Genetic Identification and Control of Weeds: An Update

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Genetic Identification of Pigweeds

Palmer amaranth

National Agricultural Genotyping Center (NAGC), Fargo

- 81 samples in <u>2019</u>
  - 31 Palmer amaranth
  - 24 waterhemp
  - 26 other pigweeds (monoecious)

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  - 26 other pigweeds (monoecious)
- Samples, not fields (may be more than one sample from a field)
- **Most from North Dakota, Minnesota, and Montana**

Genetic Identification of Pigweeds

National Agricultural Genotyping Center

- NDSU campus (1616 Albrecht Blvd N)
- www.genotypingcenter.com
- megan.oneil@genotypingcenter.com

United
Soybean Board

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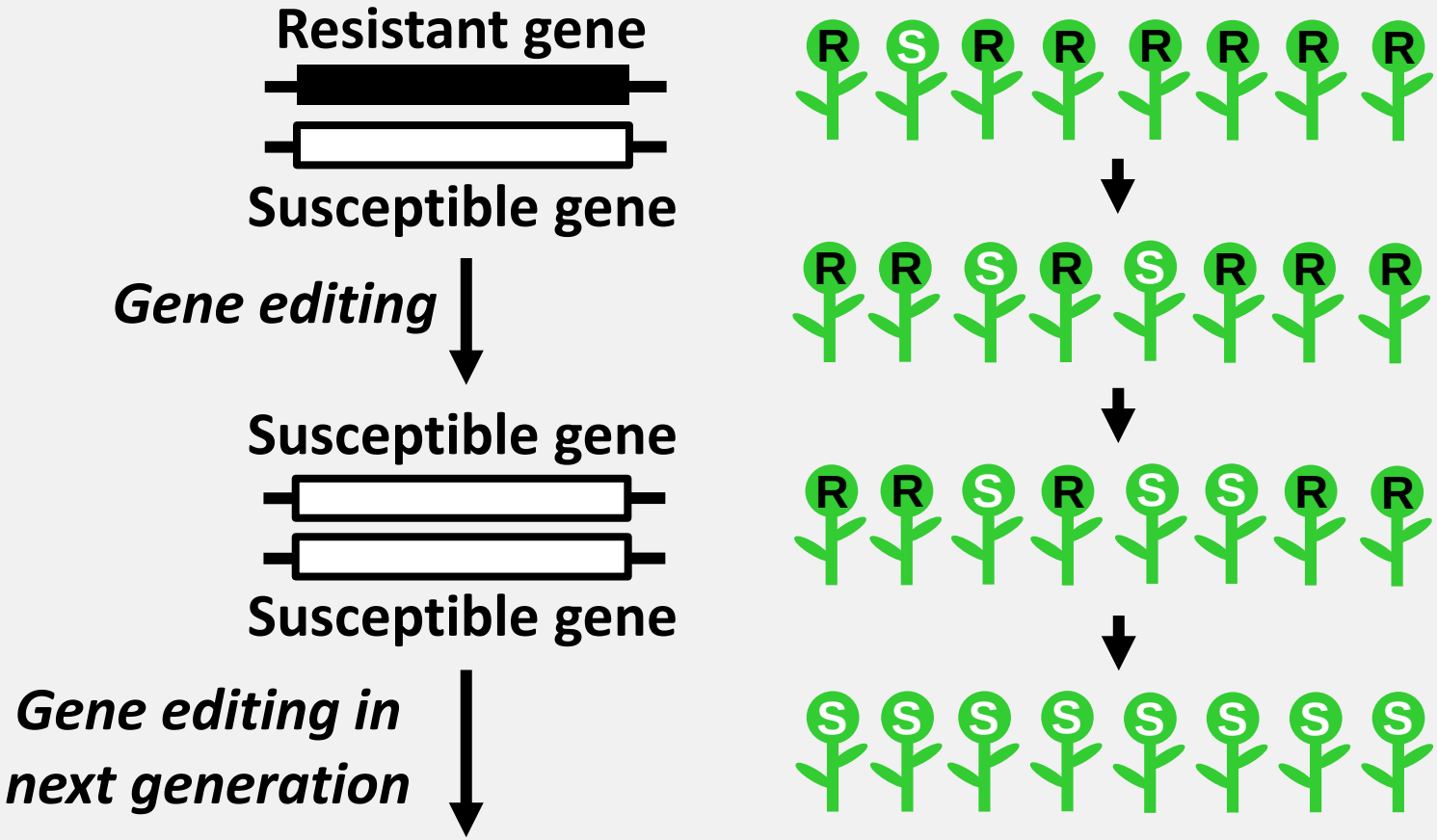
Development of this test funded by:

- North Dakota Soybean Council
- North Dakota Corn Council

Gene Drives for Pest Management



If Genes were Coins

Chance of heads is 50%

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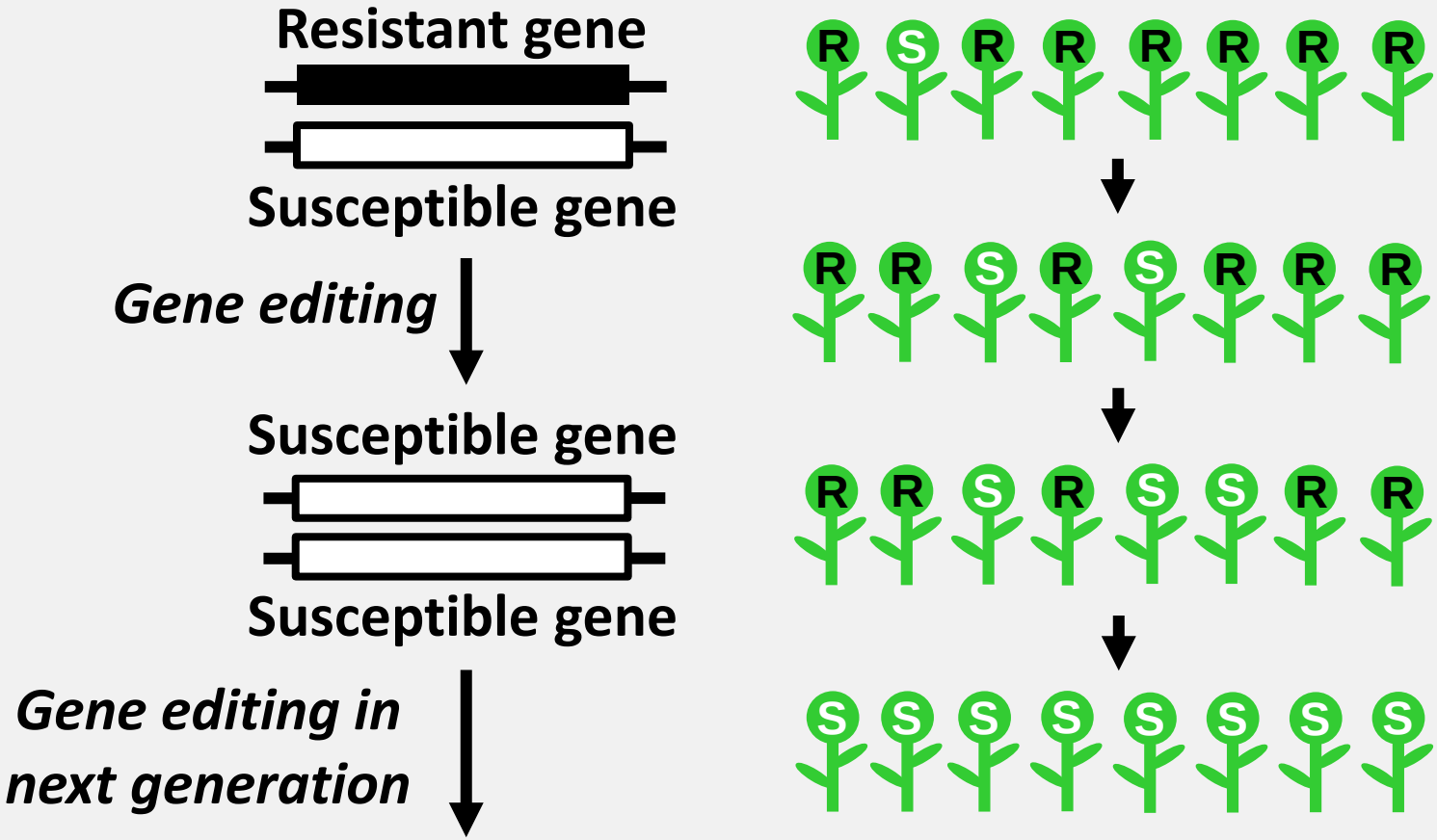
↓ **Edit**

