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Tolerance of tipworm injury in cranberry: mechanisms and tradeoffs

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Tolerance of tipworm injury in cranberry: Mechanisms and tradeoffs

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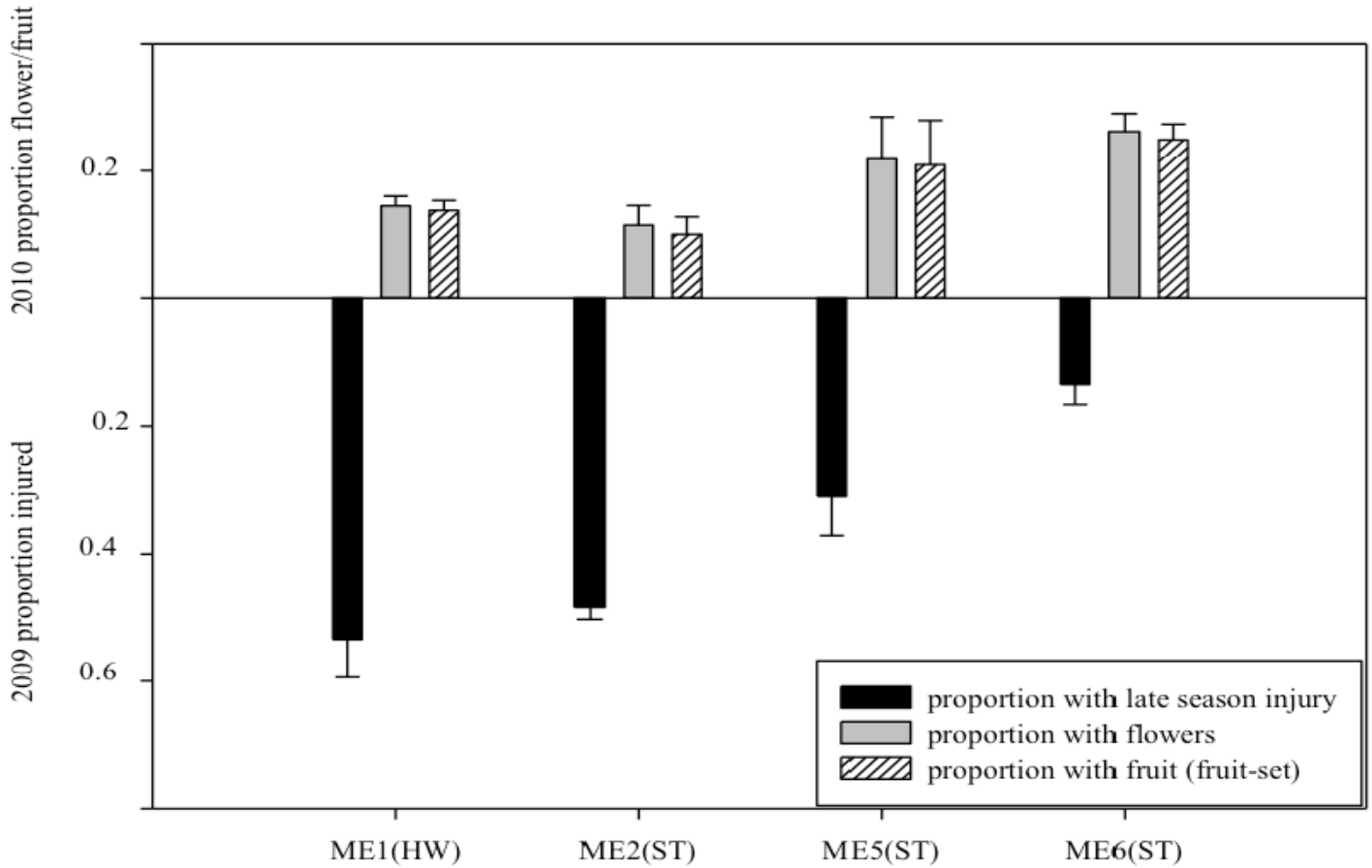
http://www.itsaruby.com/

Recap of past results....

- The key finding of my past work is that majority of cranberry uprights (95%) with tipworm feeding injury at the end of growing season, do not produce flowers in the next growing season.
- This result was consistent between Maine and Massachusetts.

Photo credit: Charles Armstrong, UMaine Extension

Recap continued…



Recap continued….

- Also, majority of flowering uprights injured early in the growing season do not produce side-shoots before the end of growing season (*Howes* & *Stevens*).

