Update on Mapping and Evaluation of Sunflower Insect Resistance Traits

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Presentation Outline

- **Brent discussed mapping progress**

- **Populations for insect-related phenotyping**
  - **Sunflower moth – hull traits**
  - **Sunflower moth – trichome number (CGT)**
  - **Sunflower moth – trichome composition (STL)**
  - **Sunflower seed weevil – resistance from PI**
  - **Pollinator traits – nectar amount and type**

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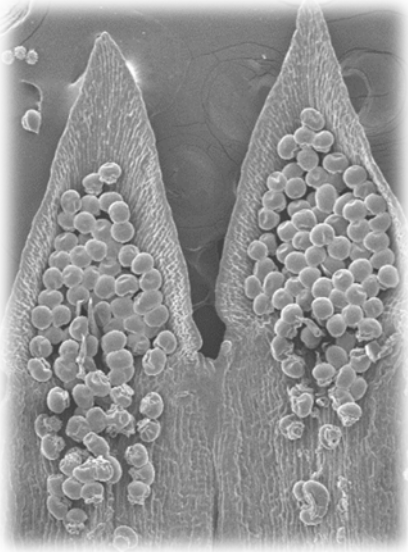
Trichome Number

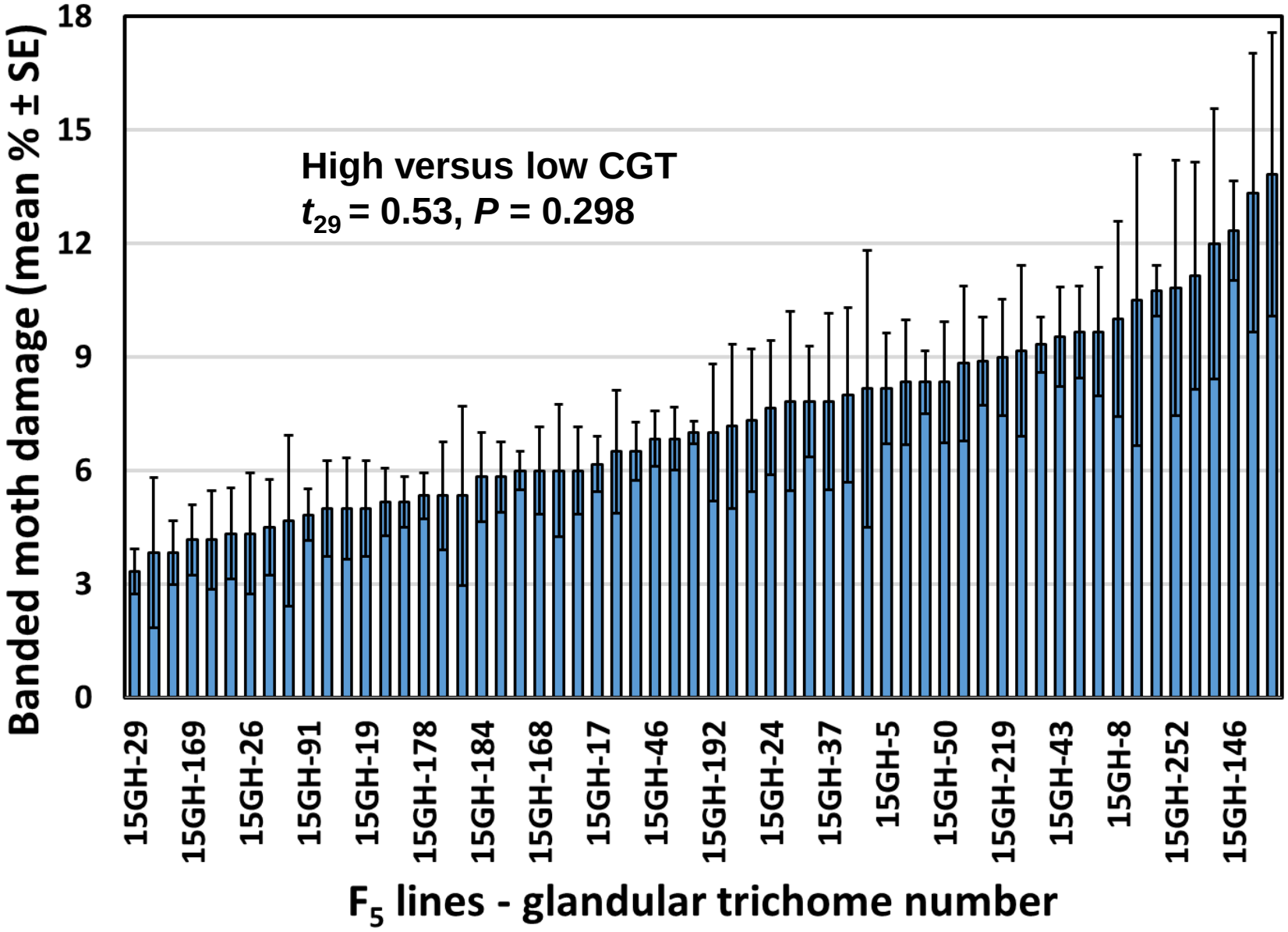
- **Glandular trichomes**
  - Contain terpenoid compounds
  - Repel, poison many insect species

