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Performance Evaluation of Exotic Peach Rootstock "Red Leaf Nemaguard" for Nursery Raising in Decidous Fruits

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Abstract

Red Leaf Nemaguard is resistant to nematode and soil moisture fluctuations for nursery production of deciduous fruit plants. The response of Red Leaf Nemaguard as rootstock for almond, peach, apricot and plum was studied at Horticutural Research Station Nowshera (Soon Valley), Khushab. The highest performance for growth behavior of nursery plants was observed in peach followed by plum. Sprouting (82.39%), scion growth rate (6.68 cm/month) while scion and stock girth remained 1.96 and 1.31 cm at the end of December. Moderate plant height (46.39 cm) was obtained with 53.21% success rate of budded plants in peach. The results were followed by plum budded on Red Leaf Nemaguard by sprouting percentage (72.36%), scion and stock growth rate remained 6.3 cm. Highest plant height (46.71 cm) and success percentage (71.44%) was recorded at the end of December. It was proved that Red Leaf Nemaguard is successful rootstock for commercial nursery production of peach and plum where nematodes are problem for nursery production.

INTRODUCTION

The demand of peach and other fruit plants is increasing day-by-day due to commercial cultivation of peach and plum in sub mountainous and plain areas of upper Punjab. Field adaptation results of peach and other deciduous fruit i.e. plum, apricot and almond are facing problems of soil borne diseases, especially in heavy clay soil and nematode infested lands of the area due to conventional rootstocks i.e. Wild Peach, Wild Apricot (Hari) and Wild Plum (Myrobalan). These studies were envisaged to find suitable rootstock for nursery production on Red Leaf Nemaguard rootstock of peach due to its resistance to Nematode infection and tolerance to excess soil moisture. Popular deciduous fruit plants, peach, plum, apricot and almond were budded on the said rootstock to find out their compatibility performance against Red Leaf Nemaguard rootstock of peach.

The economic viability of an orchard is directly related to production of an orchard and its efficient management (Costes and Garci´A-Villanueva, 2007., Christ and Reighard, 2008). To obtain vigorous and high yielding plants for good economic returns,

grafted plants are mainly preferred by growers. Grafting is practiced in fruit plants on desired rootstocks to maintain the true to type characters of specific cultivars by asexual propagation. Thus, rootstocks play a crucial role and proper selection of a rootstock is of vital importance. Rootstocks also induce other characters such as plant height, hardiness, flowering period and disease resistance as well as reducing the internode length of fruiting branches (Webster, 2001, Seleznyova *et al.*, 2003; Weibel *et al.,* 2003). Greater number of leaves in peach elevate the rate of photosynthesis and hence increased carbohydrate formation (Akhtar *et al.*, 2000). Growth and yield of different scion rootstock combinations is dependent on soil and climatic conditions and the results may vary (Sitarek *et al.*, 2008). Diseases are a major set back in fruiting plants which adversely affect the production of an orchard. peaches are prone to various diseases, Root Knot Nematode (RKN), being one of them. In peach,the ring (*Criconemoides xenoplax* Raski [*Mesocriconema xenoplax* (Raski) Loof& de Grisse]), root-knot (*Meloidogyne incognita (Kofoid& White)Chitwood, M. javanica*(Treub) Chitwood , *M. arenaria*(Neal) Chitwood, and *M. hapla* Chitwood), lesion (*Pratylenchusvulnus Allen & Jensen* and *P. penetrans (Cobb) Chitwood & Oteifa*) and dagger (*Xiphenema americanum Cobb*) nematodes are recognized as injurious and adversely effect growth especially in the warmer regions and sandy soils (Sherman and Lyrene,1983.Nyczepirand Becker, 1998.,Nyczepir *et al.*, 2006, Christ and Reighard, 2008). Red Leaf Nemaguard is resistant to Root-knot Nematode and soil moisture fluctuations for nursery production of deciduous fruit plants (Handoo *et al.*, 2004) and is still popular in nematode infested areas. The response of Red Leaf Nemaguard as rootstock for almond, peach, apricot and plum was studied at Horticutural Research Station Nowshera (Soon Valley), Khushab during 2012 -2013.