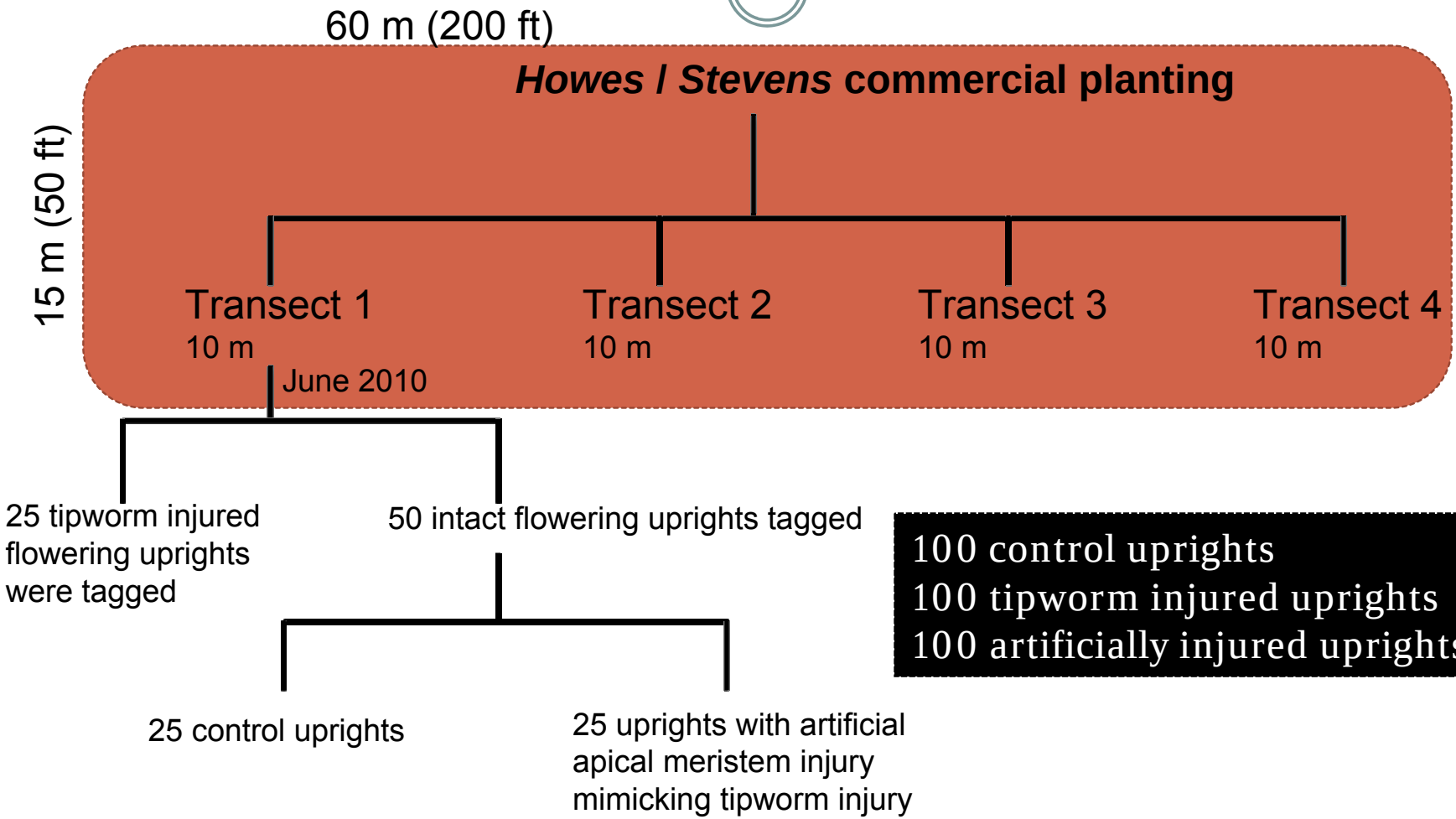
- Question: What is the flowering and growth response of uprights that produce side-shoots after tipworm-injury (in the next growing season)?

What about flowering and growth (next growing season) in uprights that produce side-shoots after tipworm injury?

No flowering

?

