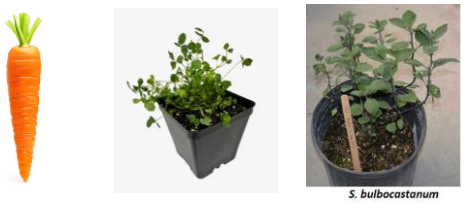
POTATOES & PESTS
PAPAS
Actionable Science Against Nematodes
USDA NIFA 2022-51181-38450

Diagnostic Molecular Markers for Identification of Different Races of Columbia Root Knot Nematode

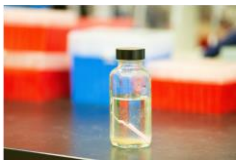
Columbia root-knot nematode (CRKN), *Meloidogyne chitwoodi* is a soil-borne pathogen parasitizing a wide range of plants in the Pacific Northwest (PNW). In potato, CRKN infests roots and tubers causing small visible brown spots in the tuber flesh, dramatically reducing their market value. In the PNW, three populations of *M. chitwoodi* exist: Race 1, Race 2, and a pathotype of Race 1_{Roza}. The races are differentiated based on the host tests which are time consuming. Developing molecular markers can aid in faster identification of races

Race 1, Race 2 and Race 1_{Roza} of CRKN:



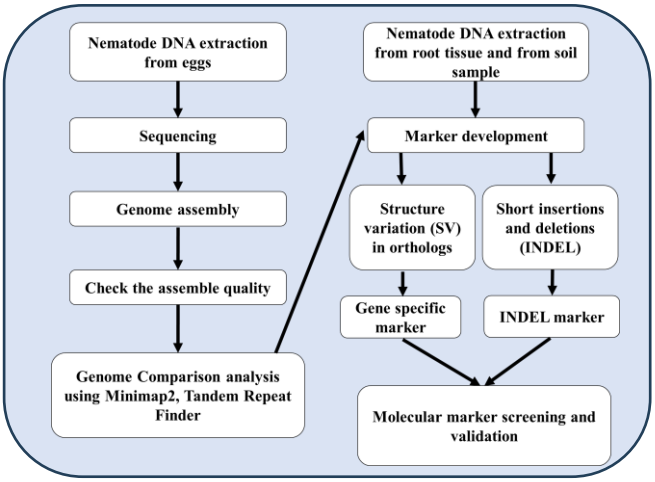
Race 1	✓	X	X
Race 2	X	✓	X
Race 1_{Roza}	✓	X	✓

Nematodes extracted from soil sample

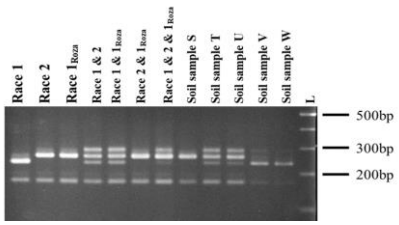


Nematode eggs extracted from root tissue

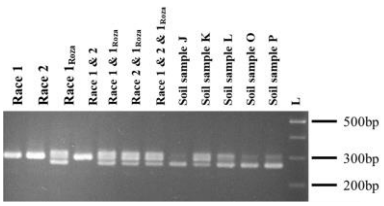
Flow chart of research method:



Molecular marker validation result:

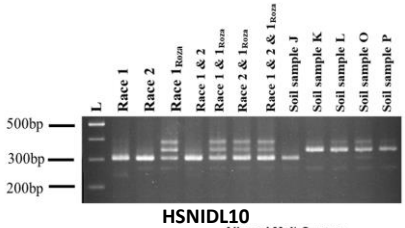


HSNIDL8



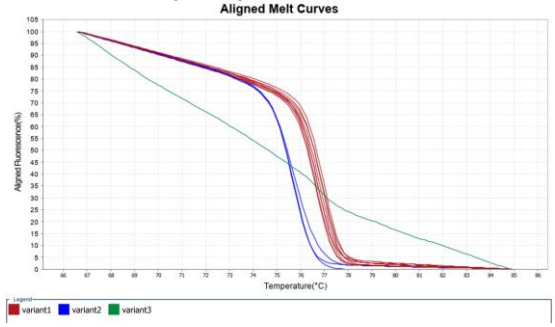
HSNIDL9

It needs more time to run the PCR and electrophoresis



HSNIDL10

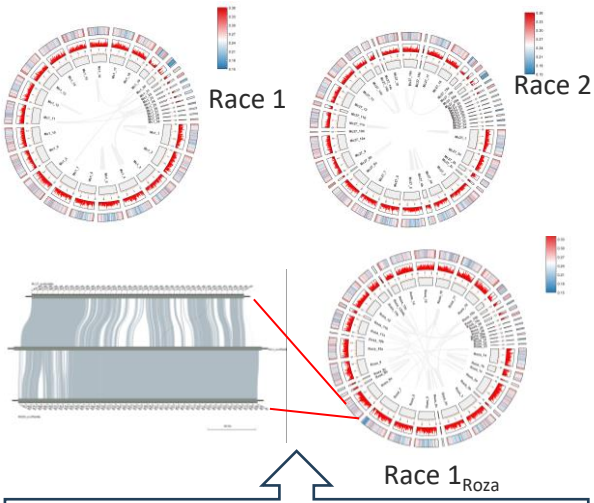
Agarose gel electrophoresis of INDEL primers HSNIDL8, HSNIDL9, and HSNIDL10products with annealing temperature of 58℃



High Resolution Melt (HRM) analysis can identify nucleotide polymorphisms based on melting temperature

HRM marker for gene Mc1_g1487

Circos plot of Race 1, Race 2 and Race 1_{Roza} :



Alignment of scaffold 8 in *Meloidogyne chitwoodi* Race 1, Race 2, and Race 1_{Roza} genomes

- By Utilizing whole genome sequence of the CRKN, we developed molecular markers (HSNIDL8, HSNIDL9, HSNIDL10, and Mc1_g1487) that can efficiently detect the nematode races and avoids laborious host tests.