- **F_4 from HA 300 × RHA 464**

- **Test F_5 in field against banded moth**
  - 30 high, 30 low CGT lines
  - 5 replicates of RCBD in Casselton



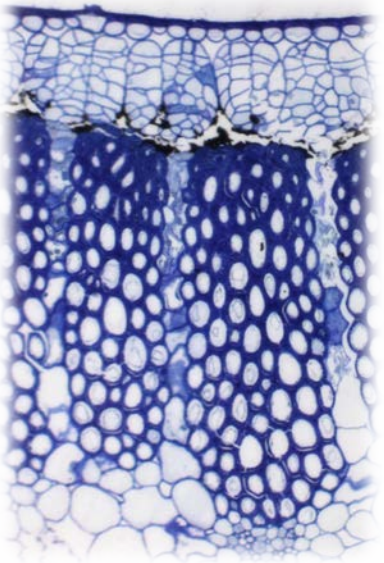
Trichome Number



Trichome Number

- **Why didn't high and low CGT lines differ?**

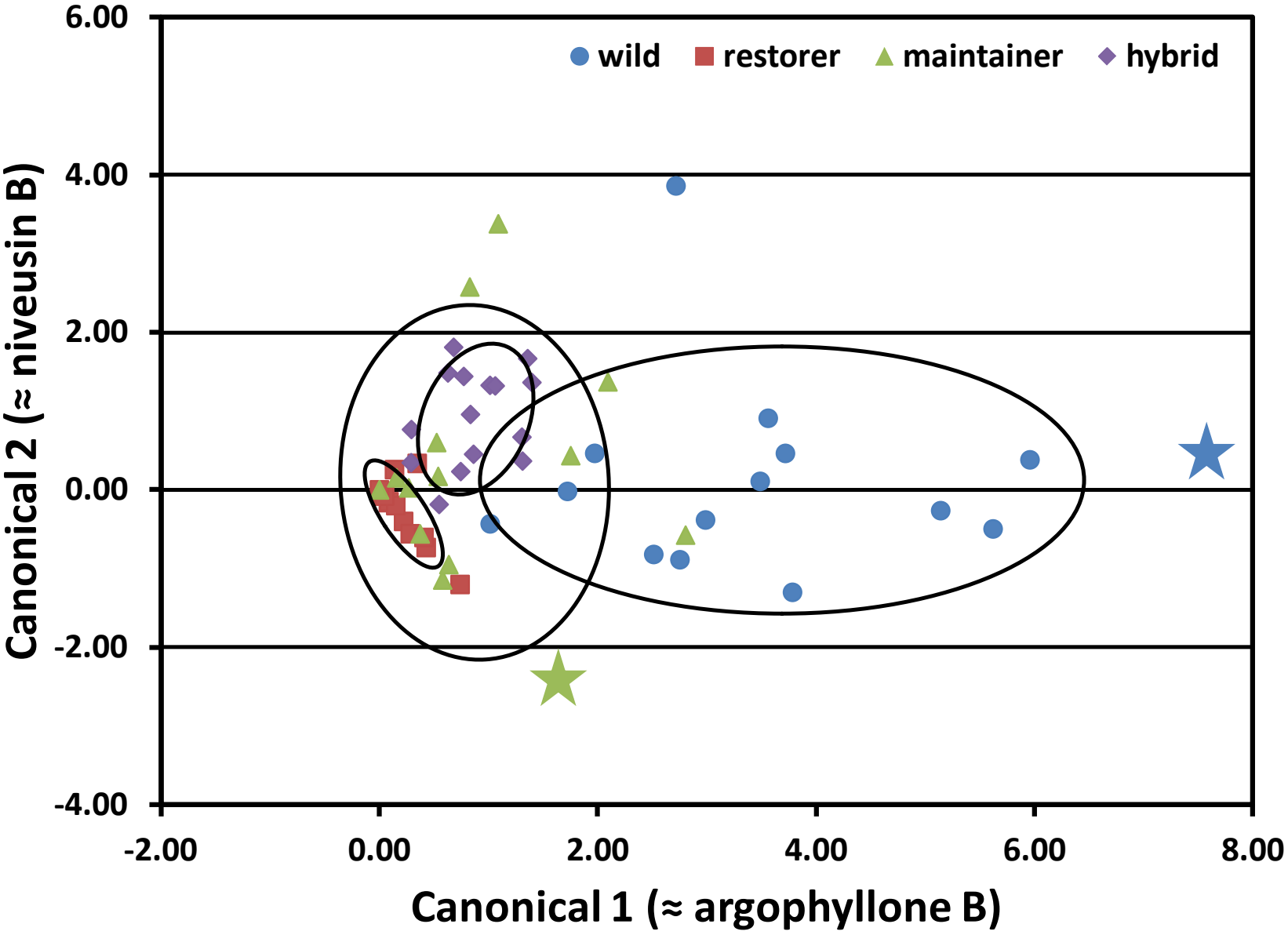
- **Banded moth ≠ sunflower moth**
- **Cultivated STL composition limits effects**
- **Other, unknown traits more important**
  - **Achene traits for seed damage?**
  - **HA 300 among least-damaged (6.4%)**
  - **RHA 464 intermediate (13.0%)**