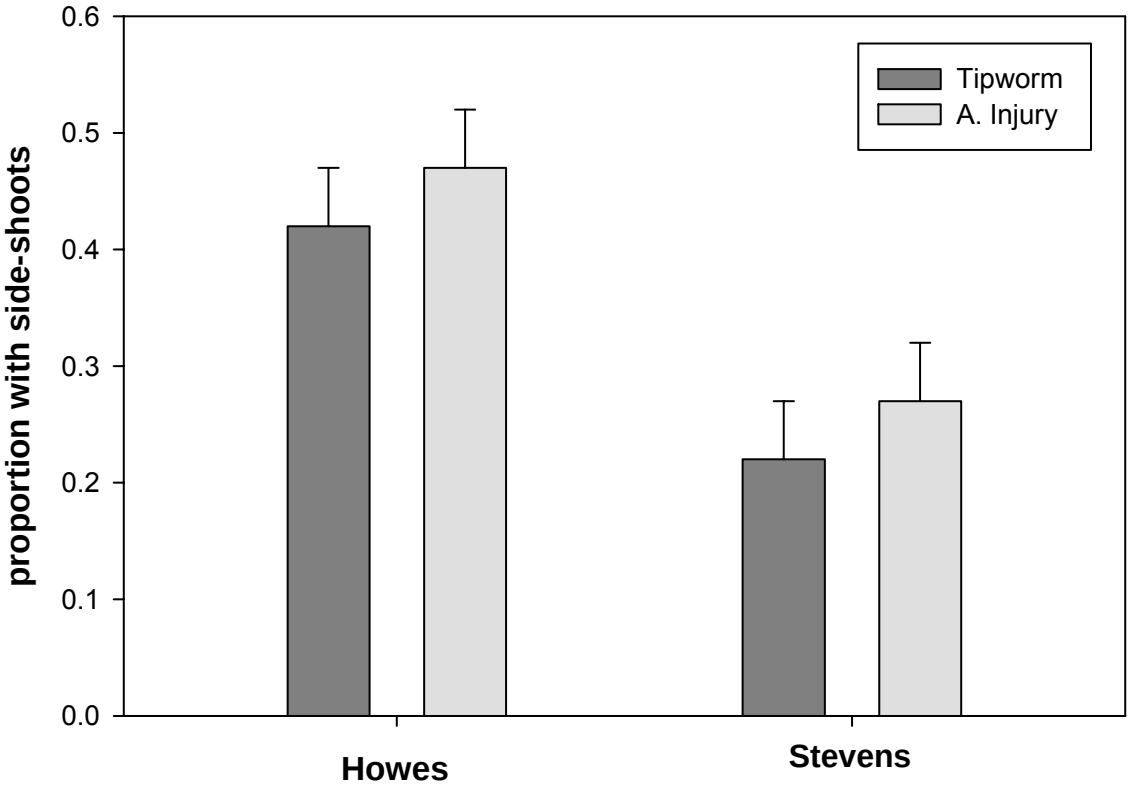
Study Design…



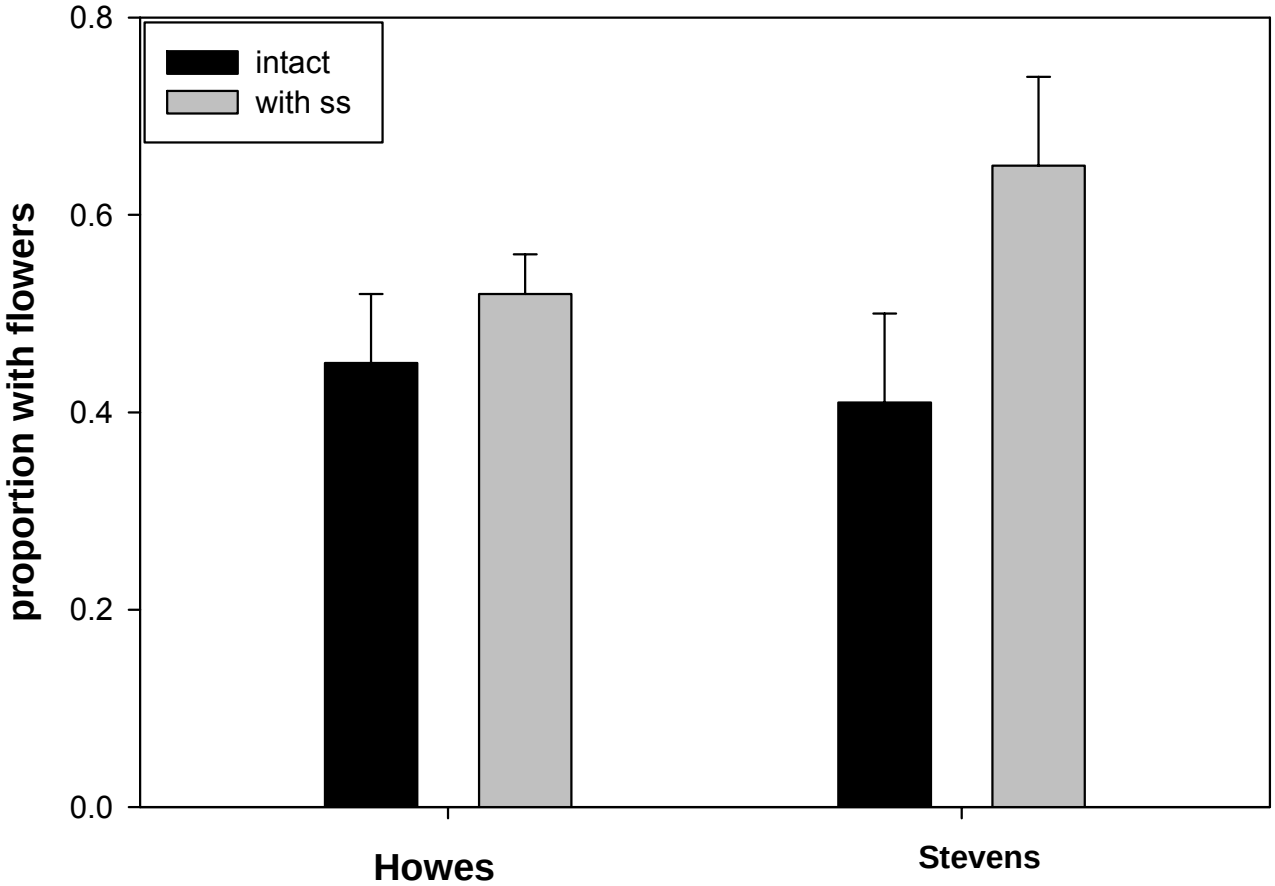
100 control uprights
100 tipworm injured uprights
100 artificially injured uprights

