

Mechanisms of insect resistance in *Lactuca Sativa*

Isabel, Juweria & Sonia

Introducing ourselves

- Isabel – 17 years old, currently studying biology, chemistry, geography and art at King Edward VI Five Ways Sixth Form. I would like to study biology at university.
- Juweria- 17 years old, currently I am studying biology, chemistry, maths and English literature at Heartlands' Academy Sixth Form. I would like to study medicine in university.
- Sonia – 17 years old, currently studying biology, chemistry, maths and psychology at Shireland Collegiate Academy Sixth Form. I would like to study natural sciences at university.

Introducing our project

- *Lactuca Sativa* (Lettuce)
- Treated with pesticides
- To avoid this, we want to determine the natural mechanisms of resistance in lettuces
 - Can be constitutionally expressed or induced
- In our experiments, the species of aphid we used were *Myzus Persicae*
 - Feed from plant phloem using stylets to obtain amino acids

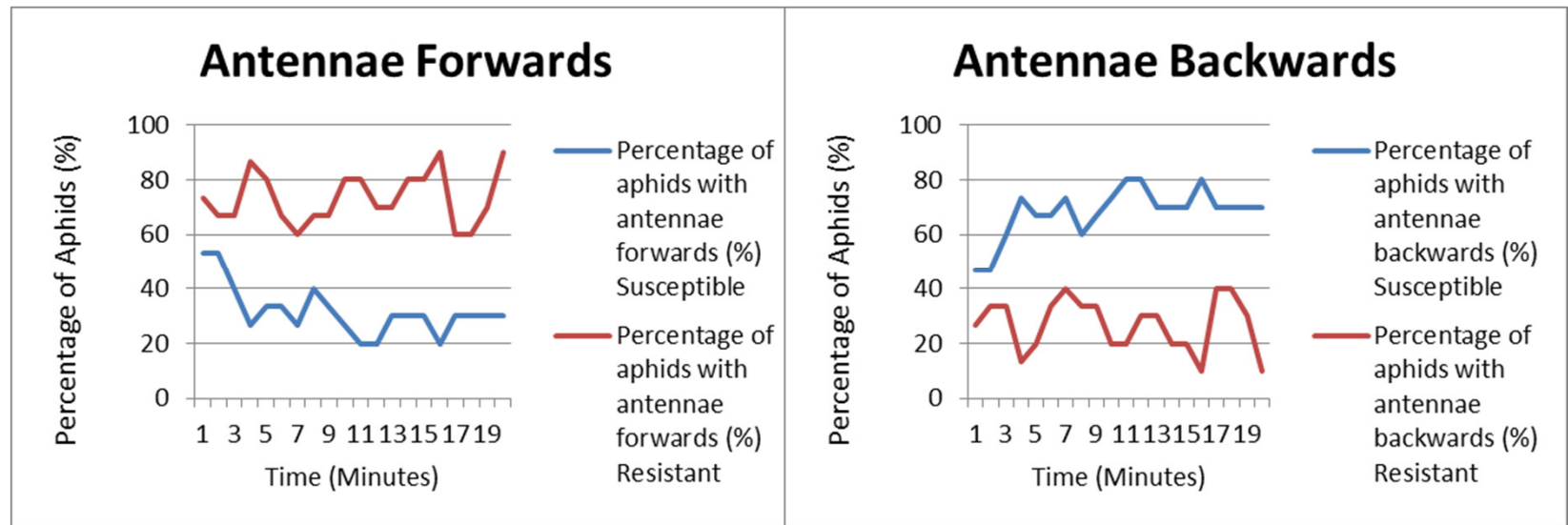
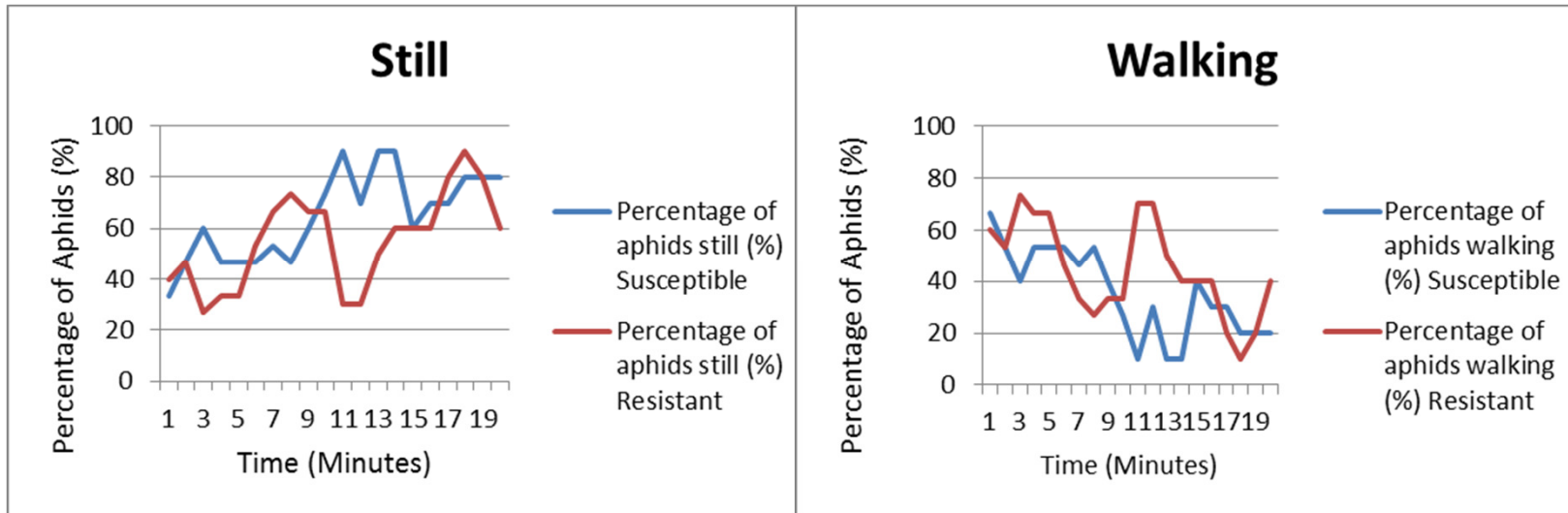
Objectives

