

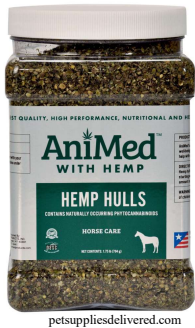
# The effect of hemp hulls on tomato growth

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## Introduction

### Hemp Hulls

- Cannabis sativa* production has increased in the US following the Farm Bill in 2018, legalizing the production as an agricultural commodity (Adesina *et al.*, 2020).
- Seed hulls are currently being used as a livestock supplement due to high fiber and protein content (Callaway, 2004).
- C. sativa* seed hulls contain small amounts of essential nutrients (Table 1). Other nutrients found in trace amounts include B, Cu, Fe, Mn, Mo, and Zn.



**Table 1.** *Cannabis sativa* leaf results from the University of Connecticut Soil Nutrient Analysis Laboratory.

Nutrient	% Dry Weight
Nitrogen	3.65
Phosphorus	0.83
Potassium	0.70
Calcium	0.20
Magnesium	0.36

### Study Species

- We used a *Solanum lycopersicum* 'green zebra' x 'micro tina' F6 population for the study, a breeding line used for research at ECSU.
- Tomatoes are a model species in the Solanaceae family, the group that includes potatoes, eggplant, tobacco, etc. (Ezura, 2009).
- We hypothesized hemp hulls would increase tomato plant growth.



**Figure 1.** *Solanum lycopersicum* 'green zebra' x 'micro tina'

## Materials and Methods

### Soil Preparation

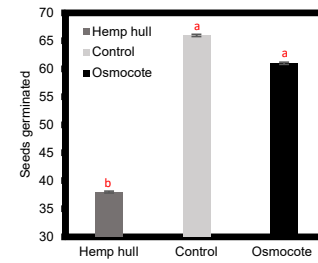
- Forty 4-inch pots were prepared with standard potting soil for each treatment.
- Four teaspoons of hemp hulls were mixed in with the soil.
- Three grams of Osmocote® were placed on top.
- The pots were left in the greenhouse for 2 months before sowing seeds to allow mold from the hemp hulls to subside.
- Five tomato seeds were sown in each pot.



**Figure 2.** Experimental design from top to bottom: Osmocote®, control, hemp hull

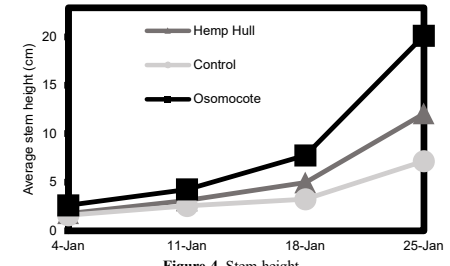
### Data Collection and Statistical Analysis

- The number of germinated seeds per treatment was recorded (Figure 1).
- The seedlings were transplanted so that there was one seedling per pot.
- Stem height was recorded once a week for four weeks (Figure 2).
- At the end of the experiment, stem diameter, number of leaves, leaf length, leaf width, and the terminal leaflet width were recorded (Figure 3).
- Statistical analyses were ANOVA and Tukey means separation (Figure 3; Figure 5).

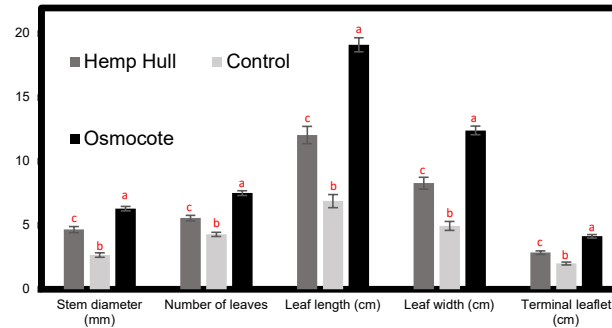


**Figure 3.** Seeds germinated after 19 days out of 200 per treatment

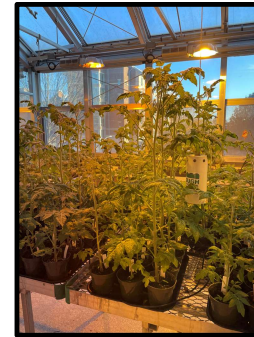
## Results



**Figure 4.** Stem height



**Figure 5.** Size measurements taken at the end of the experiment



**Figure 6.** Final results

## Discussion

- Hemp hulls significantly inhibited germination rate (Figure 3).
- Plants grew significantly taller in hemp hulls than plants grown without but not as tall as plants grown in Osmocote® (Figure 4).
- All measured parts of the plants grown in hemp hulls were greater in size than parts of the plants that were grown without hemp hulls but smaller than the plants grown in Osmocote® (Figure 5).
- Hemp hulls seem to be an effective soil amendment but not as effective as Osmocote®.
- In future studies, we can test on other major plant families that produce food for human consumption (ex. Poaceae, Rosaceae, etc.)

## Literature Cited

- Adesina, I., Bhowmik, A., Sharma, H., & Shahbazi, A. (2020). A review on the current state of knowledge of growing conditions, agronomic soil health practices and utilities of hemp in the United States. *Agriculture*, 10(4), 129.
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