Feeding our foes

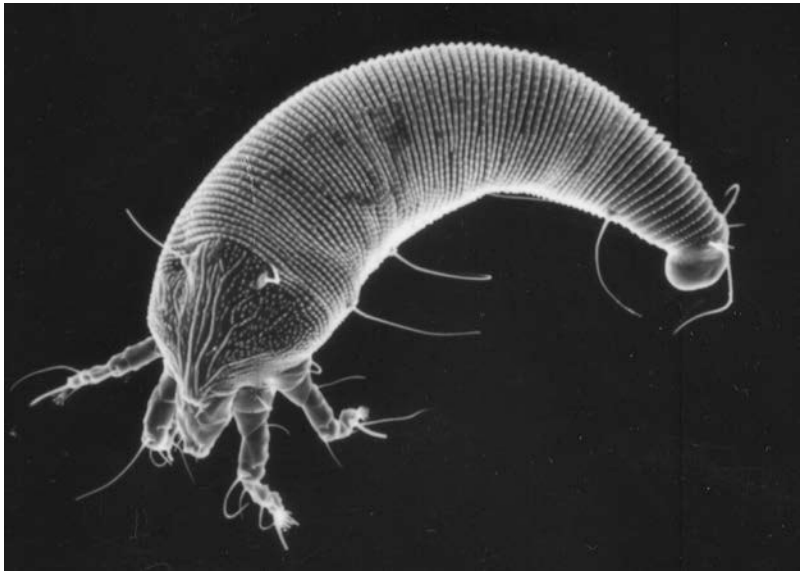
Improvements in the laboratory culturing of two insects

Carolyn Mitchell

The James Hutton Institute

The insects

The vine weevil
Otiorynchus sulcatus

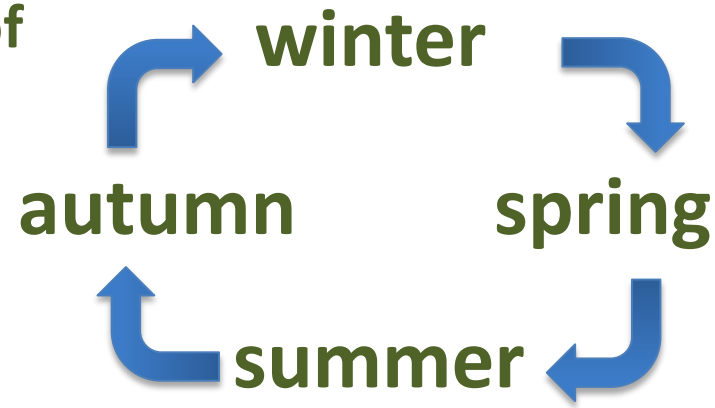


The raspberry leaf and bud mite
Phylocoptes gracalis

RLBM Life-cycle

Overwinter in buds scales and petiole scars

Development of deutrogyne females



Deutrogynes lay fertilised and un-fertilised eggs on the floricane leaves

Population size increases and mites move to the primocanes and the developing flower buds

