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EFFECT OF DIFFERENT *PSIDIUM* ROOTSTOCKS ON THE CONTROL OF ROOT KNOT NEMATODE AND GROWTH AND YIELD OF GUAVA (*PSIDIUM GUAJAVA* L.)

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EXTENDED ABSTRACT

Guava (*Psidium guajava* L.) is one of the important fruit crops grown in Sri Lanka. However, in recent years,the extent and production is gradually decreasing due to decline symptoms such as purple browning of leaves, growth inhibition, leaf drop, and death of the plants. These symptomatic seedlings found to have infected with root-knot nematode *Meloidogyne* spp. (Rajapakse *et al.,* 2015). The damage was widespread across the country and all guava varieties were reported to be susceptible. The use of resistant rootstocks is a promising method to control *Meloidogyne* if guava-compatible genotypes can be found. Two *Psidium* spp. *i.e. Psidium friedrichstalianium* (Costarican guava) and *P. cattleianum* (Chineese guava) are reported as resistant to guava root-knot nematode (Freitas *et al.*, 2014). Therefore, the present research aimed at verifying grafting compatibility between guava and other *Psidium* spp. at the stage of nursery production and post-planting in the field.

Studies were conducted at the Fruit Crops Research and Development Station (FCRDS) at Gannoruwa and Agriculture Research Station (ARS) at Kalpitiya, Sri Lanka, during 2012-2016. In first experiment, seeds of three *Psidium* spp. namely, *P. guajava, P. friedrichstalianium* and *P. cattleianum* were obtained from the orchard of the FCRDS and planted in a sand bed nursery. Two weeks after germination, plants were transferred to black polythene bags and were maintained up to the grafting size for about 8 months, by following recommended practices of Department of Agriculture (DOA), Sri Lanka. These plants were cleft grafted and patch budded using scion of two recommended guava varieties Bangkok Giant and Horana Rosi and one selection of guava 'Gannoruwa selection'. In each treatment, 10 pots were used and the experiment was arranged in a Randomized Complete Block Design (RCBD) with five replicates. Data were recorded on the percentage grafting success and growth of the scion wood after grafting.

The second experiment was established at the FCRDS at Gannoruwa to investigate the growth and yield of plants established using different planting materials namely, seedlings, air layered plants, and grafted plants to rootstock of *P. friedrichstalianium* and *P. guajava*. Planting materials developed from the previous study using the variety Gannoruwa selection, and seedlings and air layered plants of the same variety were used. The experiment was established in a RCBD with eight replicates. Plants were established in 4 m x 4 m spacing and maintained using recommended cultural practices of the DOA. Data on growth and yield characters were recorded in six months interval. The third trial was established at the ARS, Kalpitiya to test the susceptibility of different planting materials for root knot nematodes. A site previously affected by root knot nematode infestation to guava was selected to the study. Seedlings and grafted plants of guava to the root stock of *P. guajava* and *P.friedrichstalianium* were planted in RCBD with three replicates. Data were analyzed using MSTAT statistical package in all studies. Confirmation of resistance of *Psidium* spp. was done by artificial inoculation of root knot nematodes at the Fruit Research and Development Institute at Horana, Sri Lanka. Nematode reproduction factor (RF) was used to verify resistance in *P. friedrichstalianium.*

Results showed that rootstock species, grafting method, and the interaction effect between rootstock species and grafting method were statistically significant ($p<0.05$; Table 1). *Psidium cattleianum* was grafting-incompatible with all *P. guajava*varieties tested. Higher percentage success was observed when all varieties of guava were cleft grafted to*P. friedrichstalianium*. However, patch budding was not successful with this rootstock. Both grafting and budding showed a success rate of about 80% when*P. guajava*was used as the rootstock. Compatibility of *P. friedrichstalianium* were previously reported by Bogantes-Arias and Eric (2010) and Regina *et al.* (2012). Renata *et al.* (2015) showed that some accessions of *P. cattleianum* were grafting-compatible with guava at lower percentage, however, those were died after field planting. In the present study, *P.* cattleianum was incompatible even at grafting stage. All varieties tested behaved similarly in grafting with different rootstock spp. Growth of scion shoots at 8 weeks after grafting showed that all grafted/budded plants have grown similarly.

