Abstract

'*Candidatus* Liberibacter solanacearum' is a α-Proteo bacteria, Gram-negative, restricted to plant phloem and to the haemolymph of psyllids that act as vectors. This emerging bacterium has been associated with different diseases in different hosts and associated with carrot (*Daucus carota*) in Spain. Vegetative disorders of unknown etiology have also been observed in celery (*Apium graveolens*) since 2008.

A real-time PCR protocol specific to '*Ca.* L. solanacearum' detection, using TaqMan probe and direct sample preparation methods have been developed. This technology has been validated in an intra-laboratory study (sensitivity 1, specificity 1 and accuracy 100%) and is available commercially as a complete kit. It has been demonstrated that '*Ca.* L. solanacearum' is associated with the observed syndrome in celery and a new bacterium haplotype (E) has been identified. With these results it is concluded that celery is a new host of '*Ca.* L. solanacearum' (Teresani *et al*., 2014a).

Using the newly developed real-time PCR protocol '*Ca.* L. solanacearum' has been detected in 42,6% of the carrot seeds lots tested and in individual seeds. The number of cells/seeds has been estimated in 4.8±3.3 to 210±6.7, which only 5% were viable. After 150 days post-germination, 12% of seedlings showed symptoms and tested positive for '*Ca.* L. solanacearum'. Liberibacter-like cells were observed in the phloem sieve elements of the seed coat and in the phloem of carrot leaf midrib from seedlings. These results

demonstrated that '*Ca.* L. solanacearum' is transmitted by carrot seeds (Bertolini *et al*., 2014b).

The collected arthropods were classified into families, and the superfamily Psylloidea was identified to the species level resulting *Bactericera trigonica, B. tremblayi* and *B. nigricornis* the main identified species. The population dynamics of different psyllids species visiting carrot, celery and potato has been determined, concluding that the highest populations are captured during summer. The bacterium has been detected in the different *Bactericera* species previous cited additionally to *Bactericera* sp. The psyllid species carrying the bacteria can be considered as possible vectors of the bacterium (Teresani *et al*. 2014b).

Electrical Penetration Graphs showed that *B. trigonica* was able to feed in the phloem of carrot, celery and potato but not in the phloem of tomato plants. Experimental transmission showed that *B. trigonica* transmitted '*Ca.* L. solanacearum' from carrot to carrot, celery, potato and tomato. More efficient transmission occurred with ten individuals, and the transmission rates were 100% in celery, 80% in carrot and 10% in potato and tomato. The experimental transmission to potatoes threatens this crop (Teresani *et al*., 2014c).

These combined results have built a scientific foundation of the biological and epidemiological aspects of '*Ca.* L. solanacearum' contributing to new scientific information that is key in cultivation of celery and carrot to establish bacteria control strategies. The use

of bacteria-free carrot seed lots will definitely contribute to mitigate damage and reduce risks of transmission to solanaceous crops.