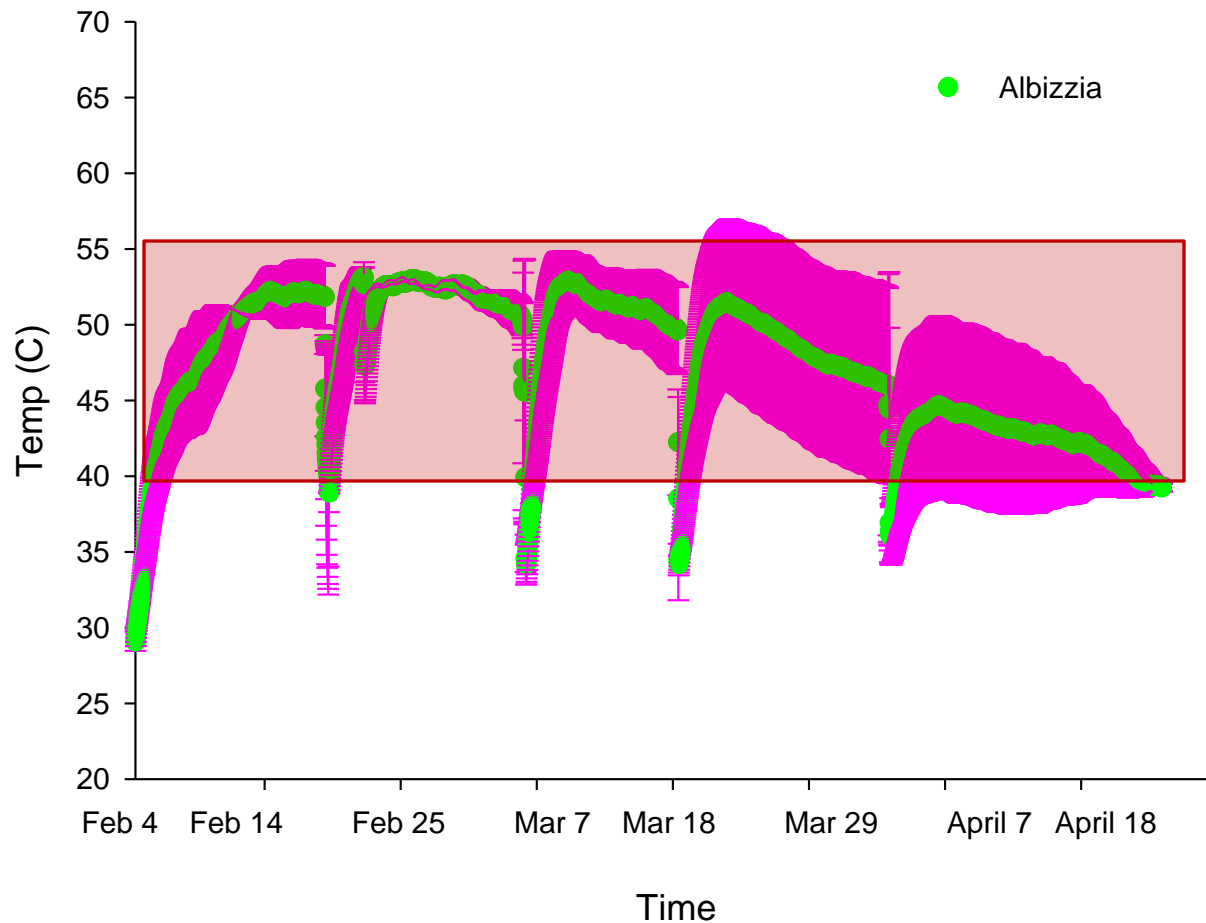
# Results: Hibiscus



- Hibiscus pile reached thermophyllic phase
- Temperature sufficiently high to kill pathogens



# Results: Albizzia



- Albizzia pile reached thermophyllic phase
- Temperature did not reach 55°C

# Summary

- Recipe affects compost quality
  - Fish waste compost high N content
  - Local composts low in P and K
- Carbon source affects composting process
  - Coconut husk is low quality carbon source that will need higher manure addition to compost correctly.
  - Hibiscus wood is highest carbon quality wood
  - Albizzia intermediate
- Locally made compost is a favorable soil amendment that can replace imported fertilizer
  - Increases soil nutrient status
  - Increases soil water holding capacity

# Acknowledgements

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