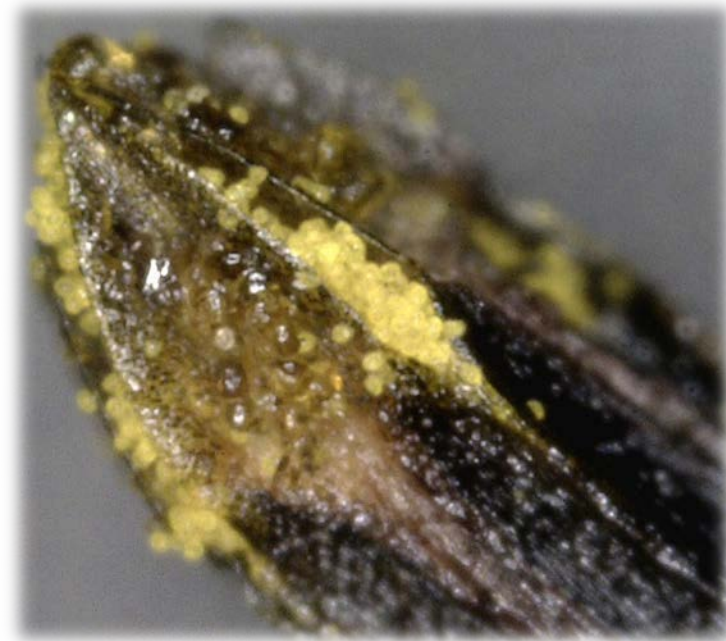


# Inheritance and Mapping of Sunflower Insect Resistance Traits



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**USDA-ARS, Sunflower and Plant Biology Research Unit**

**Fargo, ND**

# **Populations Relevant to Insect Resistance**

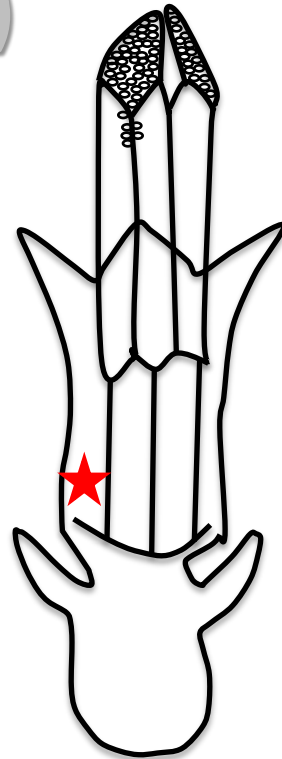
- **Glandular trichome number (SFM, F<sub>5</sub>)**
- **Pericarp strength and thickness (SFM, F<sub>4</sub>)**
- **Glandular trichome chemistry (SFM, F<sub>2</sub>)**
- **Red seed weevil resistance (F<sub>5</sub>)**
- **Others (BSM, SSW) not being advanced**

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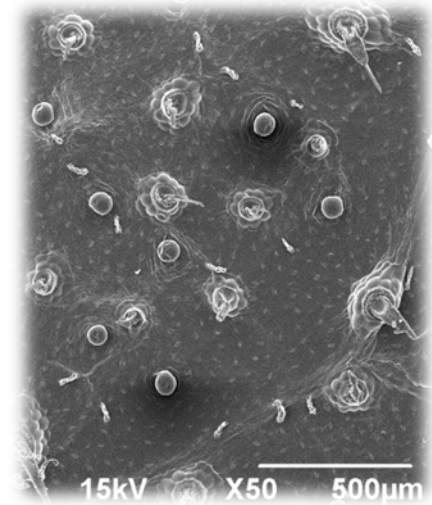
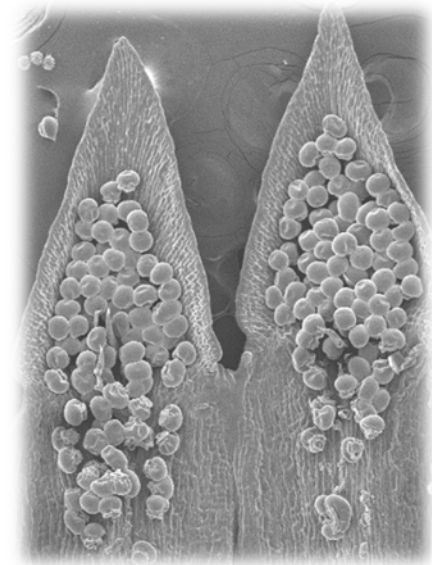
# Populations Relevant to Insect Resistance

