

Pre-breeding for resistance to aphids in barley



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The pest and one of its hosts

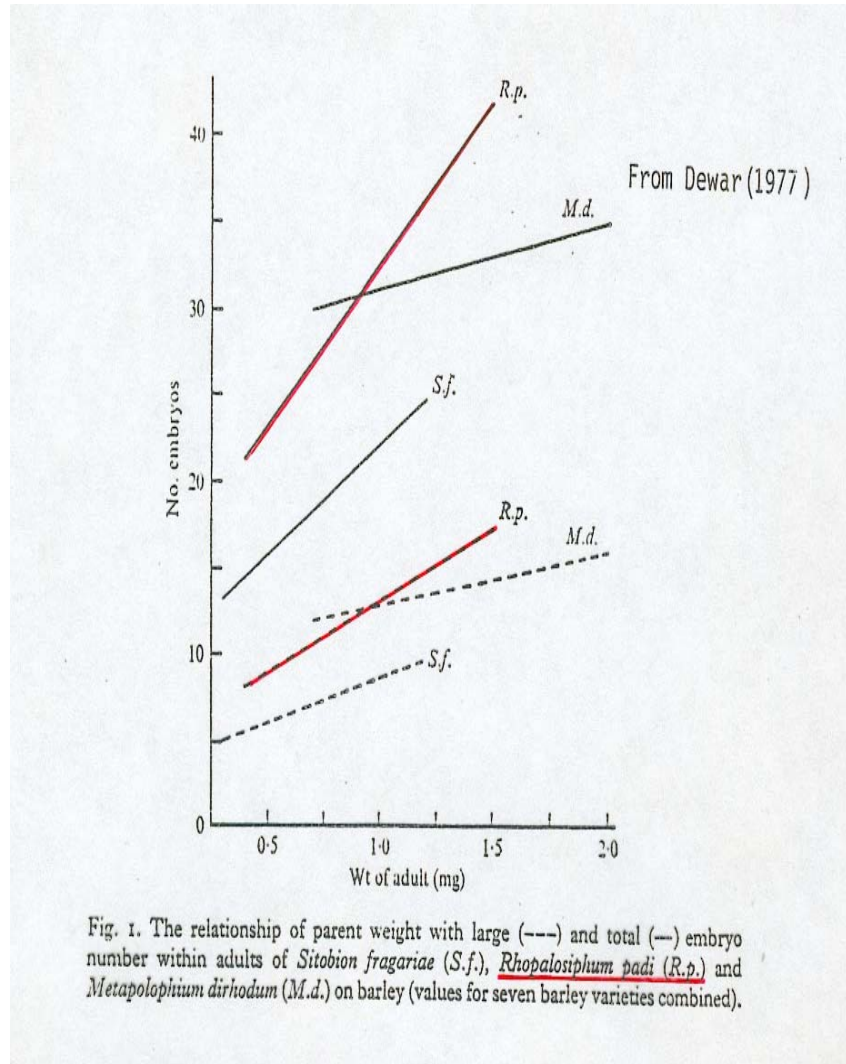


Bird cherry – oat aphid (*Rhopalosiphum padi*) on barley (*Hordeum vulgare*)

