

## Validation of ISF differential table of *Plasmodiophora brassicae* (Pb) in *Brassica oleracea* ISF Project

### Project Overview

The ISF Clubroot Project was initiated to validate a standardized differential host set for *Plasmodiophora brassicae* (Pb), the pathogen causing clubroot in *Brassica oleracea*. Given the introduction of resistance genes from other *Brassica* species into commercial breeding programs, the project aimed to harmonize resistance classification across the global seed sector.

### Methodology & Participation



- The project involved 14 laboratories across multiple countries, using 8 field isolates and 4 differential genotypes.
- A pre-ring test was conducted to harmonize methodologies.
- A standardized pipetting method and observation scale were used to ensure data comparability.
- The testing protocol was applied to evaluate resistance reactions under defined temperature and growth conditions.

### Key Results

- The ISF differential set, consisting of 4 differentials and 4 denominated races (Pb: 0 to Pb: 3), was confirmed as fit-for-purpose.
- The validated differential varieties include:
  - *Bartolo* (Susceptible)
  - *Bejo 051632* (HR: Pb: 0, Pb: 3)
  - *Clapton* (HR: Pb: 0, Pb: 1, Pb: 3)
  - *Lodero* (HR: Pb: 0, Pb: 1, Pb: 2)
- Ringtest results showed strong inter-laboratory consistency.
- Observed non-conformities were attributed to temperature deviations, reinforcing the importance of standardized environmental conditions (optimal: 20–23 °C).

### Final Outcome

- The differential set and protocol were formally endorsed by the project group in April 2025.
- The materials are now available for use by the ISF Expert Group and was proposed for inclusion in UPOV and CPVO DUS testing guidelines for *Brassica oleracea* and accepted.
- Type isolates and differential varieties are available through Naktuinbouw-Plantum and MATREF collections.

 Access the official report and validated differential set under:  
 Brassica oleracea Clubroot (Pb) on the ISF Disease Resistance page:  
<https://worldseed.org/our-work/disease-resistance/differential-hosts/>