



# POTATOES & PESTS PAPAS

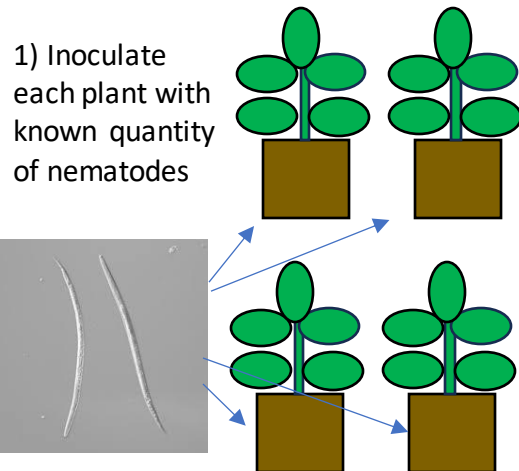
USDA NIFA 2022-51181-38450

Actionable Science Against Nematodes

## Breeding for Columbia root-knot nematode resistance

### How is nematode resistance measured?

#### Nematode reproduction on plant host



3) Extract nematodes from soil and calculate abundance using microscope

4) Calculate reproductive factor (RF)

$$RF = \frac{\text{Final nematode count}}{\text{number of nematodes at start of trial}}$$

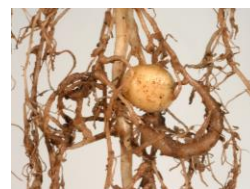
RF > 1 is a good host (susceptible)

RF < 1 is a poor host (tolerant)

RF < 0.1 is a non-host (resistant)

#### Field screen for nematode damage

Plant clones in a nematode infested field and evaluate symptomology



Root galling



Embedded egg masses



Mild



Severe

### Are there any known sources of genetic resistance to Columbia root-knot nematode (*Meloidogyne chitwoodi*)?

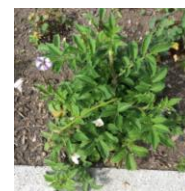
There are no cultivated potato varieties that exhibit resistance to Columbia root-knot nematode



Screens of wild potato relative species have identified the following species that are non-hosts



*Solanum bulbocastanum*



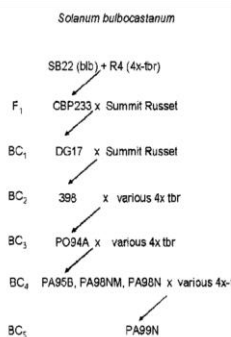
*Solanum hougasii*



*Solanum fendleri* (stoloniferum)

#### Introgression of resistance

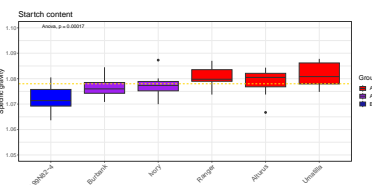
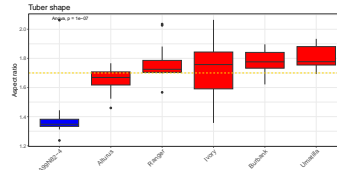
Resistance from *S. bulbocastanum* was introgressed into *S. tuberosum* background through somatic hybridization



Resistances is inherited dominantly across multiple genetics backgrounds

#### Our most advanced resistant clones do not meet industry standards

PA99N82-4 has low specific gravity



PA99N82-4 is not oblong enough for French fry production