Oviposition choice of *Mythimna unipuncta* on different host plants

Ciara Verstraete
Dr. Maya Evenden,
Dylan Sjolie, Chetna Saran, Ronald Batallas ,Wu Yingje
Department of Biological Sciences, University of Alberta

Introduction:

- *M. unipuncta* damages crops when in its larval form; moving across a field in an army like fashion. *M. unipuncta* has a broad host range but causes most damage to grass crops (Foerster *et al*.., 1999).
- *M. unipuncta* females oviposit eggs in rows in tight places directly on the host plant – usually between the sheath and the blade of a plant.
- The diverse moth family Noctuidae, to which *M. unipuncta* belongs, demonstrates diversity in host-dependant oviposition preference behaviours, such as egg-imprinting in which moths prefer to oviposit on the plant on which they were positioned as an egg (Karpinski *et al.* 2014).
- In some Noctuid moths, there is a correlation between female choice of oviposition host and larval fitness of the offspring (Jimenez *et al.* 2014).
- Oviposition choice may be affected by the nutrition status of the female moth. Female *Pseudaletia sequax* (Lepidoptera: Noctuidae) lay more eggs and live longer when provided with a sugar source (Marchioro and Foerster 2014).

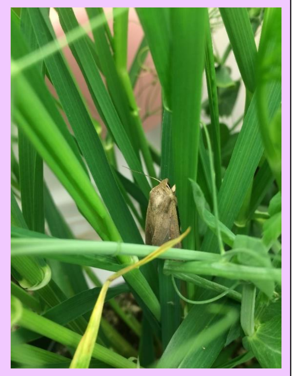

Figure 1. *M. unipuncta* laying eggs on a plant

Purpose:

1) To determine if *M. unipuncta* females show an oviposition preference towards certain agricultural species over others.
2) To discover if the absence of a nutrition source will change the females preference for the oviposition host.

Methods:

1) **Planting and Fertilizing:** On 17 June 2015, 40 specimens of the five potential host plants were planted. Tested plants were: corn, wheat, barley, peas and canola. The plants were kept in a regulated growth-room with a light cycle of 16:8 LD and a temperature of 24°C. Plants were fertilized weekly from 1-22 July (17.1g/4L Plant-Prod® Water Soluble Fertilizer 20-20-20).
2) **Moth Rearing:** Once the larvae pupated, they were cleaned with 20% bleach solution and rinsed three times with water. They were separated by gender. They were placed in a growth chamber with a regulated temperature of 24°C, a relative humidity of 95-99% and a light cycle of 16:8 LD.

Figure 2. A female and male *M. unipuncta* pair

Methods, cont'd:

3) **Moth Mating:** Once the moths emerged, they were paired and provided with either a 10% sugar water solution or deionized water to induce starvation. They were left in the growth chamber to mate for two days.

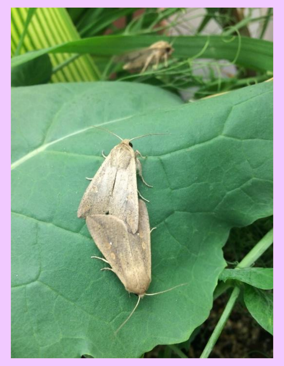

Figure 3. A pair of moths mating

4) **Crop Cages:** One of each of the plant species (five in all) were put into cages which served as the habitat for two pairs of mated moths (four in total) of the same nutrient regime treatment. The moths were left in the cages for seven days to lay eggs.
5) **Egg Counting:** After one week the plants were harvested and put into separate plastic bags. All plant material was searched thoroughly for eggs. If found, the eggs were counted under the microscope at 12X magnification.

Figure 4. Crop cages

6) **Data Analysis:** Data was evaluated using a 2-way ANOVA with a negative binomial distribution, at significance level of 0.05. Means comparison was performed using Tukey's studentized range test. All analysis were performed in R 3.1.1.

Results:

	Mean number of eggs (± SE)	
Host Plant	Water	Sugar
Poaceae		
Barley	404.0 (± 77.8)	517.5 (± 102.6)
Corn	407.3 (± 102.7)	390.5 (± 81.3)
Wheat	476.8 (± 107.6)	380.9 (± 87.6)
Brasicaceae		
Canola	1.8 (± 1.8)	0.0 (± 0.0)
Fabaceae		
Peas	0.8 (± 0.6)	1.2 (± 1.2)

Table 1. Mean number of eggs (± SE) oviposited by two pairs of *M. unipuncta* moths per cage on different host plants. Moths were supplied a food source, either deionized water or sugar water, inside the cages.

