Management of vegetable pests in the Salinas Valley



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Pests covered

- Springtails – Lettuce
- Cabbage maggot – Brassicas
- Bagrada bug - Brassicas

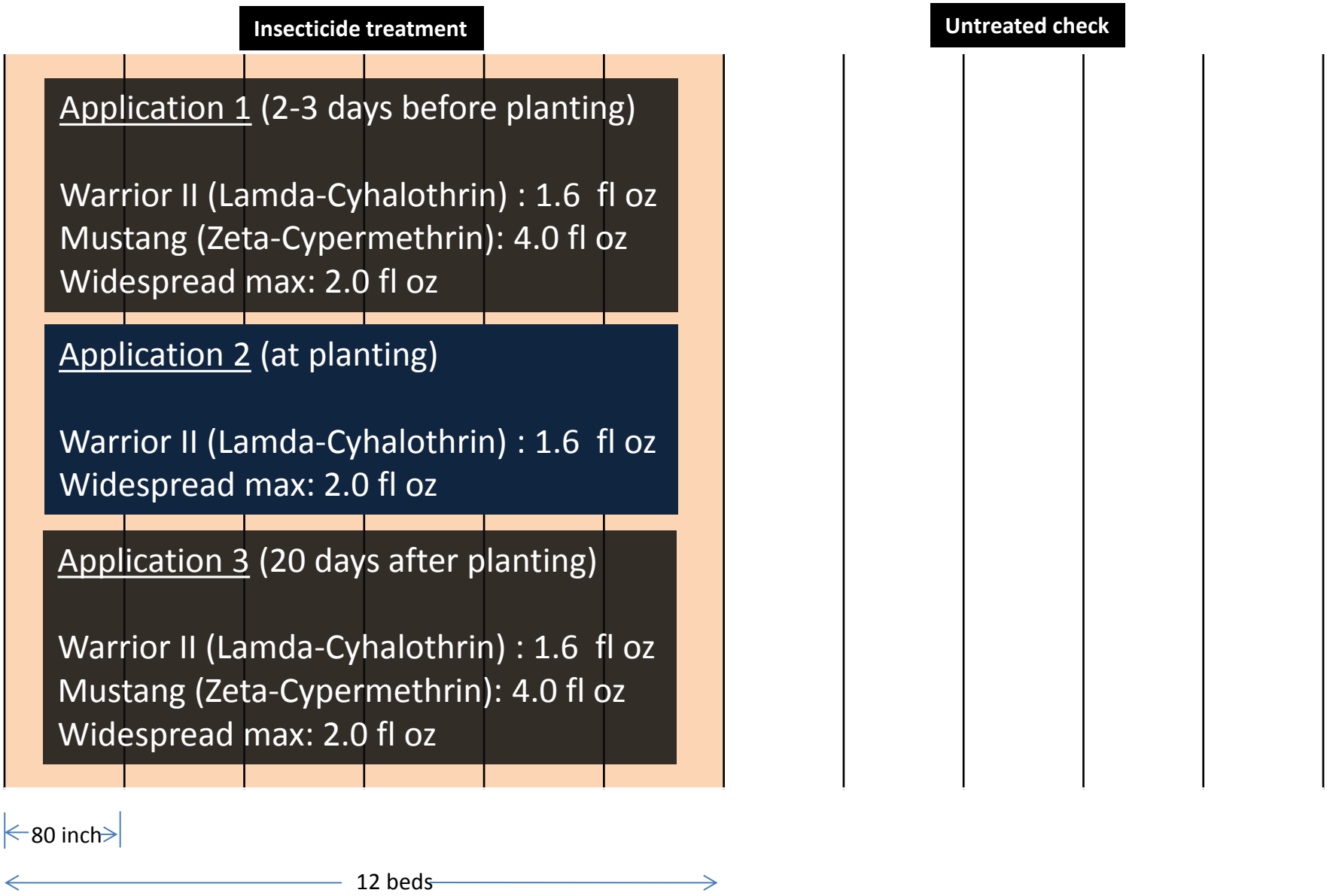
Questions

1. What is causing the inconsistent lettuce stand?

Monitoring

Garden symphylans?

Method - Experiment design



Results

Results

Results

Results

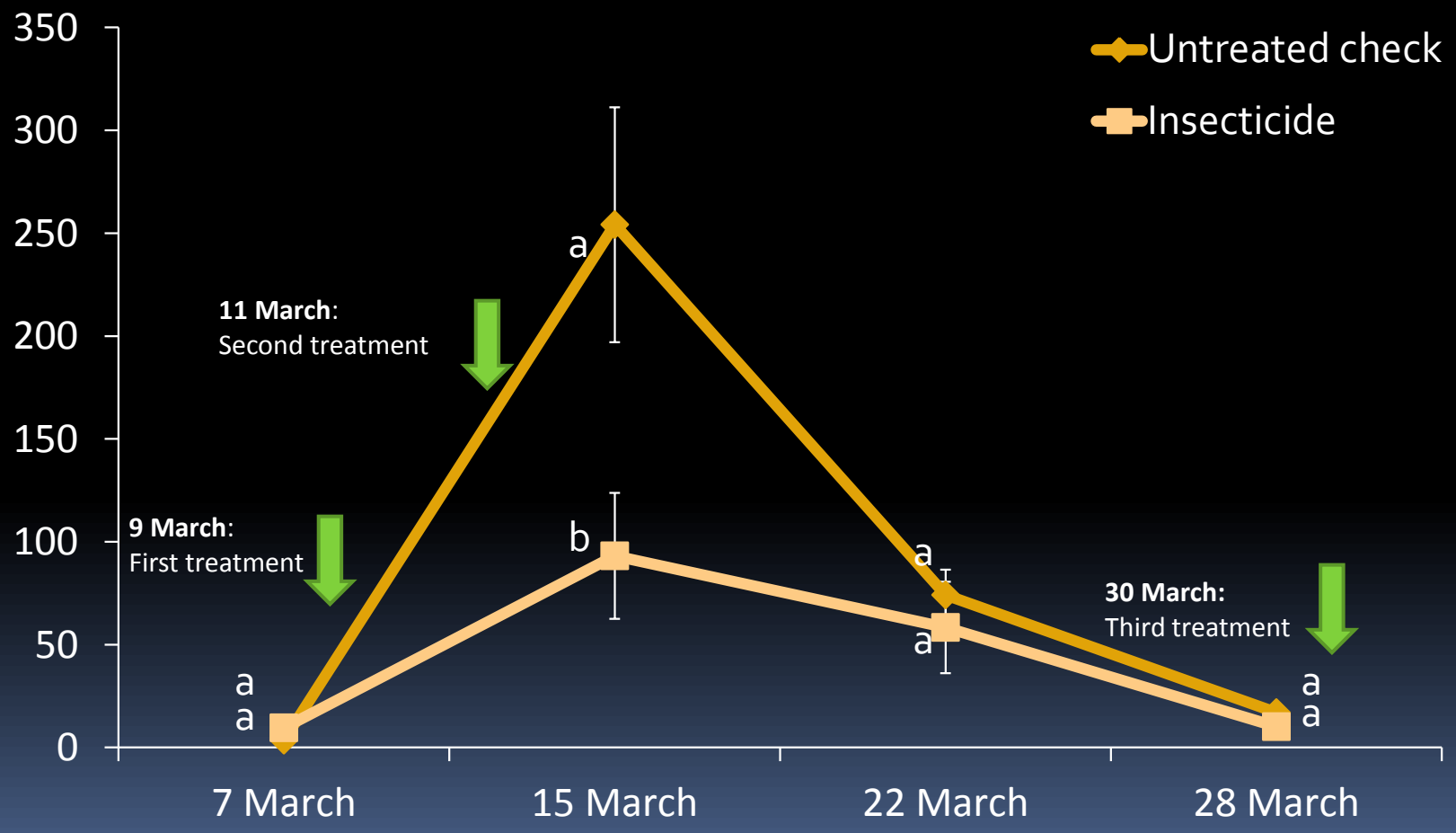
Insecticide treatment

Untreated check

Springtail:
[*Protaphorura fimata* (Family: Onychiuridae)]