Result 1

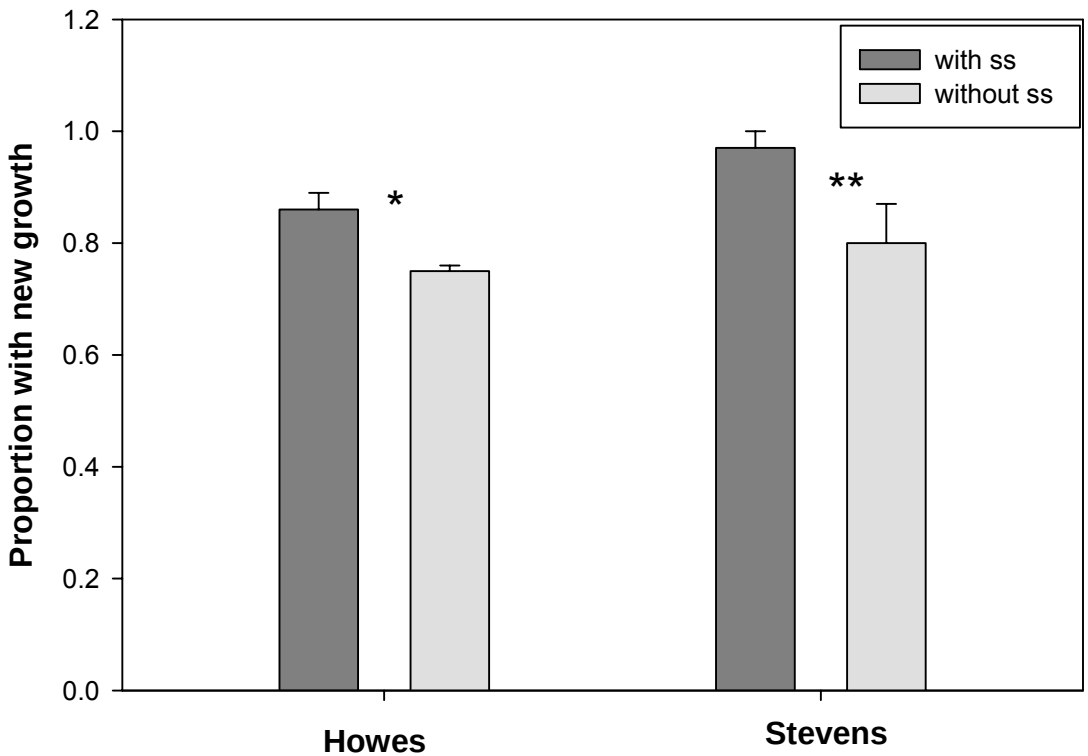
Uprights of *Howes* are more likely to produce side-shoots than *Stevens.*
No difference in side-shoot production between the two types of injuries.



Result 2: uprights with side-shoots were just as likely as intact uprights to flower in the next growing season.



Result 3: Uprights with side-shoots were more likely to resume growth in the next growing season as compared to those without side-shoots.



* → p = 0.001
** → p = 0.024

Important Questions

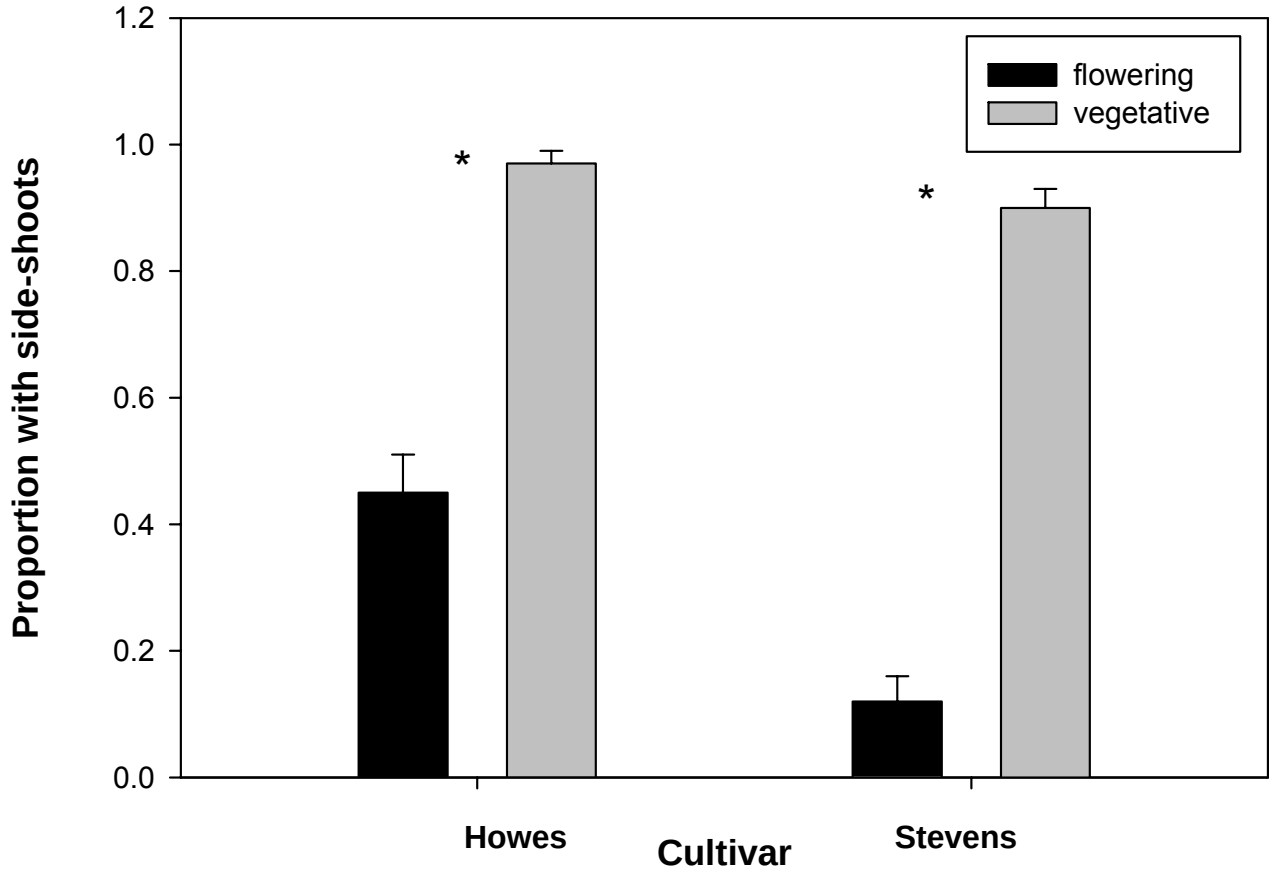
- We have established that side-shoots are important in recovering from tipworm injury.