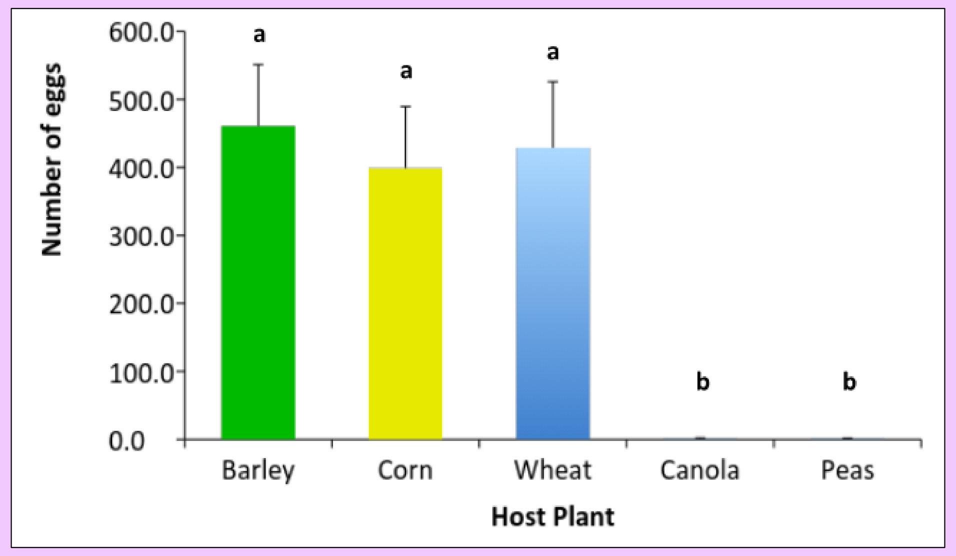

Figure 5. Mean number of eggs oviposited by two pairs of *M. unipuncta* moths per cage on different host plants. Error bars represent standard errors of the mean. Bars followed by the same letter indicate no significant difference by using ANOVA and Tukey's studentized range test.

- Female M. unipuncta moths had a oviposition preference for Poaceae host plants (barley, corn and wheat) over Brasicaceae (canola) or Fabaceae (peas) (P < 0.001)
- However the preference was not significant between wheat, barley and corn.

Results, cont'd:

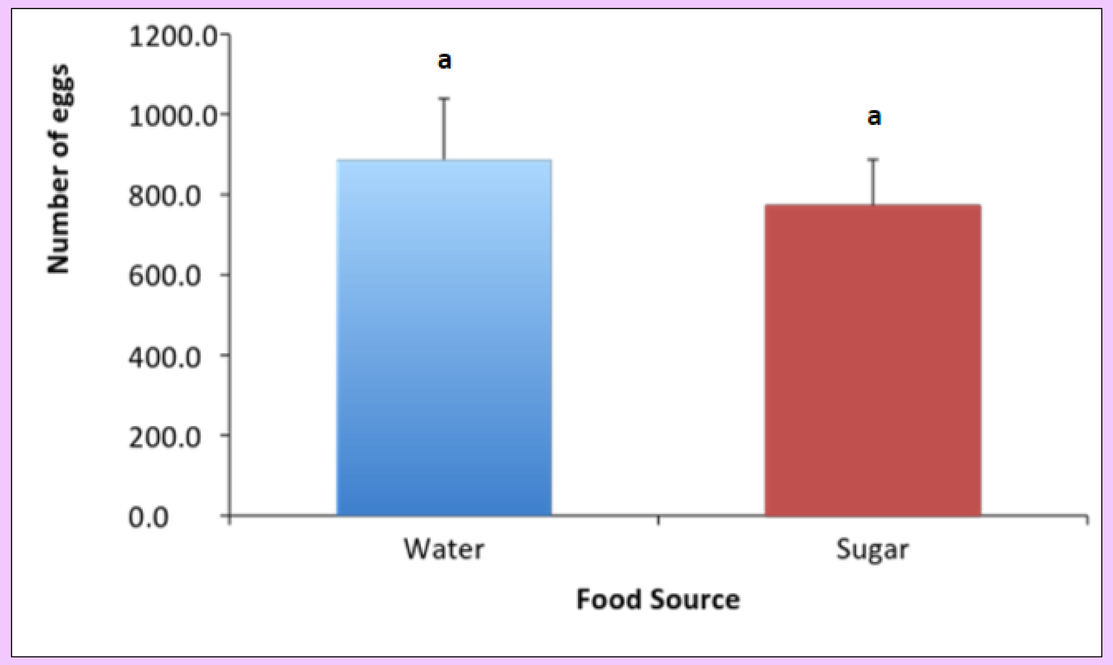

Figure 6. Mean number of eggs oviposited by two pairs of M. unipuncta moths supplied with either deionized water or sugar water. Error bars represent standard errors of the mean. Bars followed by the same letter indicate no significant difference by using ANOVA and Tukey's studentized range test.

- There was no significant interaction between nutrition regime and host plant species on the number of eggs laid by female M. unipuncta moths (P = 0.727)
- Nutrition regime had no significant effect on the number of eggs laid by the female moths (P=0.682).

Conclusion:

- Preference was shown towards Poaceae plants over Brasicaceae and Fabaceae when female *M. unipuncta* selected host plants. No significant preference was shown between the three preferred host plant species.
- Treatment (sugar & water) had no significant impact on the number of eggs oviposited by female *M. unipuncta*. The presence of flowers on the pea plants could have provided a source of nutrients for the moths via nectar.
- The interaction between host plant and food source showed no significant impact on the number of eggs laid or the host plant selected.

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