



Development of symptoms in diploid and tetraploid potato after inoculation with highly aggressive strain of *Dickeya solani*

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Introduction

Pectinolytic bacteria *Dickeya solani* is spreading in potato crops in Europe. In some studies strains of *D. solani* are more aggressive than other pectinolytic bacteria (Czajkowski 2013; Toth et al.2011). Two diseases of potato are caused by *D. solani*: potato soft rot and potato blackleg. Little is known about the resistance of potato to these bacteria. The goal was to assess the resistance reaction of tubers and potato plants to highly aggressive strain of *D. solani* in diploid hybrids and cultivars.

Materials and methods

Plant material

The plant material consisted of cultivars and diploid interspecific hybrids of *Solanum*, originated beside *S. tuberosum* from wild and primitive cultivated potato species.

Bacteria

D. solani, IFB0099 (syn. IPO2276) (Golanowska et al. 2015) 24 h cultures on LB medium at 27 °C; OD₆₀₀ ~ 1.0

Tuber resistance

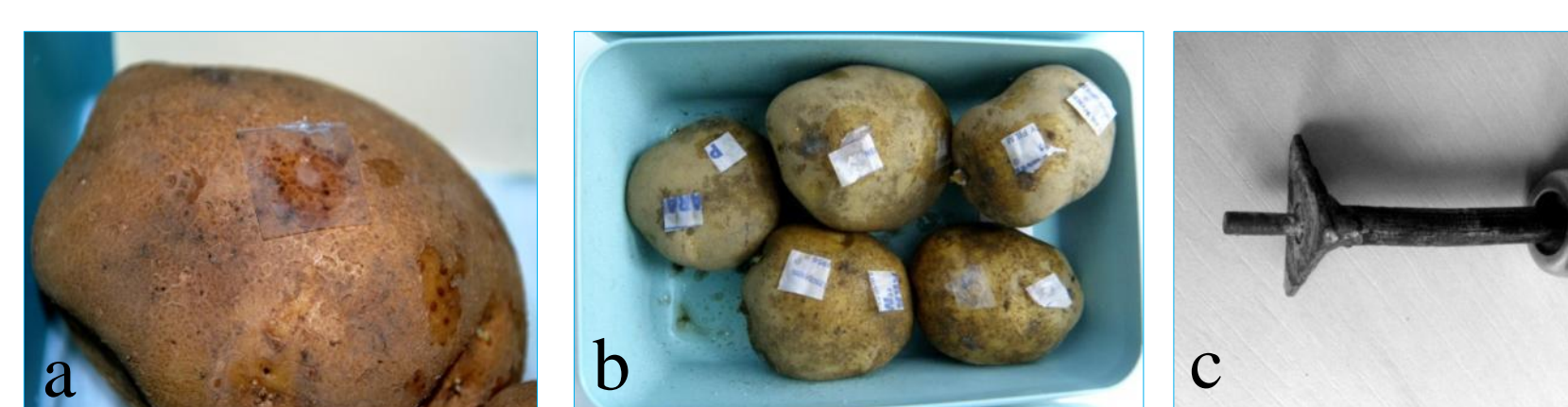


Fig. 1. Tuber resistance: 20 tubers per genotype were: washed in tap water air dried at room temperature for one day wounded with a steel rod (c), and inoculated with 10 µl of bacterial suspension covered with a vaseline (a, b), then sprayed with water and incubated at 26°C for 3 days in plastic boxes (b). The chosen temperature of 26° C based on the results of tuber maceration of cultivars Irys, Glada, Gandawa, Sonda, tested in 4 different temperatures: 20 °C, 23 °C, 26 °C and 30 °C. The experiment was repeated twice.