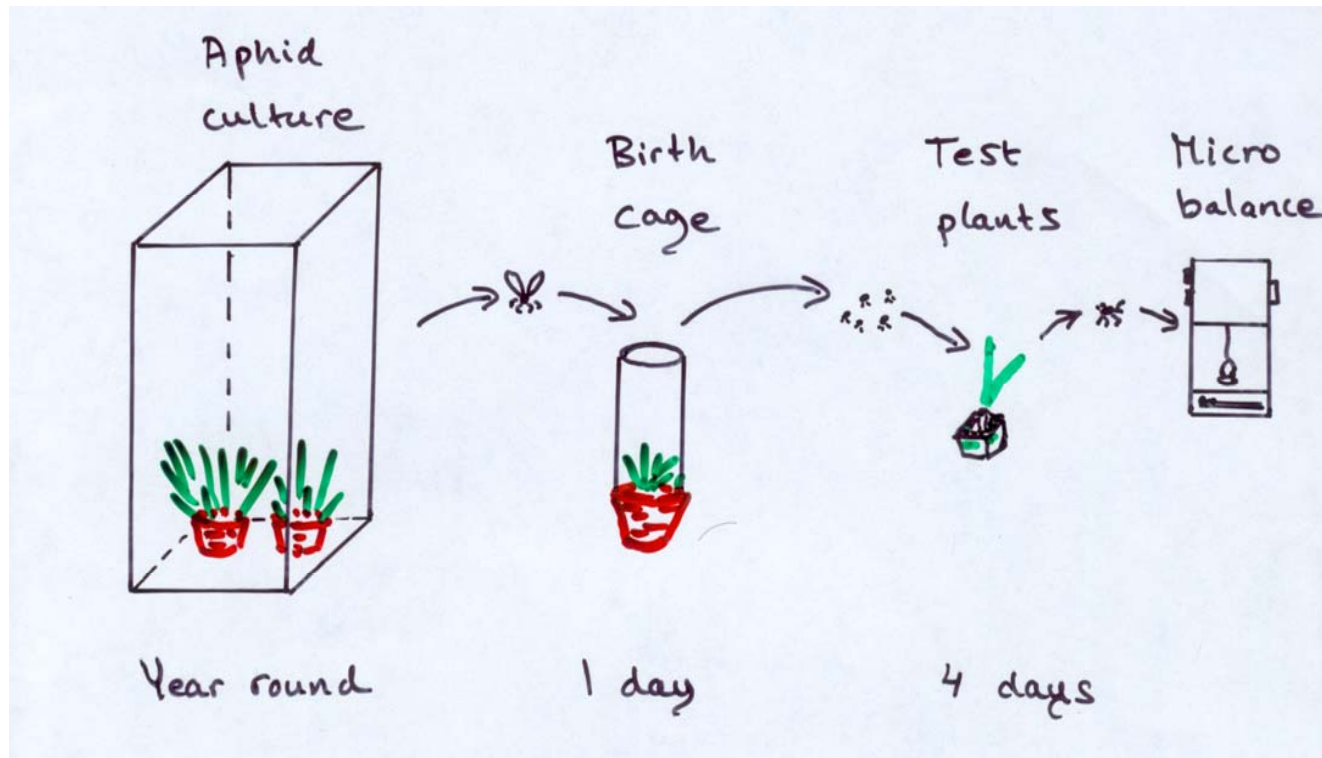
"Resistance"

Genetically inherited characteristics of the host plant which reduce the effect of a parasite attack

Larger aphids produce more offspring!



Screening test for resistance based on aphid growth rate



Potential resistance sources

- Other barley cultivars
- The ancestor of barley, wild barley *Hordeum vulgare* subspecies *spontaneum*
- Other barley species
- Transgenes - genes from other sources

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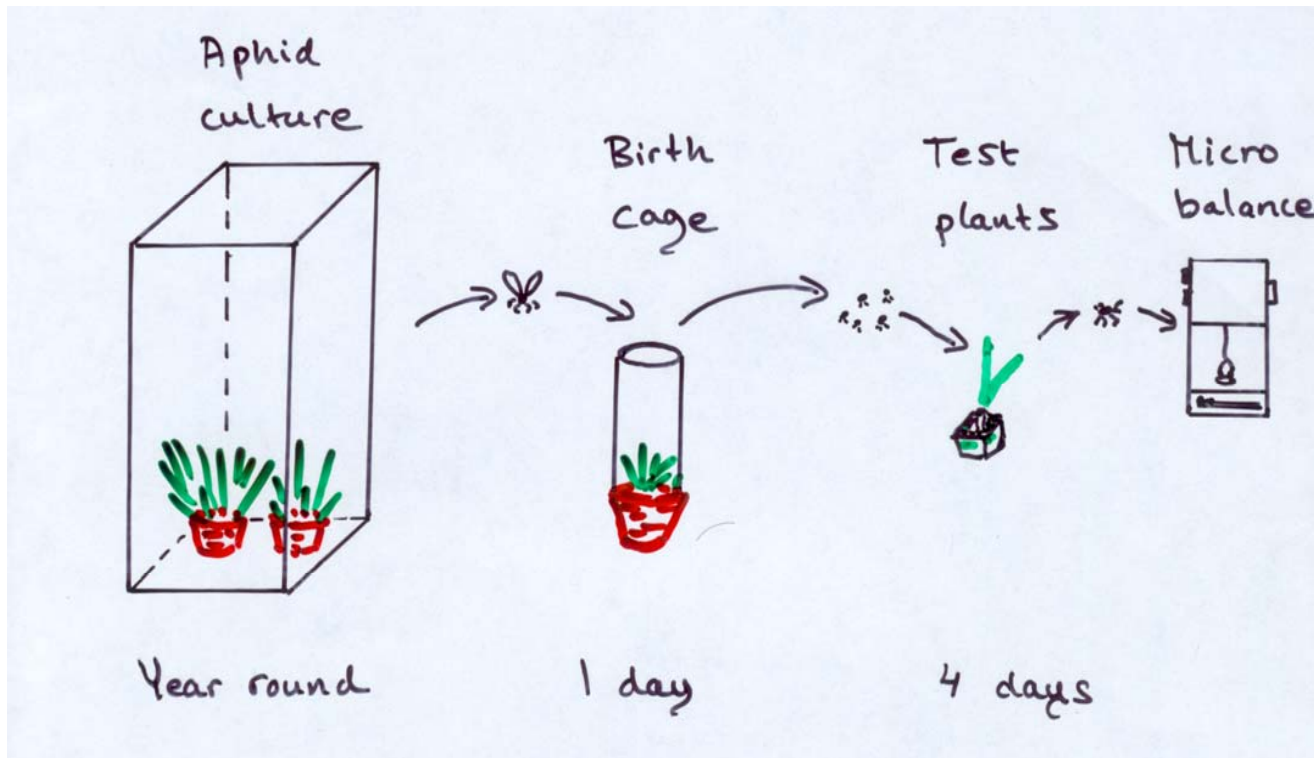
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Back-cross series to cv Lina

