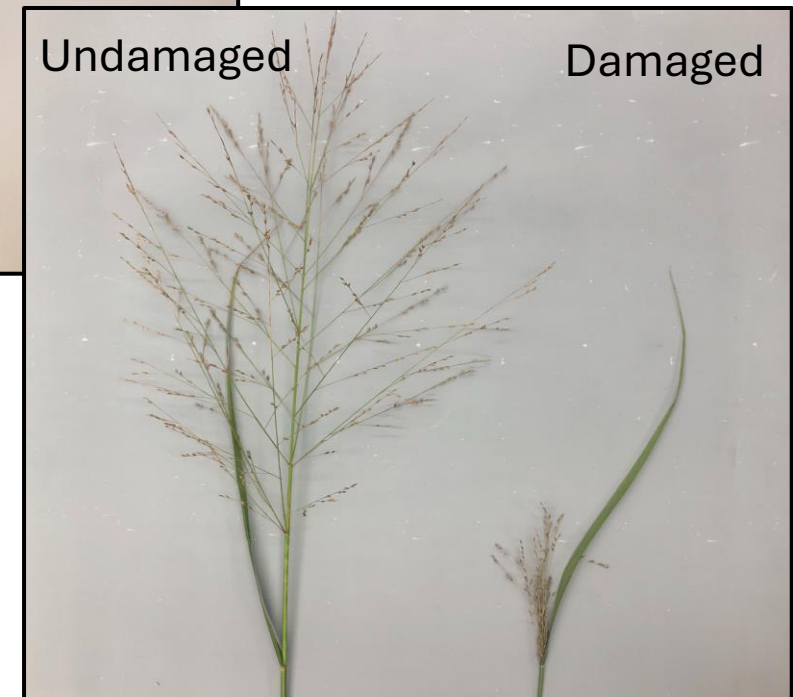
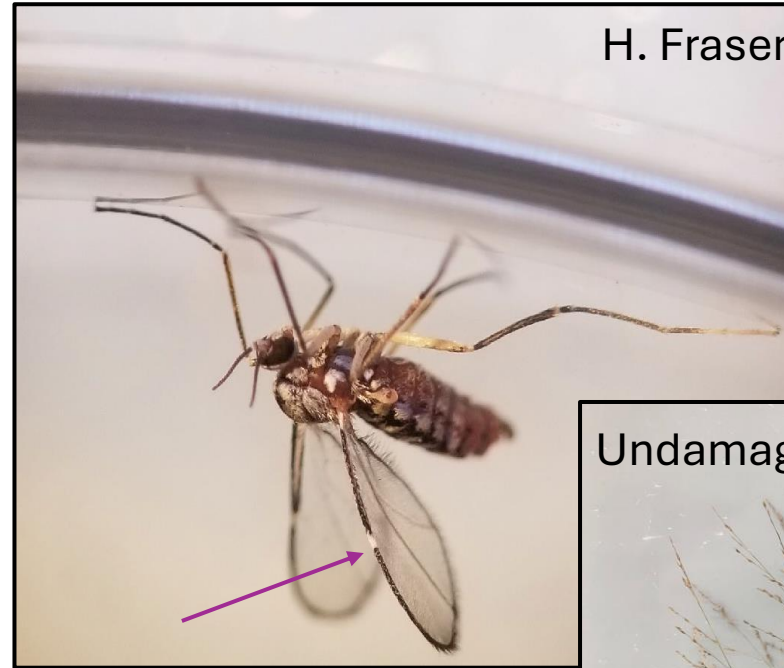


Phenology and Yield Impact of the Switchgrass Gall Midge in Southern Ontario



Switchgrass gall midge (SGM) *Chilophaga virgati* Gagné

- Discovered in 2008 in South Dakota
- Range included South Dakota, Minnesota, Nebraska, Illinois, Oklahoma, New York, and New Jersey
- Caused nearly 100% seed loss and a 35% reduction in biomass per tiller
- Switchgrass is a perennial bioproduct crop
- SGM found in southern Ontario in 2020 by the Ontario Ministry of Agriculture, Food, and Agribusiness (OMAFRA)



Boe and Gagné (2011), Calles Torrez et al. (2014)