Plant resistance

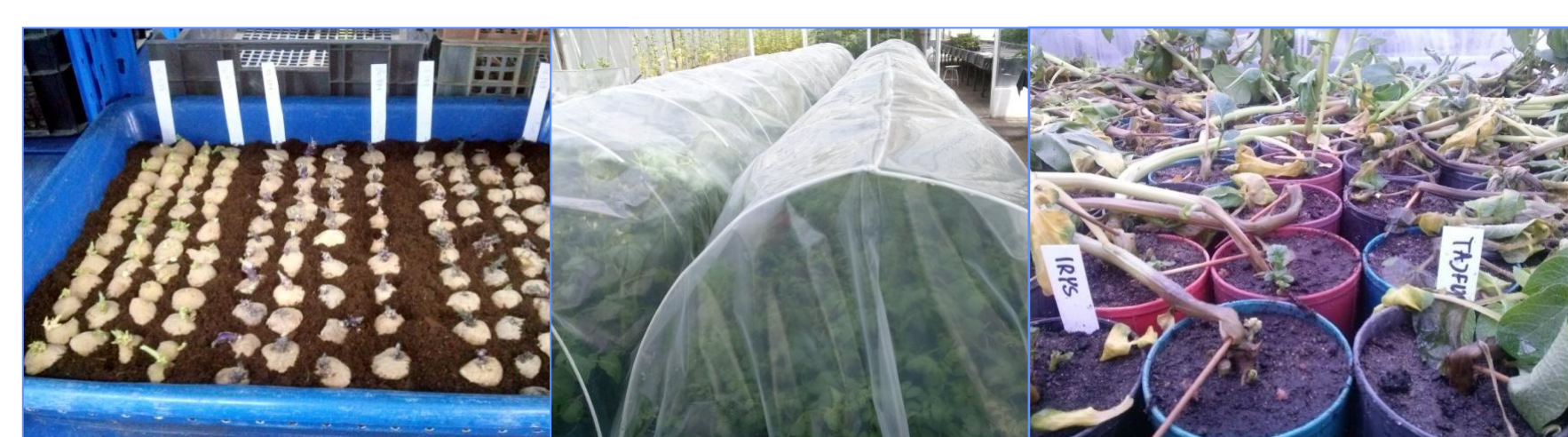


Fig. 2. Plant resistance: eyes from on average 68 tubers per genotype were kept until sprouting for 2.5 weeks (a), then plants were grown in a greenhouse for 3.5 weeks and were inoculated with a toothpick soaked in a bacterial suspension in a base of a stem. Plants were covered with a foil to keep high humidity (b), symptoms were evaluated after their development (c). The experiment was repeated twice.

Results

Tuber resistance

The tuber resistance of 24 diploid clones did not differ significantly from the highly resistant standard of resistance to *Pectobacterium*, the somatic hybrid of *S. brevidens* (+) *S. tuberosum*, USA 249, and was significantly higher than the resistance of cultivars Glada, and Irys, medium resistant and susceptible to *Pectobacterium* spp., respectively (Fig. 3). The best cultivar in this experiment was cv. Mieszko, originated from the double backcross of the highly resistant to *P. atrosepticum* diploid clone DG 88-9.