Chance of heads is 100%

Gene Drives for Pest Management



Gene Drives for Pest Control

Mosquitoes

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Interested groups include:

- Malaria No More
- Target Malaria

Gene Drives for Pest Control


NIH

Mammalian pests such as rodents

- Predators of native species
- Reservoir of diseases such as Lyme

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Interested groups include:

- Island Conservation

ISLAND CONSERVATION
Preventing Extinctions

- Genetic Biocontrol of Invasive Rodents

GBIRd

- Predator Free NZ

PREDATOR FREE NZ

Gene Drives for Pest Control


Judy Gallagher

Fruit flies

- **Agricultural pest**

Interested groups include:

- **California Cherry Board**

Gene Drives for Pest Control

Weeds

- Agricultural pest
- Allergens

Gene Drives for Pest Control

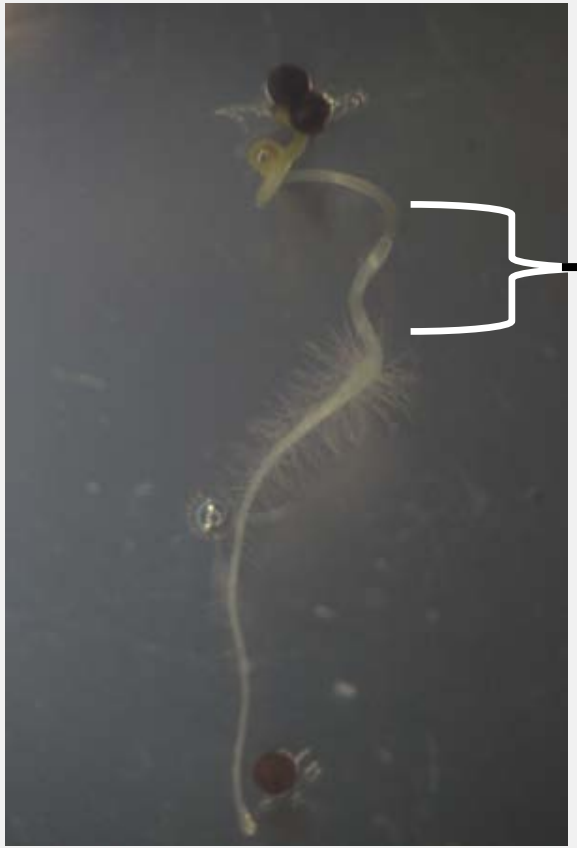
Weeds

- Agricultural pest
- Allergens

Research approaches include:

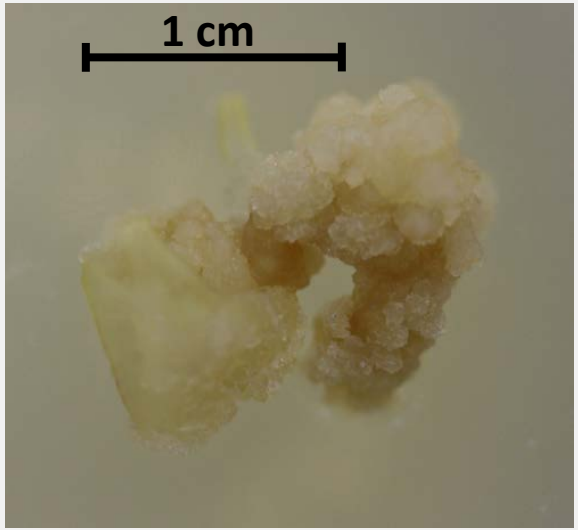
- University of Illinois
  - Females to males
- NDSU
  - Resistant to susceptible