What we knew

Bioenerg. Res. (2011) 4:77–84
DOI 10.1007/s12155-010-9102-6

**A New Species of Gall Midge (Diptera: Cecidomyiidae)
Infesting Switchgrass in the Northern Great Plains**

Arvid Boe · Raymond J. Gagné

Bioenerg. Res. (2014) 7:417–423
DOI 10.1007/s12155-013-9386-4

**The Switchgrass Gall Midge (*Chilophaga virgati* Gagné)
in the Northern Great Plains**

Verónica Calles Torrez · Paul J. Johnson · Arvid Boe



Early instar
1.5-2.5 mm

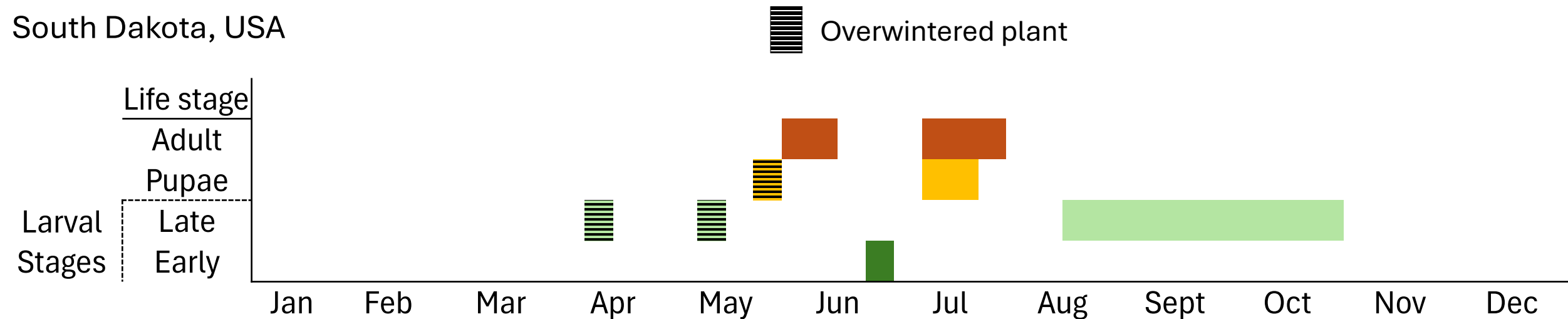


Late instar
4.8 mm



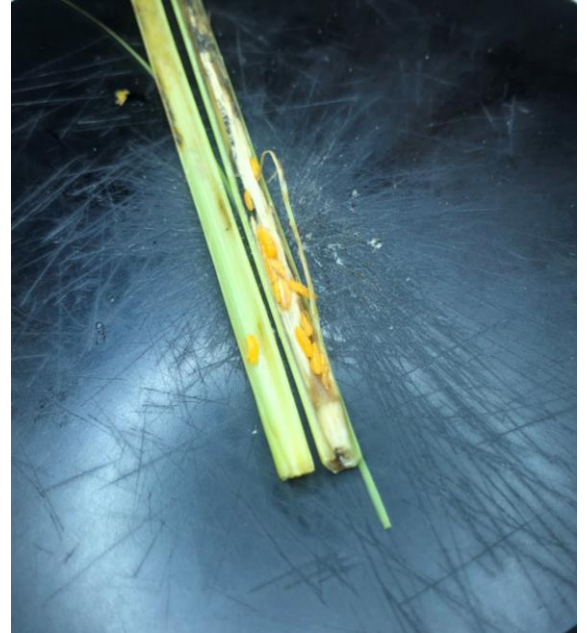
Pupae

South Dakota, USA

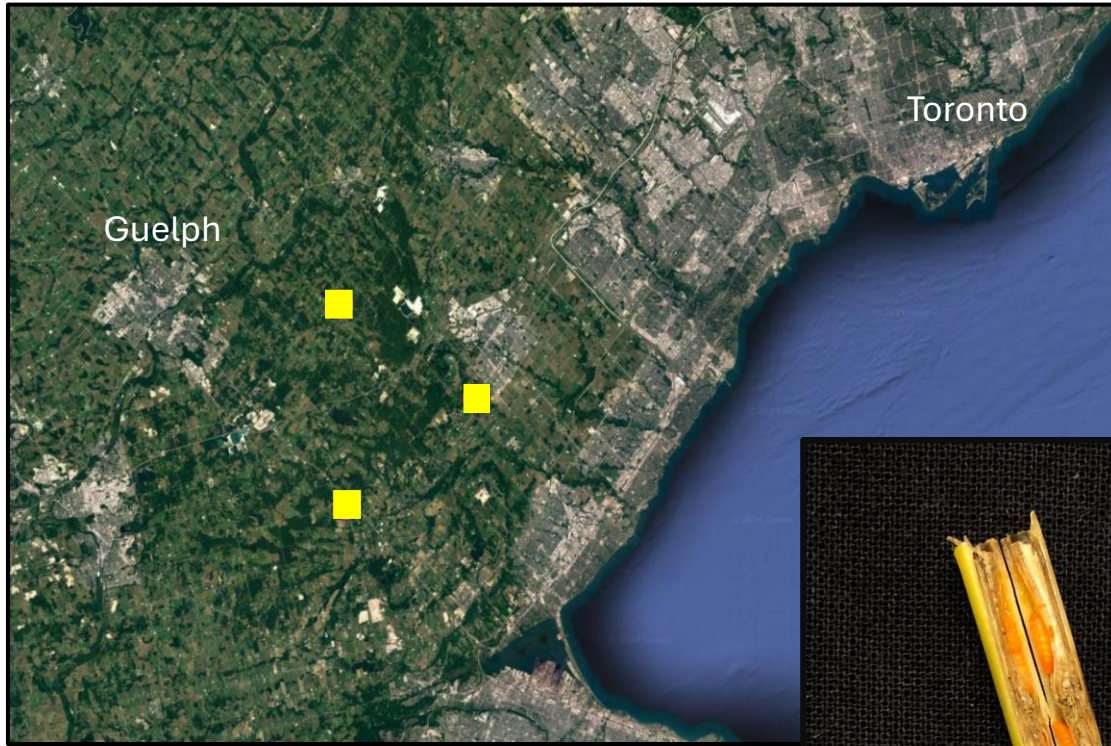


Objectives

1. Describe and locate all life stages
 - a. Larvae
 - b. Pupae
 - c. Adults
 - d. Eggs
2. Determine the phenology of SGM in southern Ontario
3. Determine the infestation rates and yield impacts of SGM



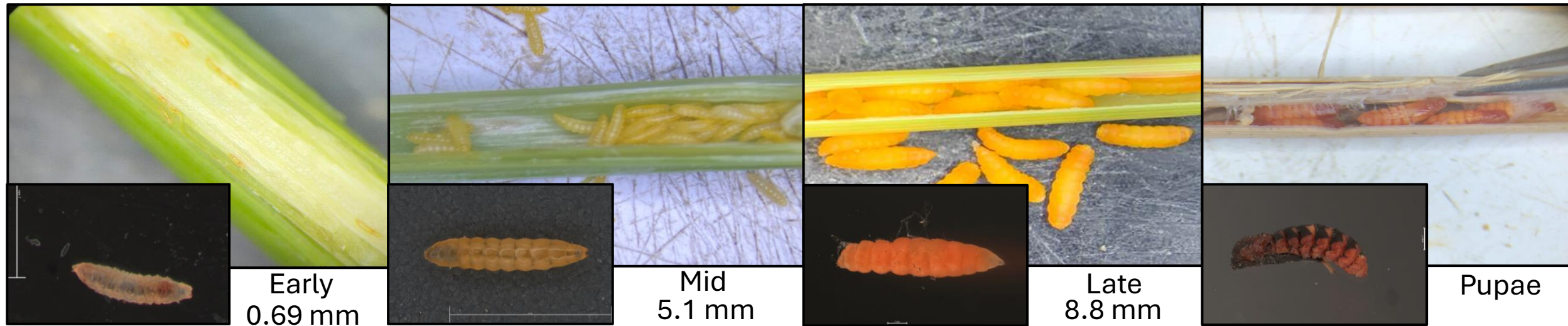
Sampling Methods



20 damaged overwintered tillers
50-80 vegetative tillers
25-50 damaged reproductive
tillers



