Eggplant Biomass is Significantly Higher in Composted Spent Coffee Grounds than Non-Composted Spent Coffee Grounds, But Not Basil Biomass

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BACKGROUND

Thousands of tons of spent coffee grounds (SCG) are sent to landfills each year, and with the recent growth in cold-brew coffee production, this is expected to increase. Waste utilization is a key component to sustainable agriculture and creating a circular economy.

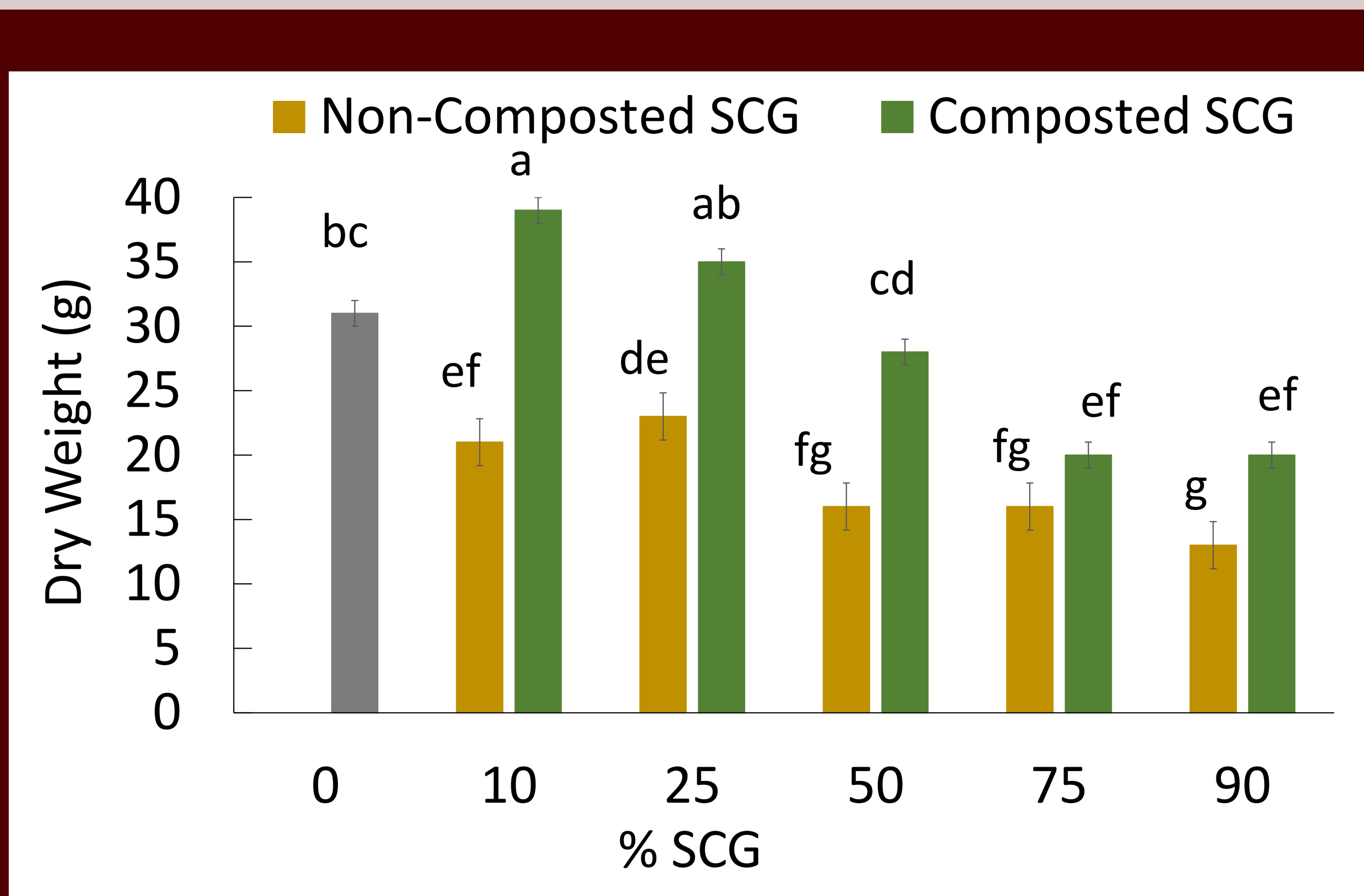
The use of SCG in agriculture can improve soil properties and plant growth by increasing organic matter and nutrients. It has been reported that non-composted SCG can have a phytotoxic effect on plant growth (Hardgrove and Livesley, 2016). Composting the SCG prior to use can reduce phytotoxicity and increase nitrogen availability (Cassity-Duffey et al., 2020).

In this experiment, we investigated the effect of non-composted and composted SCG (CSCG) on eggplant and basil biomass and its possible use as a partial replacement for peat-based potting mixtures.

METHODS

- Treatments included Pro-mix LP 15 (80-90% peat moss, 10-20% perlite) with non-composted or composted SCG at rates of 10%, 25%, 50%, 75%, 90%, and 0% control with five replicates per treatment
- Plant varieties were *Solanum melongena* 'Patio baby' Eggplant and *Ocium basilicum* Sweet Basil.
- Complete randomized design was used, plants were watered daily with a 15-5-25 fertilizer at a rate of 0.4 g/L (400 ppm)
- Data were analyzed through ANOVA (SAS 9.4, Cary, NC). Mean separation procedures were performed using Tukey's HSD Test at $P \leq 0.05$.