- **Glandular trichome number (SFM, F<sub>5</sub>)**
  - Map genes responsible for determining #
- **Pericarp strength and thickness (SFM, F<sub>4</sub>)**
- **Glandular trichome chemistry (SFM, F<sub>2</sub>)**
- **Red seed weevil resistance (F<sub>5</sub>)**
  - Assess if mapping is possible
- **Others (BSM, SSW) not being advanced**

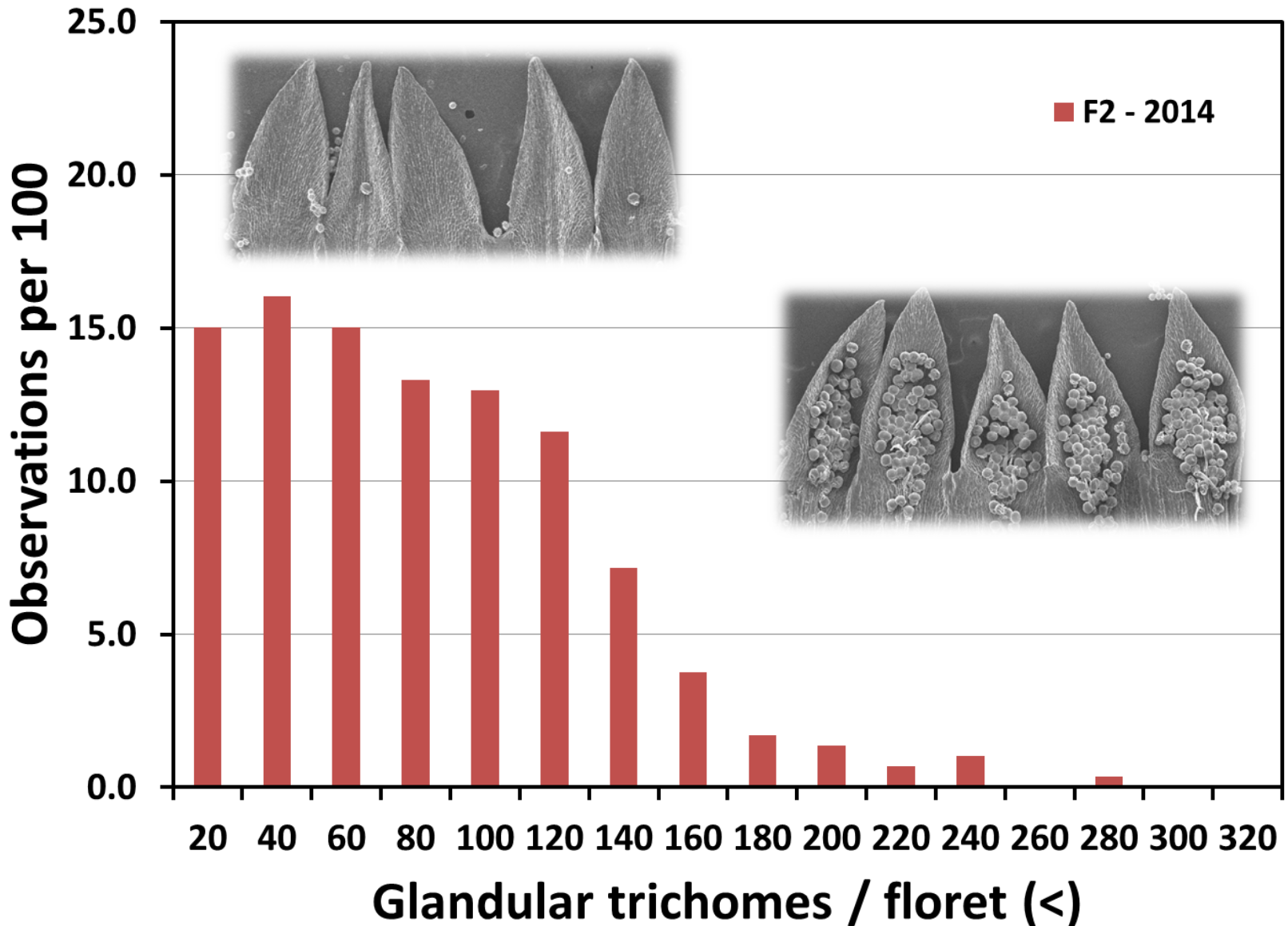


# Glandular Trichome Number

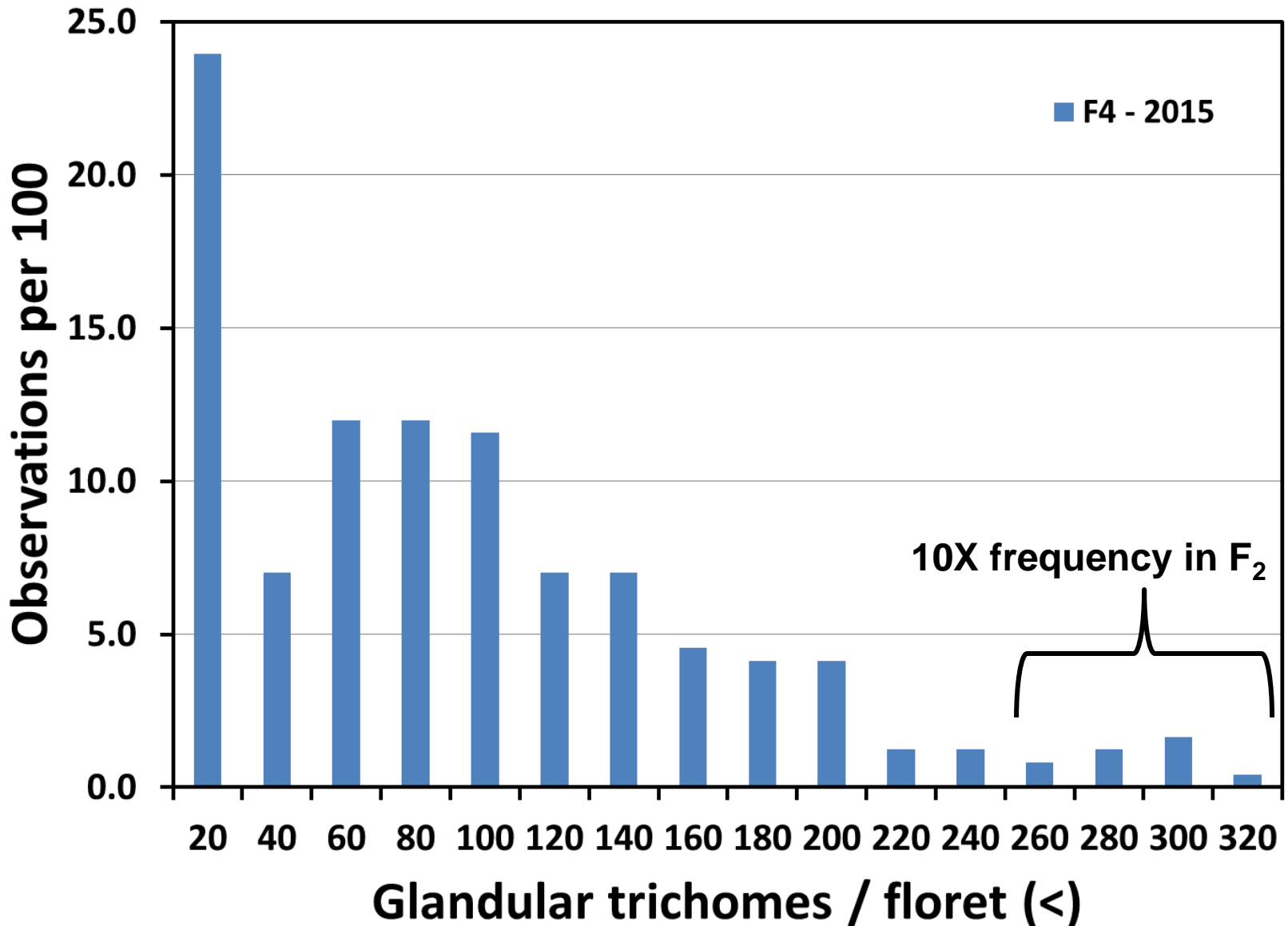
- **Trichomes contain terpenoids**
  - Toxic or repellent to insects
- **Also on sunflower leaves**
  - Less dense, different patterns (?)
- **High female × low male**
  - HA 300 ( $\approx 310$ ) × RHA 464 ( $\approx 2$ )