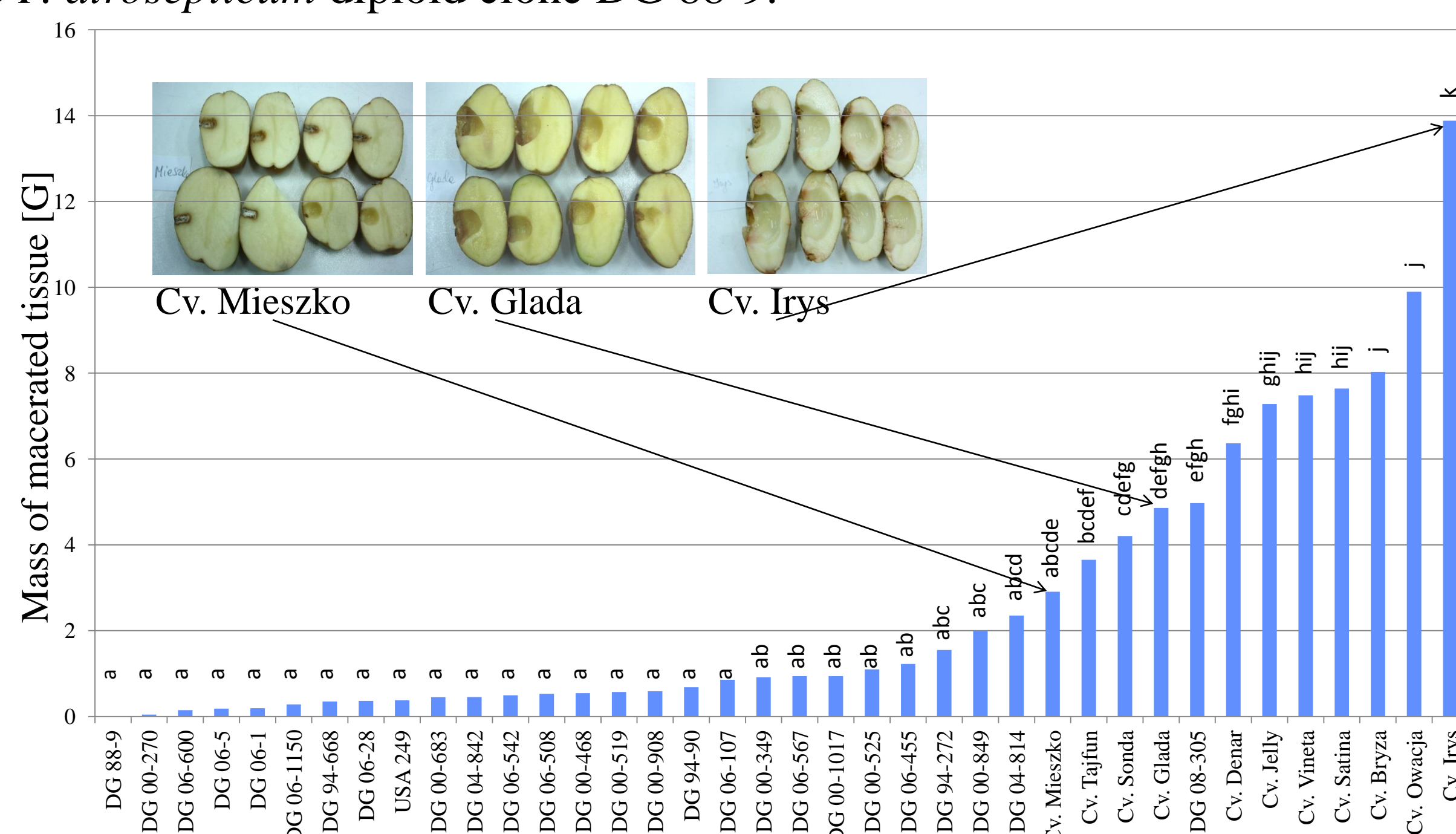


Fig.3. Rotting of tubers inoculated with *D. solani* strain IFB0099 after three days of incubation at 26°C. Means of twenty tubers per genotype tested in two independent experiments. Means followed by the same letter do not differ significantly acc. to Tuckeys range test with P = 0.05.

Plant resistance

Due to high temperature in a greenhouse the symptoms of the stem base rotting were observed after few days post inoculation (pi) In the repeated experiment the symptoms were observed 8 days pi mostly as leaves necroses and wilting than the rotting of stems. In general, potato cultivars showed symptoms of infection with bacteria *D. solani* on higher number of plants than did the diploid clones (Fig.4.)

