



**DOWNY MILDEW RESISTANCE IN ARUGULA:** Downy mildew is a serious disease for brassica crops including arugula. The disease is caused by the oomycete, *Hyaloperonospora parasitica*. It thrives in cool, moist conditions, spreading through wind-dispersed spores and water splashes. Infected plants have yellowish, angular lesions on the upper leaf surface, reducing photosynthesis and yield. Host plant resistance is the most promising approach for management. Here, we provide an overview of lab and field screening for resistance.

## THE DISEASE

Baby Leaf Arugula leaves showing typical downy mildew symptoms



Close up of downy mildew reproductive structures, called sporangio-phores



## THE APPROACH

- Collect disease isolates for both wild and cultivated arugula.
- Evaluate breeding lines in laboratory inoculation trials
- Determine the best lines for further study
- Evaluate best lines in the field
- Share results with plant breeders

**1st step:** Collected 5 isolates of *H. parasitica* for use in screening experiments

**3rd step:** Evaluate seed lines with field collected isolates

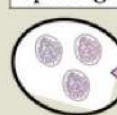


Host Plant	Date	Location
Wild Arugula	Sept 2020	San Juan Bautista
Wild Arugula	Aug 2022	Soledad
Wild Arugula	Aug 2022	Salinas
Wild Arugula	Sept 2022	Gonzales
Wild Arugula	Sept 2022	King City

**2nd step:** Acquire seeds from 199 lines of wild arugula



1. Inoculation with sporangia suspension



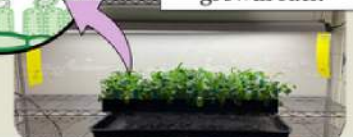
2. Spore germination induced in humidity chamber



4. Sporulation induction in humidity chamber



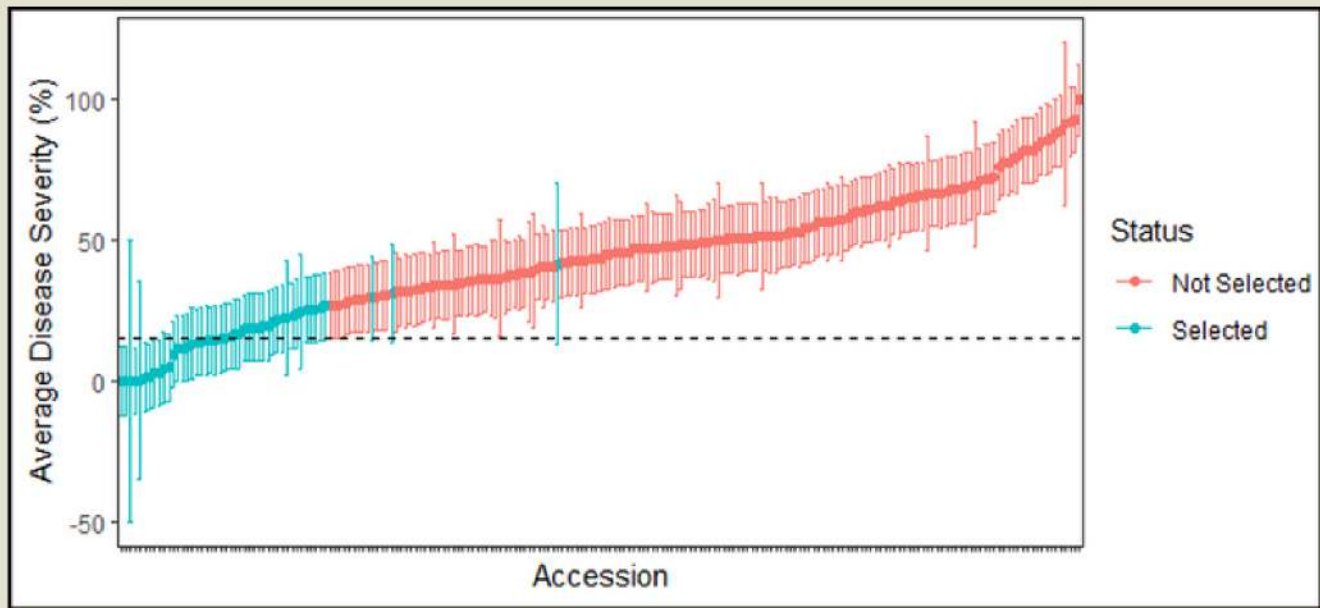
3. Pathogen establishment on growth rack