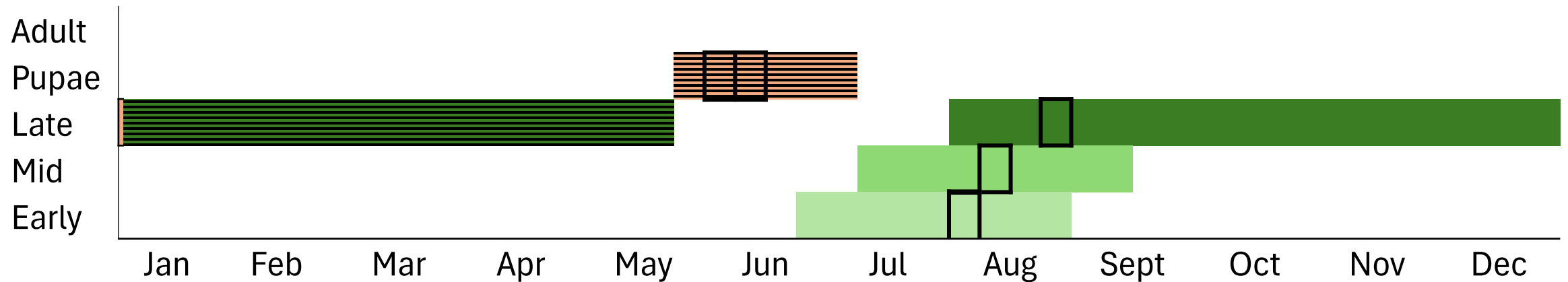
Larvae and Pupae



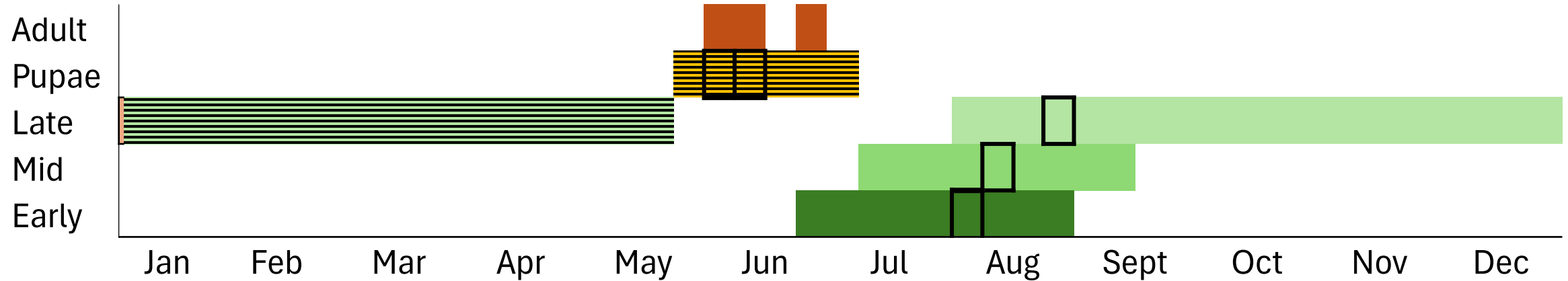
Overwintered plant



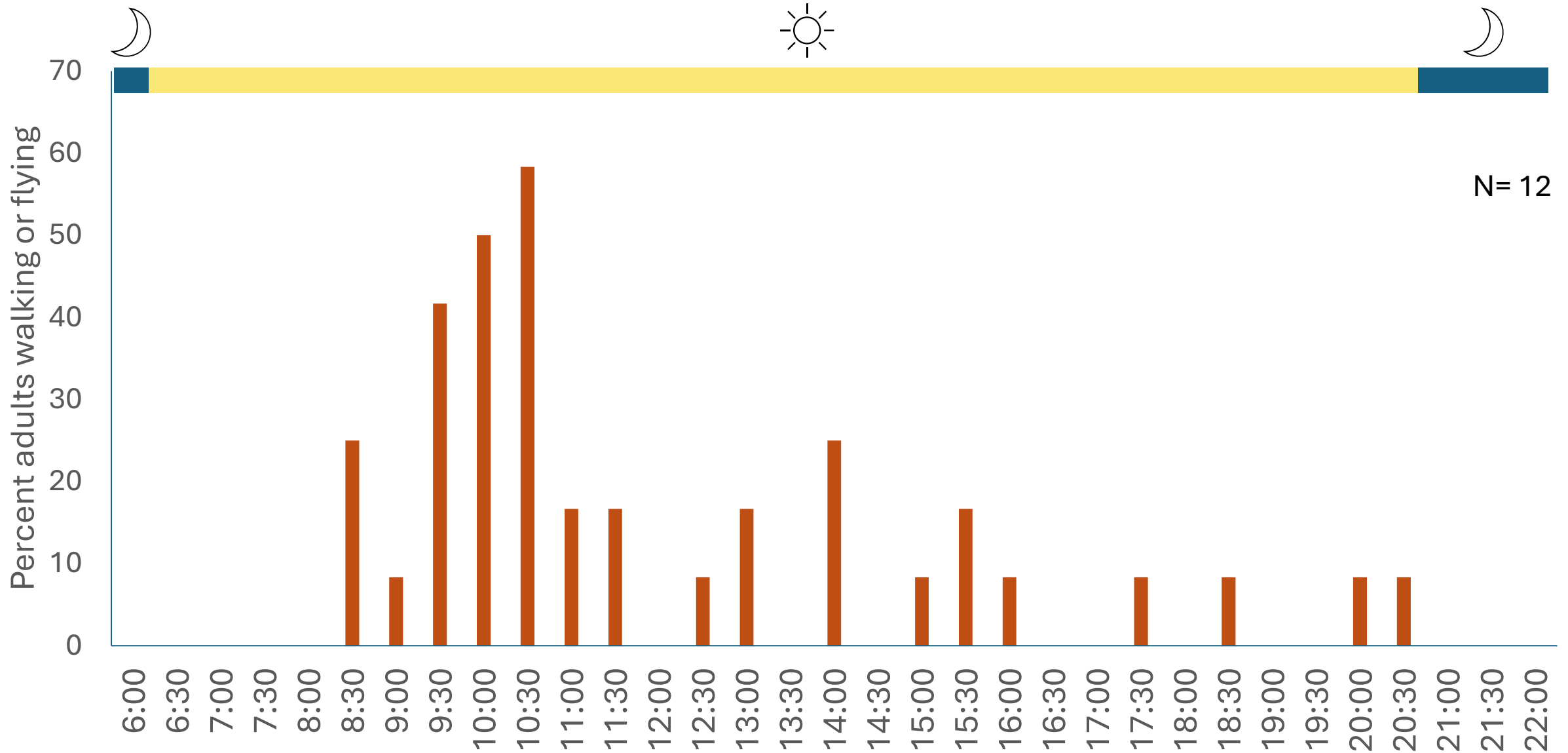
Peak abundance