- To determine whether the natural mechanisms of resistance in lettuces is constitutionally expressed or induced
- To determine whether age affects resistance in lettuces

Aphid behaviour

- Observation (Susceptible vs. Resistant)
- Plants just under 3 weeks old
- 5 aphids on each plant
- Minute instances for 20 minutes
- Percentages of aphid behaviours
- Behaviour categories – Still, Walking, Antennae Forwards, Antennae Backwards

Suggests constitutionally expressed plant defences



EPG - Resistant vs. Susceptible

- Electrical Penetration Graph
- Plants were 3 weeks old
- 4 resistance and 4 susceptible plants
- One aphid wired up on each channel
- We did two runs each running for 4 hours
- Different behaviours showed different voltages on the EPG

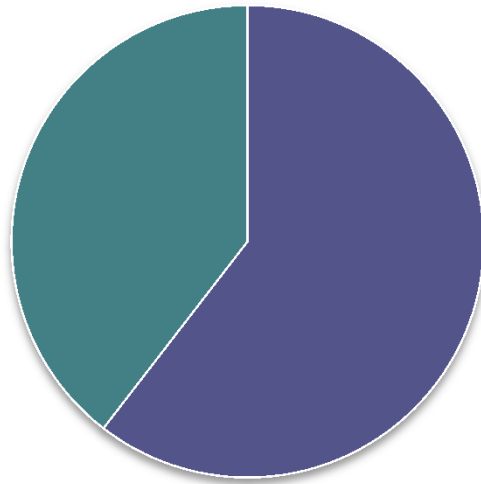


EPG pin



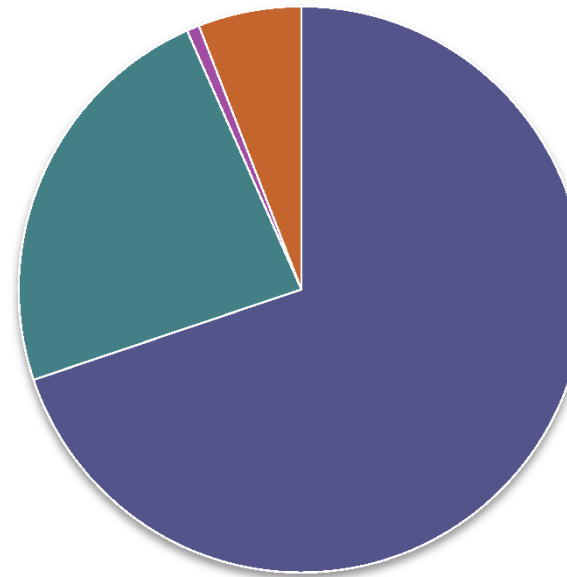
EPG machine

Susceptible



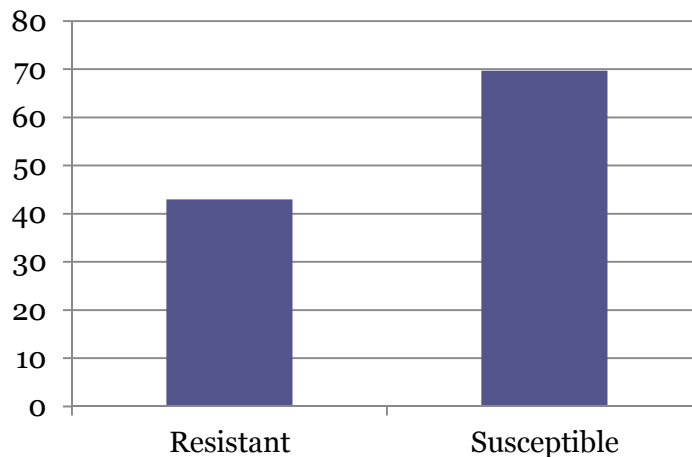
- Mean % no penetration
- Mean % pathway

Resistant



- Mean % no penetration
- Mean % pathway
- Mean % salivating
- Mean % xylem

Mean frequency of cell penetrations



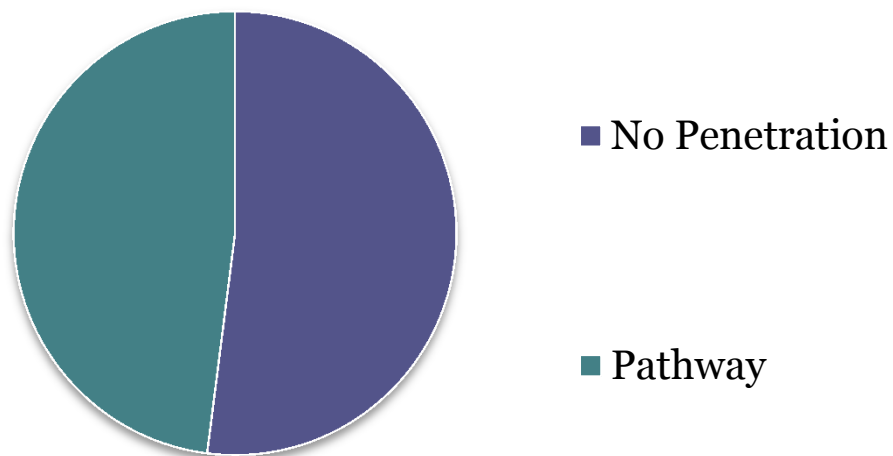
- Mean frequency of penetrations

Suggests that the resistant plants have constitutionally expressed plant defences but also potential induced plant defences.