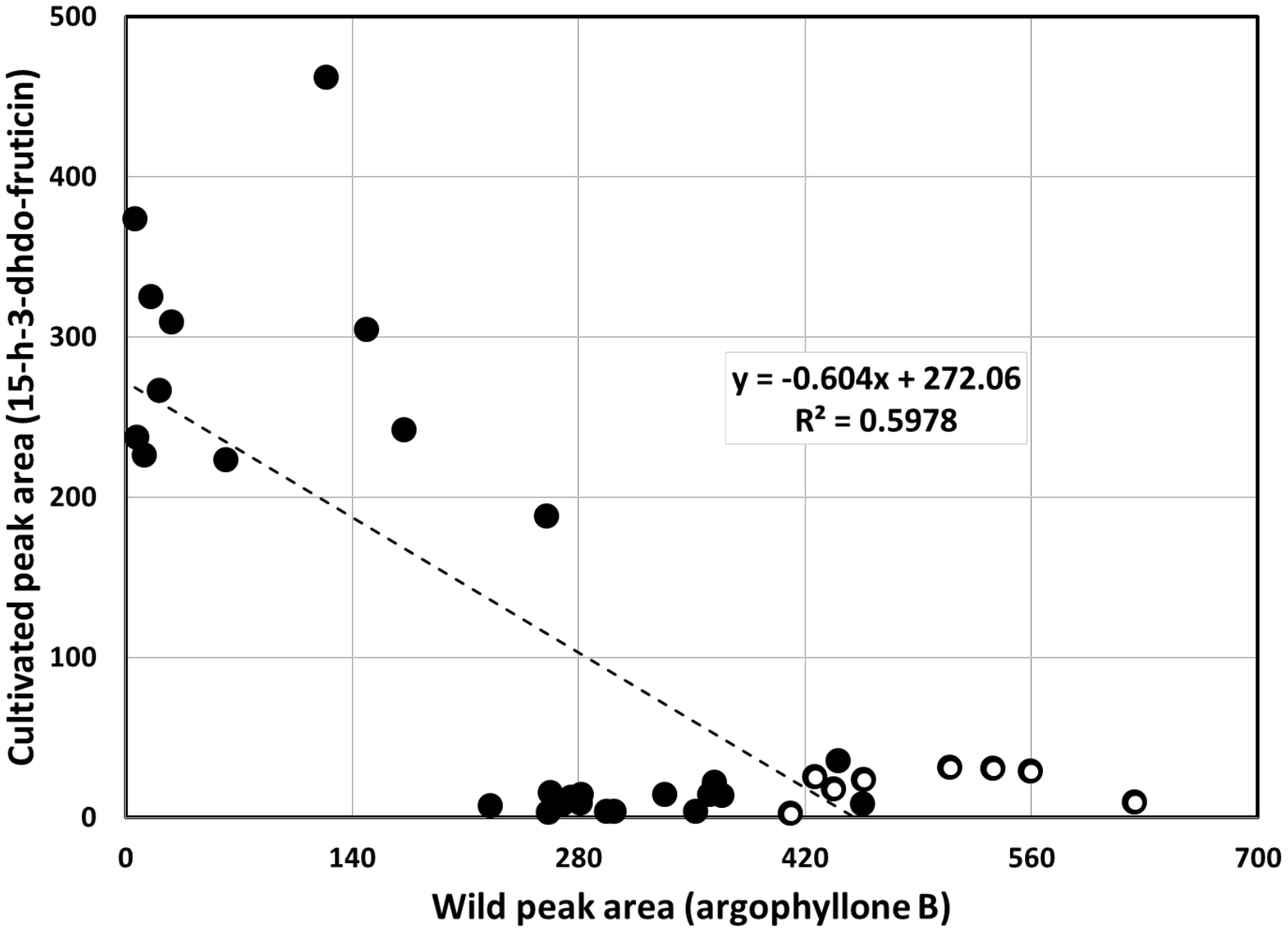
Trichome Composition

- **Sesquiterpene lactone differences**
  - **Wild sunflowers contain more argophyllone B**
  - **Argophyllone B toxic, repellent to SM larvae**
- **Population from HA 821 × PI 435485**
- **Looking for progeny with ‘wild’ chemistry**
  - **Single headed, no anthocyanins, self-fertility…**