MATERIALS AND METHODS

Seeds from Red Leaf Nemaguard *[Prunus persica* (L.) Batsch] trees were harvested, fruit flesh removed and pits dried at room temperature for 3-4 days and stored under dry conditions in a paper bag at room temperature. Before sowing, seeds were stratified at 5°C for 30 days in perlite filled trays and sown in nursery according to layout design to induce seed germination. Seedlings germinated during the end of February. Best cultural practices were adopted to raise the rootstock well in time for budding of scion varieties. Buds of peach (Earligrande), plum (Red Beauty), almond (Nonpareil) and apricot (Narai) cultivars were obtained from mother blocks of the genepool bank and budded at the end of May by T-budding method. Twenty seedlings per replication were considered for each treatment in four replications. The experiment was laid according to Randomized Complete Block Design (RCBD). Data were recorded bi-monthly till the end of December during the period of studies.

Germination percentage of the rootstock pits was calculated as number of germinated pits/total pits sown x 100. The sprouted buds in each treatment were counted 30 days after budding and sprouting percentage of bud was calculated as total sprouted buds/total buds inserted x 100. Growth of scion shoot was measured bi-monthly with the help of measuring tape. Growth rate of scion (cm) was calculated as length of scion shoot/2 where 2 is bi-monthly interval for data recording. Scion girth growth rate (cm) was calculated bi-monthly with the help of measuring tape from the point nearest to bud union and calculated as circumference of scion shoot /2 where 2 is bi-monthly interval for data recording. Rootstock girth growth rate (cm) was calculated bi-monthly with the help of measuring tape from the point nearest to bud union and

calculated as circumference of rootstock /2 where 2 is bi-monthly interval for data recording. Height of plants was measured using a measuring tape. One end of the measuring tape was placed on the budded portion and the other was extended to the top of the shoot to get actual length. The mean of the twenty plants was recorded during each experimental year and mean was calculated from the data recorded for the said period. The sprouted buds were counted after 60 days after budding and the success percentage was calculated as total sprouted buds/ total buds taken x 100. Experimental data were subjected to analysis of variance. For mean separation, a Duncan's test at $P \leq 0.05$ was used. Data were analyzed by ANOVA statistical (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Germination Percentage (%)

Data regarding germination percentage in table 1 shows no significant difference among treatments. Good germination percentage was observed in pit germination of rootstock which is important character of Red Leaf Nemaguard rootstock of peach. This will be helpful for economic returns of nursery business.

Scion Sprouting Percentage

Data regarding scion sprouting percentage in table 1 shows highly significant results in peach (82.39%) followed by plum (72.36%) while apricot (67.15%) and almond (64.81%) remained at par with each other but significantly differed with rest of the treatments. These results are in line with Gautam *et al.* (1991) who reported the highest budburst (65%) in peach with T-budding on local peach root stocks.

Growth Rate of Scion (Cm)

Data depicted that growth rate of scion (Table 1) was maximum in plants budded with peach (6.68 cm) however it was also at par with apricot (6.11cm) and plum (6.33 cm). Almond had lowest growth scion rate (4.29 cm). This might be due to compatibility difference within different types of fruits and due to presence of greater number of leaves in peach which elevate the rate of photosynthesis and hence increased carbohydrate formation. Similar results have been reported by Akhtar *et al.* (2000).

Scion Girth Growth Rate (Cm):

Scion girth growth rate depicted in figure 1 showed no significant difference among different treatments and all were at par with each other regarding scion girth growth rate. No prominent effect of rootstock on scion girth growth rate was noted in the studies. Similar results have been reported by Sitarek *et al.* (2004).

Rootstock Girth Growth Rate (cm)

Rootstock girth growth rate depicted in figure 1 showed no significant difference among different treatments and all were at par with each other regarding scion girth growth rate. No prominent effect of rootstock on scion girth growth rate was noted in the studies. Results show that no significant difference between growth of scion and stock has been observed at nursery stage, hence deciduous fruits nursery budded Red Leaf Nemaguard will show balanced growth between stock and scion. Similar results have been reported by Webster (2001).

