



Pea PI 180693 - Root Rot Resistance

USDA Agricultural Research Service, USA

Aphanomyces root rot is a devastating pathogen that causes up to 100% yield loss in peas (*Pisum sativum*). Pea accession PI 180693, a landrace maintained by the U.S. National Plant Germplasm System (NPGS), was found to have resistance to this disease, among others. This resistance was bred into improved cultivated backgrounds and released to the breeding community, paving the way for resistant cultivars. PI 180693 was used to identify specific genes contributing to *Aphanomyces* and *Fusarium* root rot tolerance, and to develop the first high density SNP map of pea.



Photo by Clarice Coyne

Flowers of pea accession PI 180693.

PROJECT GOALS

- ✓ Identify *Aphanomyces* root rot resistance genes
- ✓ Develop pea cultivars resistant to devastating root rots

Problems Addressed

Peas grown in the field are particularly susceptible to root rots caused by fungi and oomycetes (a fungal-like protist). *Aphanomyces* root rot and *Fusarium* root rot can cause total yield loss, and it is recommended to take peas out of rotation for 4 to 8 years if a field is badly infected. This greatly diminishes the value of peas in crop rotations with cereals, presenting a major problem for the many growing areas in the United States that have few other economically feasible rotation options available.

Solutions Developed

PI 180693, a pea landrace accession at the NPGS unit in Pullman, Washington, was identified as a source of resistance to *Aphanomyces* root rot, *Fusarium* root rot, and *Fusarium* wilt. PI 180693 was used to develop breeding lines, enabling pea breeding programs to release commercially viable cultivars with partial resistance to *Aphanomyces* and *Fusarium* root rot. Mapping populations developed from PI 180693 and lines derived from it enabled the discovery of major resistant genes for both *Aphanomyces* and *Fusarium* root rots.



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