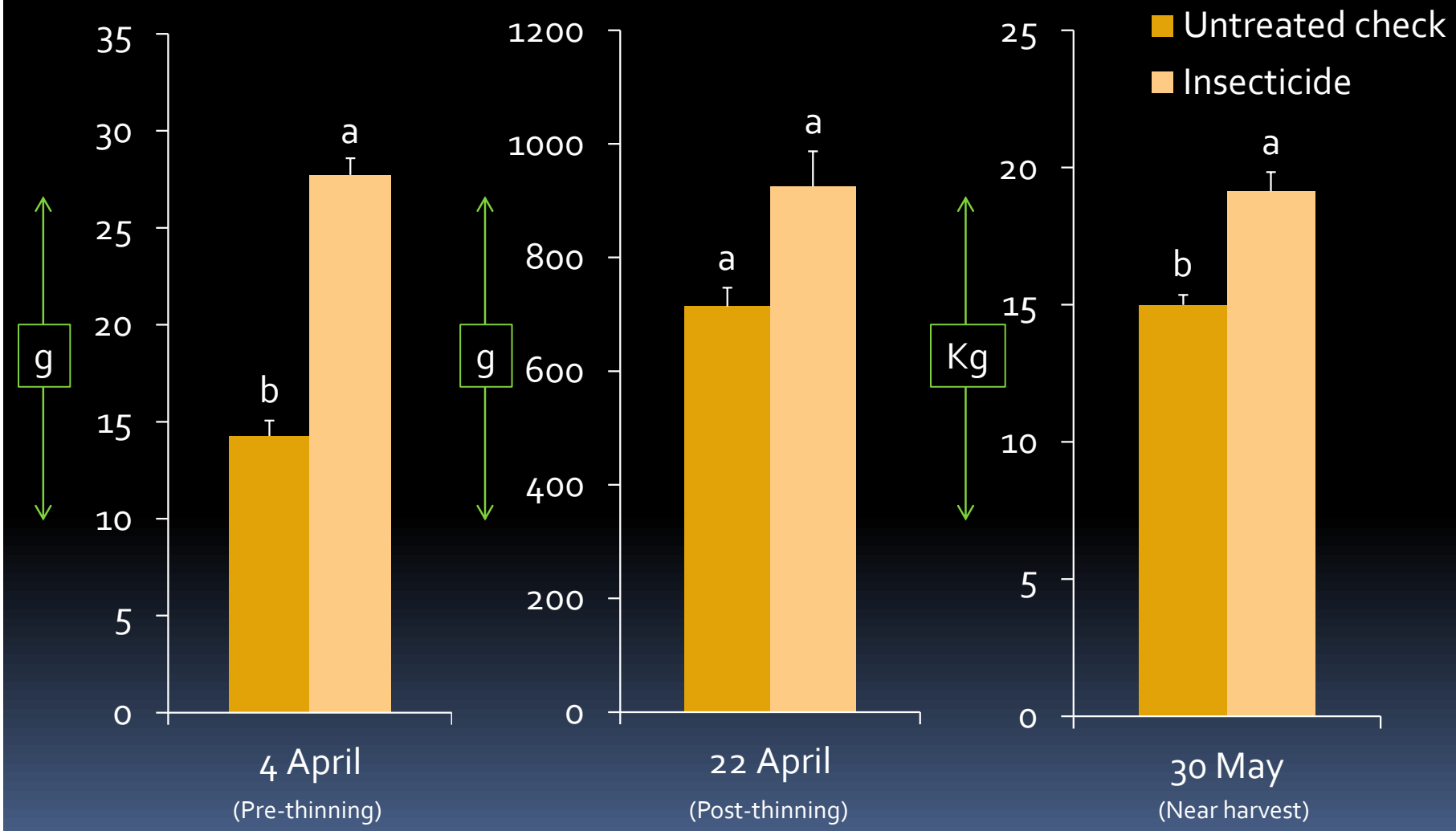
Results: Springtail counts

No. of springtails per trap



Results: Fresh weight

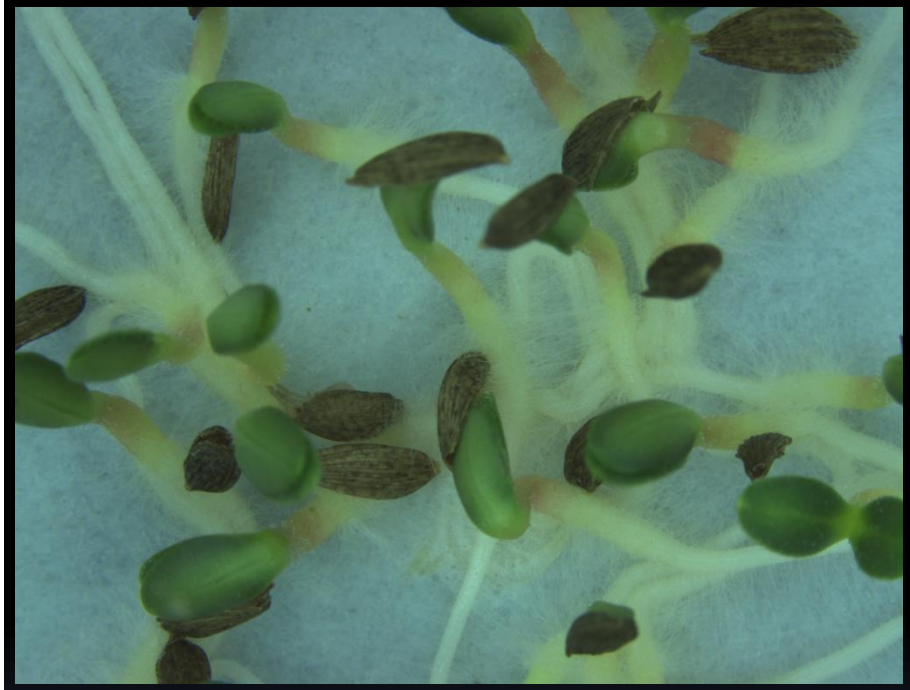
Fresh weight (g/Kg) of lettuce per 61.3 square meter