Doubled haploids of BC3 with cultivar Lina, and other more modern cultivars as recurrent parents have been produced in 2009

1 = equal aphid weight on the resistance source and line
p1, p2 = selected resistant lines for the subsequent cross

Screening test for resistance based on aphid growth rate



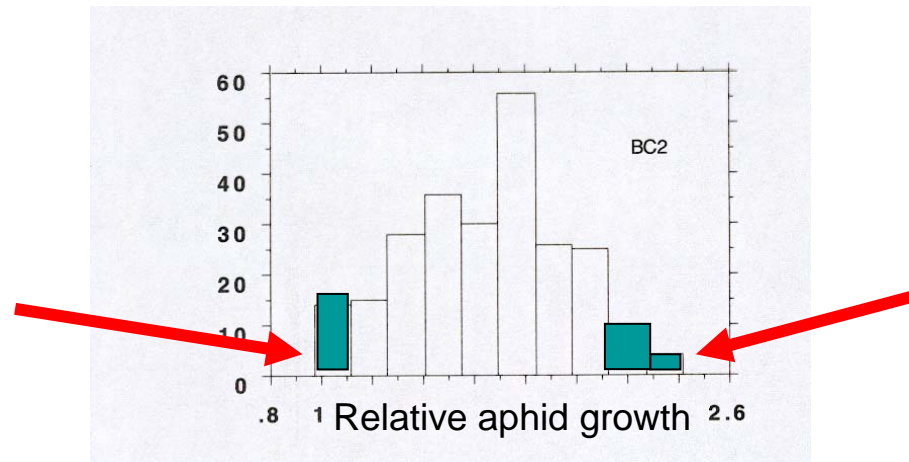
Reliable but time consuming!!!
Ca. 20 lines per full-time week

Search for molecular markers for aphid resistance in the Lina x H. spont F1-DH population

One QTL marker (QTL1) was localised to chromosome 2H and explained ca. 20% of the variance in aphid growth

Validation of the QTL1-marker

The most resistant and most susceptible lines in BC2-DH were selected using the aphid growth test



Accordance between phenotypes and the QTL1 marker

In just 3 out of 30 lines from 3 BC2F1 DH
was there mismatch between resistance/susceptible
phenotyping and presence/absence of QTL1

Use of the QTL1-marker in newly produced back-crosses (BC3)

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- Only lines carrying the marker for QTL1 will be tested for aphid growth rate
- Selected lines supporting poor aphid growth will be used in new crosses with modern barley

Search for molecular markers for aphid resistance in the BC2-DH population that lacked the QTL1 marker

Another QTL marker (QTL2) was localised to chromosome 3H and explained ca. 9% of the variation in aphid growth

Validation of the QTL2-marker

- Parents will be tested for QTL2

Validation of the QTL2-marker

- Parents will be tested for QTL2
- Aphid growth on offspring barley lines* with and without QTL2 will be compared

*(with known presence/absence of the QTL1- marker)

Thank You for Your attention!

And:

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