How Differing Soil Microbial Communities and Dehydration Stress Effect *Arabidopsis thaliana* Morphological Development

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Abstract:
Arabidopsis thaliana was exposed to five different soil treatments: Vermicompost, 'Food Waste' Compost, Potting soil (4:1 Promix BX/Perlite), Autoclaved Vermicompost and Autoclaved 'Food Waste' compost. Soil treatments A and B were tested for the presence of bacteria using MacConkey and Phenylethyl Alcohol media. All plants were watered on Tuesdays and Fridays and no longer received water after one month. Leaf number, stem height and length of the largest leaf were measured before and after dehydration stress. Once the dehydration stress began, the majority of the plants did not survive with the exception of the vermicompost.

Hypothesis:
In different soil types, dehydration stress and microbial communities will effect morphological development *A. thaliana*.

Treatment:

5 Treatments:

	Vermicompost	'Food Waste' Compost	Potting Soil	Autoclaved Vermicompost	Autoclaved 'Food Waste' Compost
Number of Plants	36	36	36	36	36

Figure 1a. 'Vermicompost' corresponds with Fig. 4, soil treatment 'A'

Figure . 1b 'Food Waste Compost' corresponds with Fig. 4, soil treatment 'B'

Figure 2. Germination took place on Murashige and Skoog agar. Four plates were used and two seedlings per well were placed in the soil treatments.

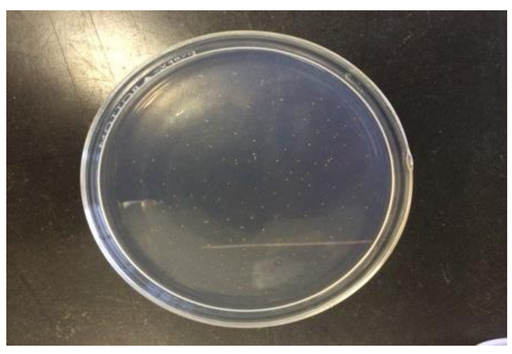

Figure 3. Bacteria media in incubator. Incubated for two days at 30° C

Results:

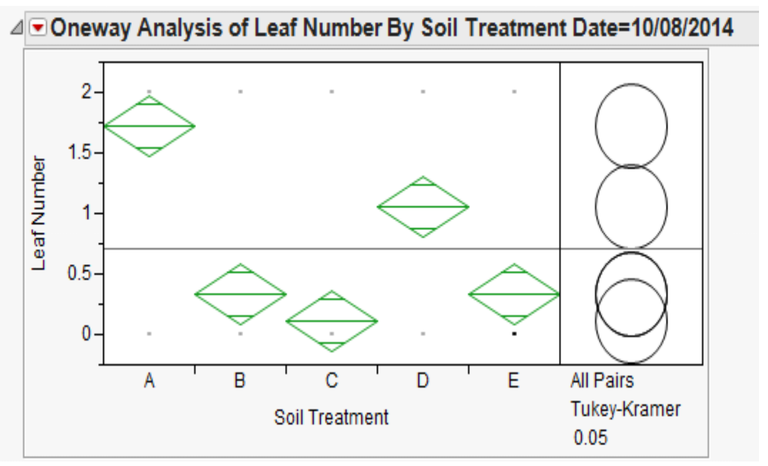

Figure 4. One way analysis of leaf number by soil treatment (A) Vermicompost, (B) Food Waste Compost, (C) Potting Soil, (D) Autoclaved Vermicompost, and (E) Autoclaved Food Waste Compost. There were significant differences due to the p-values were <0.5. (p-value= <0.001). (Rsquare= 0.389817)