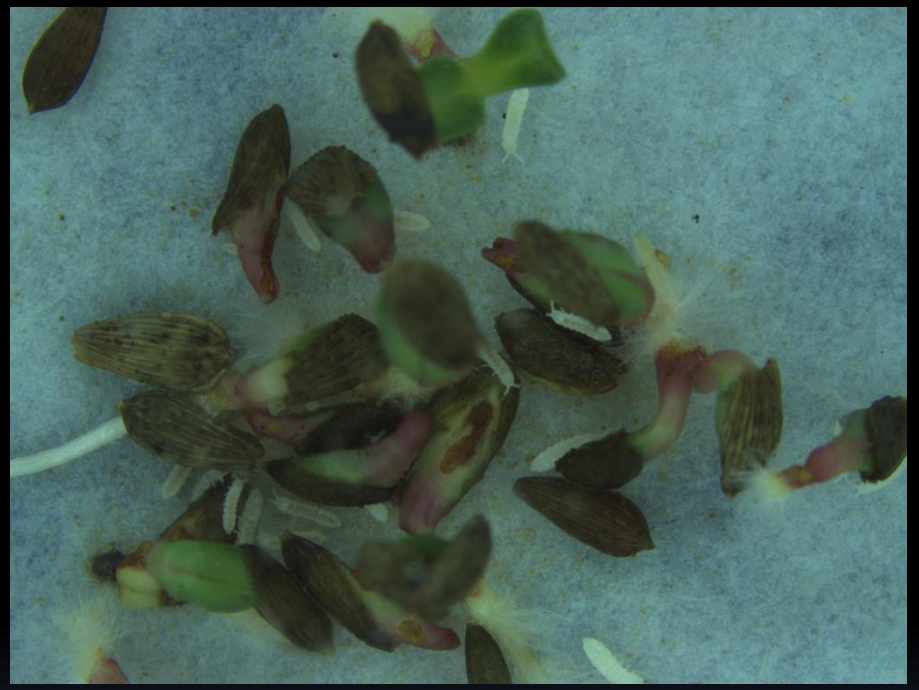
Questions

1. What is causing the inconsistent lettuce stand?
2. Would springtails ***really*** feed on geminating seeds/plants?

Germination of leafy lettuce

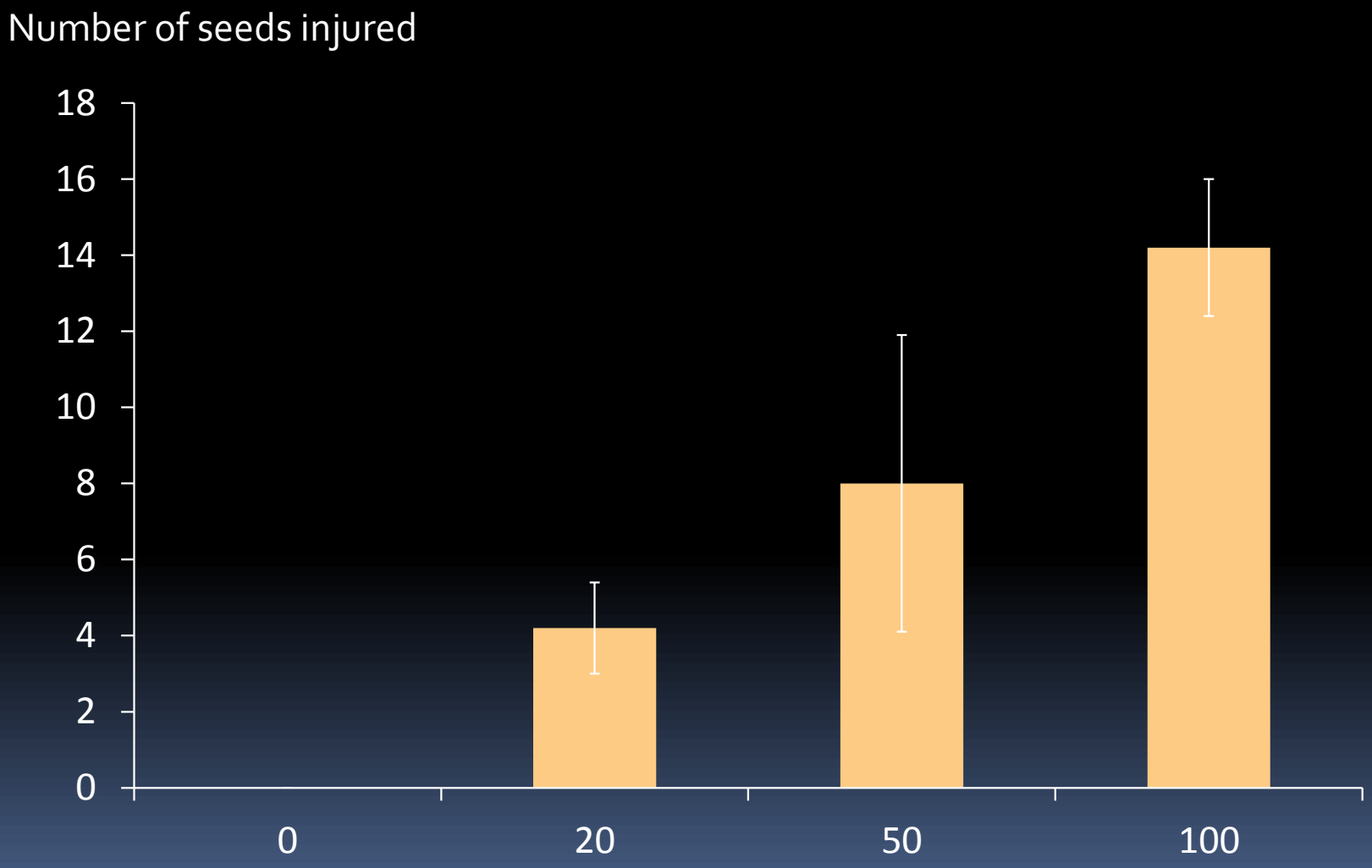


Without springtail

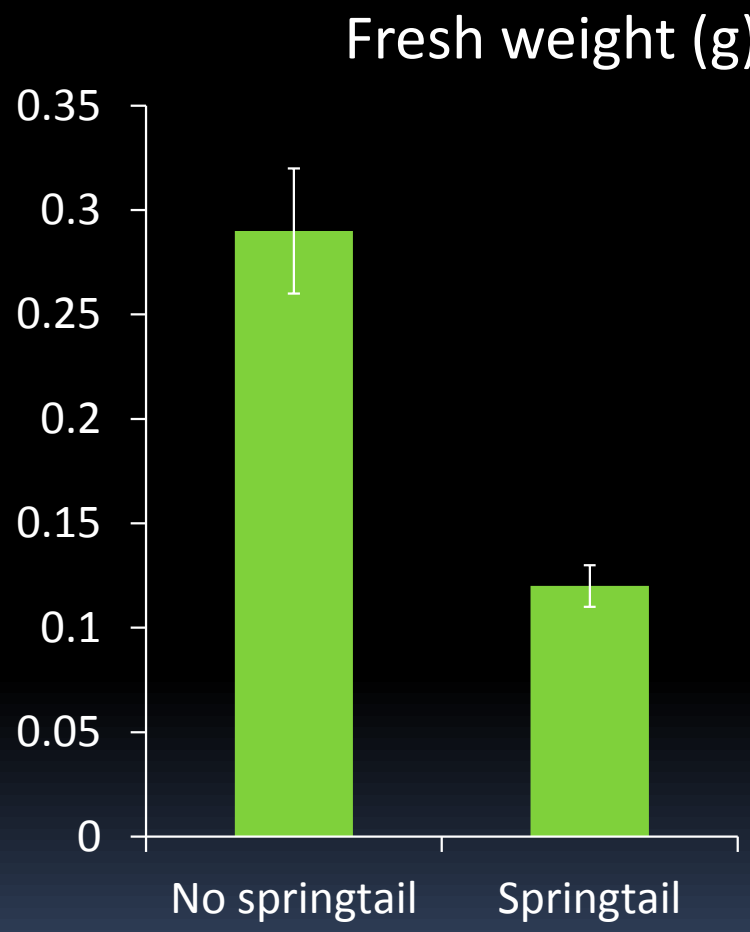


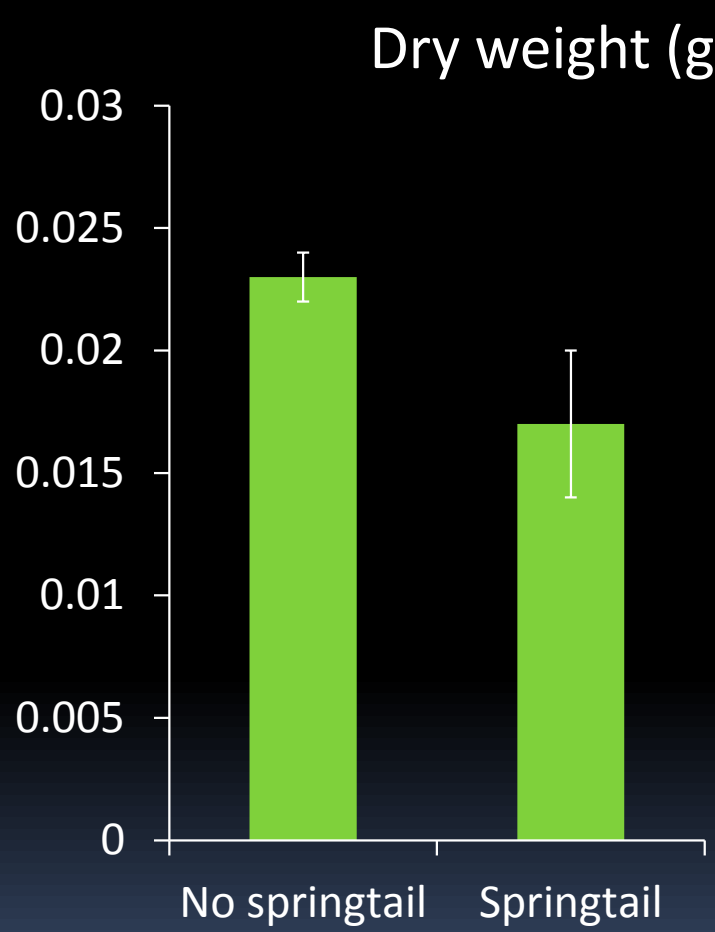
With springtail

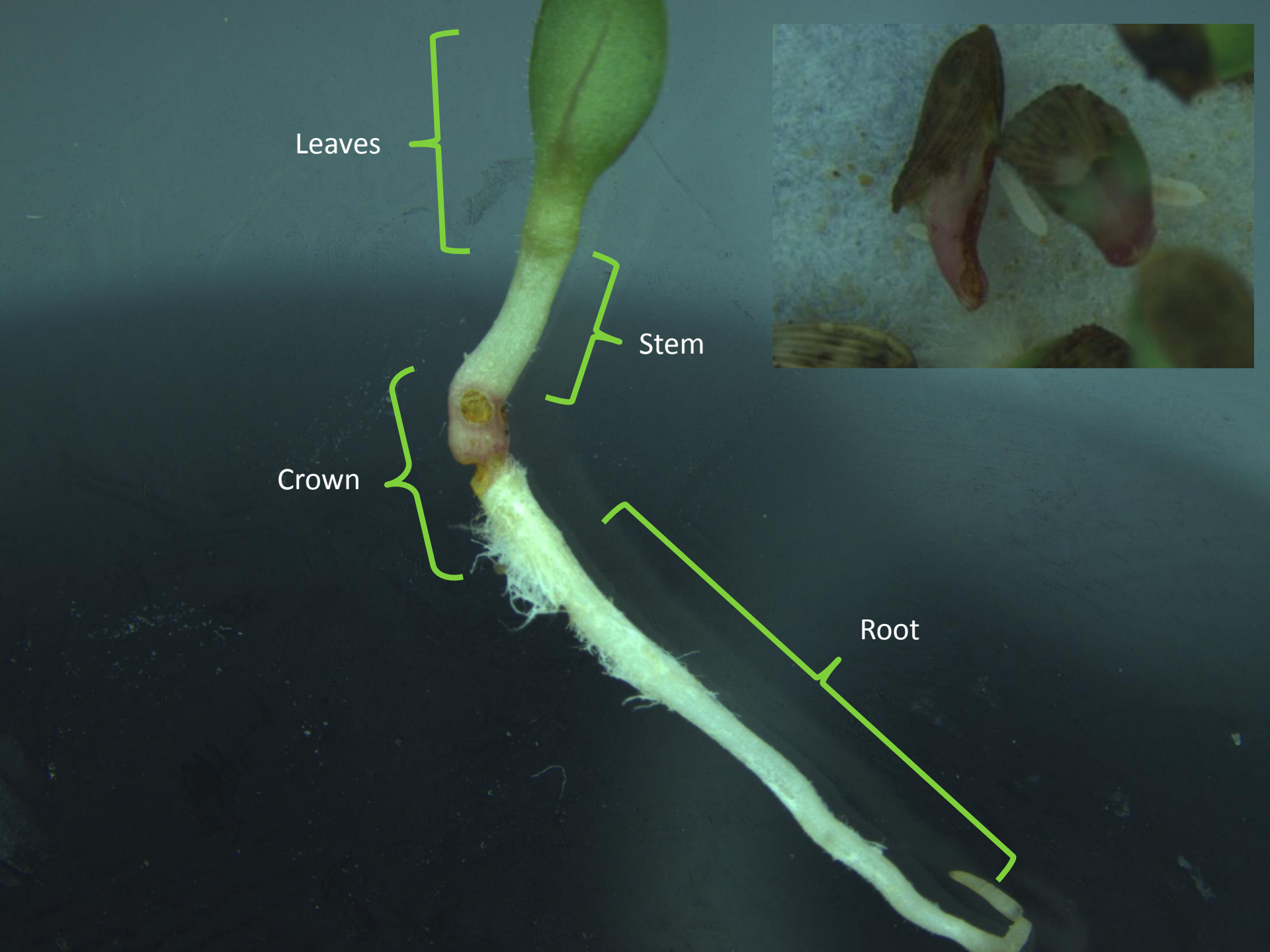