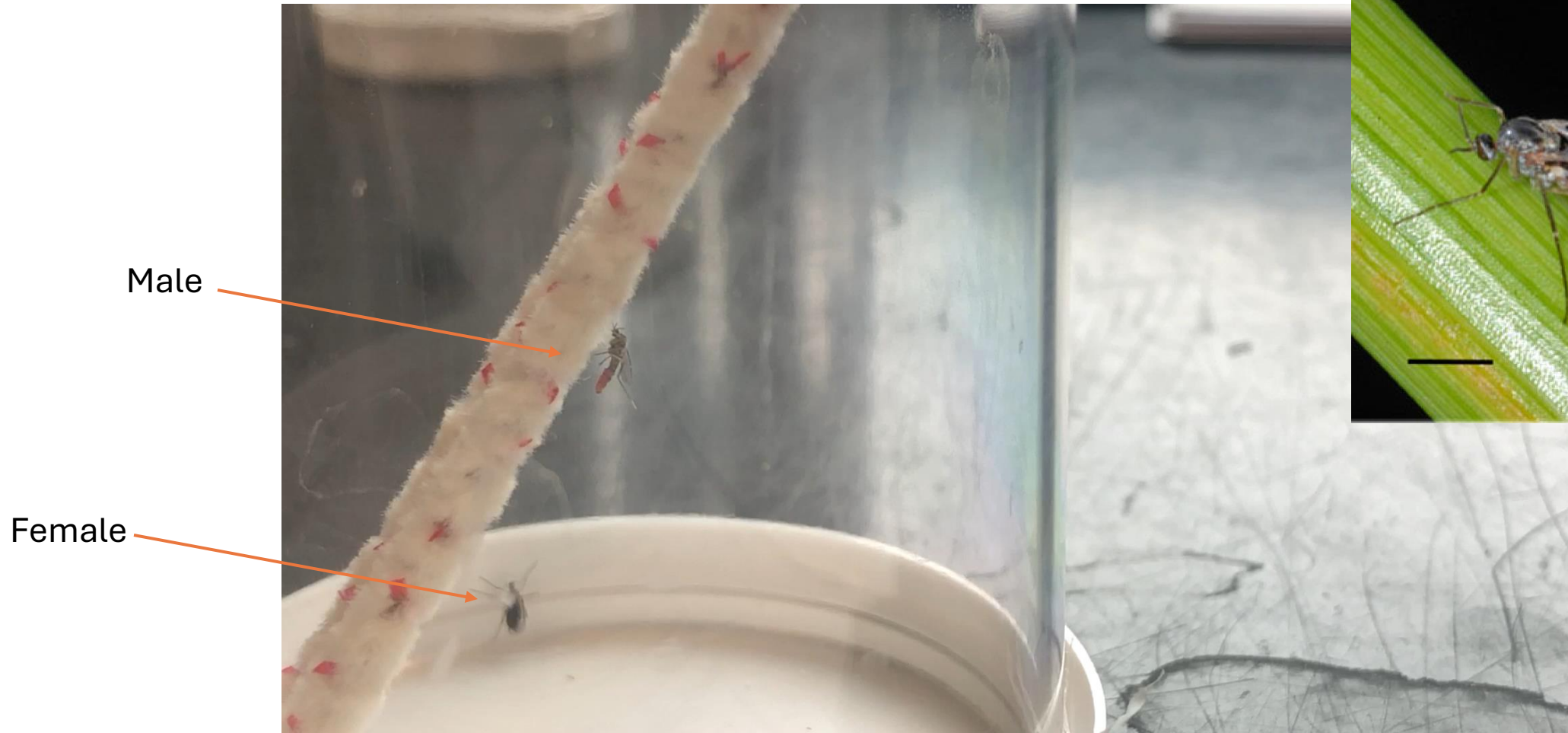
When do adults emerge?



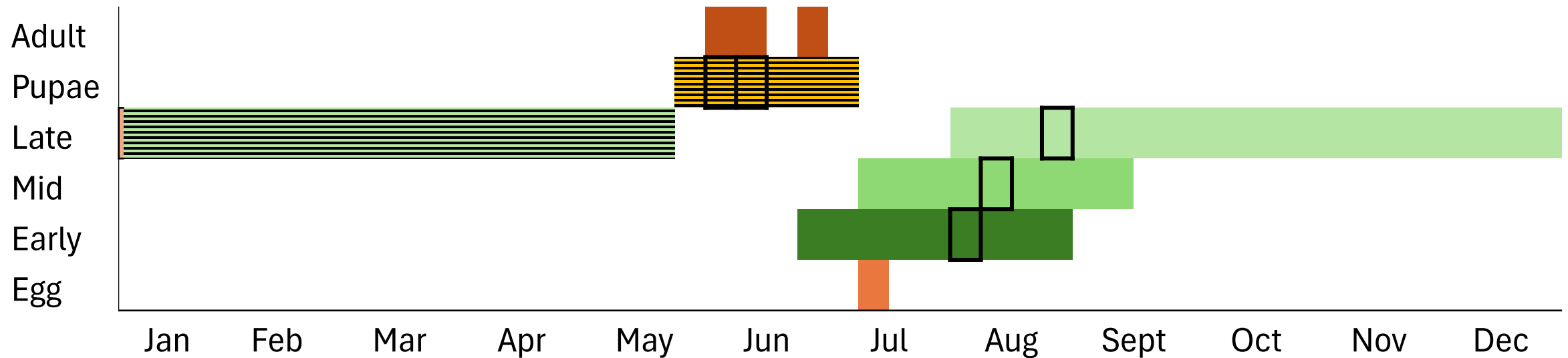
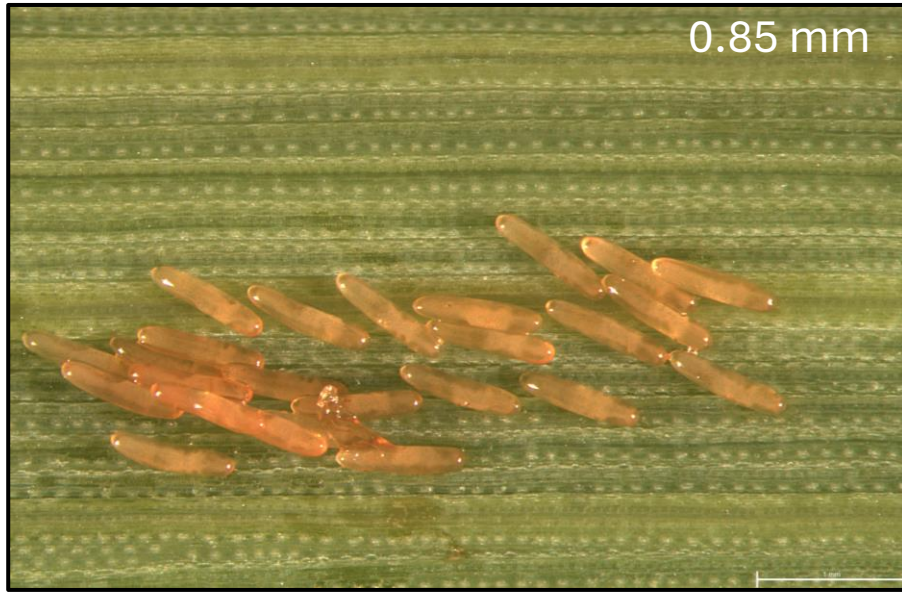
What time of day are adults active?



