Eur J Plant Pathol (2022) 163:841–852
https://doi.org/10.1007/s10658-022-02523-9

Pectobacterium spp. isolated from rotting carrots obtained from markets in Gampaha district, Sri Lanka exhibit the potential of having broad host ranges

Kishani N. Naligama · Anupama P. Halmillawewa

Accepted: 17 May 2022 / Published online: 23 May 2022

Abstract Carrot production in Sri Lanka faces severe post-harvest losses due to bacterial soft rot. The quality deterioration of vegetables owing to typical bacterial soft rot can greatly affect the market value and consumer preference. Although the carrot soft rot causing bacteria occur all over the world, and are well-studied and characterized, the scarcity of data on the precise identification of the causal agents of the disease in Sri Lanka acts as a great barrier in managing such post-harvest losses. In an attempt to bridge this knowledge gap, we have isolated potential causative agents of bacterial soft rot from diseased carrot samples collected from Gampaha district, Sri Lanka. All the seven bacterial isolates were confirmed for their ability to exhibit pectolysis, and vegetable disk assays were used to evaluate the pathogenicity of bacterial isolates. The pathogenicity assays showed that these isolates have the ability to infect not only carrot, but also potato, radish, beetroot and Napa cabbage, suggesting their possible broad host range. The ITS–PCR RELP profiles of the pectobacterial isolates and hierarchical clustering of the resulting profiles have placed the strains isolated in this study into four groups. The 16S rRNA gene sequencing and subsequent analyses aided in identifying isolates as *Pectobacterium carotovorum* (C1B5, C2B6, C2B7 and C2B8), *P. aroidearum* (C1B3 and C1B4), and *P. polaris* (C3B9). The study indicated the possibility of different *Pectobacterium* spp. being involved in causing carrot soft rot in the area, emphasizing the need to carry out an island-wide, comprehensive analysis to understand the distribution of the pathogen, which could be used in implementing successful disease management strategies.

Keywords Soft rot *Pectobacteriaceae* · Pectolysis · *Pectobacterium* spp. · Carrot soft rot

K. N. Naligama · A. P. Halmillawewa (✉)
Department of Microbiology, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka
e-mail: anupama@kln.ac.lk

K. N. Naligama
e-mail: kishani.nimeshika@gmail.com

Introduction

Carrot (*Daucus carota*) is one of the most economically important vegetable crops in the world, which is a rich source of carotenoids, flavonoids, vitamins, minerals and dietary fibers. Vegetables, including carrots, play a significant role in the Sri Lankan diet, providing numerous nutritional and health benefits (Da Silva, 2014). Vitamin A deficiency, which is a major nutritional problem in developing countries (Udani, 1979) is high among Sri Lankan children between 5 and 15 years. It can lead to night blindness (Jayathissa et al., 2002; Jayatissa & Ranbanda, 2006) and the inclusion of vitamin A rich sources such as carrots in the diet can be helpful (Numan, 2019). Although carrot is grown in all agro-ecological regions in Sri Lanka, it is mainly considered as an up-country vegetable. The country's average annual carrot crop yield was recorded as 22.73 t/ha for both 2018 and 2019 (AgStat, 2019; AgStat, 2020). Although raw carrots garner high consumer preference,