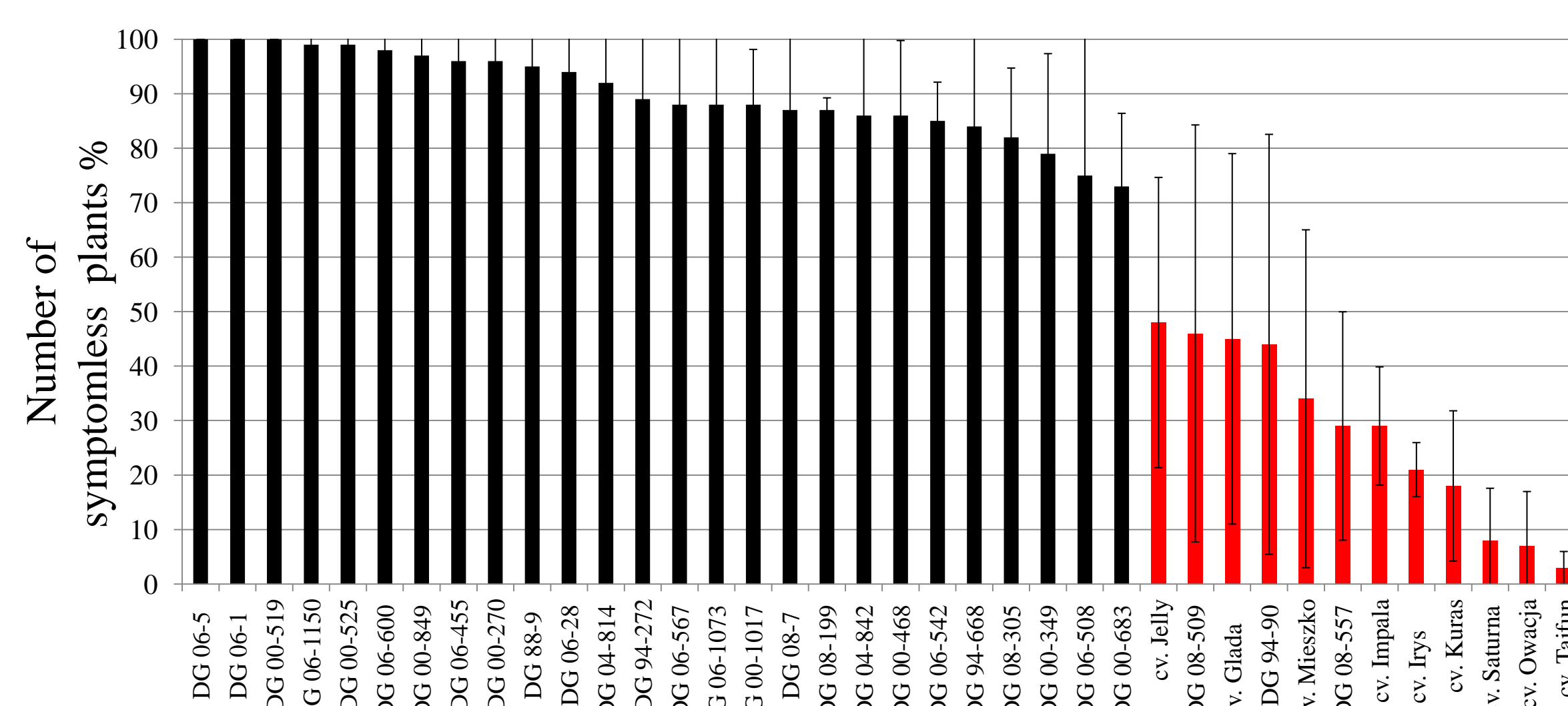


Fig. 4. Plants without the symptoms of blackleg (black and red are significantly different). Means from two independent experiments (±SD) are represented by 68 plants in average (range 26 - 164 plants per genotype).

Conclusions

The diploid hybrids might be used for improving potato resistance to bacteria *D. solani* in new cultivars.

Ref. Czajkowski R et al., 2013 Plant Pathol 62:597–610; Golanowska M et al., 2015. Genome Announc 3(2):e00109-15. doi:10.1128/genomeA.00109-15; Toth IK et al., 2011. Plant Pathol 60: 385-399



The work granted by Polish-Norwegian project POTPAT Pol-Nor/202448/28/2013 WP1 and by the Ministry of Agriculture and Rural Development, #56 „The expression and genetic characterization of resistance to bacteria *Dickeya solani* in selected sources of resistance diploid potato” (Badania ekspresji i genetyczna charakterystyka odporności na bakterie *Dickeya solani* w wyróżnionych źródłach odporności w ziemniaku na poziomie diploidalnym)