

**AGRICULTURAL RESEARCH FOUNDATION
FINAL REPORT
FUNDING CYCLE 2014 – 2016**

TITLE: Breeding for Resistance to Verticillium Wilt of Potato: Identification of Potential Resistant Germplasm

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Describe any similar research for which you are currently receiving grant support. Indicate the source and award amounts

The Oregon State University (OSU) Potato Breeding and Variety Development program plays a key role in the Tri-State potato variety development program. OSU breeding efforts focus on the four major market classes: 1) Russets for processing, 2) Fresh market russets, 3) Chipping; and 4) Specialty. Traits of importance include yield potential, biotic stress resistance (PVY, Verticillium wilt, nematodes, soft rot, late blight, silver scurf, potato tuber worm, aphids, psyllids, etc.), abiotic stress resistance (drought and heat stress, cold sweetening), cooking quality, low acrylamide level, bruise resistance, storability, internal quality and appearance. In this study we propose to establish an efficient Verticillium wilt resistance breeding program by understanding the availability of resistant germplasm in our collaborative breeding programs (access to resistant germplasm) and also identification of new sources of resistance to Verticillium wilt.

Objectives:

1. Field inoculation studies to determine the extent of Verticillium wilt resistance in the advanced selections from the western regional potato breeding programs.
2. Evaluate host-pathogen interactions to identify Verticillium wilt resistant germplasm

Objective 1: Greenhouse inoculation studies to determine the extent of Verticillium wilt resistance in the advanced selections from the western regional potato breeding programs.

OSU Potato Breeding and Variety development participates in coordinated western regional variety trial and national low acrylamide agronomic trials. The main goal of the western regional variety trial is to evaluate breeding selections for their adaptability to broader environmental conditions of the western U.S. before their release, while the low acrylamide agronomic trial is conducted to evaluate the performance of selections or cultivars with low acrylamide across potato production regions of U.S. In

this study, we will systematically perform field inoculation studies on advanced selections from regional (russet selections) and agronomic trials (russet selections) for their resistance to Verticillium wilt. Cultivars Russet Norkotah and Ranger Russet will be used as susceptible and moderately resistant controls. Advanced selections will be planted in field and will be replicated two times with 10 plants per replication. Verticillium wilt isolate belonging to VCG4A will be used to inoculate the plants at 5 weeks after planting tubers using organic rye berries at the rate of 10^5 colony forming units (CFU). Total chlorosis and necrosis will be recorded twice at 90 days and 120 days of planting. The area under the disease progress curve (AUDPC) will be calculated.

Objective 2: Evaluate host-pathogen interactions to identify Verticillium wilt resistant germplasm

Resistance against *V. dahliae* has been identified in wild species in the past. In this study we will collect potato germplasm from other breeding programs and will perform field inoculations as described in objective 1 to identify potential germplasm that carry the resistance. Resistant germplasm that is identified in this study will be used in the breeding program to establish a Verticillium wilt resistance breeding program.

Significant Accomplishments:

1. All Tri-state and western regional advanced selections from the tri-state breeding program were planted and evaluated for their performance to verticillium wilt. Disease ratings were carried out based on percent of green left at 90 and 120 days of planting. The AUDPC values ranged from 58 (AOR06070-1KF) to 2828 (TX08352-5R)
2. Four clones from our breeding program (POR06V12-3, AO03123-2, AOR06070-1KF and OR5039-4) had found to have high level of tolerance to Verticillium wilt. These clones are being used in the breeding program for VW resistance breeding. Two of these clones (POR06V12-3 and OR5039-4) are proposed for release as tri-state releases.
3. In addition, 94 seedlings from 20 accessions are currently being screening for their resistance to VW. The identified resistance from the wild accessions will be used in the breeding program.

BENEFITS & IMPACT:

Two potential clones with resistance to Verticillium wilt were identified and are currently being used as parents for wilt resistance breeding. The clones POR06V12-3, OR05039-4 and AO3123-2 has very good processing. POR06V12-3 and OR5039-4 will be released in 2016 and will have potential to benefit PNW potato industry.

ADDITIONAL FUNDING RECEIVED: No additional funding was received

FUTURE FUNDING POSSIBILITIES: A Multi State Specialty Block Grant was applied to conduct competitive research on Verticillium Wilt Breeding.