- However, majority of tipworm-injured uprights do not produce side shoots before the end of growing season (MA – *Howes and Stevens)*.

Question 1: Do flowering and vegetative uprights differ in production of side-shoots after injury?

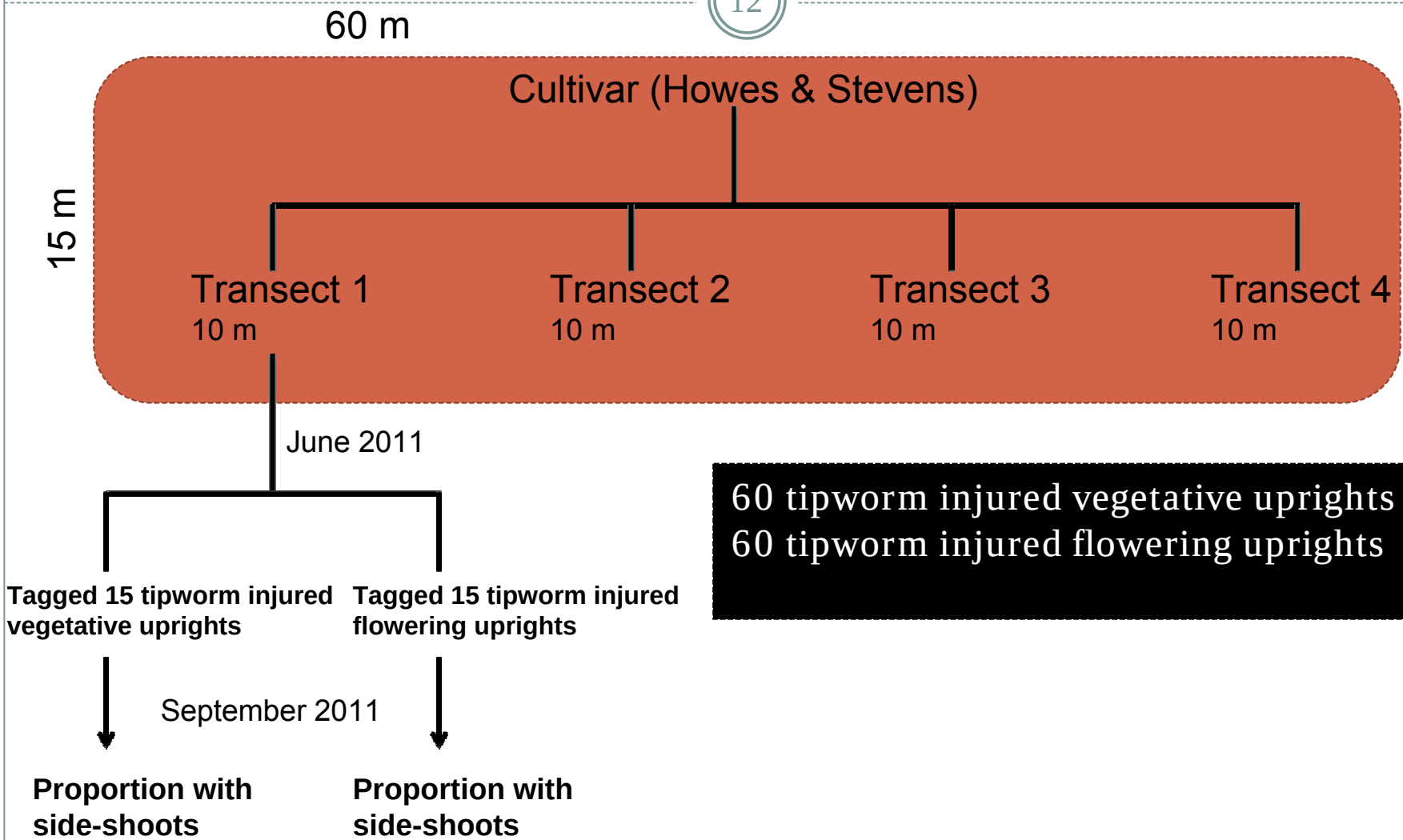
Questions 2: Does the presence of developing flowers/fruits suppress side-shoot production in flowering uprights?

Result (Part 1): After tipworm-injury, vegetative uprights were more likely to produce side -shoots.



