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Performance of Clementine Mandarin Infected with Exocortis Disease on Nine Rootstocks

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ABSTRACT. The performance of Clementine mandarin trees infected with a mild source of exocortis was evaluated on nine different rootstocks growing on red ferralitic soil in the Jagüey Grande area of Cuba. Exocortis effect per rootstock was evaluated seven years after planting with regard to symptoms, tree growth, and fruit quality and yield. Bark scaling symptoms were seen in *Poncirus trifoliata*, Carrizo, Troyer and Yuma citranges, and Swingle citrumelo. As expected, tree development varied greatly depending on the rootstock and its susceptibility to the exocortis isolate used. Swingle citrumelo, Volkamer lemon, Morton and Yuma citranges attained the highest production. However, sour orange produced the best quality fruit followed closely by *P. trifoliata* and its hybrids.

Clementine is an easy-peeling mandarin cultivar widely grown in the world and is the most important mandarin in Spain, Israel, Morocco and Corsica (5, 6, 7). Its performance has been studied on different rootstocks such as rough lemon, Rangpur lime, Troyer citrange, and Cleopatra mandarin (4, 5). Under Cuban conditions, few studies have been conducted with this cultivar (1, 2). This study reports the performance of Clementine mandarin grafted on nine rootstocks infected with a mild source of exocortis seven years after planting.

Clementine mandarin infected with exocortis was grafted on *Poncirus trifoliata*, Troyer, Carrizo, Morton and Yuma citranges, Swingle citrumelo 4475, sour orange, Volkamer lemon, and Cleopatra mandarin rootstocks. Tree growth, fruit quality, production, and effect of the exocortis were evaluated during this study.

The tree development varied greatly depending upon the rootstock and the sensitivity to exocortis. *P. trifoliata* and its hybrids, Carrizo and Troyer, had the least variability of the growth parameters measured.

Volkamer lemon, Morton citrange, sour orange, and Cleopatra mandarin produced the highest growth. Yuma citrange and Swingle

citrumelo also produced vigorous trees similar to the aforementioned. Symptoms of bark scaling were observed in *P. trifoliata*, Carrizo, Troyer, and Yuma citranges, and Swingle citrumelo by the seventh year after planting. It should be noted that even though the growth of trees grafted on *P. trifoliata*, Troyer and Carrizo were affected by exocortis, the Clementine scion did not exhibit strong dwarfing effect as has been seen in combinations of these rootstocks with sweet oranges or grapefruits inoculated with exocortis (3). Morton citrange did not show the dwarfing reported in other countries (6), and it was similar to Yuma and Swingle citrumelo, even though Swingle is considered tolerant to exocortis (7).

The first production was obtained two years after planting and it increased through the seventh year. The highest production was on Swingle citrumelo with 100.4 kg/tree. This was greater than that of *P. trifoliata*, Troyer and Carrizo. Regarding the cumulative yield, Swingle, Volkamer lemon, and Morton citrange produced the highest yields; sour orange and Cleopatra mandarin produced moderate yields; while *P. trifoliata*, Troyer and Carrizo yielded the least. The productive efficiency (kg/m³) was high

for almost all the rootstocks used and was, in fact, larger than that reported by other authors. The highest efficiency was obtained with the greatest dwarfing rootstocks, especially *P. trifoliata*, with 4.07 kg/m³

The rootstocks used influenced the fruit quality. Cleopatra mandarin and Volkamer lemon had the

poorest fruit quality. Cleopatra had the lowest soluble solids, low juice content, and small fruit. Volkamer lemon had good size fruit, but low soluble solids, juice percentage, and vitamin C content. Sour orange rootstock produced the best quality fruit, however, *P. trifoliata* and its hybrids were nearly as good.

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