



First report of latent infection of *Malva nicaeensis* caused by *Pectobacterium carotovorum* subsp. *brasiliense* in Israel

L. Tsrur [Lahkim]^{1*}, S. Lebiush¹, O. Erlich¹, I. Galilov¹, L. Chalupowicz², M. Reuven², O. Dror² and S. Manulis-Sasson²

¹ Agricultural Research Organization (ARO), Dep of Plant Pathology and Weed Research, Gilat Research Center, MP Negev 85280, Israel; ² ARO, Dep of Plant Pathology and Weed Research, Volcani Center, Rishon LeZion 7528809, Israel

*E-mail: tsror@volcani.agri.gov.il

Received: 22 Oct 2018. Published: 28 Jan 2019.

Potato blackleg and tuber soft rots in Israel, caused by *Pectobacterium* and *Dickeya* spp., originating from seed tubers imported from Europe, are of a great concern due to the warm climatic conditions during the growing season that favour disease expression and may result in the establishment of the pathogens in potato fields and their spread to weeds and other crops (Tsrur *et al.*, 2009). In a previous survey in Israel, *Dickeya solani* was isolated only from *Cyperus rotundus*, out of symptomless plants of 12 weed species (Tsrur *et al.*, 2010). Recently, *Pectobacterium carotovorum* subsp. *brasiliense* (Pcb) was reported as an emerging threat in Western Europe and the primary blackleg-causing pathogen for some countries in the region (van der Wolf *et al.*, 2017). The pathogen is also responsible for considerable disease in Israel (personal information).

To study the dissemination of Pcb to weeds, a survey was conducted in potato fields where Pcb-infected plants were detected during the spring of 2018. Symptomless weed plants from 13 genera and 10 families, namely *Solanum nigrum* (Solanaceae), *Polygonum equisetiforme* (Polygonaceae), *Sentaurea procurrentis*, *Sonchus oleraceus* (Asteraceae), *Lolium rigidum*, *Phalaris brachystachys*, *Avena sterilis* (Poaceae), *Malva nicaeensis* (Malvaceae), *Amaranthus blitoides* (Amaranthaceae), *Chenopodium murale* (Chenopodiaceae), *Chrozophora tinctoria* (Euphorbiaceae), *Orobancha aegyptiaca* (Orobanchaceae) and *Erucaria rostrate* (Brassicaceae), were randomly collected from areas where potato plants infected by Pcb or *D. solani* had been identified. Roots or stems (in the case of *O. aegyptiaca*) of 6-15 plants of each weed were washed, surface sterilised, macerated in sterile distilled water and the suspensions were plated on crystal violet pectate medium. Cavity forming bacteria were transferred to nutrient agar for further characterisation. Pcb was isolated only from latently infected *Malva nicaeensis* plants and with an incidence of 16.7%. DNA extracted from these colonies reacted positively in a PCR assay using BR1f/L1r specific primers (Duarte *et al.*, 2004) and also in a TaqMan assay based on *araC* sequence (van der Wolf *et al.*, 2017). Sequencing the *gapA* gene (Cigna *et al.*, 2017) identified the isolate as Pcb (GenBank Accession No. MK086015). A maceration assay on potato tubers at 30°C (Tsrur *et al.*, 2013) was positive.

This is the first report of latent infection of *Pectobacterium carotovorum* subsp. *brasiliense* in one of the most prevalent weeds in potato

fields in Israel. *Malva nicaeensis* may serve as an alternative host for Pcb allowing the pathogen to survive in the absence of the host crop.

Acknowledgements

This study was supported by the Israeli Ministry of Agricultural and Rural Development (grant no. 20-02-0051).

References

- Cigna J, Dewaegeire P, Beury A, Gobert V, Faure D, 2017. A *gapA* PCR-sequencing assay for identifying the *Dickeya* and *Pectobacterium* potato pathogens. *Plant Disease*, 1278-1282. <http://dx.doi.org/doi.org/10.1094/PDIS-12-16-1810-RE>
- Duarte V, De Boer SH, Ward LJ, de Oliveira AMR, 2004. Characterization of atypical *Erwinia carotovora* strains causing blackleg of potato in Brazil. *Journal of Applied Microbiology* **96**, 535-545. <http://dx.doi.org/10.1111/j.1365-2672.2004.02173.x>
- Tsrur [Lahkim] L, Erlich O, Lebiush S, Hazanovsky M, Zig U, Slawiak M, Grabe G, van der Wolf JM, van de Haar JJ, 2009. Assessment of recent outbreaks of *Dickeya* sp. (syn. *Erwinia chrysanthemi*) slow wilt in potato crops in Israel. *European Journal of Plant Pathology* **123**, 311-320. <http://dx.doi.org/10.1007/s10658-008-9368-0>
- Tsrur [Lahkim] L, Lebiush S, Erlich O, Ben-Daniel B, van der Wolf J, 2010. First report of latent infection of *Cyperus rotundus* caused by a biovar 3 *Dickeya* sp. (syn. *Erwinia chrysanthemi*) in Israel. *New Disease Reports* **22**, 14. <http://dx.doi.org/10.5197/j.2044-0588.2010.022.014>
- Tsrur [Lahkim] L, Ben-Daniel B, Chalupowicz L, van der Wolf J, Lebiush S, Erlich O, Dror O, Barel V, Nijhuis E, Manulis-Sasson S, 2013. Characterization of *Dickeya* strains isolated from potato grown under hot-climate conditions. *Plant Pathology* **62** 1097-1105. <http://dx.doi.org/10.1111/ppa.12030>
- van der Wolf JM, Haan EG, Kastelein P, Krijger M, de Haas BH, Velvis H, Mendes O, Kooman-Gersmann M, van der Zouwen PS, 2017. Virulence of *Pectobacterium carotovorum* subsp. *brasiliense* on potato compared with that of other *Pectobacterium* and *Dickeya* species under climatic conditions prevailing in the Netherlands. *Plant Pathology*, 571-583. <http://dx.doi.org/10.1111/ppa.12600>

To cite this report: Tsrur [Lahkim] L, Lebiush S, Erlich O, Galilov I, Chalupowicz L, Reuven M, Dror O, Manulis-Sasson S, 2019. First report of latent infection of *Malva nicaeensis* caused by *Pectobacterium carotovorum* subsp. *brasiliense* in Israel. *New Disease Reports* **39**, 4. <http://dx.doi.org/10.5197/j.2044-0588.2019.039.004>

©2019 The Authors

This report was published on-line at www.ndrs.org.uk where high quality versions of the figures can be found.