Assessing the potential of pheromone granules for the augmentation of *Agriotes obscurus* control with *Metarhizium brunneum*

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Introduction

Figure 1. a. *Agriotes obscurus* **b.** *Metarhizium brunneum* rice granules **c.** pheromone corn grits

- **Wireworms** , the larval stage of the click beetle ***Agriotes obscurus***, are a pest of potatoes.
- Fungal pathogen ***Metarhizium brunneum*** has been investigated as a biological control of adult beetles.
- **Corn grits**, impregnated with female **sex pheromone** (Contech Inc.), can be applied in combination with rice cultured *M. brunneum*, to disseminate the fungus.

The Question

How do male *A.obscurus* beetles respond to a corn grit formulation of sex pheromone?

Methods

- Male *A.obscurus* adults were collected from Agassiz, BC, using **pheromone baited pitfall traps**. Beetles collected in April and May were kept separately.

Experiment 1: Airflow

- A beetle (n=220) was placed into a **low speed wind tunnel arena,** and given 5 minutes to acclimatize under an upturned cup**.**
- A **band of corn grits** was then introduced and the cup was removed.
- Beetle movement was filmed for **10 minutes**

Table 1. Treatments		
Airflow	Moving	Still
Corn grits	Pheromone	Blank
Collection period	April	May

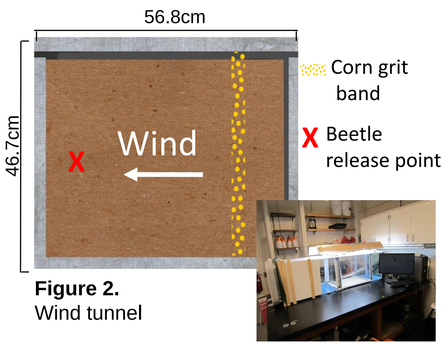

Figure 2. Wind tunnel

Experiment 2: Light quality

- A beetle (n=88) was placed into a **petri dish arena**
- Corn grits were introduced into the **middle** of the arena
- Beetle movement was filmed for 10 minutes

Table 2. Treatments		
Light	Red	White
Corn grits	Pheromone	Blank
Collection period	April	May

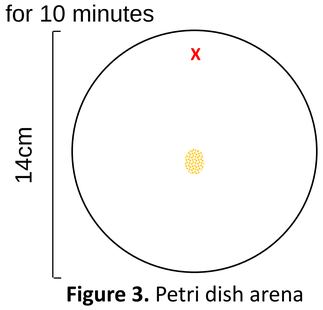

Figure 3. Petri dish arena

Video Analyses

Videos were analyzed using Ethovision XT (Noldus)

Results

Experiment 1: Air movement

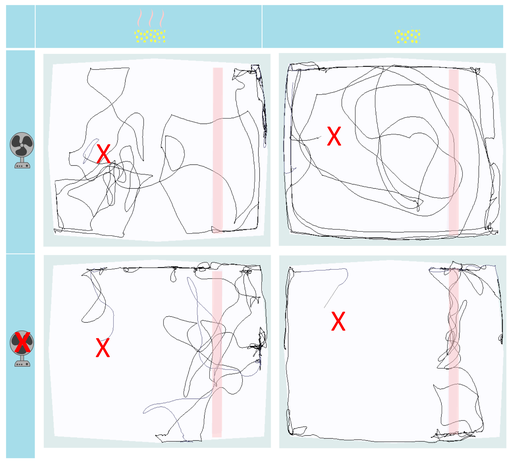

Figure 4. Examples of tracks for April collected beetles. Tracks were highly variable.

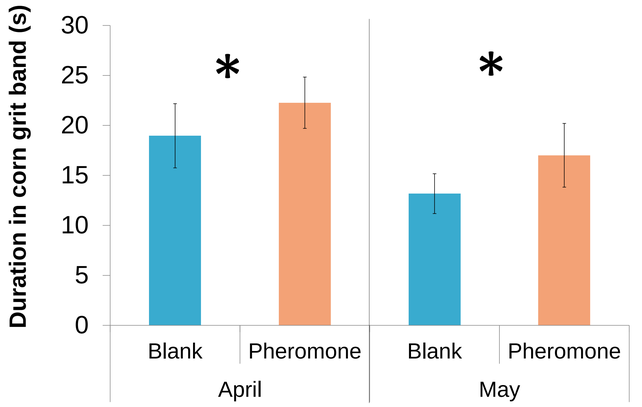

Figure 5. LS mean duration ±SEM spent by beetles in corn grit band. Beetle collection month significantly affected duration spent in band. LS means were compared within the beetle collection month. (*) indicates significant differences between treatments.

