

DIFFERENTIAL SET

Plasmodiophora brassicae (Pb)- ***Brassica oleracea***

Clubroot (*Plasmodiophora brassicae*) is a persistent and devastating soil-borne disease. Resistance genes out of amongst others *Brassica rapa* have been introduced into commercial varieties of *B. oleracea*. A new race designation system for clubroot with four clubroot races and differentials from several *B. oleracea* species was developed in 2012 to enable a relevant and reproducible description of clubroot resistant *B. oleracea* varieties.

ISF EG DRT carried out a project with ring test from 2022 till 2025 to validate this differential set.

In this project isolates representing all potential reactions (8 groups) on 4 differentials were tested.

These 4 undermentioned differentials from the original set and the 4 type isolates from the originally defined 4 races were validated. It was decided not to denominate any other isolates, because these 4 are sufficient for differentiating the 4 different genotypes for resistance to clubroot in *B. oleracea*.

However, some of the other isolates, like the isolate breaking all resistance genes (P1) will also be maintained and are available through GEVES isolate collection.

Although additional resistance genes to clubroot do exist in *B. rapa*, the resistance genes, represented by the differentials in this table, are also the main genes deployed within commercial products of *B. rapa*.

Therefore, the race panel described is also applicable to characterize clubroot races within *B. rapa*.

Differentials		ISF Code and races	Pb: 0	Pb: 1	Pb: 2	Pb: 3
		Gene (s)				
Bartolo ¹	White cabbage		S	S	S	S
051632 ¹	White cabbage		HR	S	S	HR
Clapton	Cauliflower		HR	HR	S	HR
Lodero	Red cabbage		HR	HR	HR	S

Explanatory Note:

In evaluating plant varieties for resistance to specific pathogens or pests, the following classifications are used to describe their response:

S = Susceptible; HR= Highly Resistant

You can find further information on this definitions in the following ISF document <https://worldseed.org/document/definitions-of-the-terminology-plants-pests-v-o-seed-industry-2022/>

All isolates and differentials are used by the industry

¹ not commercial available (anymore), but through MATREF and Naktuinbouw-Plantum isolate collection

References

W. D. Smilde, E. G. A. Linders & R. M. Veenstra, 2012. Characterization of clubroot resistance in *Brassica oleracea*. Program and abstract book 10th Conference of the European Foundation of Plant Pathology, 1-5 October 2012, Poster abstract P46

(http://www.efpp.net/ipm2/Program_and_abstract_book/posters.html)

Final report ISF EG DRT clubroot project *Plasmodiophora brassicae* (Pb) in *Brassica oleracea*

Protocol

CPVO. See <http://www.cpvo.europa.eu/> for a protocol on disease resistance testing

For more information contact the ISF Secretariat at isf@worldseed.org

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