

Influence of MM-106 and M-9 Root Stocks on Starking Delicious Apple

MUHAMMAD JAVED TAREEN, ABDUL QADIR TAREEN†, JAVED A. KAMAL‡ AND BADAR NASEEM SIDDIQUI[]

Market Committee, Quetta-Pakistan

†*Seed Farm Agriculture Research Institute, Quetta-Pakistan*

‡*Agriculture (Extension) Balochistan, Quetta-Pakistan*

[]*On Farm Water Management, Muslim Bagh, Balochistan, Pakistan*

ABSTRACT

Performance of apple cultivar starking delicious was studied on two different dwarfing rootstocks Viz MM-106 and M-9 at Agricultural Research Institute, Sariab Quetta. Rootstock M-9 significantly increased per cent fruit set and peel colour as compared to MM-106. While MM-106 showed more pre-harvest fruit drop, proper stage of maturity increased yield and fruit weight than M-9 rootstock. MM-106 rootstock might be recommended for commercial apple production in Balochistan

Key Words: Apple; Rootstocks; MM-106; M-9; Cultivar

INTRODUCTION

Apple (*Malus sylvestris*) is a deciduous fruit crop. Apples are not only consumed as fresh fruit but also used for making processed products and canned in syrup. In Indo Pak sub-continent apples are grown in hilly tracts of north-western Himalayas. In Pakistan, Quetta, Pishin, Ziarat, Mustang, Kalat, Kashmir, Chitral, Swat, Hunza and other localities over 1000m above the sea level are apple-growing regions. Apple is grown on an area of 58.2 thousand hectares with an annual production of about 438.9 thousand MT tones, Balochistan contributes about 318.4 thousand MT tones of apple per annum from 48.3 thousand hectares (MINFAL, 2000-2001). Apple has beautiful shape, attractive colour and very good taste highly nutritive and called the King of deciduous fruits. With rising cost of production there is greater interest of fruit growers in recent years in smaller trees. Though dwarf fruit trees have been grown in Europe for centuries, recently they have evoked little attention in North America, as they been earlier and are more easily and economically pruned, sprayed, thinned, harvested. This helps to compensate initial cost involved in purchase and planting of dwarf trees per hectare. Small trees require less space and more number of good colored fruit. The project 'Influence of rootstocks was initiated to check the various horticultural parameters and to find out suitable rootstock and productive scions cultivars for apple growing regions of Balochistan, Pakistan.

MATERIALS AND METHODS

This experiment was conducted at Horticultural farm, Deciduous Fruit Development Centre, Quetta, Balochistan. It was laid out in Randomized Complete Block Design (RCBD) including two rootstocks (MM-106 & M-9), and one cultivar starking delicious. All the selected trees were

ten years old spaced (20x20 ft), trained to central ladder system and grown using standard commercial cultural practices. Data was collected for the following parameters.

- (i) Percentage of fruit set;
- (ii) Pre-harvest fruit drop;
- (iii) Proper stage of maturity;
- (iv) Yield (kg);
- (v) Fruit shape: Average fruit shape was compared with (Childers, 1983); Fruit size (mm);
- (vi) Fruit weight (g);
- (vii) Peel colour, Peel colour data was taken by giving points to each colour quality attribute. Light red colour (1-3), red colour (4-6), and dark red colour (7-9); (viii) Number of seeds per fruit
- (viii) Seed colour;
- (ix) Fruit firmness: (kg) Data of fruit texture/firmness was evaluated with the help of Penetrometer. A thin circular portion of skin was removed to accommodate the plunger tip on each side of the fruit and;
- (x) Consumer's acceptability: Consumer's acceptability was evaluated through organoleptic evaluation method. A performa was prepared in this regard.

RESULTS AND DISCUSSION

Percentage of fruit set. Maximum fruit set (25.21%) was recorded on rootstock M-9 while minimum (10.90%) was observed on MM-106 (Table I). Increase in fruit set M-9 seems to be due to the effect of rootstock on scion.