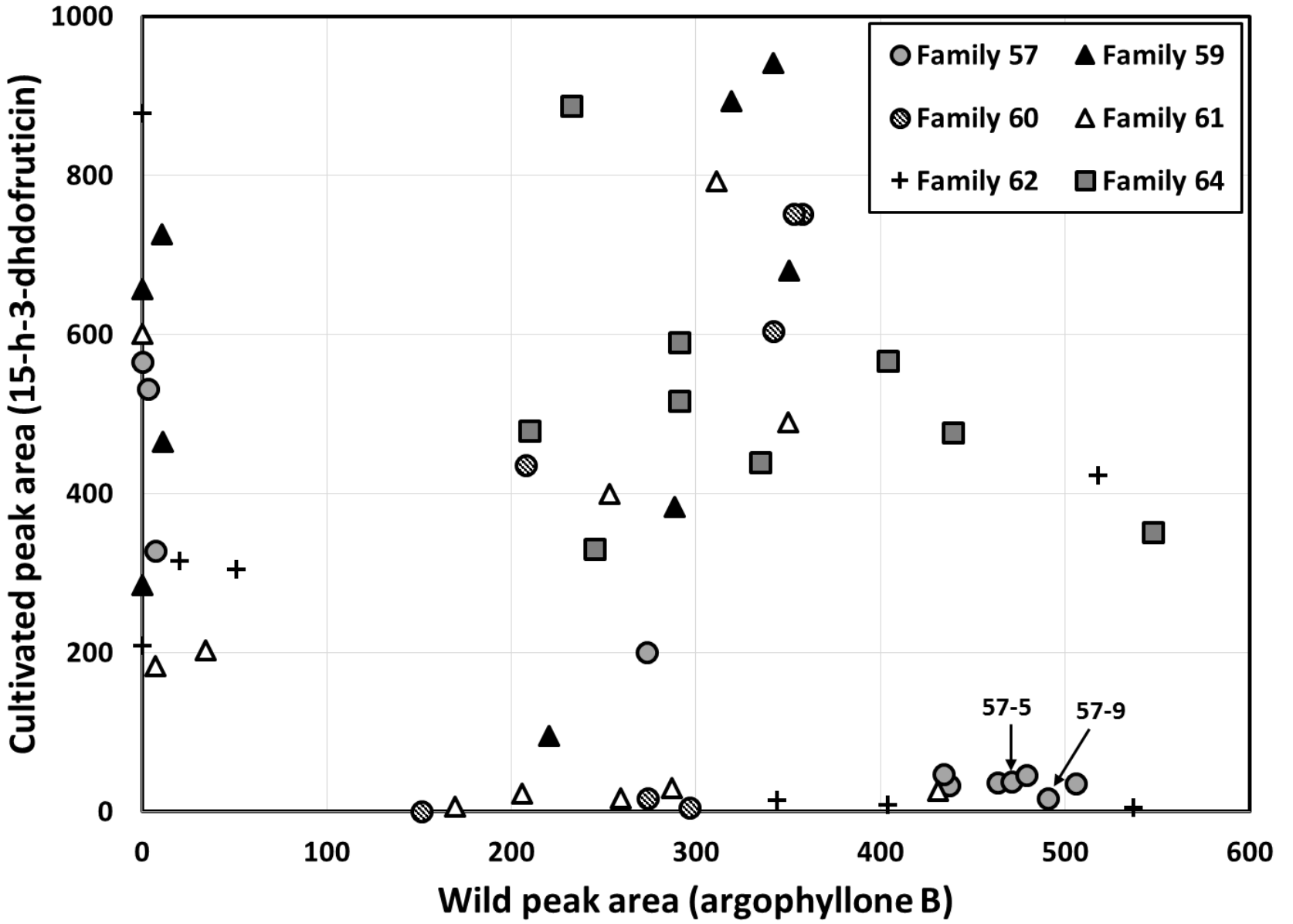
Trichome Composition



Trichome Composition – F_2



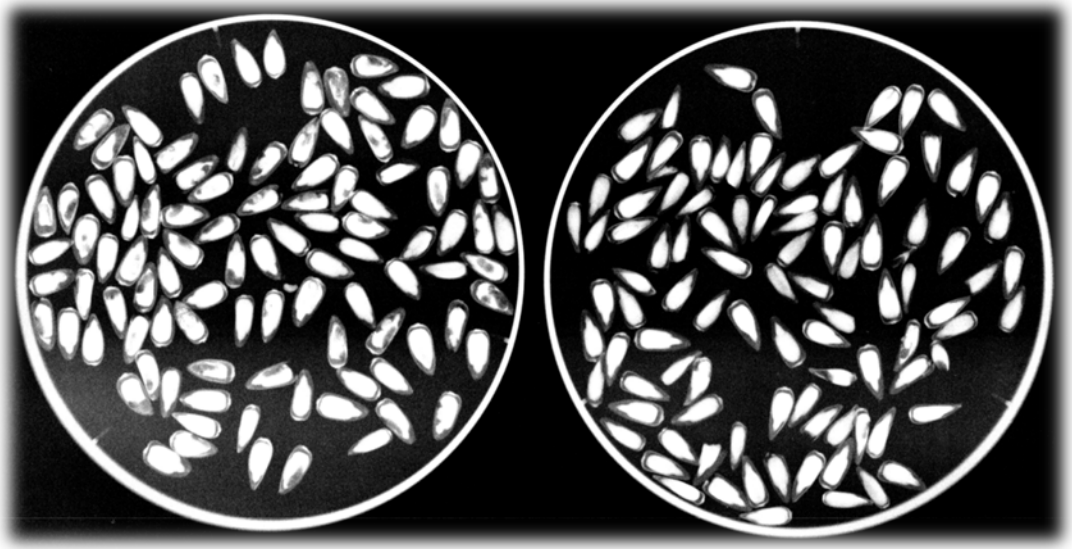
Trichome Composition – F_3



Red Sunflower Seed Weevil

- **HA 441/PI 431542 br.//HA 467**
  - **F_4 and F_5 data in 2014 (n=44) and 2015 (n=93)**