Do adults produce a pheromone?



Eggs: What, Where, and When?



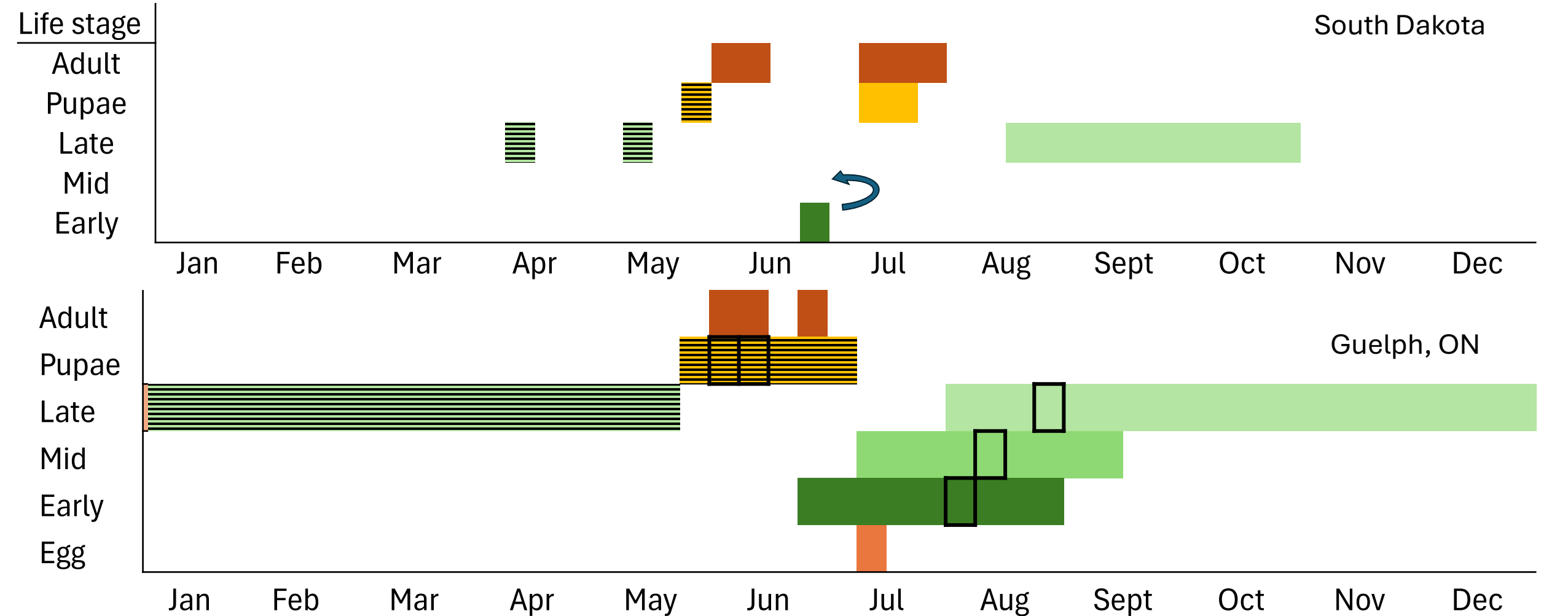
What We Know



Overwintered plant



Peak numbers

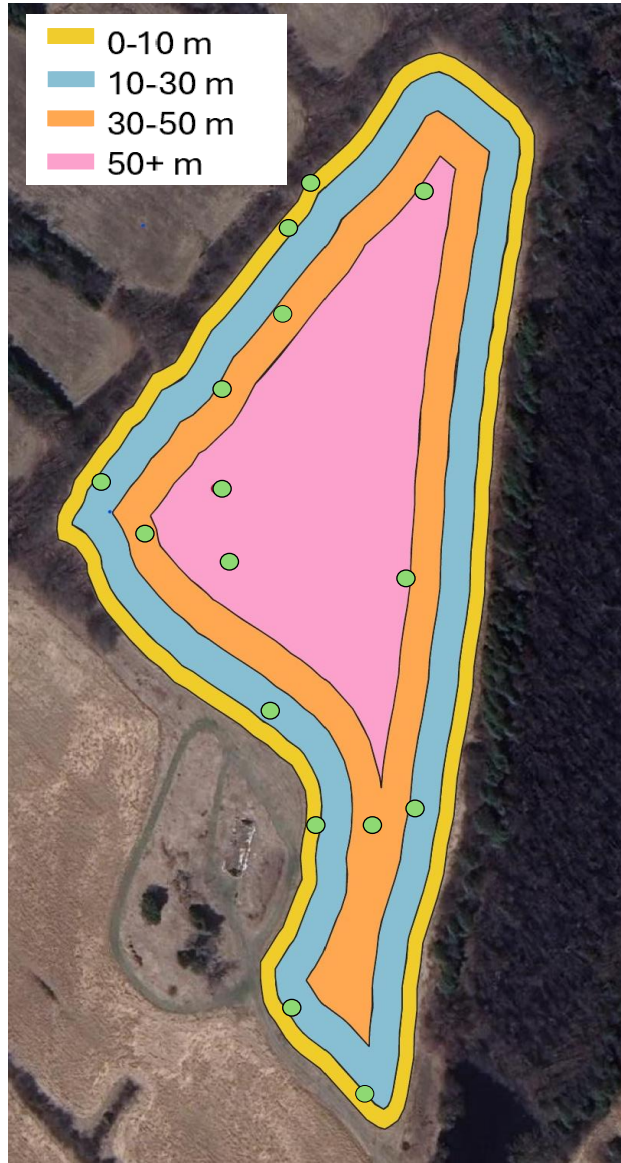


SGM's infestation rates and yield impact?