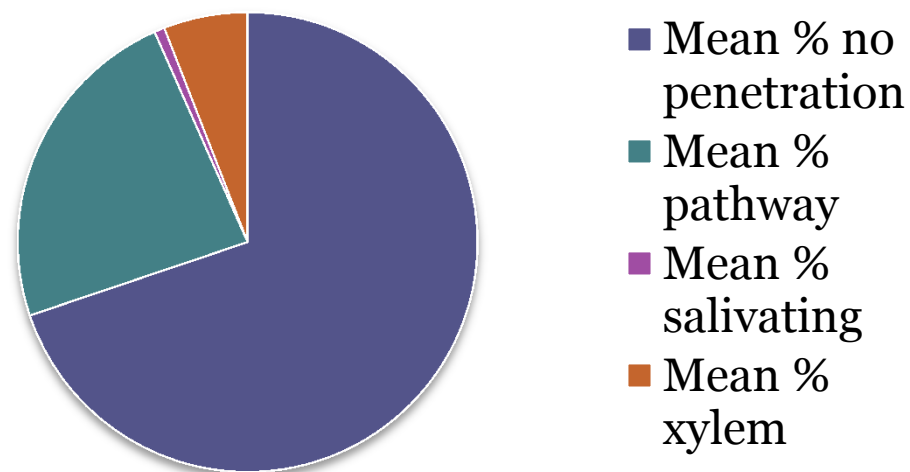
EPG - Does age effect resistance?

- Eight 6 weeks 5 days old resistant plants
- (Compare to 3 week old results)
- Make pins, wire up aphids, attach to EPG
- Two 4 hour runs
- Penetration of different tissue results in changes in voltage – displayed on trace

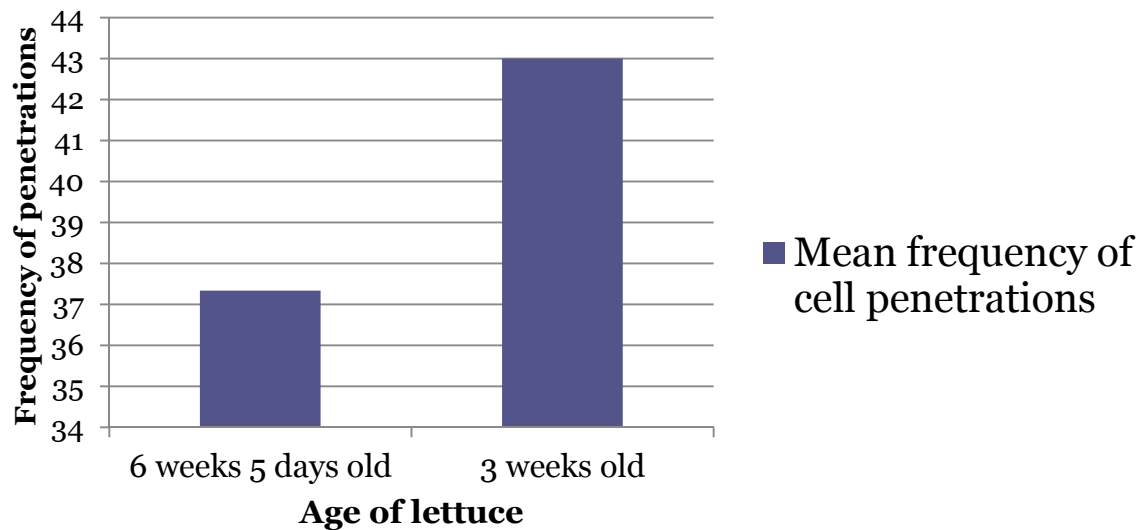
6 week 5 days old resistant - Average %



3 week old resistant- Average %



Mean frequency of cell penetrations



3 weeks old
more resistance-
vulnerable

Summary

- Mechanism of resistance is likely to be constitutionally expressed
- Resistance is negatively affected by ageing
- If farmers grow resistant varieties- more economically viable
- Young lettuce plants may need less pesticides due to natural defences
- Further research could implement natural mechanisms of resistance in other varieties of lettuce



Any questions?