Seed predation



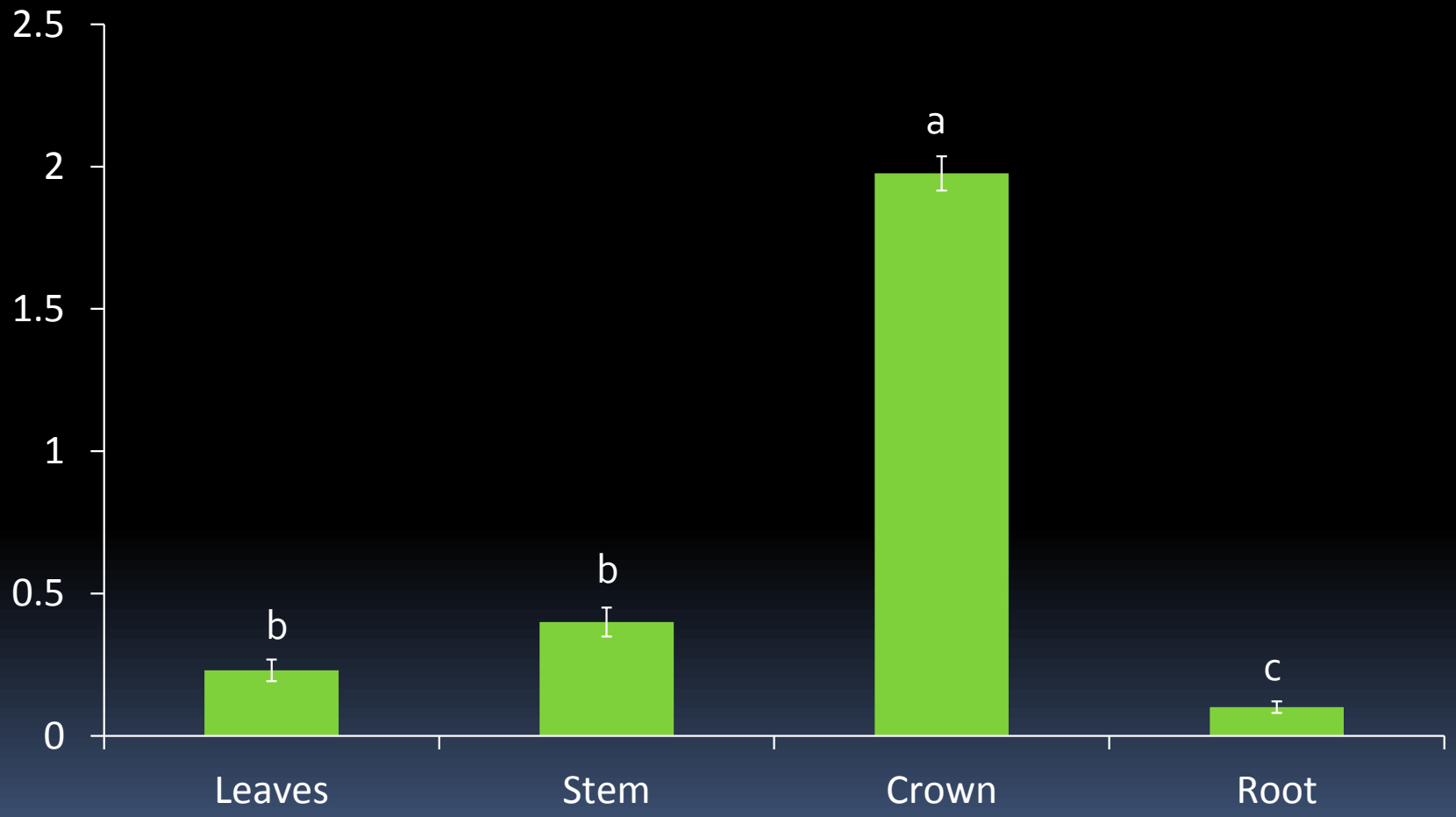
Springtail in soil bioassay






Leaves
Stem
Crown
Root

Site of feeding



Questions

1. What is causing the inconsistent lettuce stand?
2. Would springtails feed on geminating seeds/plants?
3. How to monitor springtail in lettuce and what are the best traps?
4. How long we should deploy the traps in the field?