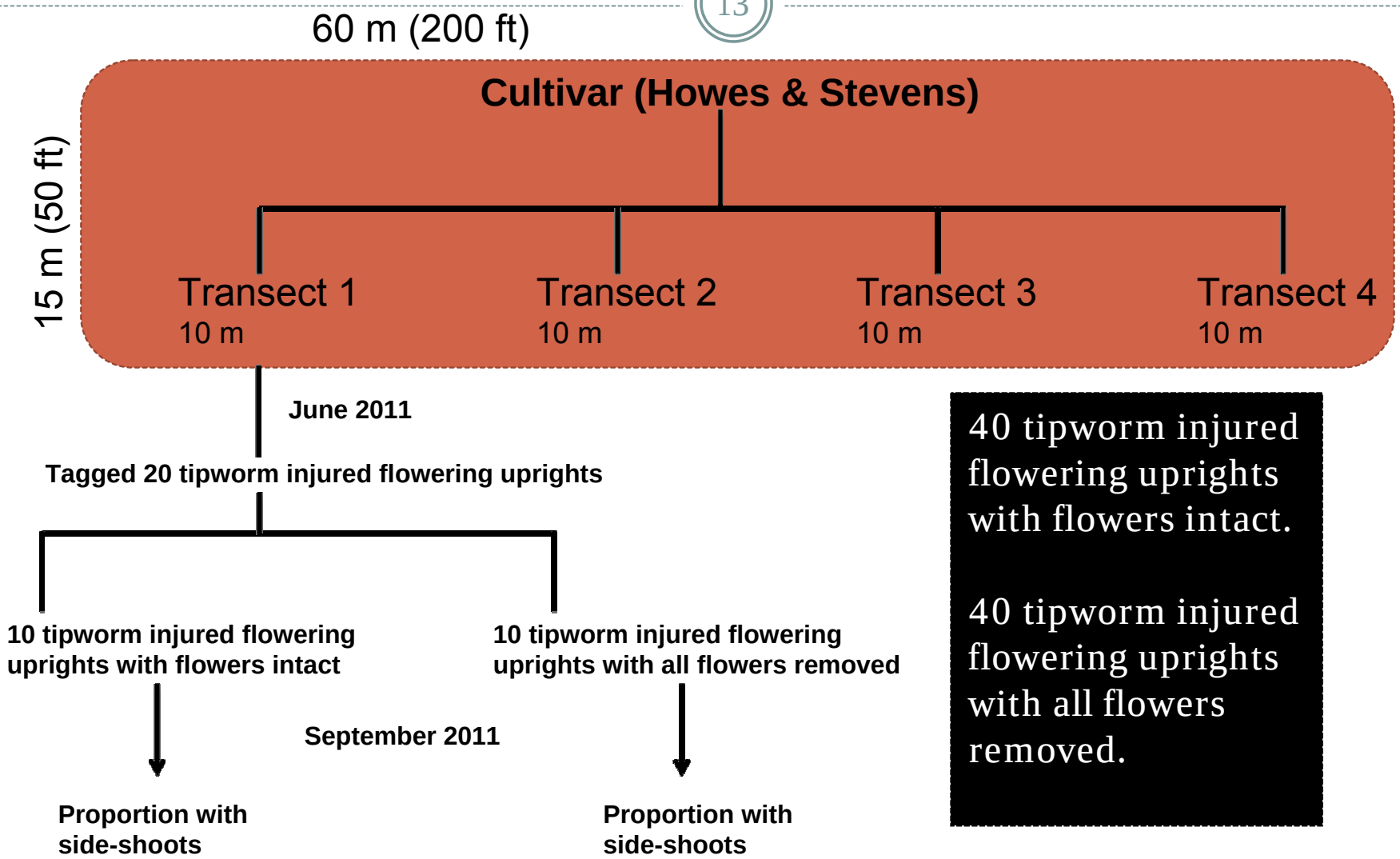
* → $p < 0.0001$

Production of side-shoots: vegetative vs. flowering uprights



60 tipworm injured vegetative uprights
60 tipworm injured flowering uprights

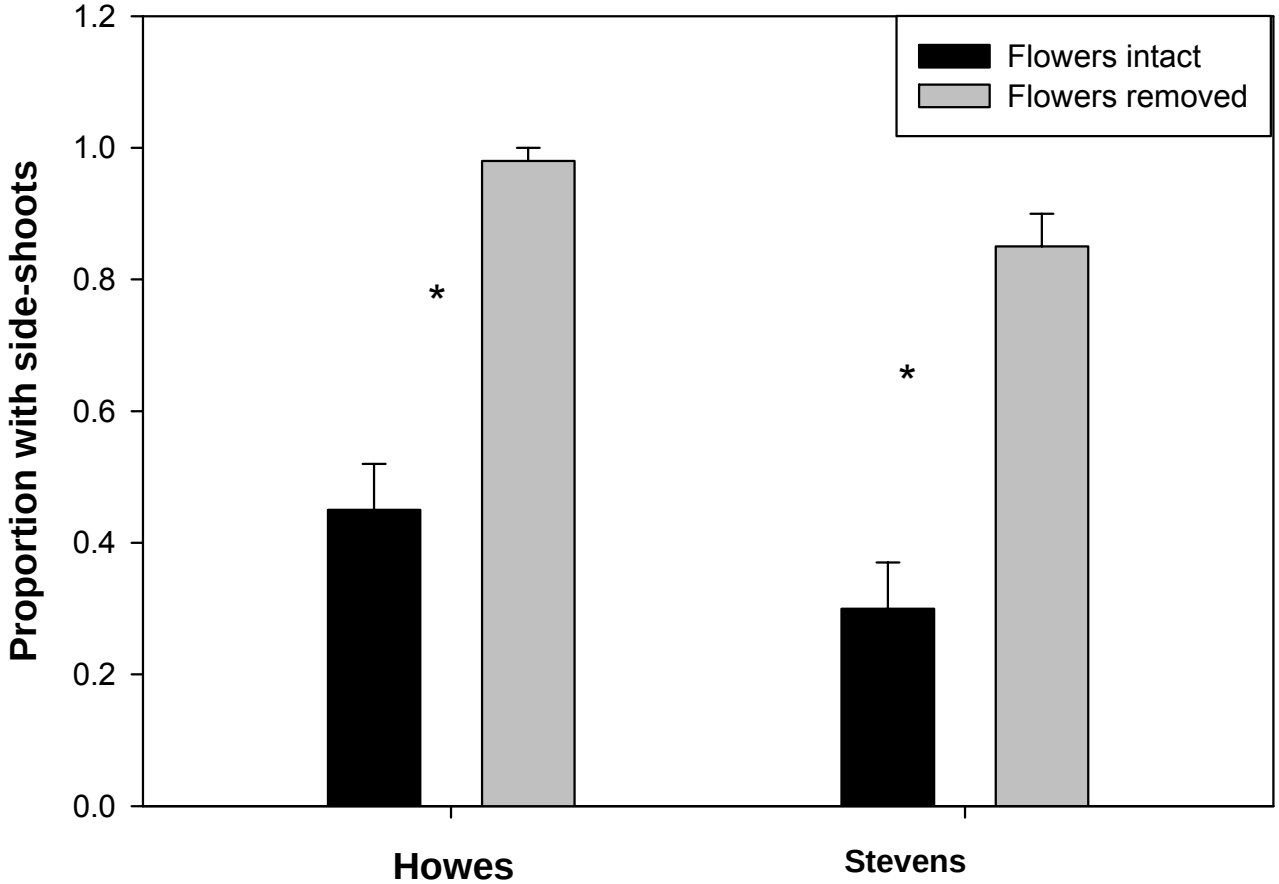
Do flowers/fruits suppress production of side-shoots?



40 tipworm injured flowering uprights with flowers intact.

40 tipworm injured flowering uprights with all flowers removed.

Result: Uprights with all the flowers removed were more likely to produce side-shoots.