# Determination of Trichome Number, 2014

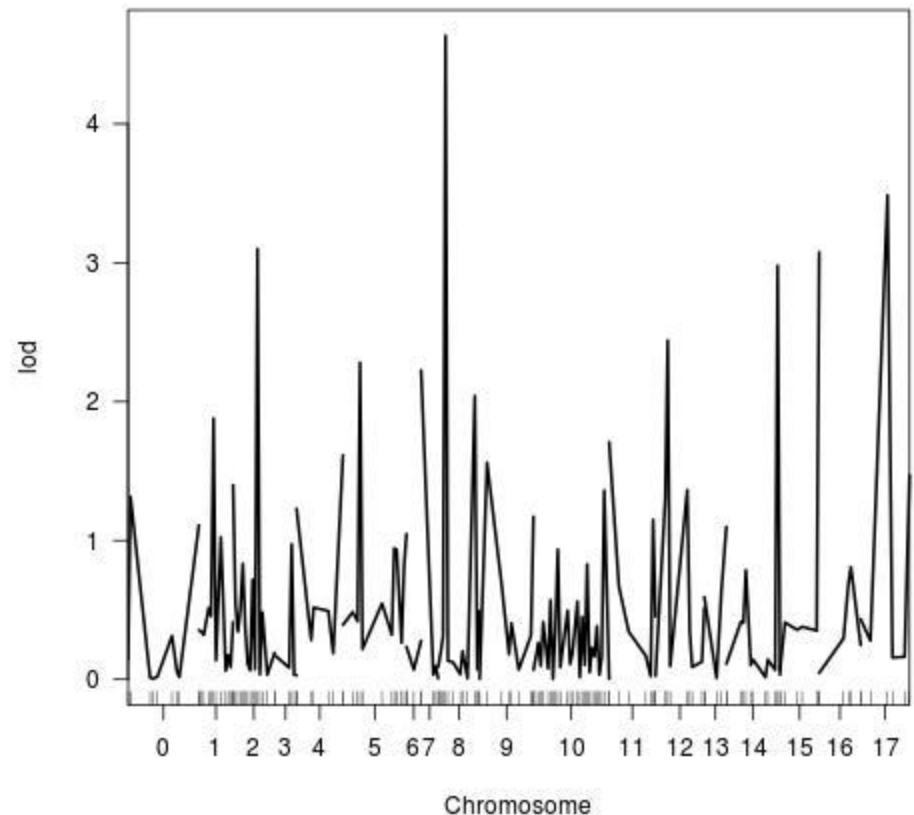


# Determination of Trichome Number, 2015



# Determination of Trichome Number

- **Preliminary QTL analysis (n=85)**
- **Major gene Chr 8**
  - 30-40 Mbase
- **Modifier Chr 17**
  - 150-160 Mbase
- **More data in process**