Eggs develop into protogyne males and females

Raspberry leaf blotch syndrome

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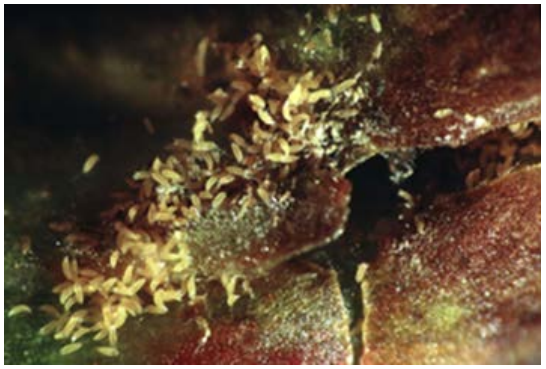
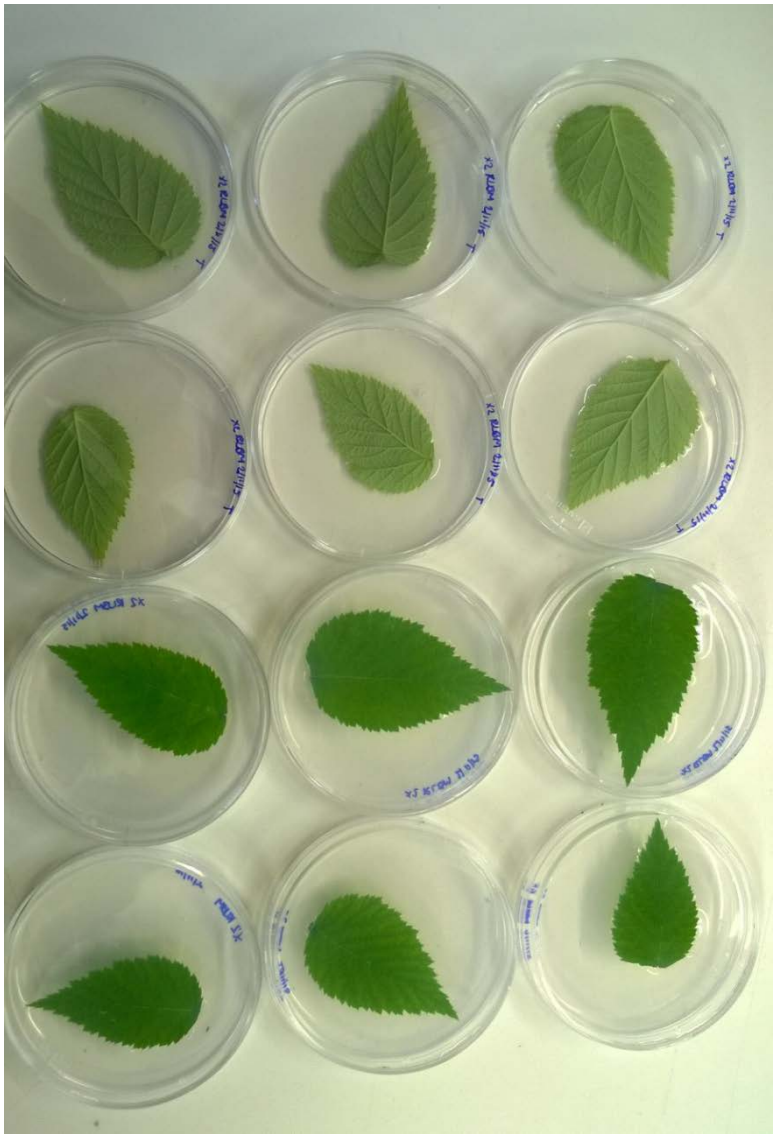


Leaf and bud mite culturing

- Aim
  - To be able to move individual mites without killing them
  - To be able to set up populations of mites from one individual
  - To find a suitable environment to do experimental work

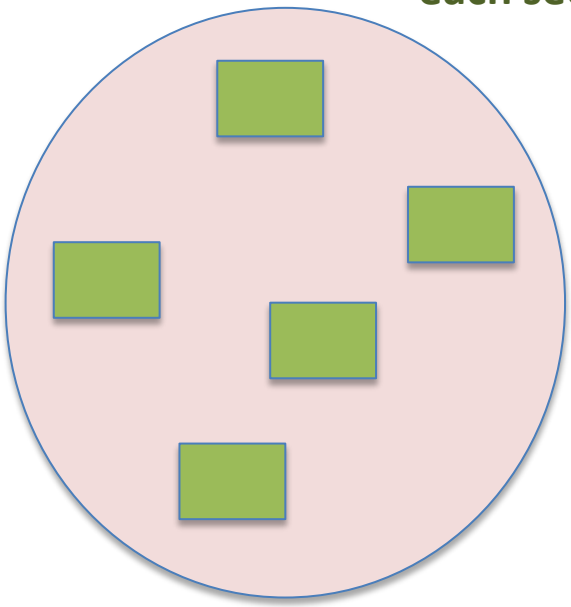
The first two attempts!



Success!

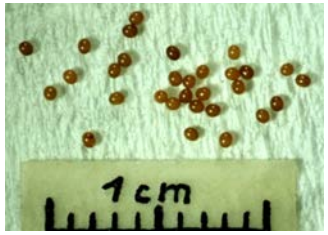
Malling Landmark – underside up

One mite placed on each section



- After 5 weeks there was 60 % survival
- One mite produced 8 young and they were successfully transferred to a new leaf
- Most of the mites were “overwintering” – not the best to use
- How do I find mated females??