Site 1

Quadrat: 0.75 m²

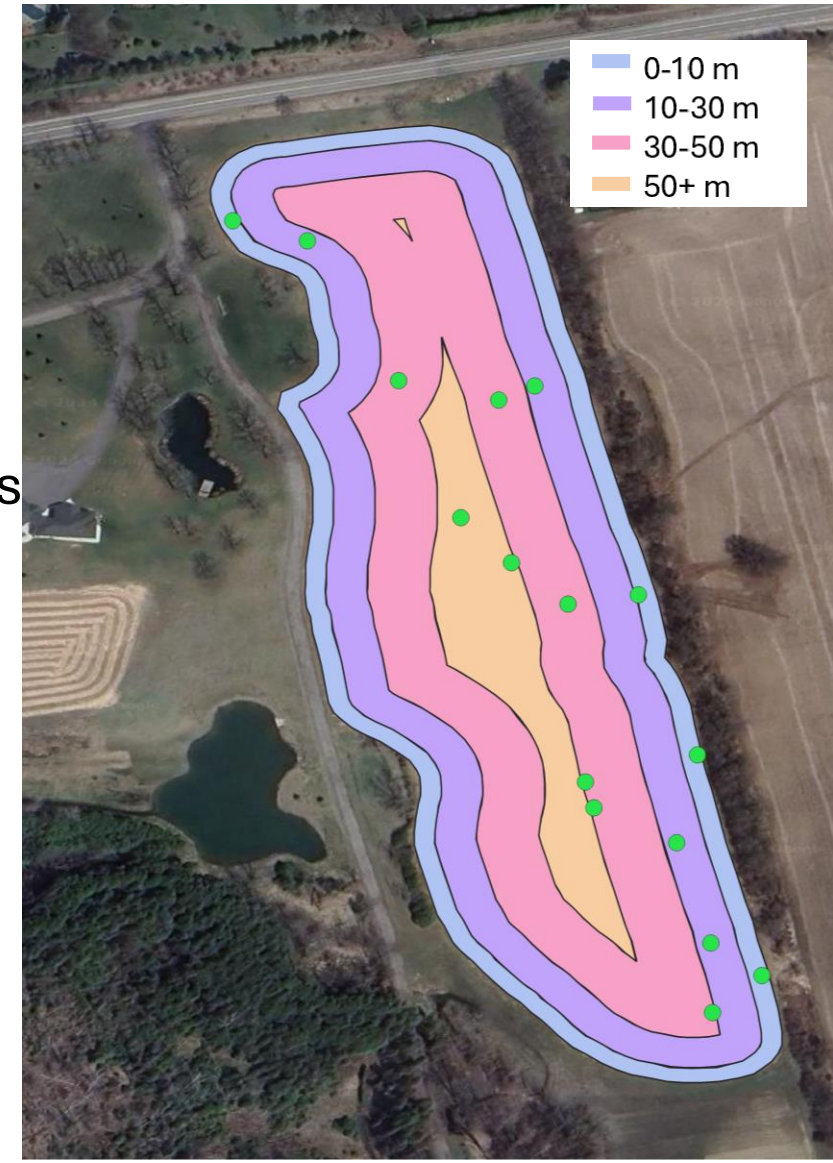
- **15/16** locations had infested tillers
- **2.1%** mean infestation per quadrat sample