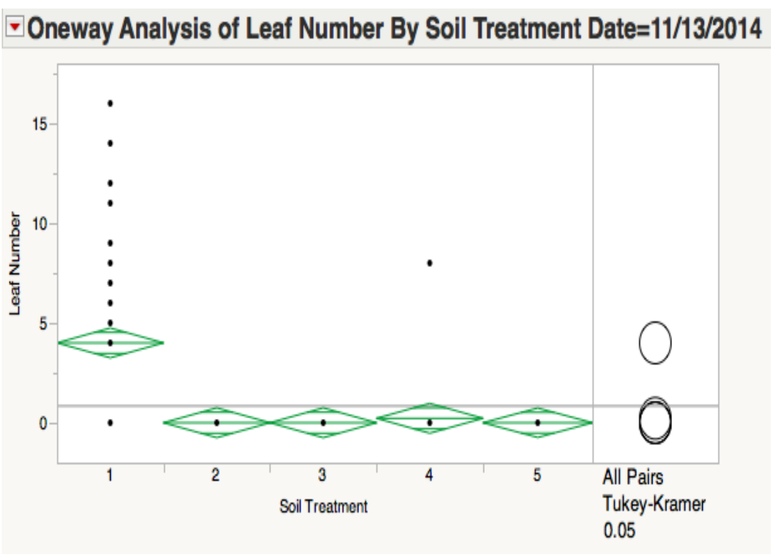

Figure 5. One way analysis of leaf number by soil treatment (A) Vermicompost, (B) Food Waste Compost, (C) Potting Soil, (D) Autoclaved Vermicompost, and (E) Autoclaved Food Waste Compost. There were significant differences due to the p-value were < 0.5. (p-value = < .0001). (Rsquare = 0.332359)

Methods:
- Strain = Col (gl-1)
- Germination took place on agar plates and were transferred at the 2-leaf stage
- Soils were streaked on multiple media
- Watering approx. every 3 days
- Plants no longer received water after 10/24/14

Conclusion:
1. Plants grown in vermicompost and autoclaved vermicompost produced more leaves, larger leaves and survived till the end of trail suggesting microbial and non-microbial advantages
2. Soil treatments B, C, E did not survive till the end of trail
3. The presence of Gram-positive cocci could have had an effect on development/water retention
4. Transfer at the 2-leaf stage appeared too stressful for the seedlings for most soil treatments (B, C, E)

Before 'A': 10/24/14
•Plants before receiving dehydration stress

After 'A': 11/13/14
•Plants after receiving dehydration stress

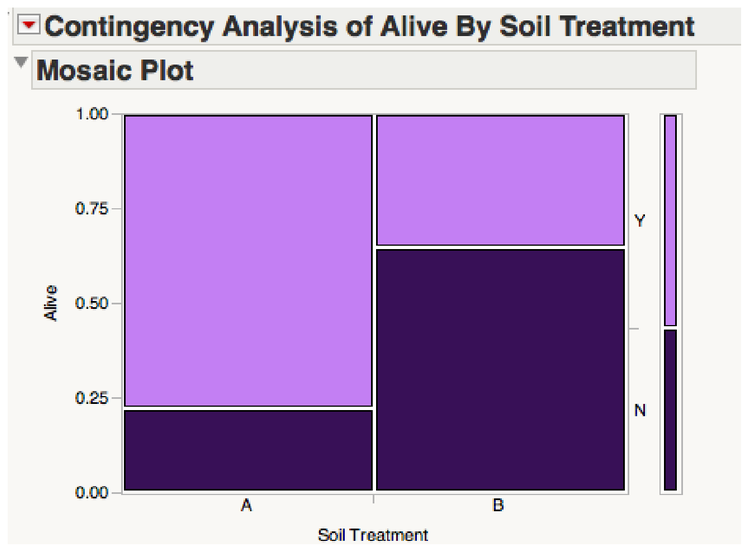

Figure 6. Contingency analysis of alive plants by soil treatment of the number of *A. thaliana* at the end of the trial. There were significant differences due to the p-value were < 0.5. (p-value = < .0001)

- Gram-positive cocci and Gram-positive bacilli was found in soil treatment 'A'. Gram-positive bacilli was found in soil treatment 'B'.

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