Vine weevil life cycle



Adults emerge from the soil in May-June and lay eggs during the summer

EGGS

ADULT LARVAE

PUPA

2 weeks until eggs hatch

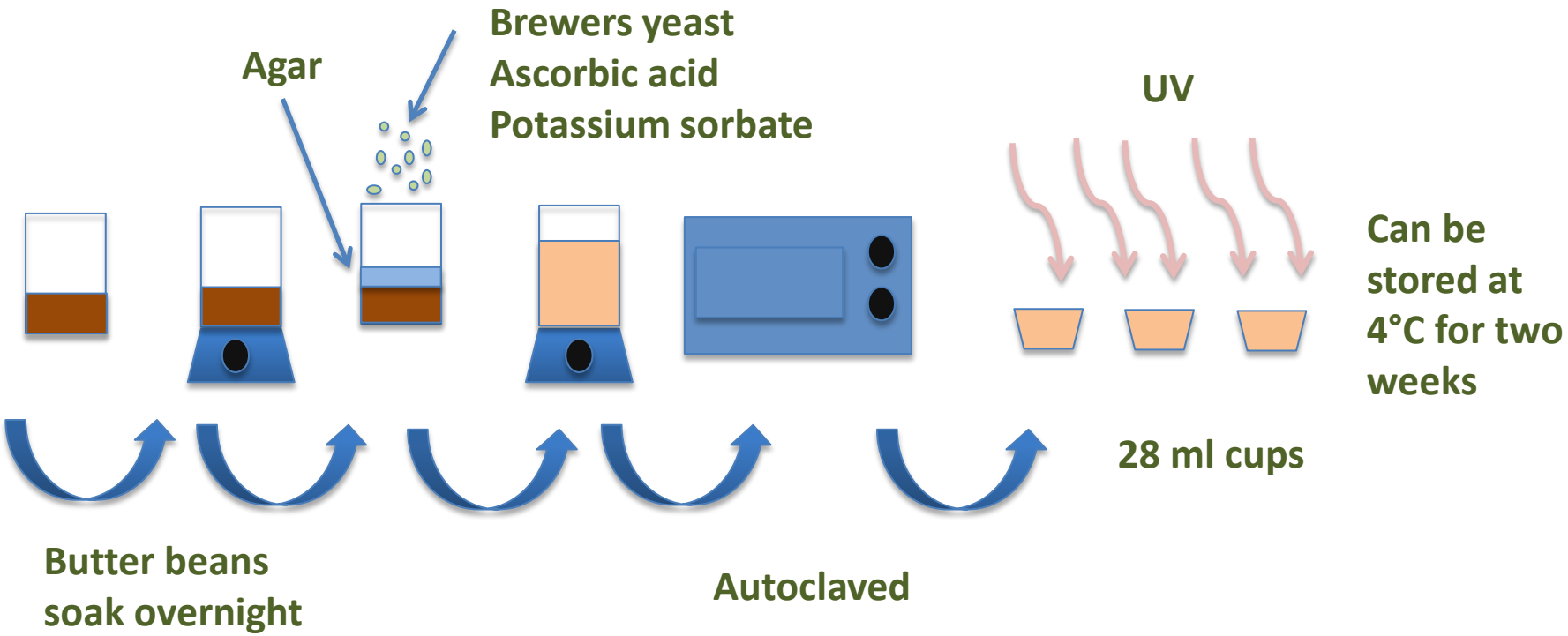
Larvae burrow into the soil/growing medium and feed on roots. Larvae overwinter in earthen cells

