

<http://www.pjbs.org>

PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Vegetative Growth Performance of Different Plum Rootstocks

Noor Rahman, Ghulam Nabi¹, Jamsher Khan¹ and Shafqatullah²

¹Agricultural Research Institute Tarnab, Peshawar

²NWFP Agricultural University Peshawar, Pakistan

Abstract: The study was conducted to investigate the vegetative growth performance of Damascos, Myrobalan and Desi plum (*Prunus domestica* L.) rootstocks propagated by hardwood cuttings at Peshawar, during 1999. Desi (Local) plum gained maximum number (176.75) of roots, root length (58.75 cm), shoot length (375.95 cm), shoot diameter (1.82 cm) and survival (73.33) percentage, while there was no differences in the sprouting percentage among all rootstocks.

Key words: Rootstock, plum, hardwood cutting and vegetative growth

Introduction

Plum (*Prunus domestica* L.) is a stone fruit of the family Rosaceae. The fruit develops with seed surrounded by hard shell or stone. The seed develops from the inner part of the ovary wall and soft flesh from the outer part. Trees grown from seedlings are seldom as satisfactory as trees propagated on recognized rootstocks. Usually Desi-plum, peach Peshawar Local and peach Swat Local are used for stone fruits as rootstocks. For Peach Peshawar local and peach Swat Local rootstocks stones (seed) are sown, while Desi-plum rootstocks are raised from hardwood cuttings. Plum rootstocks to be utilized in modern plantations must have the following characteristics:

High and lasting grafting affinity with cultivars of greatest commercial value.

Control of vigour, with a reduced size of tree foliage.

High, constant and early entering into full fruit production by the grafted cultivars.

A limited or no capacity of striking root suckers and a good anchoring in the soil.

A large range of adaptability to environmental conditions (climate, soil and diseases).

The existing stone fruit orchards in the plain areas of NWFP are mostly raised on peach Peshawar Local rootstock, which is best suited with soil conditions. However, average life of tree is less due to attack of Gummosis problem. There is a need to overcome this problem by replacing the existing rootstock with other promising rootstock/rootstocks. Myrobalan (*Prunus cerasifera* L.) is the stock more frequently used in many countries because of its marked adaptability to different types of soils and the tree growth is also fast with high vigour and satisfactory yield. But in Pakistan no body tested or compared this rootstock with existing rootstock.

Desi plum is considered successful rootstock for stone fruit scion varieties and also it is thought to be one of the parents of the important species *Prunus domestica*. It can survive successfully in water logged area.

Similarly, plants budded on Damasco rootstock, has shown better performance at Tarnab Peshawar Institute. Therefore, this study was under taken at the institute using three rootstocks Desi-plum, Myrobalan and Damascos cuttings to find out best suitable rootstock regarding sprouting, tree growth, soil, climate adaptability and disease resistance. Black (1959) tested several varieties as rootstocks for Japanese, European Plums and apricot cultivars and observed that Myrobalan plum when used as rootstock produced most vigorous tree. West Wood and Chaplin (1973) reported that Myrobalan plum resulted usually larger than did peach rootstock. Benjamin and Shoemaker (1978a) reported that Myrobalan

was the most satisfactory rootstock for plum in the east. Benjamin and Shoemaker (1978b) noted that Myrobalan seed for the production of seedling rootstock required 100-200 days of after ripening at (40 to 50°F). Garner and Hatcher (1955) planted hard wood cutting of the Myrobalan plum in autumn and spring seasons with and without growth regulators treatments and stated that autumn planting for the plum stock was much more superior to spring planting. The growth substances were most beneficial with Myrobalan plum. Hudson *et al.* (1981a) reported that rooted hard wood cutting, of Myrobalan, Bromption and Mariana plums made good stock, for plum.

Tarasenko (1973) found that plums propagated by cutting gave better results than propagated on sour cherry. Chandler (1978) recommended peach or Marianna plum as a rootstock for soil having nematodes and sandy soil. Glenn (1962) found that Myrobalan rootstock was resistant to bacterial and canker diseases. Hudson *et al.* (1981b) recommended peach or Myrobalan plum seedlings stock for plum for that soil having root nematodes. He concluded that T-budding was most successful.

Materials and Methods

The experiment was conducted during the 3rd week of February, 1999, in shade house at Agricultural Research Institute, Tarnab, Peshawar. Hardwood 20 cm long, uniform and six node cuttings of plum using the method as described by Mullins and Rajasekaran (1981) were planted in perforated polyethylene bags. Bags were filled with potting mix consisting on 1:1:1 ratio, Sand, silt and organic manure (FYM). The experiment was laid out in Randomized complete Block design (RCBD), having three treatments i.e. Desi plum, Myrobalan and Damascos and were replicated four times. Each treatment has fifteen cuttings. Each cutting was placed 2/3 rd part deep in potting mix (media). After plantation, all bags were covered with transparent polyethylene sheet. All the cultural practices like weeding, irrigation and pesticide application were kept properly and accordingly. After 20 days of plantation, only one healthy shoot was selected on each cutting while the rest of shoots were thin out. The data were recorded on the following growth parameters.

Sprouting percentage, Shoot length (cm), plant survival (percentage), Root numbers, Root length (cm), Shoot diameter and Root diameter.