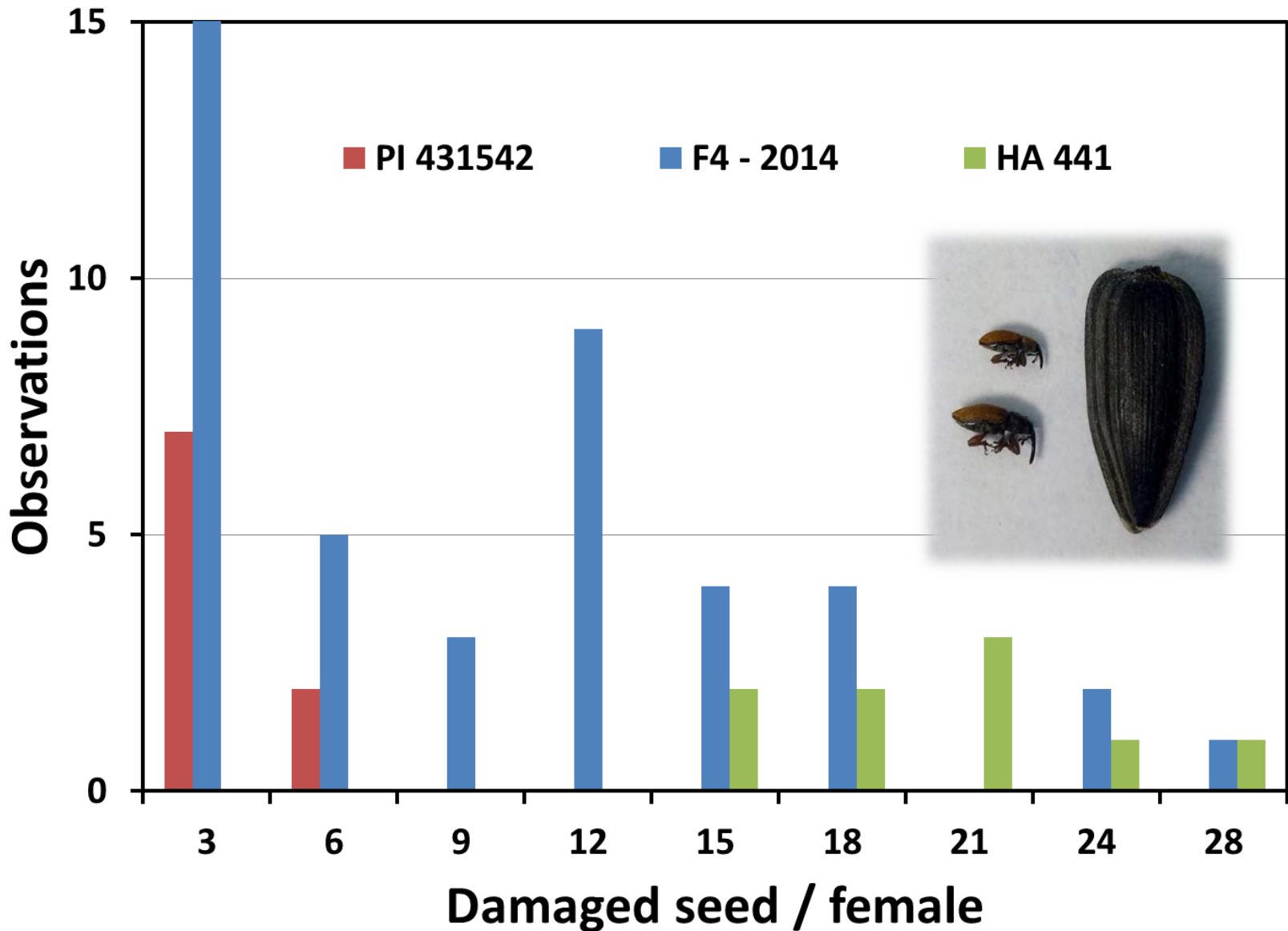




# **Red Seed Weevil Resistance**

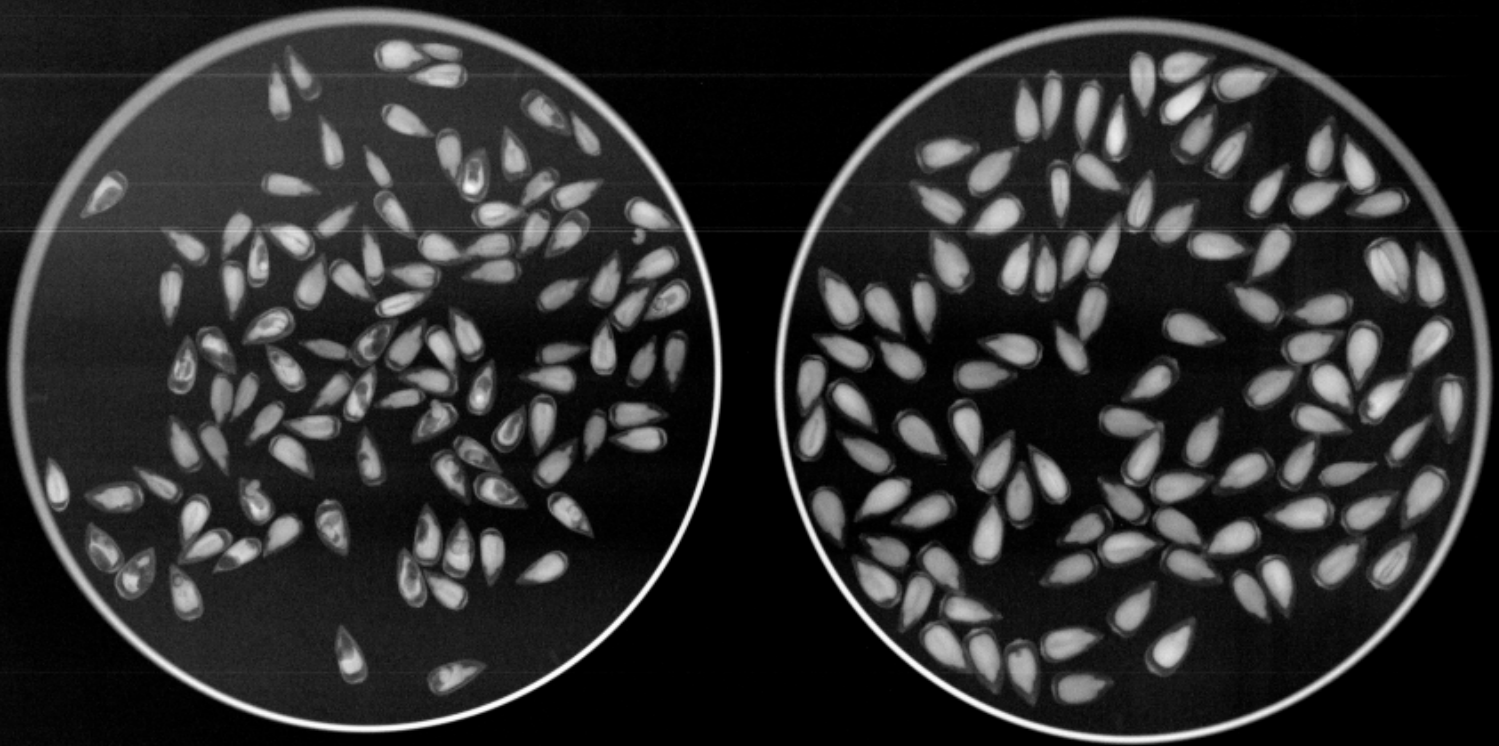
- **Based on cross with PI 431542**
  - **Breeding line from former Yugoslavia (1979)**
- **Open-field, PI damage 20% of other entries**
  - **Limited by closure of Highmore station**
- **Population of HA 441/PI 431542 br.//HA 467**
  - **Infested heads in mesh bags, 30 weevils each**

# Red Seed Weevil Resistance, 2014



# Red Seed Weevil Resistance, 2014

## Susceptible & resistant examples



# **Red Seed Weevil Resistance, 2015**

- **2014 data suggest mapping is possible**
  - Resistance appears simple
  - Very poor seed set on 39 of 110 heads
  - Replication limited # of independent samples
- **Planted 144 entries from population**
  - Infested 122 lines (single plant), plus parents
  - In process of scoring samples

# Plans for Early 2016

- **Complete mapping CGT genes**
  - **Submit manuscript on effects, markers**
- **Score 2015 seed weevil samples**
  - **Compare 2014 data, submit for genetic analysis**
- **Field tests of extreme trichome types (F<sub>5</sub>)**
  - **Possible effects on banded sunflower moth**