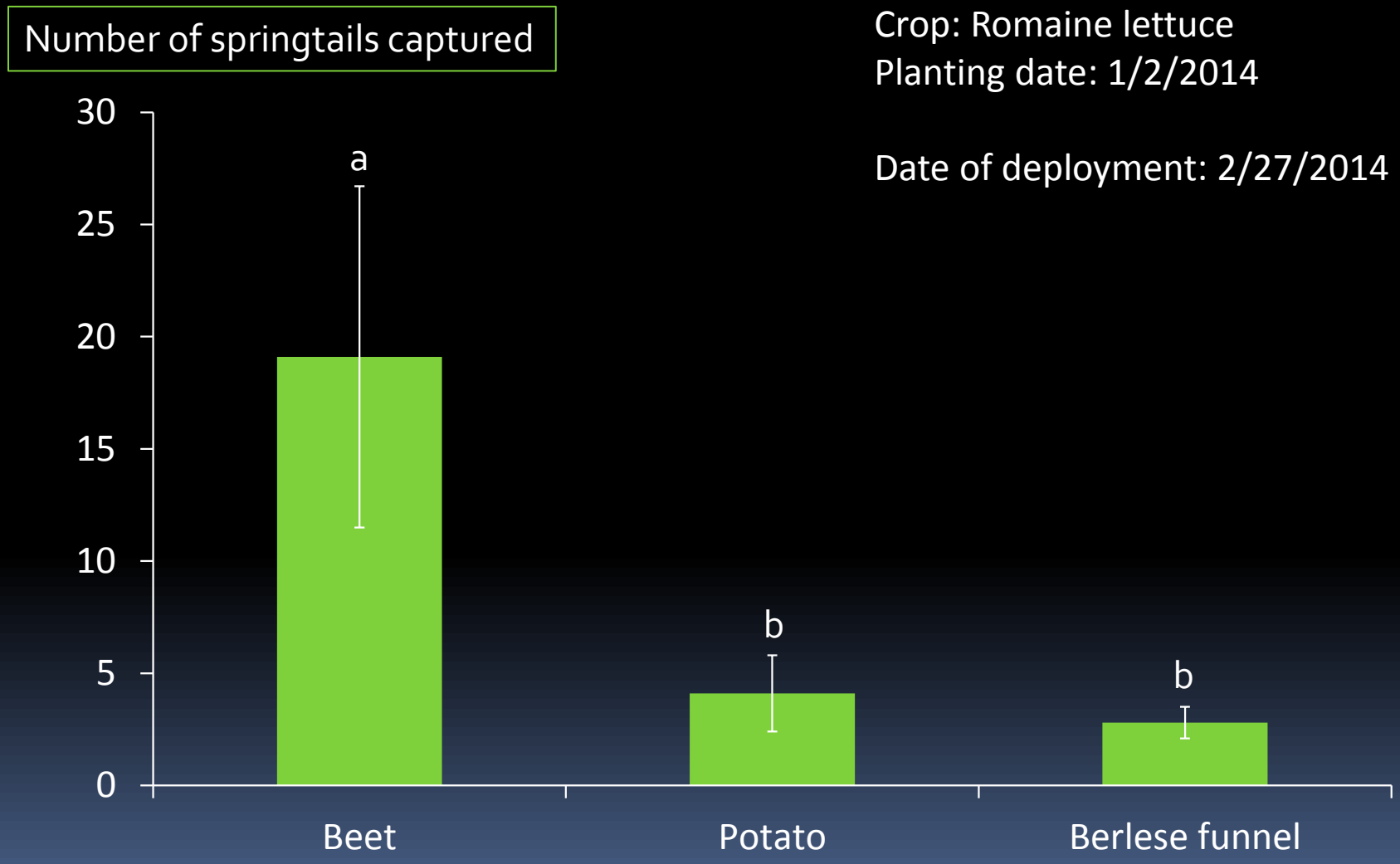
Trap comparison

Beet

Potato

Berlese funnel

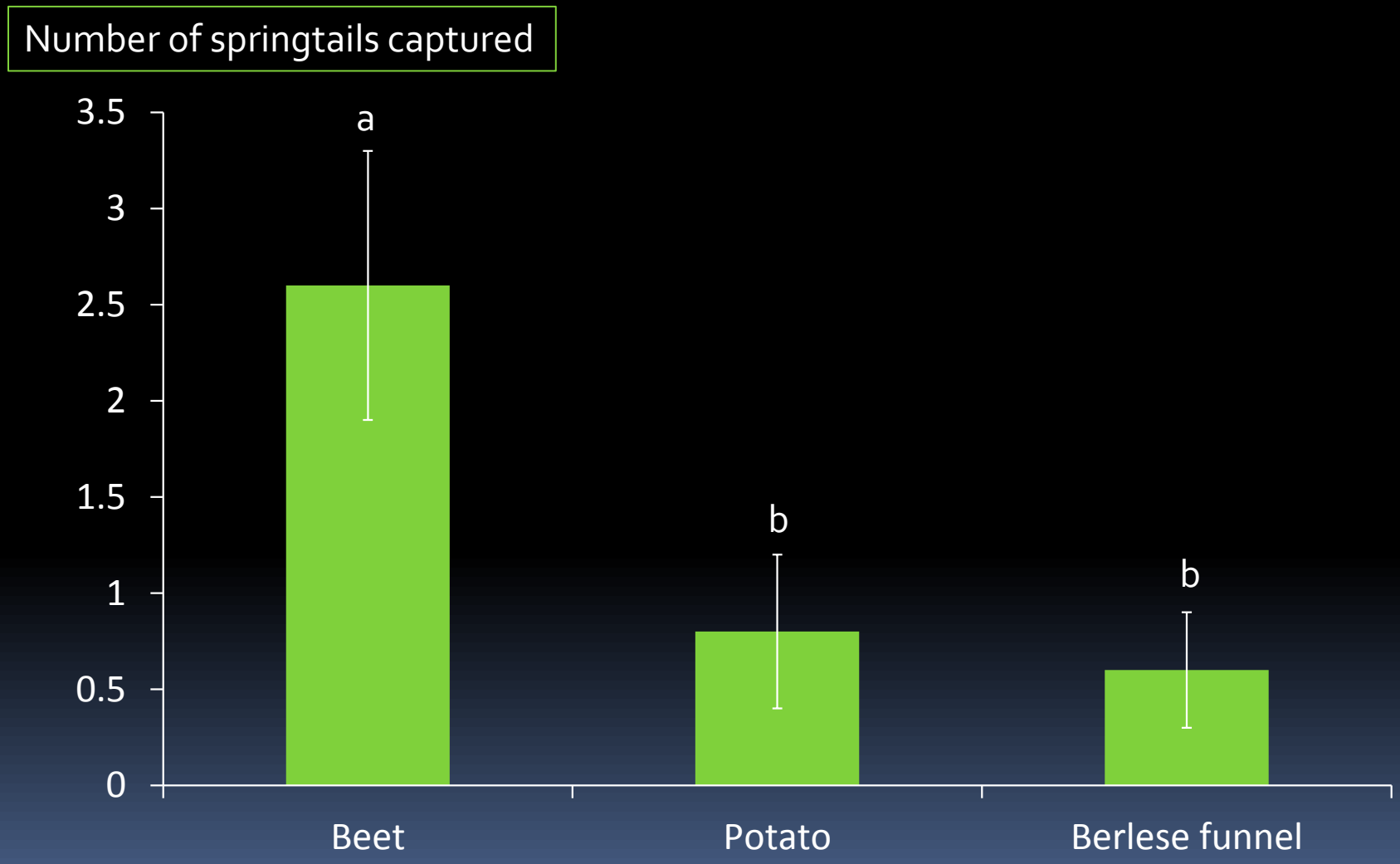
Trap comparison 1



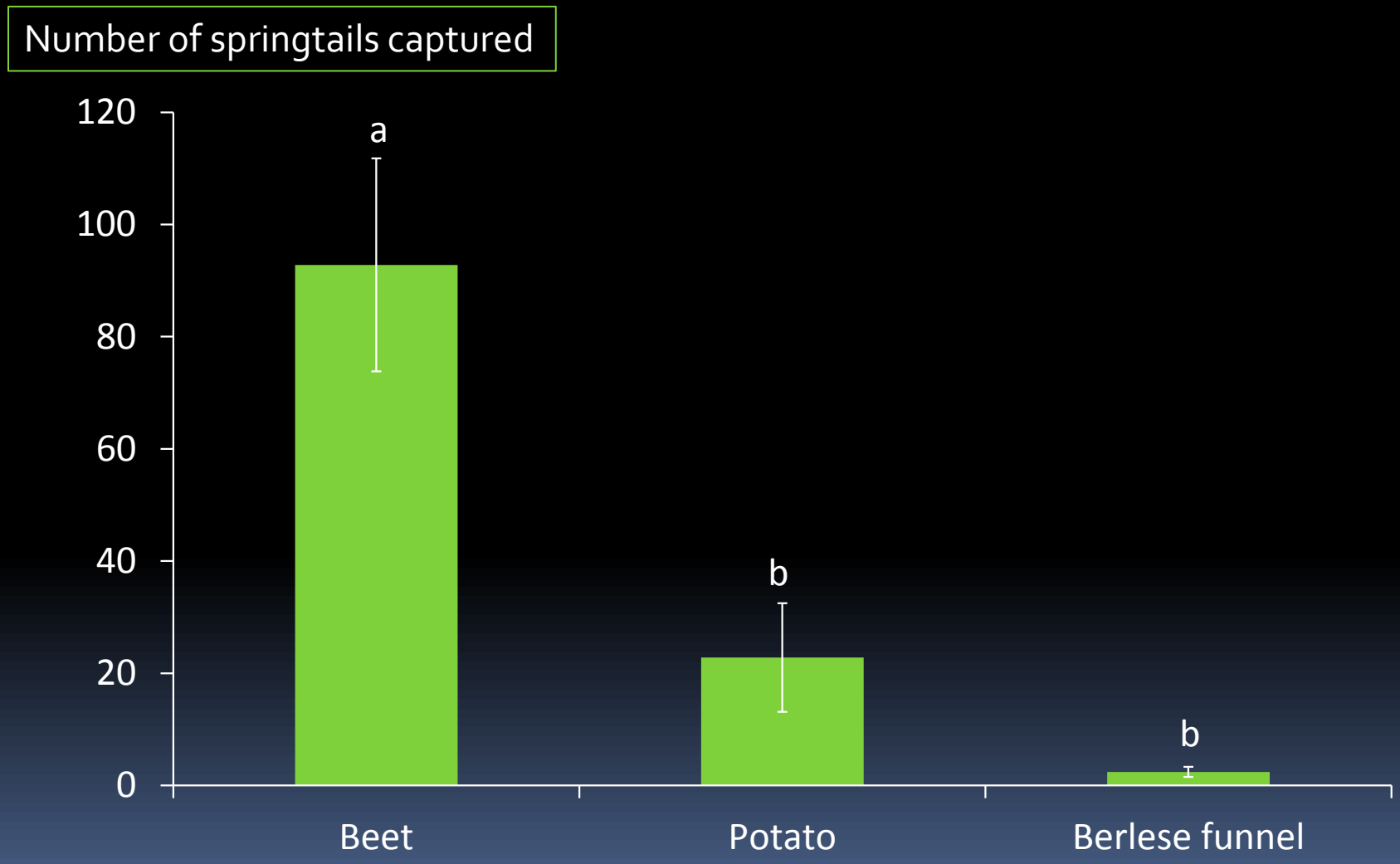
Crop: Romaine lettuce
Planting date: 1/2/2014

Date of deployment: 2/27/2014

Trap comparison 2

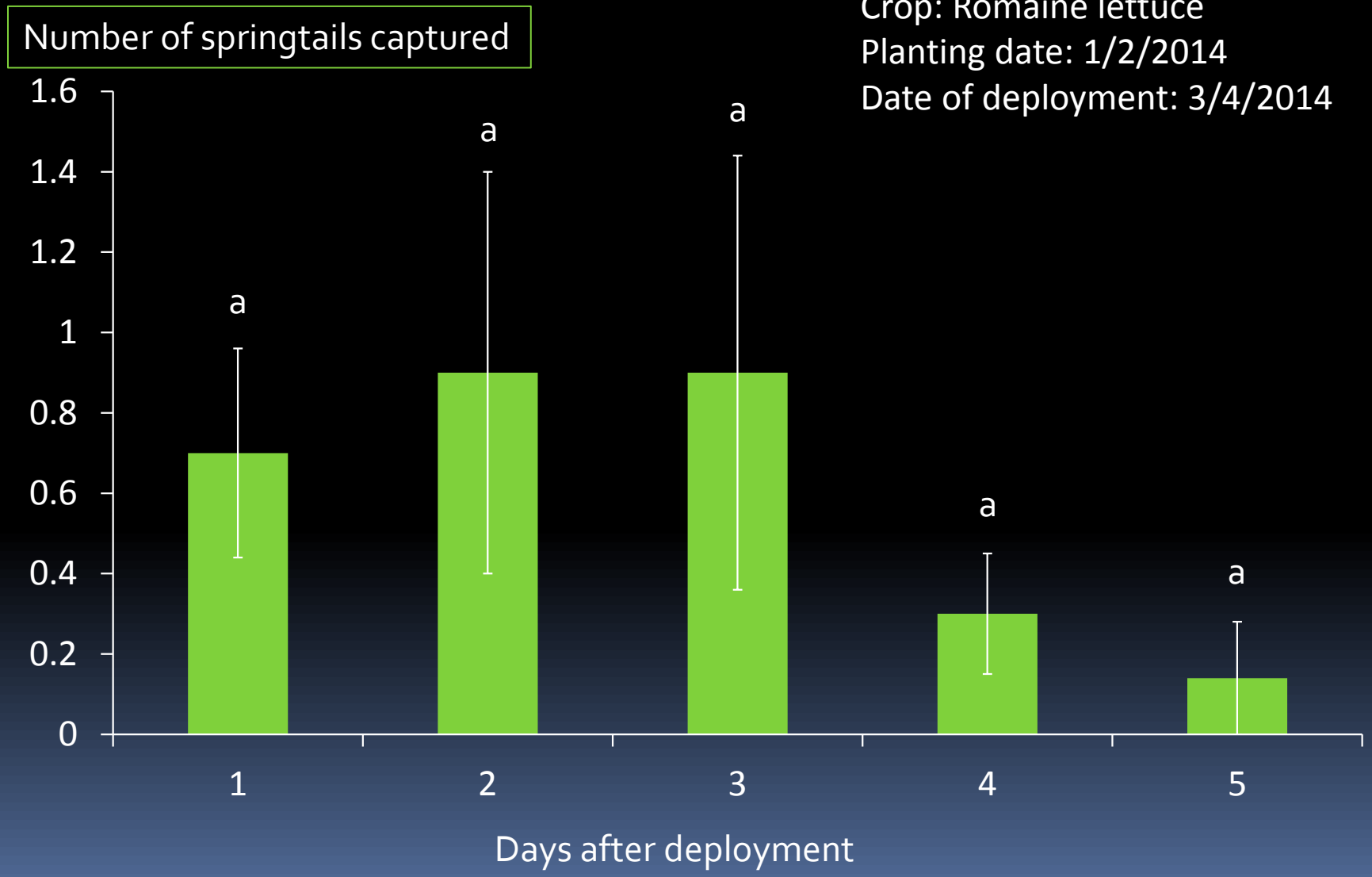


Trap comparison 3



Trial 1: Beet trap age

Crop: Romaine lettuce
Planting date: 1/2/2014
Date of deployment: 3/4/2014



Trial 2: Beet trap age

Number of springtails captured

Date of deployment: 3/11/2014

Summary

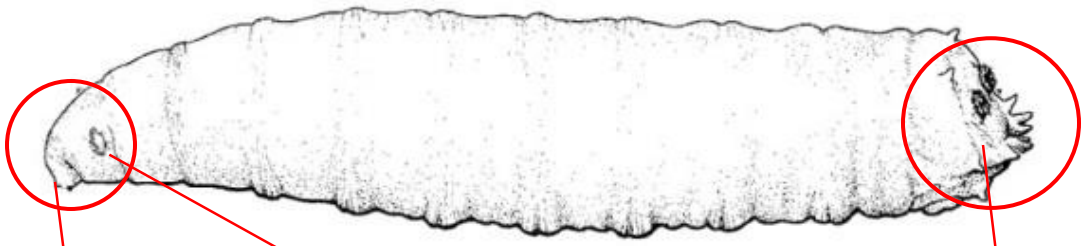
- The white springtail (*Protaphorura fimata)* is a pest of lettuce
- They feed on the germinating seeds of lettuce
- Beet is the better bait than potato for monitoring this springtail
- Do not leave the beet more than 3 days for monitoring

Cabbage maggot

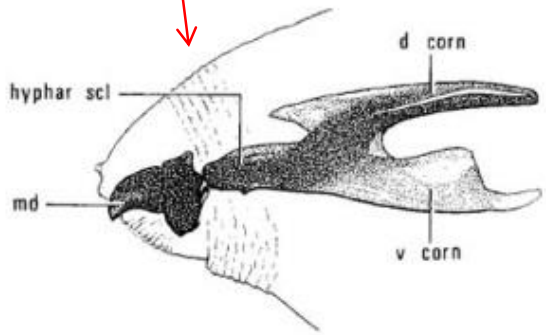
Diptera (Anthomyiidae)