Results and Discussion

The mean values of sprouting *percentage* are given in Table 1. It is revealed from the analysis of variance (Table 1) that the sprouting percentage in different rootstocks i.e. Damasco, Myrobalan and Desi Plum were not

Table 1: The Mean Values of Sprouting Percentage, Shoot Length , Shoot Diameter, No. of Roots, Root Length and Percent Plant Survival in Different rootstocks

Treatment	sprouting percentage	Shoot length	Shoot Diameter	No. of roots	Root length	Percent plant survival
Damascos	096.70 A	120.00	0.7713	64.5013	37.13 AB	38.4 8
Myrobalan	100.00 A	126.75 B	0.91 B	43.75 B	26.28 B	25.03 B
Desi Plum	100.00 A	375.95 A	1.82 A	176.75 A	58.75 A	73.33 A
Significance	ns	**	**	**	-	-

Mean showing a common letter are not significant different at 5% level of significance

LSD value for shoot length, shoot diameter, root number, root length and for survivals at 5% level of significance = 121, 0.43, 06 ,50.4 ,23.81, 25.57 respectively

significantly different from one another at both level of significance. Same media was used for all cuttings therefore all cuttings showed similar response in term of sprouting percentage. Which agrees of the finding and recommendation. Moreover, cutting utilizes the preserved carbohydrate (CHO) for their initial growth. The mean values of shoot length (Table 1) show that the maximum shoot length was gained by Desi plum followed by Myrobalan with (126.75 cm). The minimum shoot length (120 cm) was obtained by Damascos plum. The maximum shoot length was also reported for the same rootstock (Desi Plum). The variation in shoot length may be the varietal characteristics. The analysis of variance of shoot diameter shows that rootstocks i.e. Damasco, Myrobalan and Desi Plum show high significant variation for one another at 5% level of significant. Similarly the mean value in shows that the maximum shoot diameter (1.82 cm) was gained by Desi Rum followed by Myrobalan (0.91 cm). The minimum shoot diameter (0.77 cm) was gained by Damasco. Similar findings were reported. The mean value of Table 1 shows that the maximum root number (176.75) were produced by desi plum followed by Demotic^o with (84.5). The minimum root numbers (43.75) were produced by Myrobalan. Paulic (1983) found Marianna and Myrobalan rootstocks more vigorous in growth than Damascos or Juliana, but due to the variation in the soil and climatic conditions Desi plum gained more root numbers as compared to other rootstocks. The mean value of (Table 1) shows that the maximum root length (58.75 cm) was obtained by Desi Plum followed by Damasco (37.13). The minimum root length (26.28 cm) was produced by Myrobalan. Again our results are in contrast to Paulic (1983). It may be clue to the same reasons, which were earlier discussed for the root numbers. The mean value of percent plant survival shows that the maximum plant survival (73.33%) was recorded in Deal plum followed by Damascos and Myrobalan which were (38.4%) and (25.03%) respectively. It may be due to the acclimatisation of Desi plum to the local climatic conditions.

References

- Benjamin, J.E.T. and J.S. Shoemaker, 1978a. Seedling Rootatook. In: Tree Fruit Production, Benjamin, J.E.T. (Ed.), 3rd Edn., AVI., Westport, Connecticut, pp: 385.
- Benjamin, J.E.T, and J.S. Shoemaker, 1978b. Alter Ripening of Seed. In: Tree Fruit Production, Benjamin, J.E.T. (Ed.), 3rd Edn., AVI., Westport, Connecticut, pp: 365.

- Black, J.D.F., 1959. Pointers from the plum and apricot rootstock trails. Hortic. Abst., 30: 3270-3270.
- Chandler, W.H., 1978. Rootstocks: Deciduous Orchard. Thoroughly Revised with 128 Illustration. 3rd Edn., Lea and Febige, Philadelphia, pp: 352.
- Garner, R.J. and E.S.J. Hatcher, 1955. The influence of source and growth substances on the behaviour of apple and plum cutting. Hortic. Abst., 24: 2444-2444.
- Glenn, E.M., 1962. Stem builder trail with plum. Hortic. Abst., 32: 297-297.
- Hudson, T.H., W.J. Fofocker and A.M. Kofranck, 1981a. Hardwood Cutting. In: Plant Science: Growth, Development and Utilization of Cultivated Plants, Hartman, H.T., W.J. Flocker and A.M. Korfraneck (Eds.). Prentice-Hall, Englewood Cliffs, New Jersey, USA., pp: 603.
- Hudson, T.H., W.J. Flocker and A.M. Kofranek, 1981b. Plant Science. Growth, Development and Utilization of Cultivated Plants. Prentice-Hall Inc., USA., Pages: 603.
- Mullins, M.G. and K. Rajasekaran, 1981. Fruiting cuttings: Revised method for producing test plants of grapevine cultivars. Am. J. Enol. Vitic., 32: 35-40.
- Paulic, N., 1983. Effect of rootstock on the vegetative and reproductive growth of the plum cultivar Bistricea. Poljop. Znan. Smot., 61: 221-229.
- Tarasenko, M.T., 1973. The effect of juvenility on regeneration frocess during vegetative propagation of sour cherry and plum. Hortic. Abst., 44: 7410-7410.
- West Wood, M.N. and M.H. Chaplin, 1973. Effect of rootstock on growth, bloom, yietd, maturity and fruit quality of plum (*Prunus domestica*). Hortic. Abst., 44: 2208-2208.