- **Mechanism not adult attraction**



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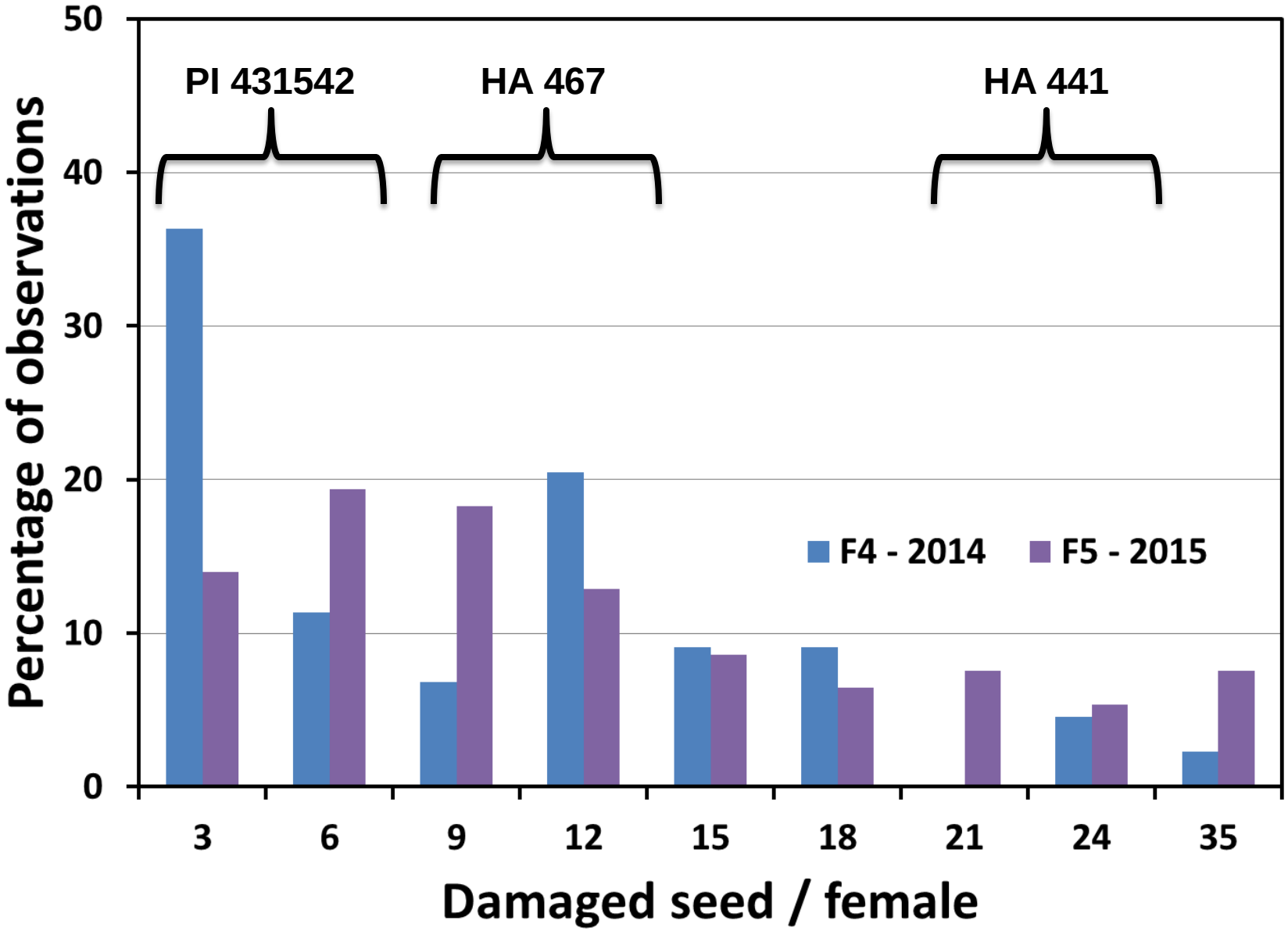

Summary

- **Trichome number showed no benefit in 2016**
  - **Repeat in 2017 and assess other differences**
- **Trichome composition may be two genes**
  - **Test promising families from F_3 and backcrosses**
- **Weevil phenotyping improved for F_5**
  - **More variation among inbred lines than thought**
  - **Ongoing evaluation of select lines, resistant PI**

Acknowledgements

- **Leonard Cook**
  - **chemotyping florets**
- **Zoe Portlas, Jamie Miller-Dunbar**
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