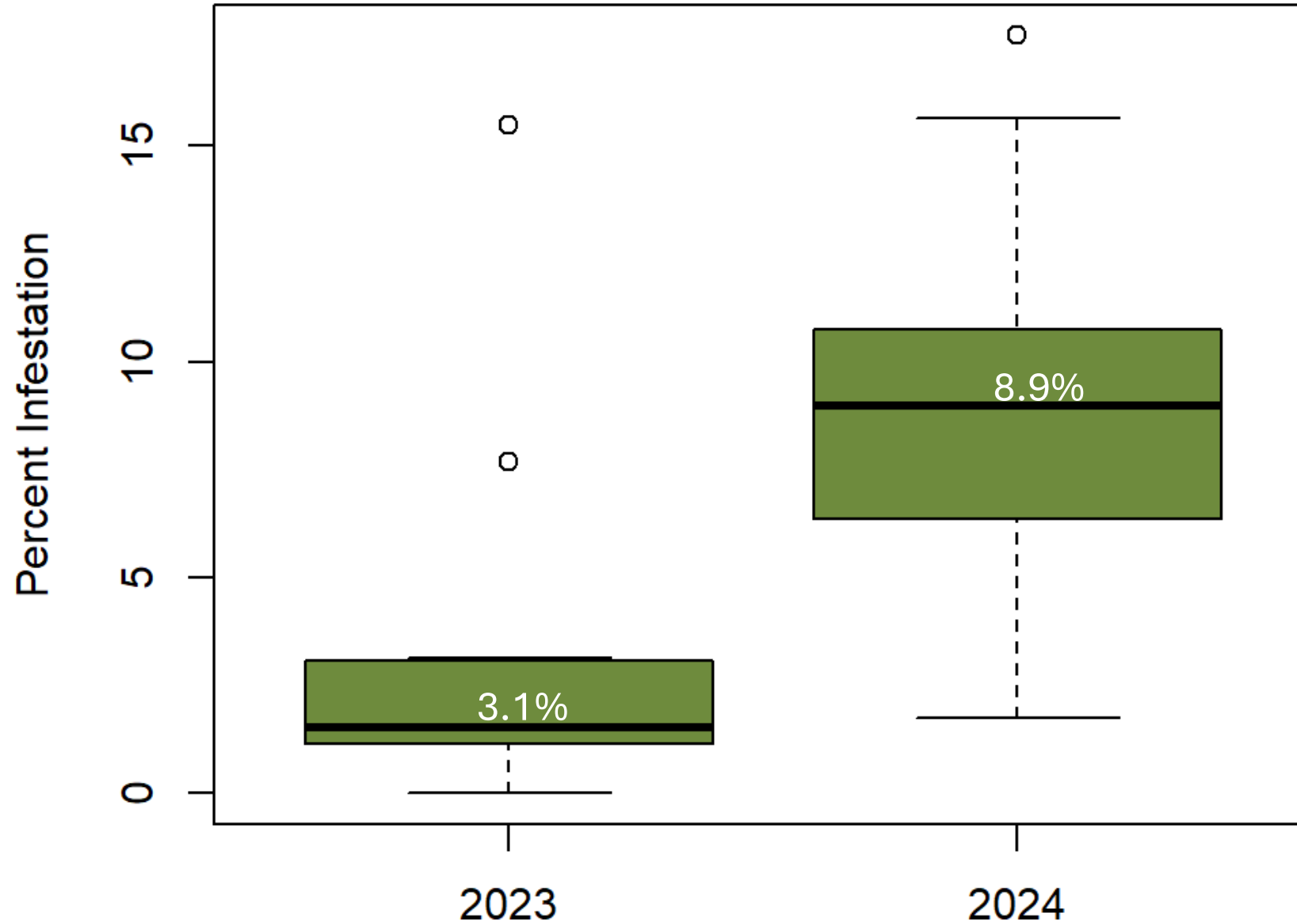
Site 2

Quadrat: 0.75 m²

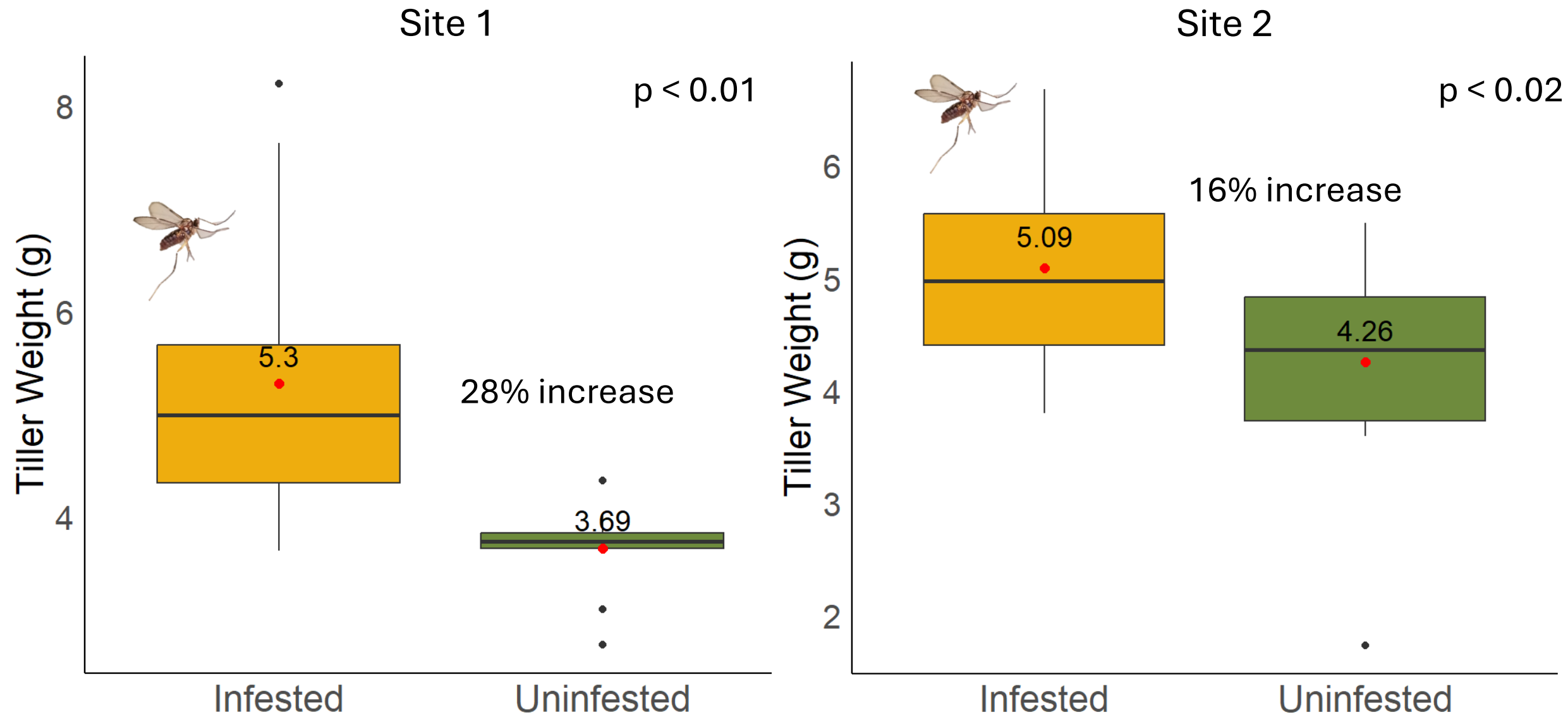
- **16/16** locations had infested tillers
- **8.9%** mean infestation per quadrat sample



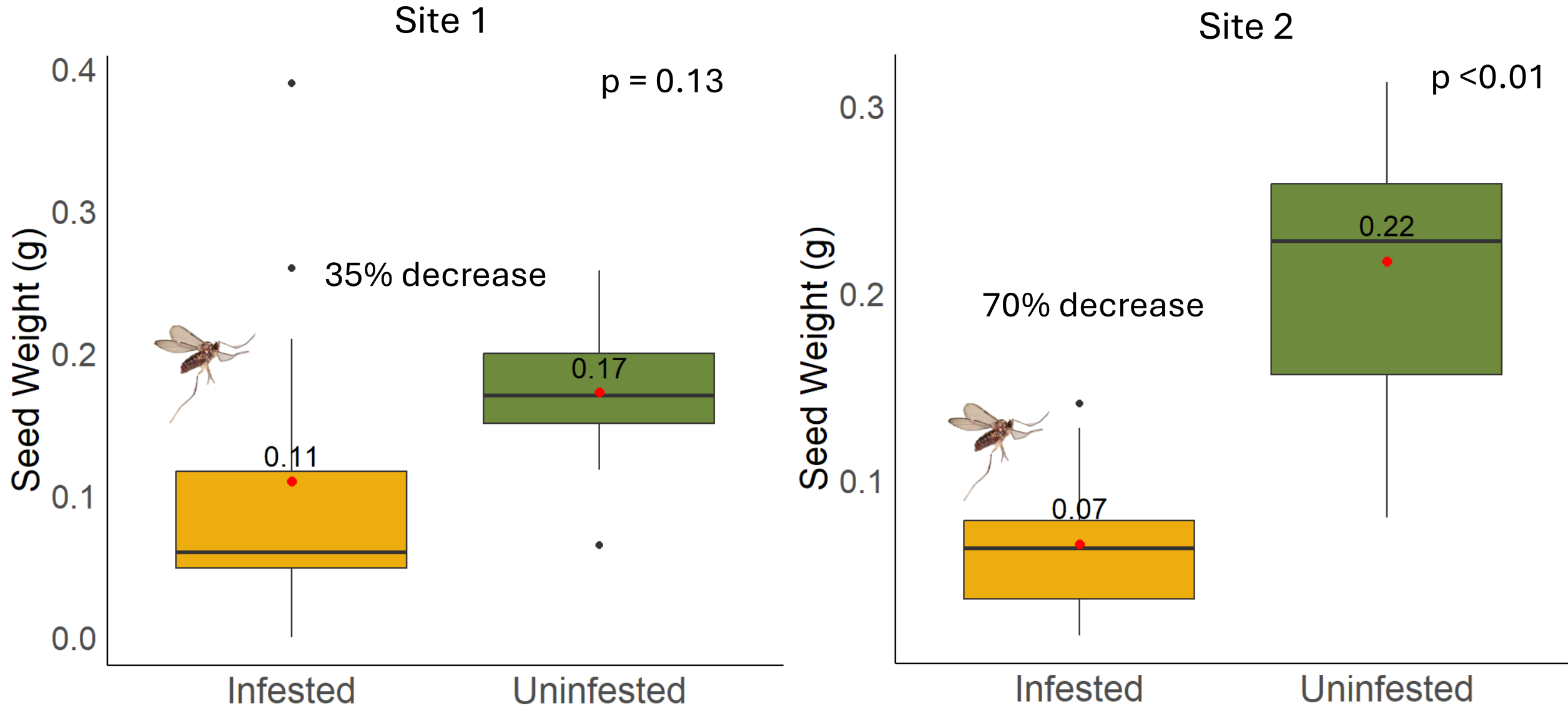
Percent infestation increased from 2023-2024 at Site 2