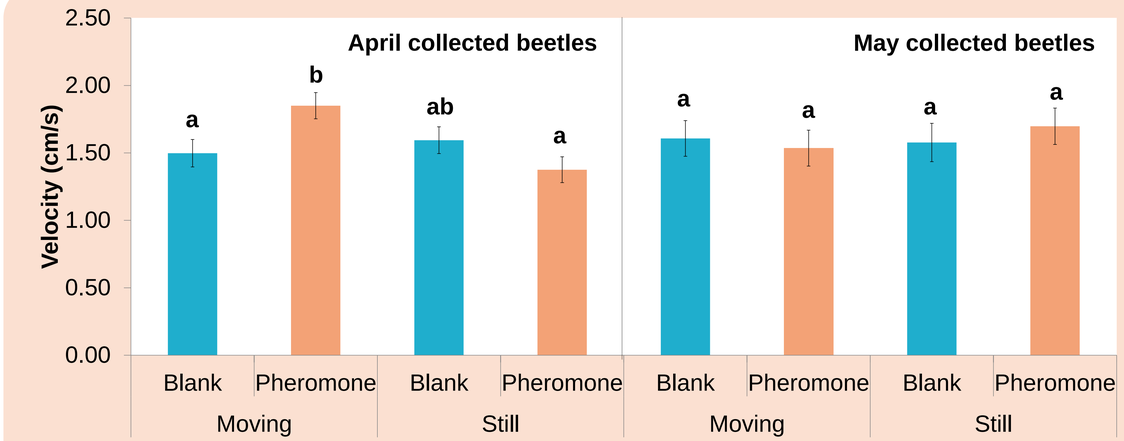

Figure 6. LS mean velocity ±SEM for April and May collected beetles. There was a significant three-way interaction among the factors, therefore LS means were compared within beetle collection date.

Experiment 2: Light quality

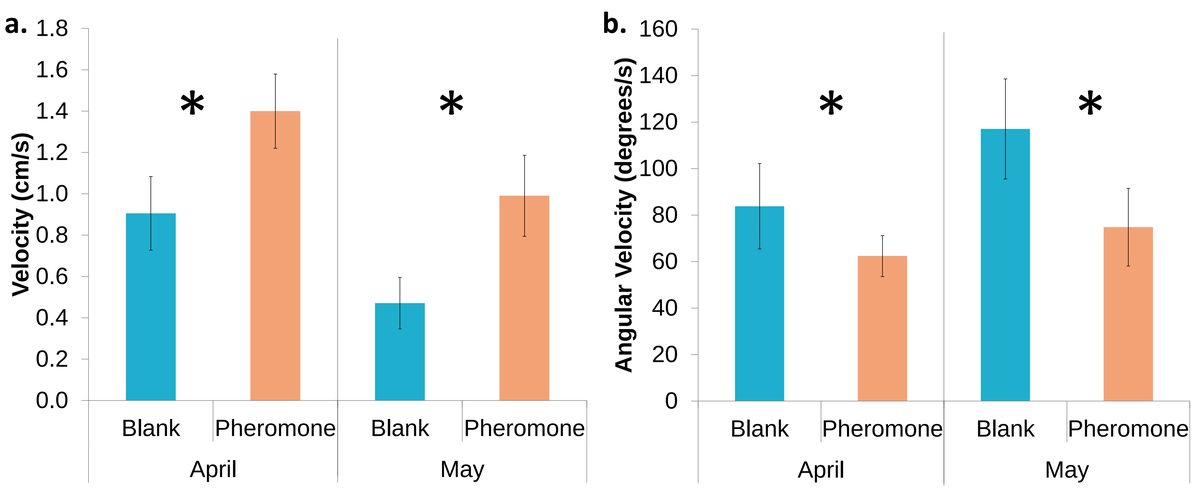

Figure 7. LS mean **a.** velocity and **b.** angular velocity ±SEM. No significant differences were detected between red and white light treatments. Beetle collection month significantly affected velocity and angular velocity. LS means were compared within collection month.

Conclusions

- In general, beetles walked **faster** in the presence of pheromone.
- Beetles decreased angular velocity, and therefore walk **straighter** paths in the presence of pheromone
- In the larger arena (i.e. wind tunnel arena) beetles spent **more time** within a pheromone corn grit band, than a blank corn grit band.
- Light quality **did not** affect click beetle movement
- Wind tunnel arena results were not consistent with petri dish arena results, suggesting possible differences in beetle response based on **range**.
- Differences were observed between April and May collected beetles, suggesting **timing** of pheromone and *M.brunneum* application may be important for effective control.

The Conclusion

Sex pheromone corn grits are an effective attractant

Future work

- How do click beetles respond to sex pheromone corn grits under **different conditions** (e.g. different temperatures)?
- Can sex pheromone increase **the initial infection** of click beetles by *M.brunneum*?
- Can *M.brunneum* **be horizontally transmitted** between individuals. Can the presence of sex pheromone augment this?

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