



Short communication

Studies on extent of polyembryony in salt tolerant mango rootstocks

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ABSTRACT

The present study was undertaken to know the extent of polyembryony in three mango rootstocks, namely Olour, Kurukkan and 13-1. Freshly harvested seeds after 10 days were sown in earthen pots (sand: soil: FYM; 1:1:1). The number of seedlings from stones of Olour, Kurukkan and 13-1 were recorded and extent of polyembryony was calculated. The extent of polyembryony was maximum in Kurukkan (74.43%) followed by 13-1 (51.85%) and Olour (33.15%). The number of seedlings per stone ranged from 1 to 5 in Olour & Kurukkan; and 1 to 4 in 13-1 rootstock. The average number of seedlings per stone was maximum in Kurukkan (2.35) followed by 13-1 (1.88) and Olour (1.51).

Key words: *Mangifera indica*, polyembryony, rootstock.

Mango (*Mangifera indica* L.) is the most popular fruit in the tropical and subtropical regions of the world and in India too. India is the largest producer of mango in the world with an annual production of 18.43 mt from an area of 2.52 mha, contributing 20.70% share in total fruit production with the productivity of 7.30 t/ha (Anonymous, 1). Mango cultivation is mainly hampered by non-availability of uniform standard rootstocks. Mango can be propagated by seeds or by grafting. For commercial purpose, grafting is the most appropriate method because it maintains the genetic purity of the propagated variety. To obtain grafted mango, it is important to use polyembryonic rootstocks since they produce a zygotic and several nucellar plantlets. The additional embryos do not always mature and their growth may be arrested at very early stage or may degenerate during seed development.

Therefore, percentage of polyembryony would be far less than its actual frequency if mature seeds are taken into account. In Horticulture, nucellar adventives polyembryony is of great importance. The nucellar embryos provide uniform seedlings of the parental type as obtained through vegetative propagation. Nucellar seedlings of mango, citrus provide better clones of orchard rootstock than cuttings. The experiment was conducted at the main orchard of the Division of Fruits and Horticultural Technology, ICAR-IARI, New Delhi during 2012-2013. Mature open-pollinated fruits were harvested from single Olour, Kurukkan and 13-1 polyembryonic mother plants maintained mango germplasm block. Stones of 13-1 and mother plant leaves were collected from Horticulture Farm of M/s Reliance Industries, Jamnagar, Gujarat. Stone of all the three polyembryonic mango genotypes were germinated

in pots (sand: soil: FYM, 1:1:1). Observations on stone germination and emergence of seedlings were recorded. Stone having multiple seedlings emergence were selected and the data was analysed statistically. All the seedling arising from a single stone were tagged.

Analysis of data pooled over years clearly revealed that in Olour 75.10% stones germinated. Out of which 33.15% stones produced more than two seedlings per stone. However, 16.30% stones produced only two seedlings, 15.76% stones produced three seedlings and only 0.54% stones produced four to five seedlings. It was interesting to note that 66.84% stones produced only one seedling. The extent of polyembryony was in Olour 33.15% (Tables 1 & 2). Analysis of data pooled over years clearly revealed that in Kurukkan 81.09% stones germinated. Out of which 74.43% were polyembryonic having more than two seedlings per stone. However, 28.57% stones produced two seedlings and 33.08% produced three seedlings. Remaining, 10.52% stones produced four seedlings and 2.25% stones produced five seedlings per stone. It was interesting to note that 25.56% stones produced only one seedling. The extent of polyembryony in Kurukkan was 74.43% (Tables 1 & 2).

In 13-1 rootstock, 27% stones germinated. Out of which 51.85% stones produced more than two seedlings per stone. However, 18.51% stones produced two seedlings, while 29.62% stones produced three seedlings per stone. Remaining, 3.70% stones produced four seedlings per stone. It was interesting to note that 48.14% stones produced only one seedling. The extent of polyembryony was 51.85% in rootstock 13-1 (Tables 1 & 2). In our investigation, maximum germination was observed in Kurukkan (81.09%) followed by Olour (75.10%) and minimum in 13-1 (27%). Similar results were observed by Srivastava *et al.* (7).

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Table 1. Germination and poly-embryony percentage in mango rootstocks (pooled data).

Rootstock	No. of stones sown	No. of stones germinated	Germination (%)	Polyembryony (%)	Monoembryony (%)
Olour	245	184	75.10 (55.37)	33.15 (25.55)	66.85 (47.22)
Kurukkan	164	133	81.09 (62.81)	74.43 (51.48)	25.56 (39.17)
13-1	100	27	27.00 (42.09)	51.85 (50.17)	48.14 (38.40)
CD _{0.05}	-	-	(5.32)	(7.01)	(5.16)

*Value in parentheses are angular transformed values.

Table 2. Extent of mono- and poly-embryony in mango rootstocks (pooled data).

Rootstock	No. of stones having 1 seedling	No. of stones having 2 seedlings	No. of stones having 3 seedlings	No. of stones having 4 seedlings	No. of stones having 5 seedlings
Olour	123	30	29	1	1
Kurukkan	34	38	44	14	3
13-1	13	5	8	1	-

They evaluated 10 polyembryonic mango varieties and observed maximum germination Olour (75.93%) followed by Mylepalian (67.82%) and minimum in Nekkare (40.57%). Sane *et al.* (5) observed highest germination percentage in Bappakai (75.8%) followed by Vellaikulumban (73.8%) and Kurukkan (73.7%) and lowest in the Peach (35.0%). Maximum germination and polyembryony percentage were highest in Kurukkan 81.09 and 74.43%, respectively. However, minimum germination observed in 13-1 (27%) and minimum polyembryony in Olour (33.15%). In contradiction to this, Sane *et al.* (5) recorded the highest polyembryony in Olour (84.4%) followed by Moreh (75.5%). Rao and Reddy (4) reported the maximum polyembryony in Peach (338%) followed by EC 959862 (296%) and minimum in Kurukkan (138%). The average number of seedlings per stone was maximum in Kurukkan (2.35) followed by 13-1 (1.88) and minimum in Olour (1.51). Singh and Reddy (6) observed maximum number of seedling per stone in Peach and Kurukkan. Khobragade *et al.* (2) observed maximum number of seedlings per stone in Kitchner (3.66) and lowest in Nekkare (1.14). Srivastava *et al.* (7) recorded maximum number of seedlings per stone in Vellaikolamban and Moovandan (1-7) and minimum in Mylepalian (1-3). However, Ochoa *et al.* (3) observed 97 and 95%, polyembryony in Manila and Ataulfo cultivars with an average 3.4 and 3.2 embryos per seed, respectively and more than 80% seeds were recorded with 2-4 embryos per seed. If genotype has polyembryony higher than 80%, the possibility of obtaining nucellar seedlings increases, making it possible to have a uniform rootstock.

Among the three polyembryonic mango rootstocks studied, Kurukkan was found best in terms of polyembryony, germination percentage and seedlings/ stone. However, Olour was a weak polyembryonic rootstock.

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