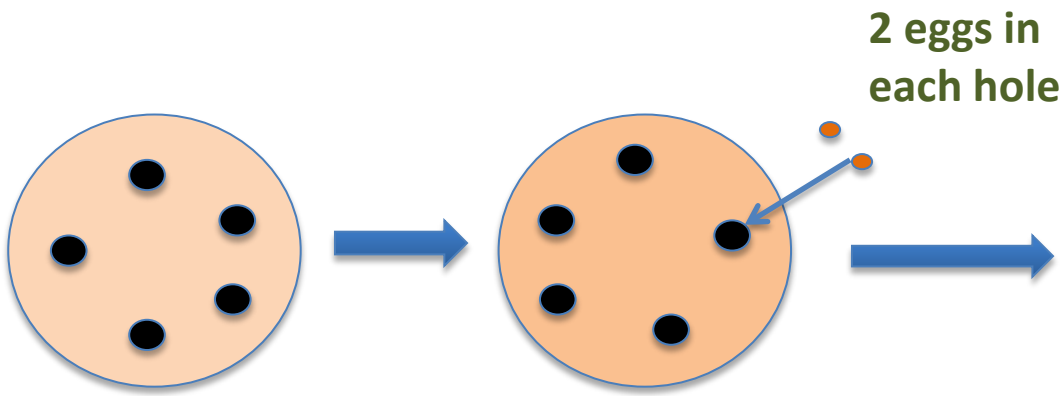
3-4 weeks as a pupa

As temperatures increase in the spring, larvae start feeding again and pupate

Location of collected vine weevil populations

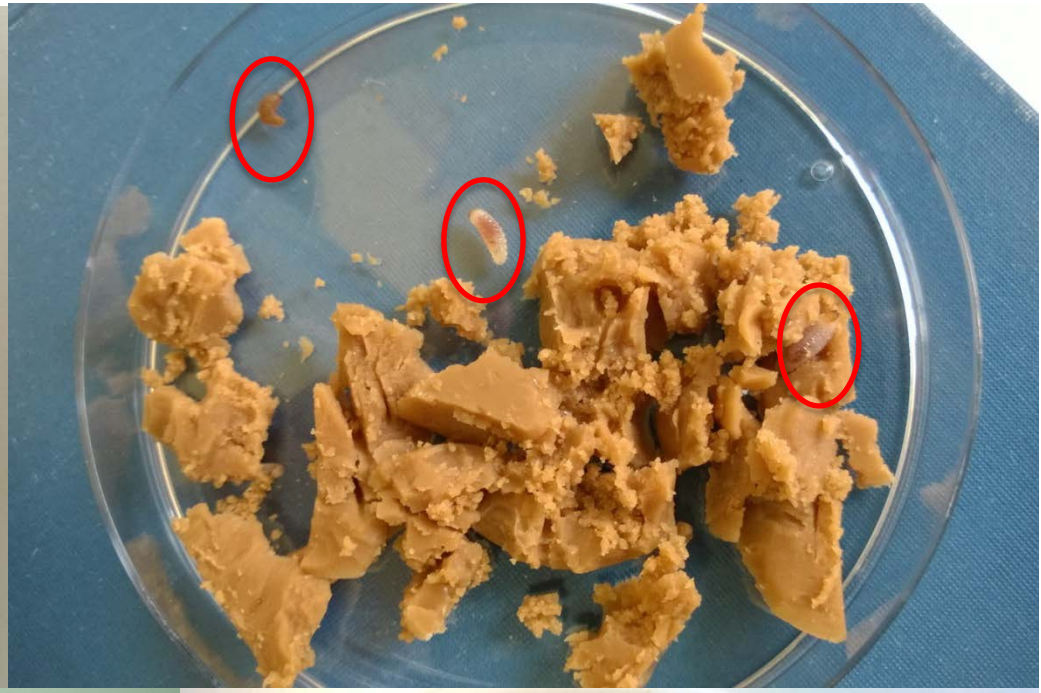
Artificial vine weevil diet (modified from Fisher & Bruck 2004)

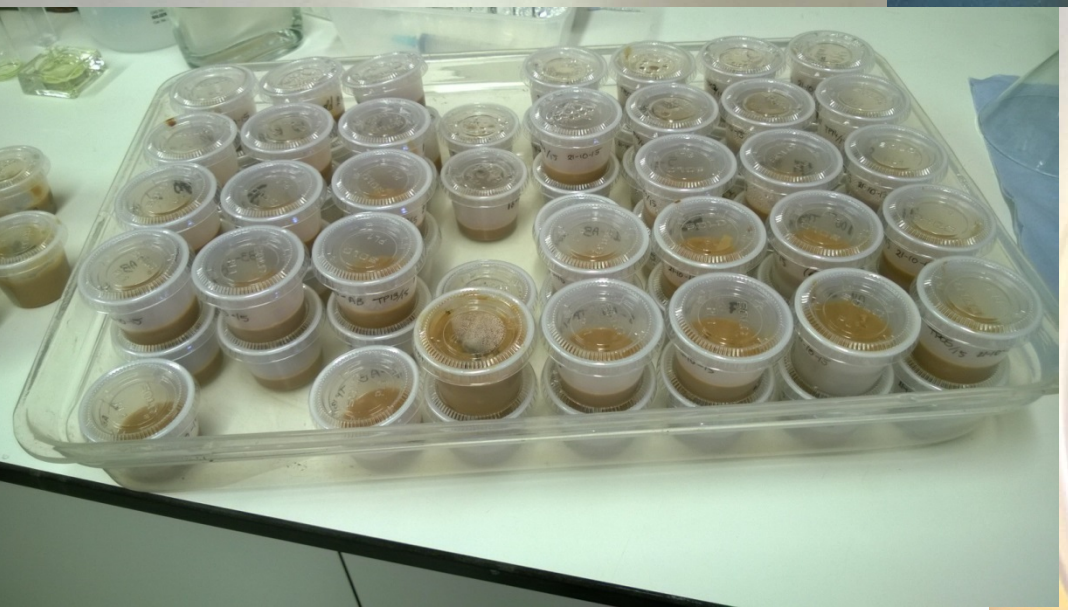




Incubate at 21°C in the dark for 6 weeks.

Transfer larvae to new diet every six weeks – pupation between 18-24 weeks





Progress

- It’s taken a few attempts to get the diet right
- We’ve been modifying the technique to make it faster and easier so that’s slowed us down
- Large number of deaths after the first 6 weeks – between 55 and 90 %
- The numbers stabilise after that
- Still waiting for the first adult but it will be very soon!

Thanks to…

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