RESULTS AND CONCLUSIONS



Means with the same letter are not statistically different

Fig. 1: Effect of percent composted and non-composted SCG on eggplant biomass.

- Compared to the control, biomass was significantly higher in 10% CSCG.
- Biomass was also greater than the control in 25% CSCG but not significantly different.
- In 50% CSCG biomass decreased but was not significantly less than the control.
- Eggplant biomass in all non-CSCG treatments was significantly less than the control.

Fig. 2: Eggplant showed no visible signs of toxicity or nutrient deficiency even at 90% composted SCG.

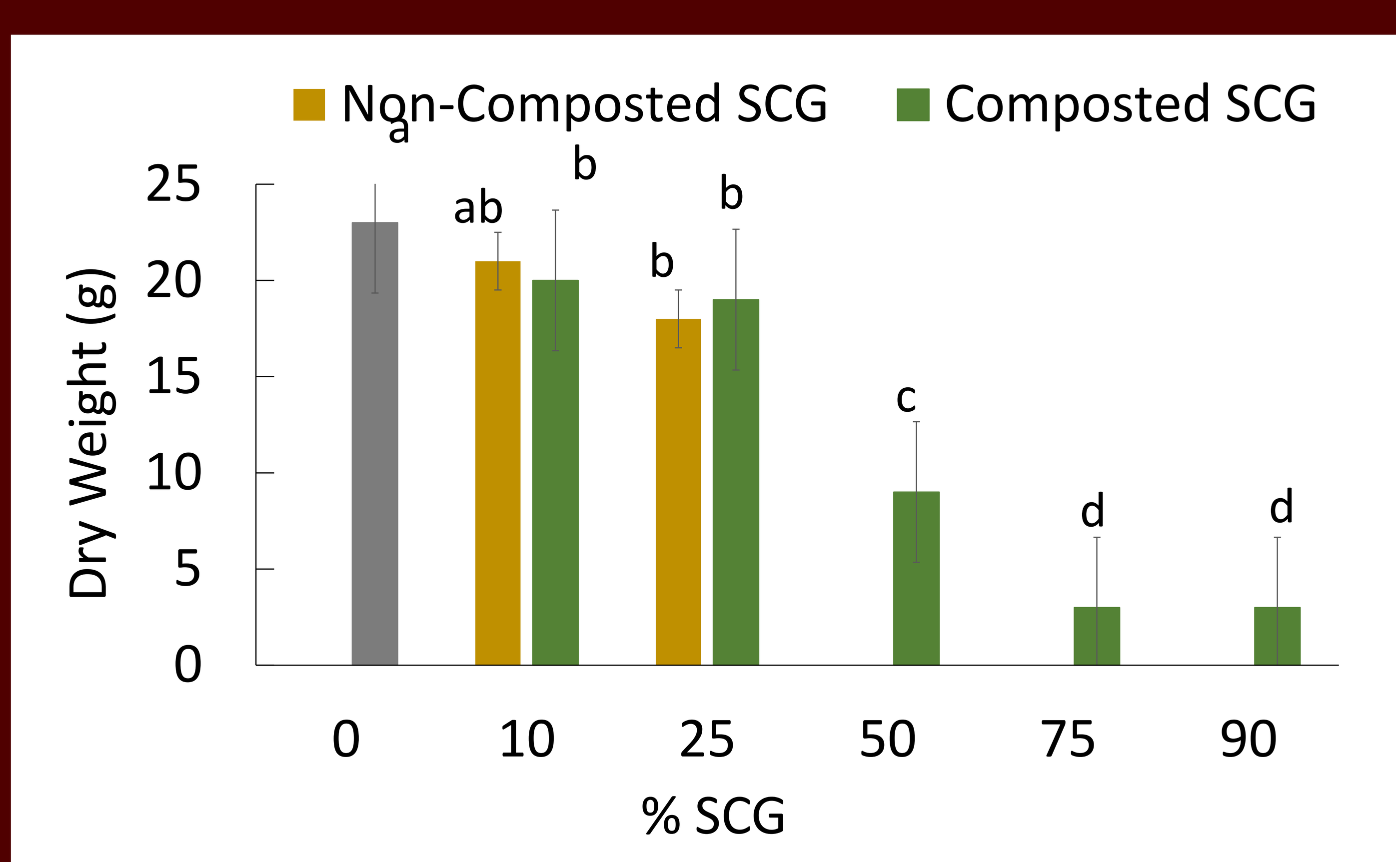


Fig. 3: Effect of percent composted and non-composted SCG on basil biomass.

- There were no differences in biomass within or among treatments of 10% and 25% composted and non-CSCG.
- The control and 10% non-CSCG were not significantly different but biomass in 10% CSCG was significantly lower.
- Basil died before the experiment ended in all non-CSCG treatments ≥50%.

Fig. 4: Tip death in basil at >25% non-CSCG was very likely the cause of death and may be due to a nutrient deficiency or toxicity.

Eggplant: Up to 50% CSCG could be used as a partial peat replacement with no significant difference in eggplant biomass. Non-CSCG significantly reduced growth and stunted development in all treatments compared to the control. Therefore we do not recommend Non-CSCG at any rate as a partial peat replacement for eggplant production.

Basil: Differences between CSCG and non-CSCG could be due to phytotoxicity, which is removed after composting. Although at levels greater than 25% even the CSCG has a phytotoxic effect on basil.

Composted SCG could be used as a partial replacement for peat-based media but should be used at species-specific rates

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REFERENCES