- The results demonstrate plasticity in regrowth response of injured flowering uprights.
- Evidence of tradeoff between vegetative and reproductive growth following tipworm injury.

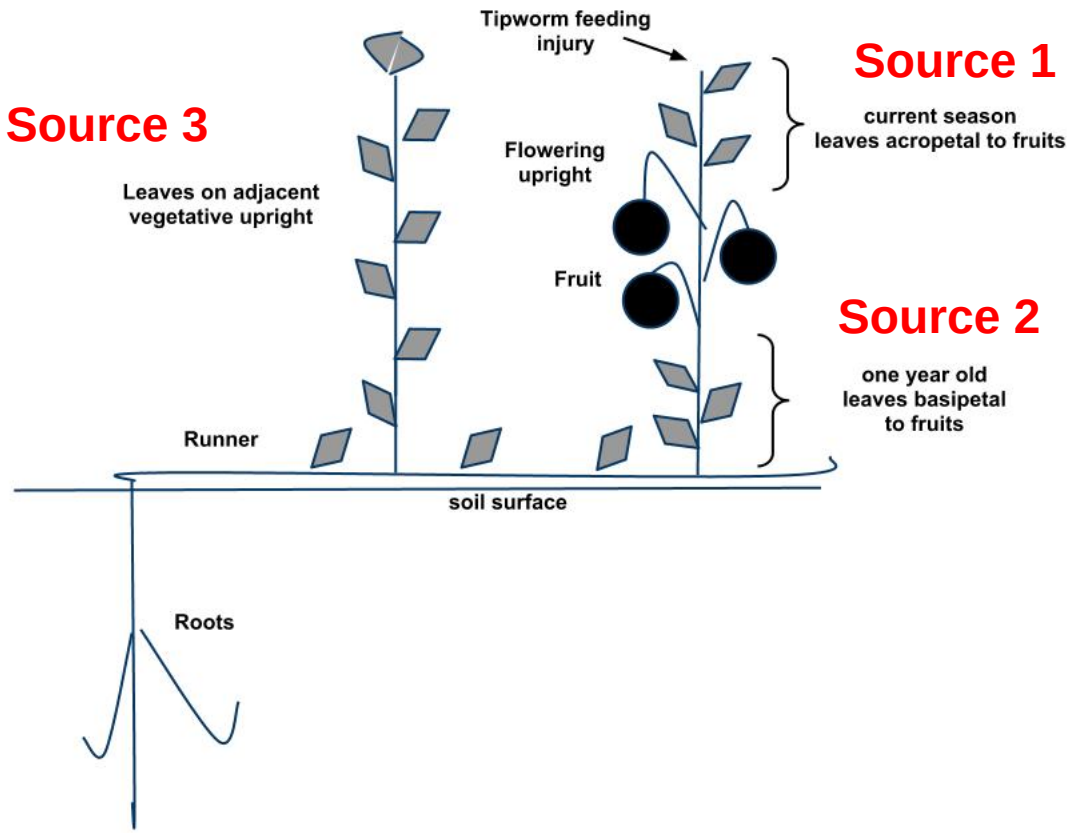
* → $p < 0.0001$

Mechanism and potential costs of tipworm injury tolerance

- Work done in Massachusetts has shown that cranberry cultivars (*Howes*, *Stevens*, *and C. Queen*) can tolerate tipworm injury <u>without a negative</u> impact on fruit biomass.