- *Delia radicum* L. – cabbage maggot
- *Delia antiqua* (Meigen) – onion maggot
- *Delia platura* (Meigen) – seed corn maggot
- *Delia floralis* (Fallen) – turnip maggot
- *Delia florilega* (Zetterstedt) – bean seed maggot
- *Delia brunnescens* (Zetterstedt) – carnation maggot
- *Delia echinata* (Seguy) – carnation tip maggot

Cabbage maggot



52 Delia radicum



53 Delia radicum

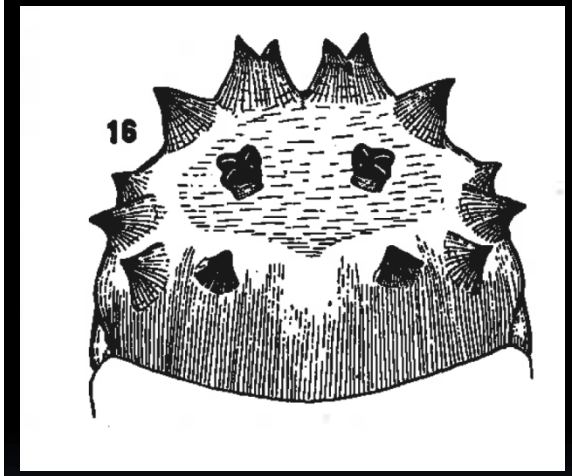
54 Delia radicum 55

Figs. 104.52–55. Larva of *Delia radicum* (Linnaeus): (52) mature larva, left lateral view; (53) details of cephalopharyngeal skeleton of mature larva, left lateral view; (54) left anterior spiracle, lateral view; (55) left posterior spiracle, dorsal view.

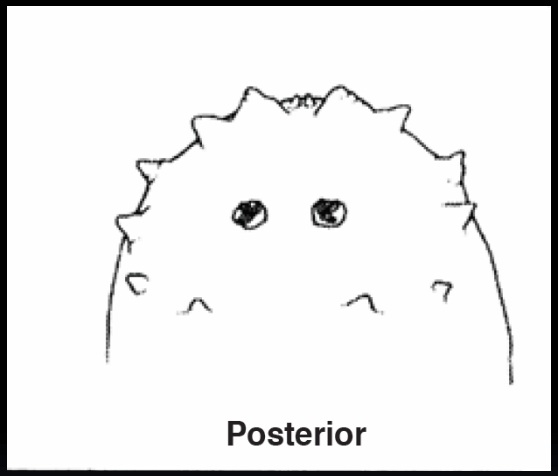
Abbreviations: d corn, dorsal cornu; hyphar scl, hypopharyngeal sclerite; md, mandible; v corn, ventral cornu.

Brooks 1951

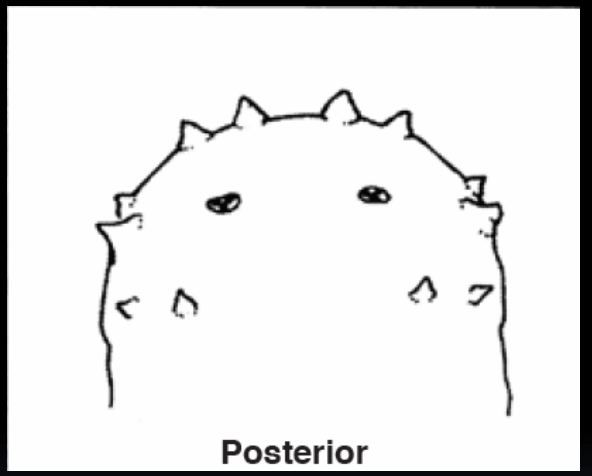
Root maggot - Larvae



Cabbage maggot

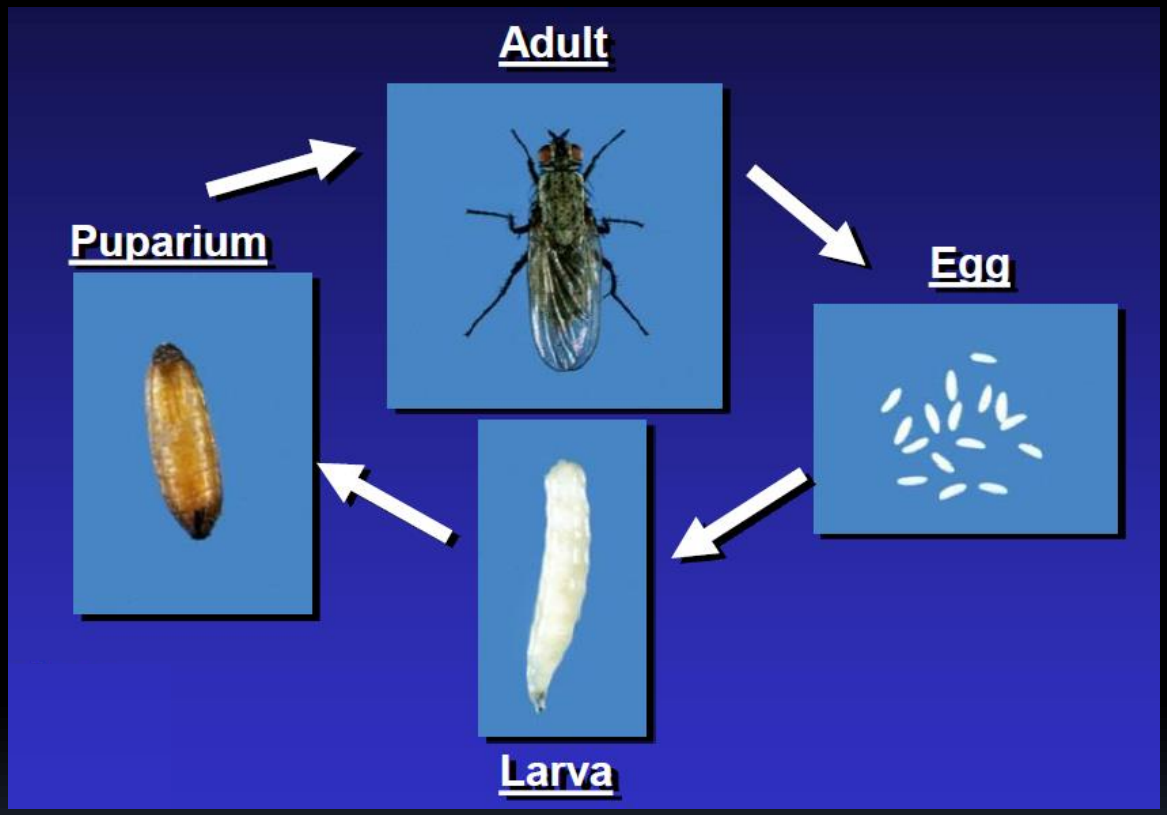


Onion maggot



Seedcorn maggot

Life history



- Feeds on roots of cool season vegetables


Root collar region
New roots
Root maggots feeding

Induction and Termination of Winter Diapause in a Californian Strain of the Cabbage Maggot (Diptera: Anthomyiidae)

ABSTRACT Populations of the cabbage maggot, *Delia radicum* (L.), occur in the field during all seasons in coastal northern California because the climate is mild, hosts are available, and a percentage of the population does not enter diapause. Laboratory experiments on this

Environ. Entomol. 26(1): 84–90 (1997)

ABSTRACT Populations of the cabbage maggot, *Delia radicum* (L.), occur in the field during all seasons in coastal northern California because the climate is mild, hosts are available, and a percentage of the population does not enter diapause. Laboratory experiments on this population of the cabbage maggot showed the following 6 results: (1) criteria for diapause vary with the conditions that induce diapause, (2) the proportion of larvae entering diapause is highest at low temperatures across all photoperiods and at short photoperiods across all temperatures, (3) developmental times of larvae producing diapause pupae were longer than for those producing nondiapause pupae, (4) rearing larvae at high temperatures and short photoperiods increased the diapause period for the pupal stage, (5) average pupal weights of diapause pupae (20.20 ± 2.27 mg) (mean ± SD) were higher than for nondiapause pupae (18.01 ± 3.31), and (6) fresh pupae weighing <15.5 mg did not complete diapause. The results support previous findings that field populations of *D. radicum* are induced into winter diapause mainly by short photoperiods, whereas temperature has a lesser effect.

KEY WORDS *Delia radicum*, diapause, pupal weight, photoperiod, temperature, developmental time

Research

- Stringent regulation with the use of organophosphate insecticides such as chlorpyrifos and diazinon
- OPs are usually applied “at planting along with seeds”
- With alternate insecticide being used - Timing the insecticide application is critical to protect initial phase of plant development
- In Salinas – broccoli is mostly seeded

