

# Does companion plant density impact insect pests and beneficial insects in outdoor cannabis crops?



Margaret Mantel<sup>1</sup>, L. Auty<sup>1</sup>, H. Fraser<sup>2</sup> and C. Scott-Dupree<sup>1</sup>

<sup>1</sup>School of Environmental Sciences, University of Guelph, Guelph, ON

<sup>2</sup>Ontario Ministry of Agriculture, Food, and Rural Affairs, Guelph, ON



## Background

- Outdoor cannabis production is threatened by economic insect pests.
- Growers have few registered insecticide options available.
- Companion planting can enhance **conservation biological control** in outdoor grown cannabis.
- It involves the planting of flowering or aromatic plants alongside cannabis **to attract beneficial insects and disrupt insect pests** (Fig. 1).
- To date, this strategy has **not been widely adopted by the cannabis industry**.
- The results of this study will inform growers about the planting density that maximizes the push-pull dynamics for insects in outdoor cannabis crops.



Figure 1. Companion plants alongside cannabis at the JC Green field site. (Photo: M. Mantel)

## Objective

**Determine if the density of companion plants in outdoor cannabis production sites impacts the number of beneficial and pest insects in the crop.**

## Methods



Figure 2. Tarnished plant bug (*Lygus lineolaris*) - a pest of cannabis, on alyssum - a companion plant. (Photo: M. Mantel)

- Alyssum (Fig. 2), cosmos and teddy bear sunflower were used as companion plants in both high density and low density treatments. Marigold, borage and sunpot sunflower were also included in the high density treatment.
- **High-density** - companion plants were planted **between each row staggered between each cannabis plant** (Fig. 2A). 100% of available planting locations were filled for this plot.
- **Low-density** - companion plants were **planted after every 5<sup>th</sup> cannabis plant and in every 5<sup>th</sup> row** (Fig. 2B). 4% of available planting locations were filled for this plot.

- Beginning August 17<sup>th</sup>, **5 randomly selected plants were** scouted in both plots (low and high density) each week until September 8<sup>th</sup> for the abundance of beneficial and pest insects.
- An **analysis of variance (ANOVA) of the relative abundance** was conducted to determine if insect attraction was different between low and high density plots, both between select insect families and for total beneficial and pest insect abundances.

### High Density Plot Scheme: A



### Low Density Plot Scheme: B

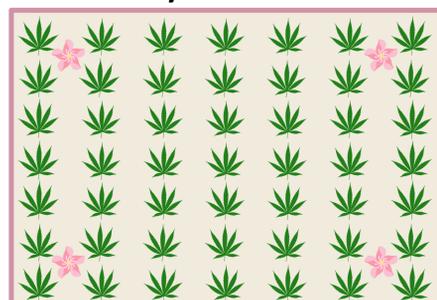


Figure 2. Plot scheme for high (A) and low density (B) companion plant plots. Flowers represent companion plants while fan leaves represent cannabis plants. These figures represent just a section of the entire plot to demonstrate the planting density. Cannabis icon by Oren neu dag.

## Results

- **No significant difference** in the total number of beneficial or pest insects attracted to low or high density plots ( $p=0.085$ ).
- The most commonly recorded pest and beneficial insects were placed in 6 families (Fig. 3).
- An ANOVA was conducted for each insect family between the high and low density plots and results indicate **no significant difference between number of individuals collected in any families** (Fig. 3).

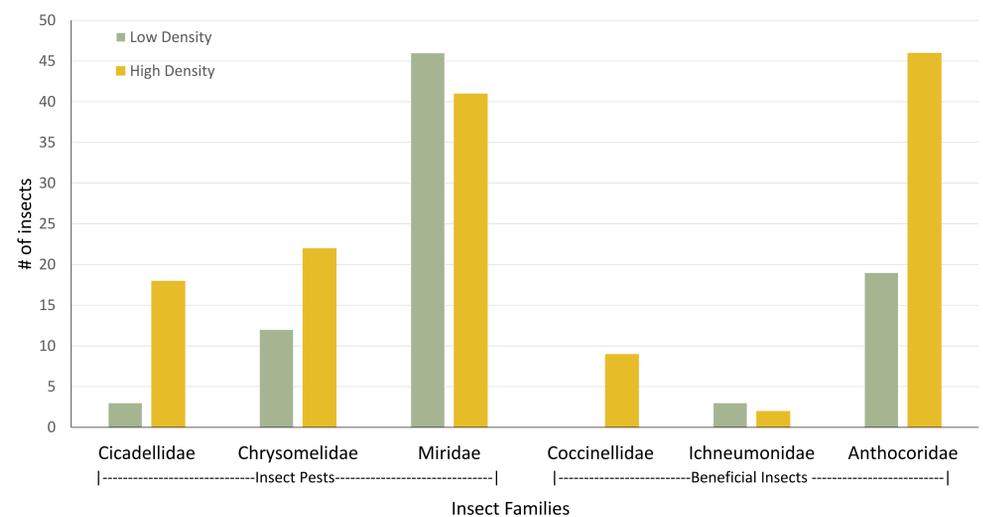


Figure 3. Pest and beneficial insect abundances in low and high density companion plant plots.

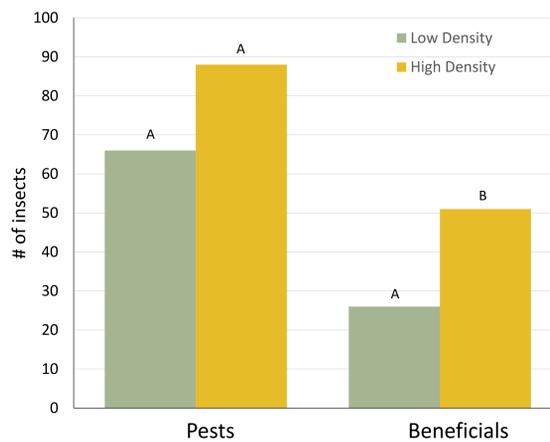


Figure 4. Comparison of insect attraction between pest and beneficial insects in high versus low density plots. AA between 2 treatments represents non-significant differences. AB between 2 treatments represents significant differences.

- Pest insect attraction did not differ between treatments ( $p=0.679$ ) (Fig. 4).
- **Beneficial insect attraction was found to be greater in high density plots ( $p=0.005$ ).**
- Even as high density plots had more plants available for insect attraction, **more insects on average were captured per plant in high density (6.95) versus low density (4.6).**
- These results indicate that high density companion planting is potentially more successful in attracting beneficial insects than low density planting.
- Similar studies should be conducted during the length of a full growing season with cannabis plants scouted to determine if different treatment levels of low density (e.g., 25% or 50% companion plant density) are more successful in attracting beneficial insects than high density planting.

## Conclusions

- High density planting was found to be more successful in attracting beneficial insects than low density planting.
- Pest insect attraction did not differ between treatments.
- Further research should be conducted over a complete growing season to allow for full companion plant maturation.

## Acknowledgements



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ONTARIO AGRICULTURAL COLLEGE  
SCHOOL OF ENVIRONMENTAL SCIENCES



Contact Information:

Margaret Mantel  
(Undergraduate Student)  
mmantel@uoguelph.ca