Height of seedlings at initial stage was greater compared to that of grafted and air layered plants when different planting materials of guava were grown. Height of the guava/guava plant was higher than that of *P. friedrichstalianium*/guava plants. Incompatible reactions were not observed between the two species after field planting of these plants, however, rootstock and the scion wood plants were easily distinguishable by the colour of the stem. One year after planting, the height difference was not significant

($p>0.05$) in grafted and air layered plants. The highest stem height was observed in seedlings.

Table 1: Effect of root species, grafting method and scion wood variety on percentage grafting success and growth of shoot.

Root stock spp.	Grafting method	Scion wood variety	Percentage success of rafting/budding*	Shoot length 8 weeks after grafting/ budding (cm)
P. guajava	Cleft	Bangkok Giant	84 (68.5)^{ab}	22.1
P. guajava	Patch	Bangkok Giant	80 (63.7)^{ab}	18.6
P. guajava	Cleft	HoranaRosi	82 (65.0)^{ab}	23.4
P. guajava	Patch	HoranaRosi	78 (62.4)^{b}	19.8
P. guajava	Cleft	Gannoruwa Selection	86 (70.2)^{a}	22.6
P. guajava	Patch	Gannoruwa Selection	80 (63.7)^{ab}	23.3
P. friedrichstalianium	Cleft	Bangkok Giant	80 (63.7)^{ab}	20.1
P. friedrichstalianium	Patch	Bangkok Giant	00 (0.99)^{c}	-
P. friedrichstalianium	Cleft	HoranaRosi	78 (62.4)^{b}	18.6
P. friedrichstalianium	Patch	HoranaRosi	00 (0.99)^{c}	-
P. friedrichstalianium	Cleft	Gannoruwa Selection	82 (65.0)^{ab}	20.6
P. friedrichstalianium	Patch	Gannoruwa Selection	00 (0.99)^{c}	-
P.cattleianum	Cleft	Bangkok Giant	00 (0.99)^{c}	-
P.cattleianum	Patch	Bangkok Giant	00 (0.99)^{c}	-
P.cattleianum	Cleft	HoranaRosi	00 (0.99)^{c}	-
P.cattleianum	Patch	HoranaRosi	00 (0.99)^{c}	-
P.cattleianum	Cleft	Gannoruwa Selection	00 (0.99)^{c}	-
P.cattleianum	Patch	Gannoruwa Selection	00 (0.99)^{c}	-
CV %			11.3	13.8
Species.			**	ns
Grafting method			**	ns
Variety			ns	ns
Species x grafting method			**	ns
Species x variety			ns	ns
Grafting method x variety			ns	ns
Species x grafting Method x variety			ns	ns

*Values within parenthesis are arcsine transformed values. Arc sine values were used for statistical analysis; **Within a column, means followed by same letter are not significantly different at $p=0.05$; ns = non-significant.

Branching ability was the highest in air layered plants and its spread was higher compared to other types. Results indicated that growth of both types of grafted plants were similar at 12 months after planting. Air layered and grafted plants flowered 245-260 days after planting, however, seedlings took about 320 days. Number of fruits per plant

was not significantly different ($p>0.05$) among the treatments. Fruit size, shape, appearance and the total soluble solids (TSS) were the same in air layered and grafted plants. Little variation of fruit size shape and appearance and quality characters were observed among seedlings.

The symptoms of root knot nematode infection appeared 6 months after planting in seedlings of guava and when it was used as rootstocks at ARS, Kalpitiya. Seedlings and rootstock of guava died at 8 months after planting. However, no symptoms or gall formation was observed in seedlings of *P. friedrichstalianium* and when it was used as a rootstock and these were successfully grown. The RF value for the species was zero thus confirming its resistance.

Results confirmed the suitability of P. *friedrichstalianium* as a rootstock for the production of root knot nematode-resistant planting material of guava.

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