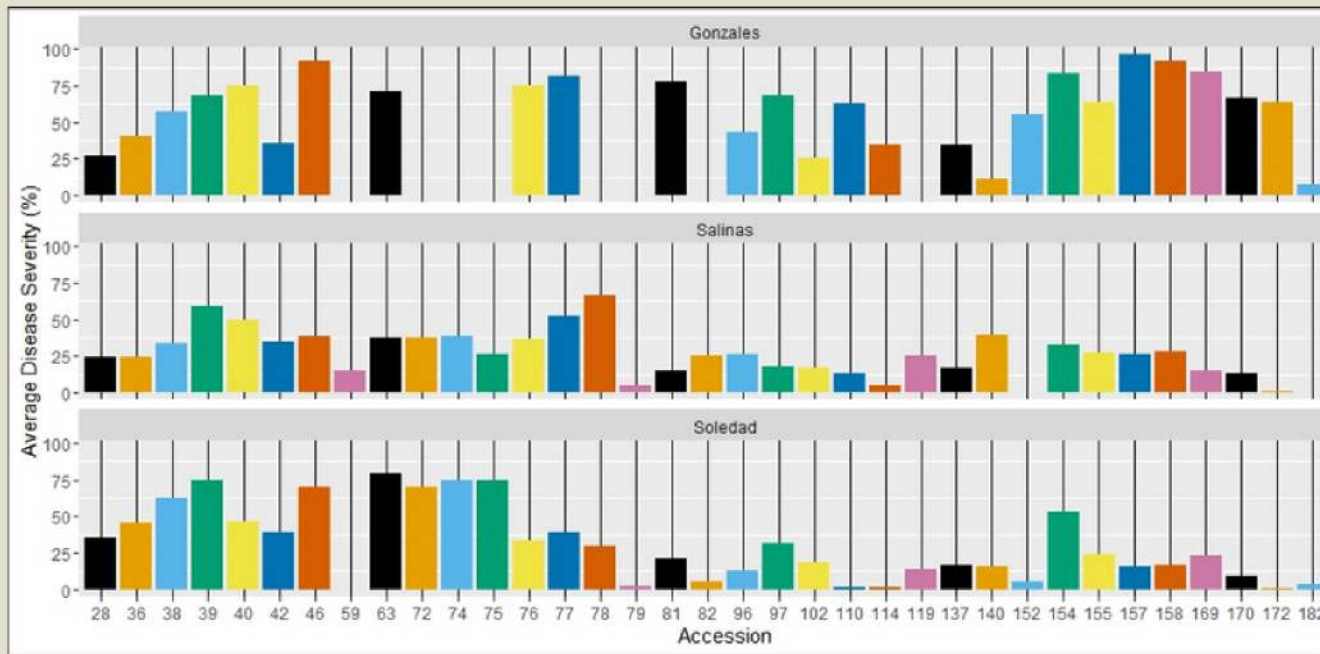


# KEY FINDINGS

Identified 37 accessions with < 25% disease severity response to our "San Juan Bautista" *H. parasitica* strain from 199 initial accessions.



Screened tolerant accessions to 3 additional *H. parasitica* strains to further explore resistance. Two accessions were excluded due to lack of seeds.



- Downy mildew-resistant accessions can be used in breeding for disease-resistant varieties.
- Planting disease-resistant varieties minimizes or eliminates the need for fungicides.
- Multiple downy mildew isolates should be used in disease resistance screening.

## NEXT STEPS

- Field evaluations of the best performing accessions. This is being completed on the Cal Poly campus
- Share results with seed breeders
- Evaluate new accessions as they become available

References or linkages to products or services do not constitute or imply the endorsement or recommendation by Cal Poly, Cal Poly Corporation, or any of its employees  
Cal Poly and the Cal Poly Corporation are Equal Opportunity Employers

## ACKNOWLEDGEMENTS

**Funding & Material Support:**  
Cal State Agricultural Research Institute, CDFA, Cal Poly, & Vilmorin Mikado  
**Research contributors:**  
M. Fernandez, J. Green, & L. Harshman.



**CAL POLY**  
College of Agriculture, Food & Environmental Sciences