

Native Herbivory on *Cannabis sativa* L. Seedlings by *Ventridens demissus* Across Various Treatment Factors

UF | IFAS
UNIVERSITY of FLORIDA

Gianna L. Arcuri, Susan Canavan, S. Luke Flory



giannaarcuri@ufl.edu

Background

- There is an increasing interest in industrial hemp around the world as the demand for natural products and fibers increases (Fike, 2016).
- The success of non-native plants to establish and spread into novel regions can be greatly influenced by the native community.
- The seedling stage is a crucial time in the initial invasion stage, as it is when plants are in the most vulnerable state due to their small size and reliant use of energy within the embryo (Hanley et al., 2004).
- The presence of native snails will have an overall impact on the establishment of hemp.

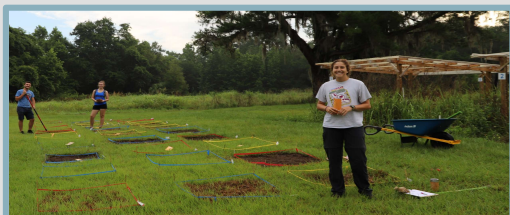


Fig 1. My coworkers and I preparing the plant seeds in the plots. In this picture you can see an entire block consisting of 27 individual 1X1 meter plots. Plots were randomly assigned different treatments.



Fig 2. This plot is showing higher emergence rates. This gives you an idea of how densely some of the hemp grew in certain plots.

Research Questions

The aims of this study were...

- (1) To evaluate the effects on snail herbivory on hemp emergence, and how herbivory varied across
- (2) the different treatment factors (habitats, biotypes, and disturbance regimes).

Methodology

- During a hemp establishment experiment at the University of Florida Bivens Arm Research site we noticed predation on hemp seedling by a native snail, *V. demissus*.
- Along with emergence counts that occurred seven days after hemp was planted, a tally counter was used to measure the number of snails present in each 1X1 m plots
- We defined **snail damage** as seedling with intact roots but with evidence of cotyledon herbivory or absence of cotyledon leaving only stem remaining (Fig. 2)
- Created a metric to quantify snail damage (Table 1).



Fig 3. *V. demissus* actively predated on hemp cotyledons before they even fully emerged. Rarely were these seedlings able to recover from predation. In most instances only the radical would remain.

Quantifying the Levels of Snail Damage	
0	no evidence of snail damage
1	some evidence (nibbling leaves)
2	nibbling & death of entire seedling (no greater than 20% death of seedlings in plot)
3	major (>50%) death of seedlings

Table 1. The level of snail damage on the plot was recorded during germination counts ever morning following germination.

Results

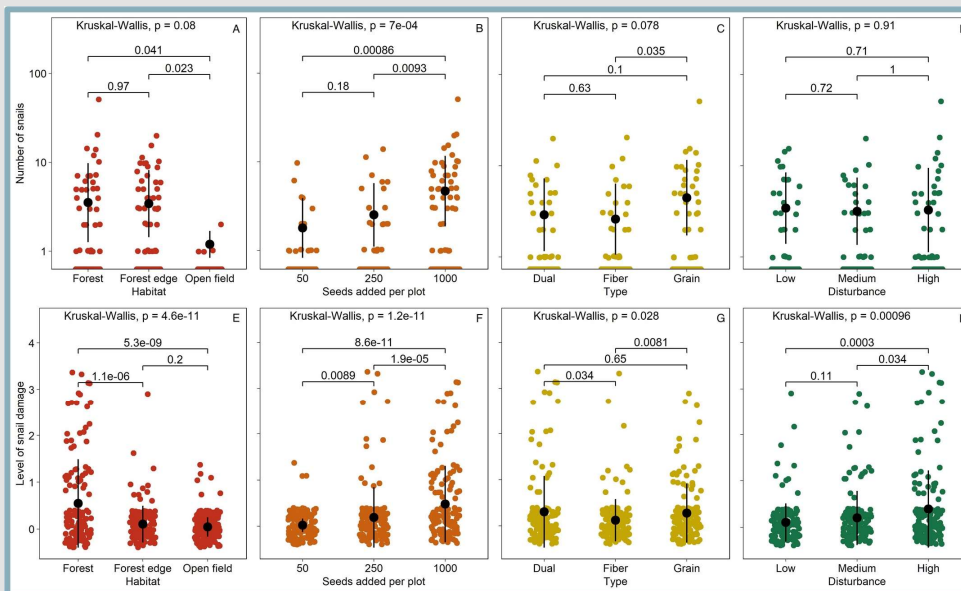


Fig 4: [A] Relationship between snails found in the three habitat treatments. [B] Relationship between the number of snails and disturbance regimes. [C] Relationship between number of snails and cultivar. [D] Relationship between the number of snails and disturbance regimes. [E] Relationship between level of snail damage and habitat treatment. [F] Relationship between level of snail damage and seeds added per plot. [G] Relationship between level of damage and cultivar. [H] Relationship between level of snail damage and disturbance regime.

Preliminary Conclusion

- The number of snails varied between treatments.
- **Snail Abundance:**
- The number of snails in plots did not vary significantly by habitat type overall.
- Number of seeds was positively correlated with seed abundance.
- Open field plots had significantly fewer snails.
- **Snail Damage**
- Seedlings in forest and forest edge plots had significantly higher levels of damage.
- Higher level of snail damage in plots that received greater propagule pressure.
- Level of snail damage was significant across biotypes, particularly grain and dual purpose compared to fiber.
- Relationship between snail damage and disturbance regimes was found to be significant.

Future Questions

- Greenhouse studies that isolate the interactions between *V. demissus* and hemp would allow us to better understand levels of herbivory and overall preference towards hemp seedlings.
- Repeat study on a smaller scale focusing on herbivory of hemp with the use of camera traps.
- Collect data in future studies to understand how other mammal and avian interactions may limit hemp establishment.

References

John Fike (2016) Industrial Hemp: Renewed Opportunities for an Ancient Crop. *Critical Reviews in Plant Sciences*, 35:5-6, 406-424, DOI: 10.1080/07352689.2016.1257842

Hanley ME, Fenner M, Whibley H, Darvill B. (2004). *Early Plant growth: identifying the end point of the seedling phase*. *New Phytologist*.

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