- I was interested in finding out if the current season growth on an injured upright produces all the resources for the developing fruits or if some of these resources come from other parts of the cranberry vine?

Background

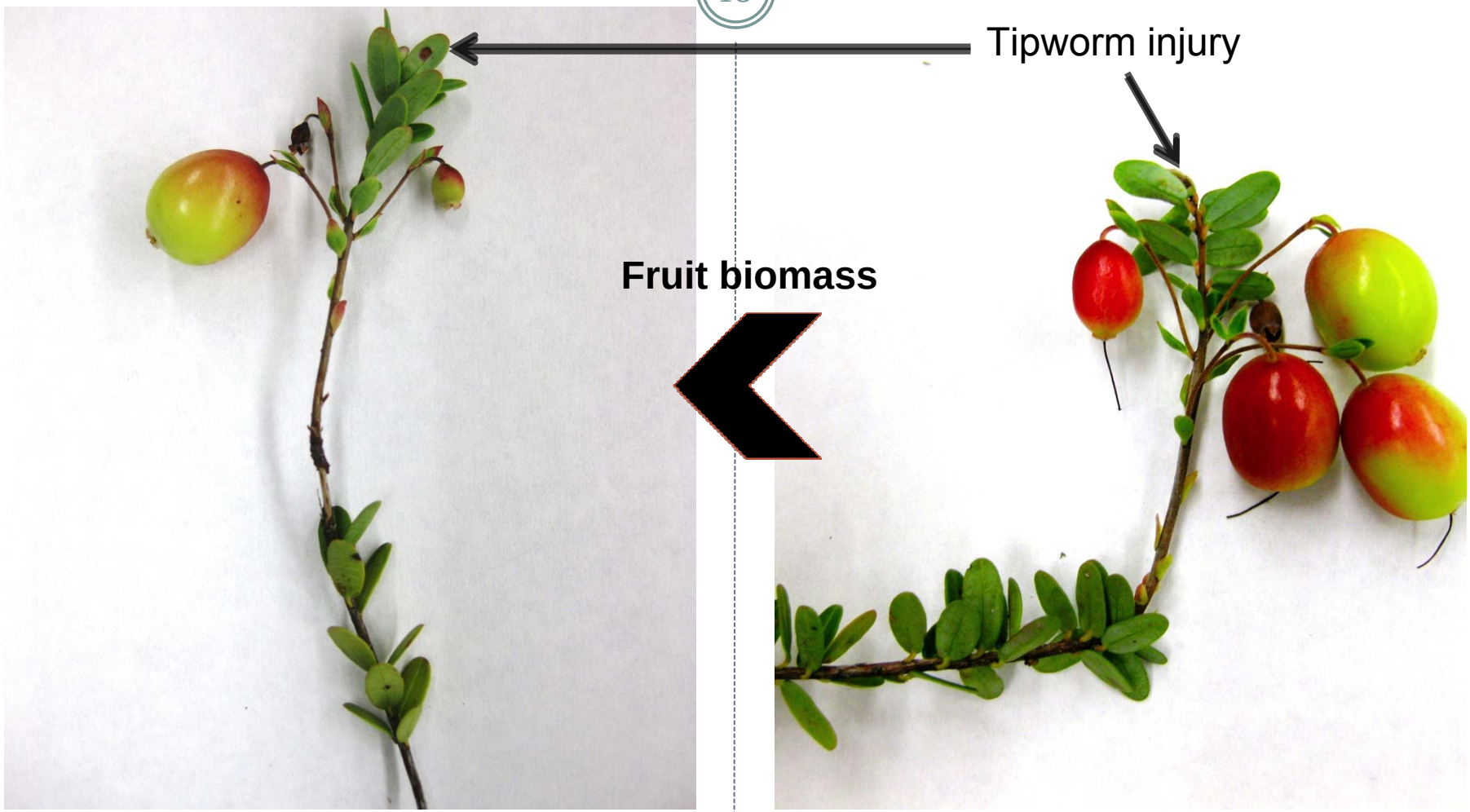

Tipworm feeding injury
Source 1
current season leaves acropetal to fruits
Source 3
Leaves on adjacent vegetative upright
Flowering upright
Fruit
Source 2
one year old leaves basipetal to fruits
Runner
soil surface
Roots

Materials and Methods

Girdling treatment

Control

Comparing girdled vs. non-girdled tipworm injured uprights



Weight of berries was 50% lower in girdled uprights (*Howes* & *Stevens*)

Conclusions

- In tipworm injured uprights, sources other than the current season growth contribute significantly to developing fruits.

- More questions: Does this mean that tolerance of tipworm injury comes at a cost to stored reserves?

Thank you !!!

ANY QUESTIONS/COMMENTS ?