Waterhemp Tissue Culture



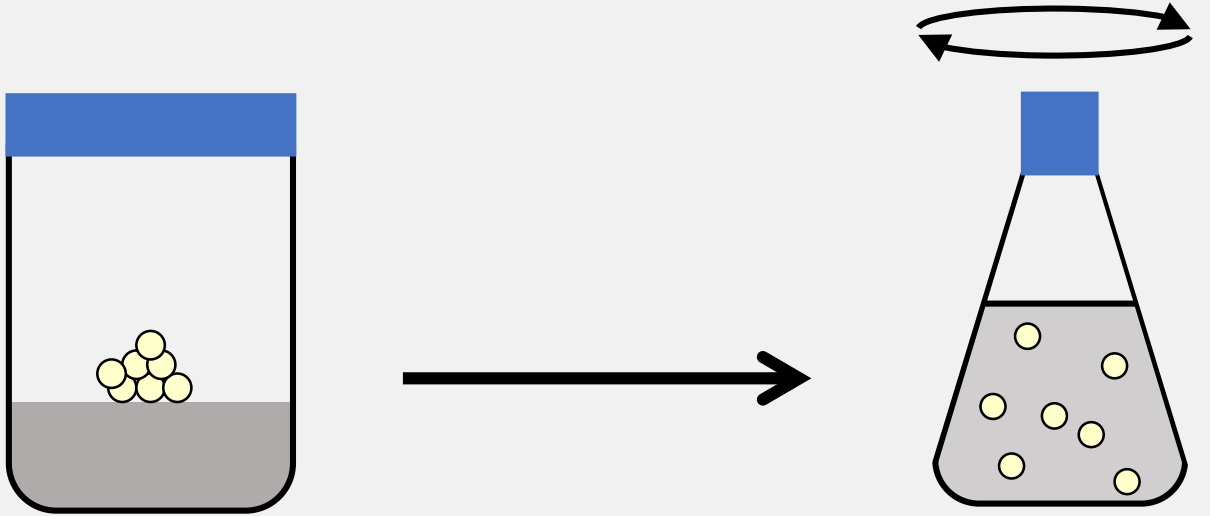
Germinated seeds

Remove a portion of the stem (hypocotyl)



Callus tissue

Waterhemp Tissue Culture

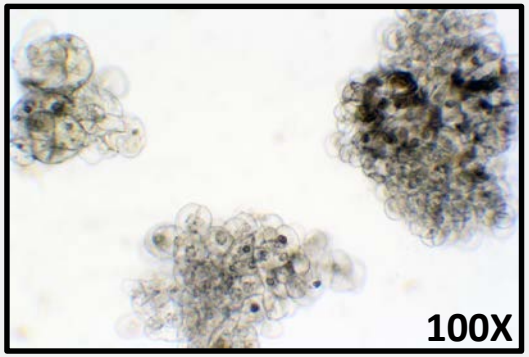


Callus culture on solid media

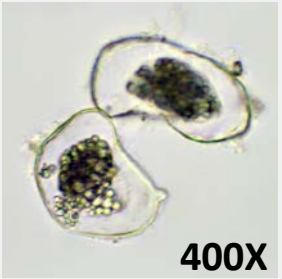
Suspension culture in liquid media

Waterhemp Tissue Culture

Suspension culture



Subculture



Next Steps

- **CRISPR-based gene editing of the acetolactate synthase (ALS) gene in yeast as a model**

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- CRISPR-based gene editing of the acetolactate synthase (ALS) gene in yeast as a model
- Establish transformation protocol for waterhemp suspension cultures
- **Editing of the ALS gene in waterhemp**

Acknowledgments

- ND Agricultural Experiment Station
- ND Corn Council
- ND Soybean Council
- ND State Board of Agricultural Research and Extension – Soybean
- USDA – National Institute of Food and Agriculture