Exclusion cage study

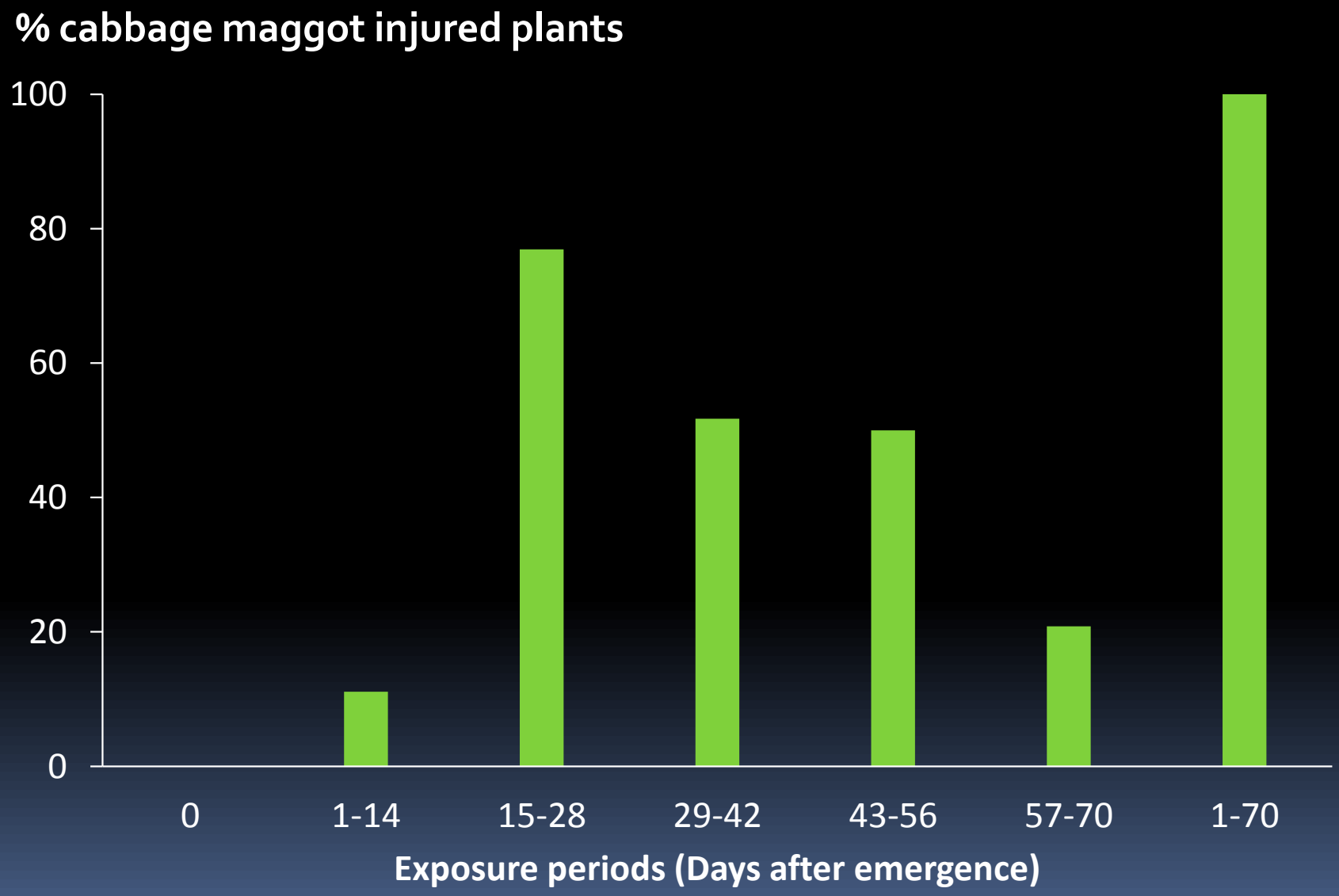
Method: example

Treatment	1st 14-d	2nd 14-d	3rd 14-d
Always exposed			
Exposed in 1st 14-d			
Exposed in 2nd 14-d			
Exposed in 3rd 14-d			
Never exposed			