Pre-harvest drop. Maximum drop (11.67) was recorded scion grafted on rootstock MM-106 while minimum (7.75) was found on rootstock M-9 (Table I).

Proper stage of maturity. More (135.03) days to maturity were taken by starking delicious on rootstock M-9 while minimum (103.27) days were taken on MM-106 (Table I).

Table I. Effect of rootstocks on various horticultural parameters/aspects of Starking Delicious apple

Cultivars	Root stocks	
Starking Delicious	MM-106	MM-9
Percentage of fruit set	10-90b	25.21a
Pre-harvest fruit drop	11.67	7.75
Proper stage of maturity	103.27b	135.05a
Yield	251.14a	189.42b
Fruit shape and size	6.71a	6.44a
Fruit weight	173.90a	159.65b
Skin colour	5.52b	16.50a
No. of seeds per fruit	6.83a	5.96a
Seed colour	4.90a	4.32a
Fruit firmness	7.94a	7.52a
Consumers' acceptability	6.41a	6.20a

Means bearing different letters are statistically different at 5% level of significance

West-wood (1978) also reported that all delicious strains of apple take 140-160 days to maturity from flowering. Difference in days to maturity between two rootstocks may be due to more in number of leaves or time of fruit set.

Yield. Maximum yield (251.14 kg) was depicted in starking delicious on MM-106 while minimum (189.42 kg) was recorded on M-9 (Table I). Eijden and Eijden (1990) also reported that yield per tree was considerably lower on M-9 rootstock.

Fruit shape. No significant differences were recorded in the fruit shape and size. However, maximum fruit size (6.17 cm) was recorded in starking delicious on MM-106 while minimum (6.44 cm) was observed on M-9 (Table I). Parry (1986) also reported little reduction in fruit size by M-9 than M-106. Fruit size may vary due to increase/decrease in fruit set. Starking delicious apple was matched with the fruit shape chart of Childers (1983), and was found to be round-conic fruit.

Fruit weight. Starking delicious on MM-106 significantly increased (173.90 g) the average fruit weight than on M-9 (159.65) (Table I).

Peel colour. Starking delicious on rootstock M-9 significantly increased the peel colour (16.50) of the fruit than MM-106 (5.52) (Table I). Variation in skin colour of fruit may be due to differences in scaffold shorter or longer period of fruit on the tree, sunshine or rootstock characteristics.

No. of seeds. No significant effect was observed in the number of seeds, however, starking delicious on rootstock MM-106 produced more (6.83) number of seeds per fruit than M-9 (5.96) (Table I).

Seed colour. More (4.90) score for seed colour was shown by starking delicious on MM-106 than (4.32) on M-9 (Table I). Variation in seed colour may be due to rootstock mall fertilized seeds. Large and healthy seeds attained more colour.

Fruit firmness. Fruit was more firm (7.94) on MM-106 than on M-9 (7.52) (Table I).

Consumers acceptability. The starking delicious on MM-106 has little non-significant increase on consumer acceptability (6.41) than on M-9 (6.20) (Table I). For better acceptability a fruit should be of good aroma, texture, color, enough total soluble solids content, shape and size of the fruit. Greulich *et al.* (1993) reported that trees on M-9, M-26 and MM-106 produced the highest and most regular yield of high quality fruits.

CONCLUSION

On the basis of the influence of two rootstocks MM-106 and M-9 on an apple cultivar starking delicious was studied under the climatic conditions of Quetta. On rootstock MM-106 apple cultivar red delicious showed partially better performance than rootstock M-9 for pre-harvest fruit drop, proper stage of maturity, yield. Whereas M-9 was better than MM-106 for percentage of fruit set, peel color and TSS. Rootstocks showed no significant differences for fruit shape and size, No. of seeds per fruit seed color, fruit firmness and consumers acceptability. MM-106 rootstock might be recommended as for commercial production of apple cultivar red delicious in the Quetta and Northern regions of Balochistan.

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(Received 29 March 2003; Accepted 28 May 2003)