SGM infested tillers were heavier



SGM infested tillers produced fewer seeds



SGM impacts across a field

With a 5.5% infestation rate per field

- 22% increase in tiller weight per tiller -> **1.2% increase**
- 52.5% decrease in seed weight per tiller -> **2.9% decrease**



Conclusion

- SGM has one generation per year in southern Ontario
- Methods to monitor adult presence still need to be determined
 - Male mating behaviour could provide insight!
- SGM does not currently pose a risk to switchgrass growers, but populations should be monitored for increase



Funding
Ontario Agri-Food Innovation Alliance Research Program
Ontario Biomass Producers Co-operative Inc.
NSERC Alliance Research Program

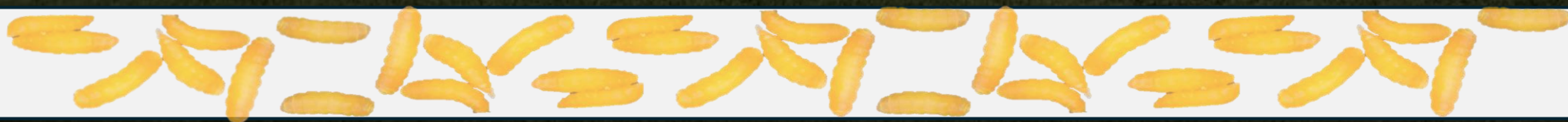


OMAFRA Partners
Hannah Fraser
Mahendra Thimmanagari

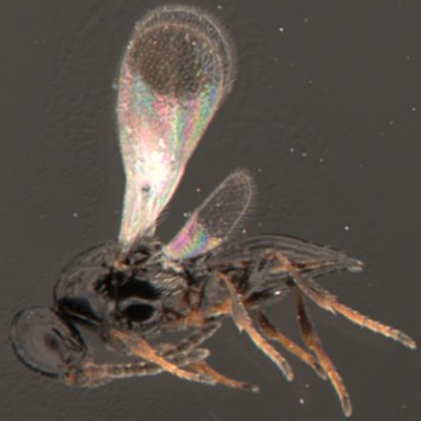
Switchgrass Growers

Student Research Assistants
Chloe El Hani
Matteo Girardo
Colin Grant
Emily Stevens
Kaitlin Pangelley
Natalie Savoia
Sam Schmidtke

Thank You!



Parasitoids of SGM



Platygaster chilophagae



Aprostocetus chilophagae



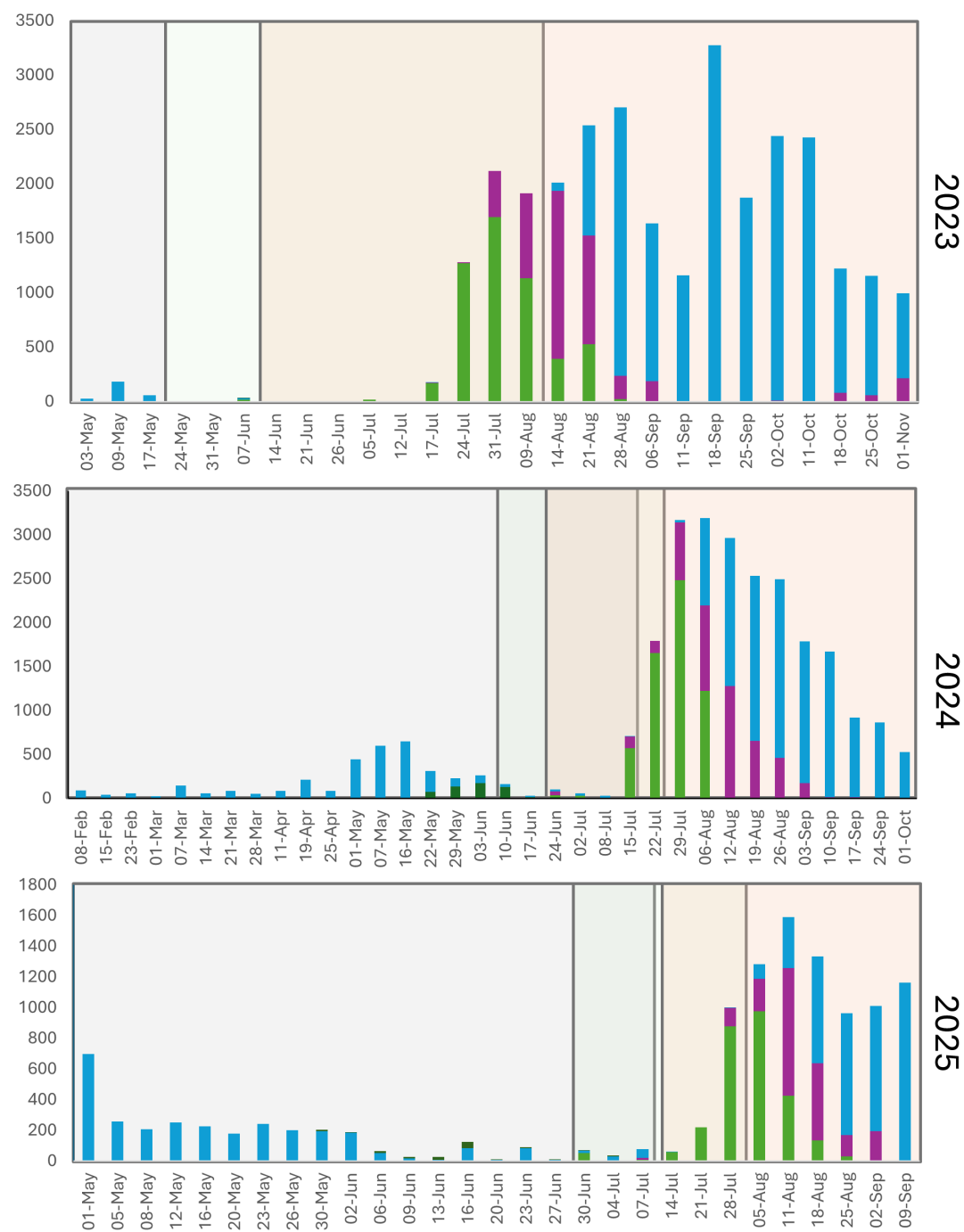
Trichacis rufipes



Quadrastichus sp.



Number of SGM



Tiller Type

- Overwintered
- Vegetative
- Reproductive

Life Stage

- Early Instar
- Mid Instar
- Late Instar
- Pupae