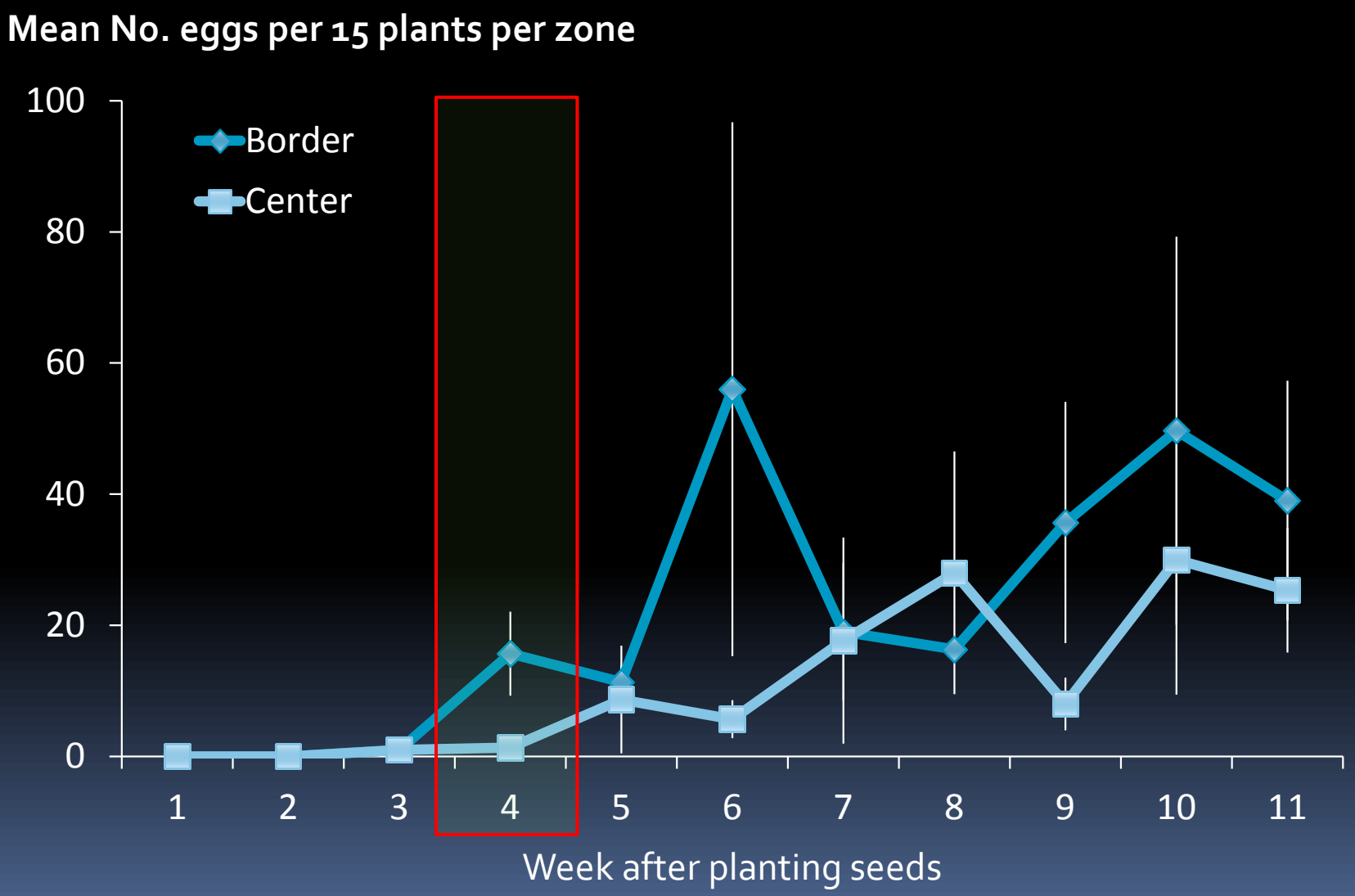
CRB design with 50 reps


At emergence

Results: summer

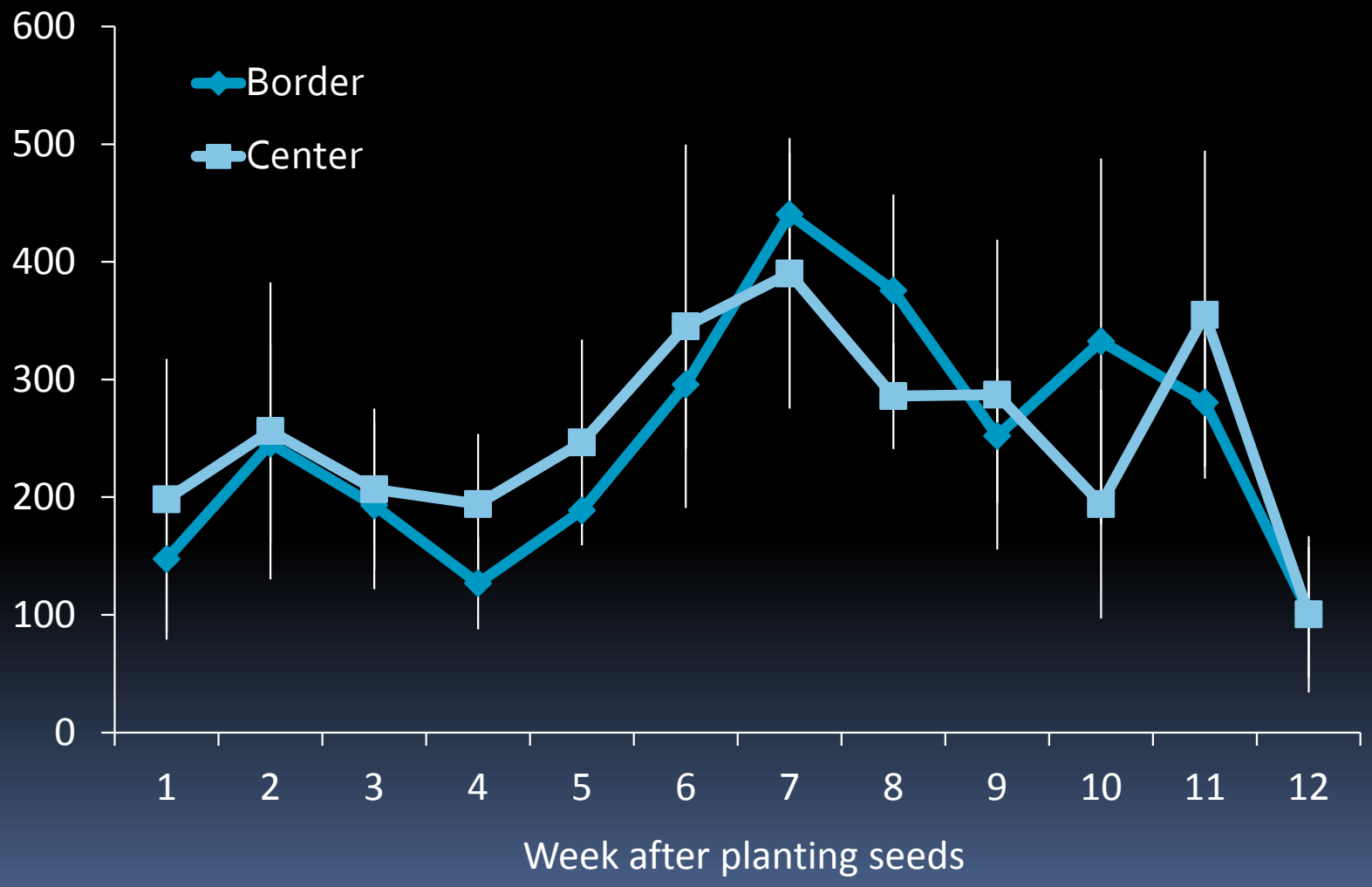


Incidence of CM eggs



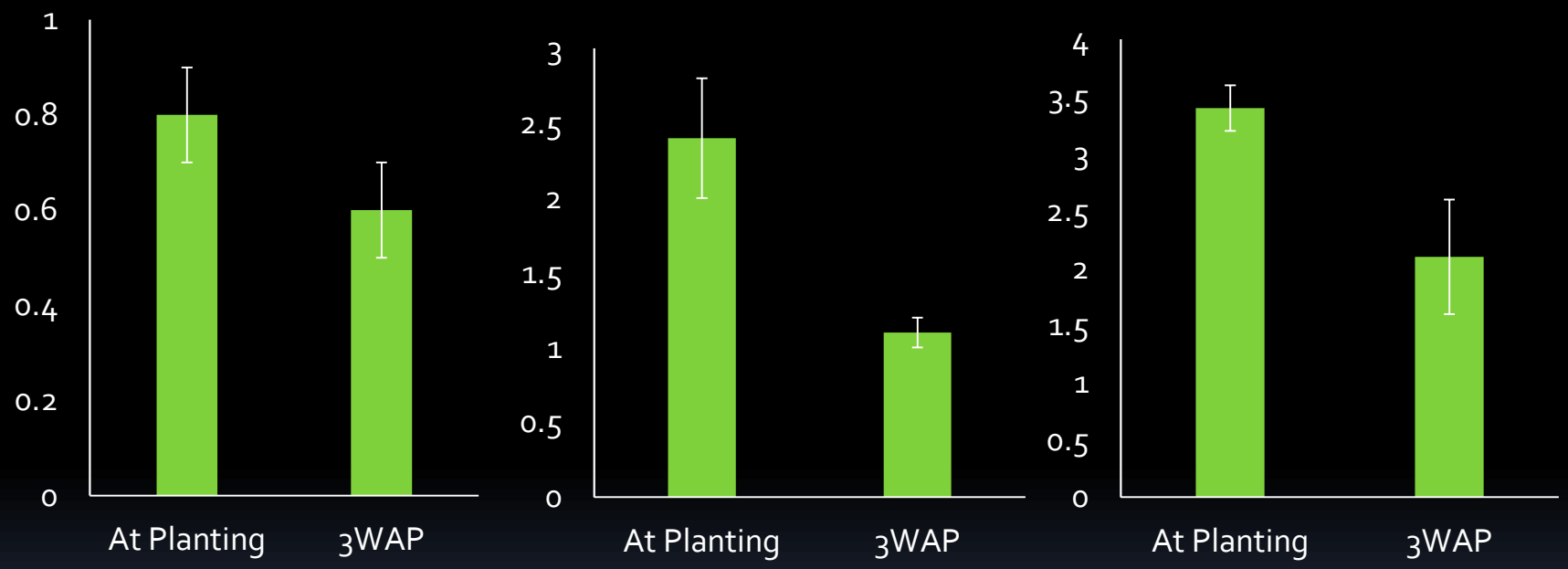
Adults

Mean number of flies per trap per zone



Insecticide application timing - turnip

Severity of cabbage maggot infestation



Insecticide: Chlorpyrifos

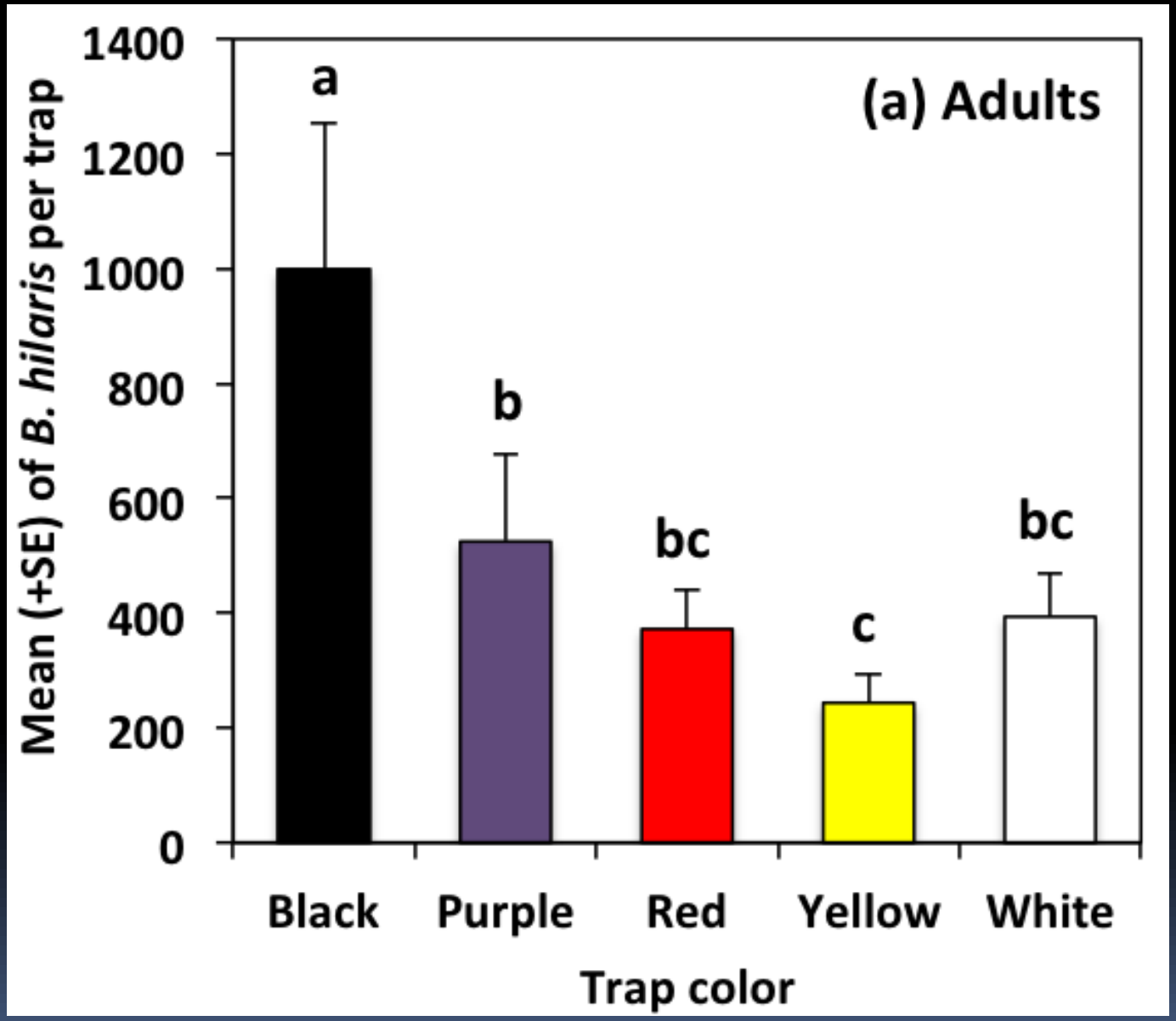
Summary

- For seeded-broccoli: First peak of cabbage maggot egg laying occurred ***three week after plant emergence***
- Cabbage maggot adults were present throughout the growing period
- Insecticide application at ***three week after plant emergence*** looked better on cabbage maggot suppression

- For transplanted-broccoli: cabbage maggot infestation was observed at second week after planting

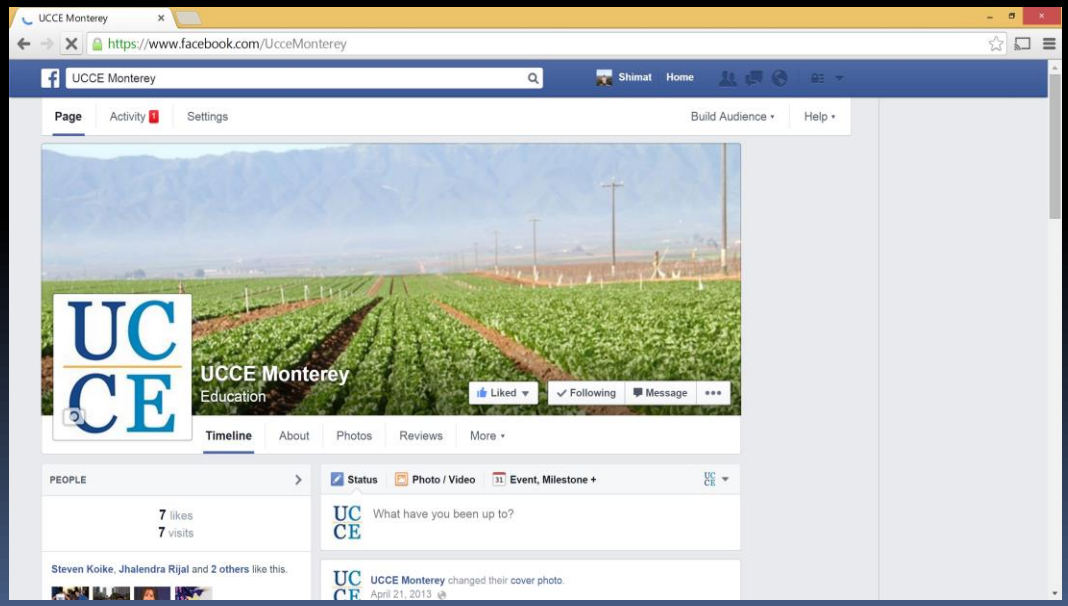
Bagrada bug

Cross-vane trap


(a) Adults
Mean (+SE) of B. hilaris per trap
1400
1200
1000
800
600
400
200
0
a
b
bc
c
bc
Black
Purple
Red
Yellow
White
Trap color

Look for info at:

- Blog: Salinas Valley Agriculture
- Facebook: UCCE Monterey



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