Plant Height (cm)

Maximum plant height (Figure 2) was noted in plum (46.71 cm) and peach (46.39 cm) followed by apricot (41.57 cm). All three treatments were statistically at par with each other, however almond showed significantly lesser growth (31.21 cm). This might

be due bud union compatability of different types deciduous fruits with the rootstock under study. Nyczepir *et al.* (2006) have reported similar for their studies.

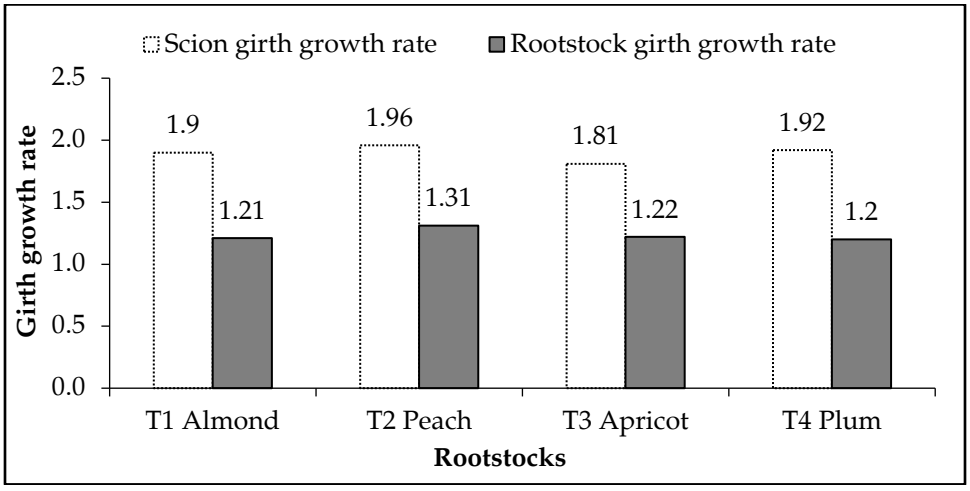

Figure 1: Effect of rootstock on scion and rootsock girth growth rates

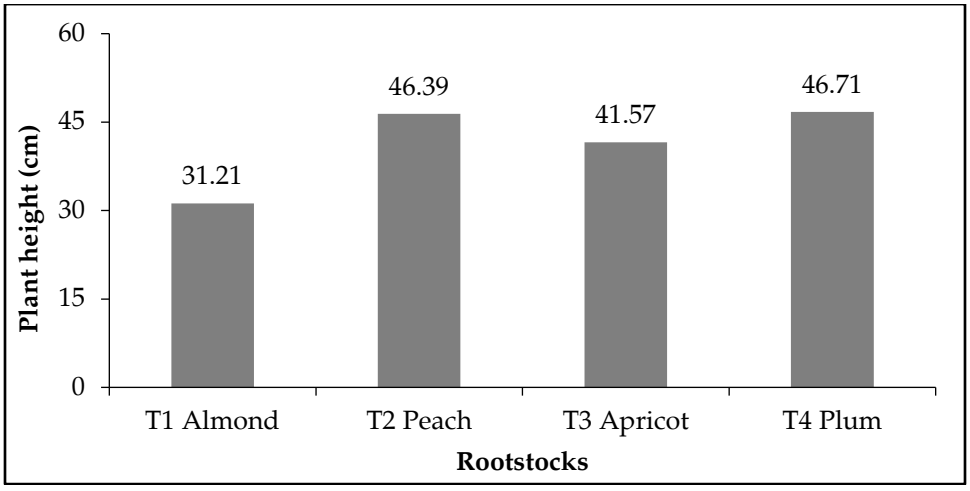

Figure 2: Effect of rootstock on plant height.

Budding Success Percentage (%)

Data regarding budding success percentage shows that maximum budding success was achieved in plum (71.44%) as compared to other treatments (Figure 3). apricot and peach followed the budding success rate by 56.23% and 53.21%, respectively. Plum, apricot and peach significantly differed from almond (44.58%). This might be due to faster growth rate of plum as compared to other treatments. These results are in conformity with the results of Weibel *et al.* (2003) and Sitarek (2008).

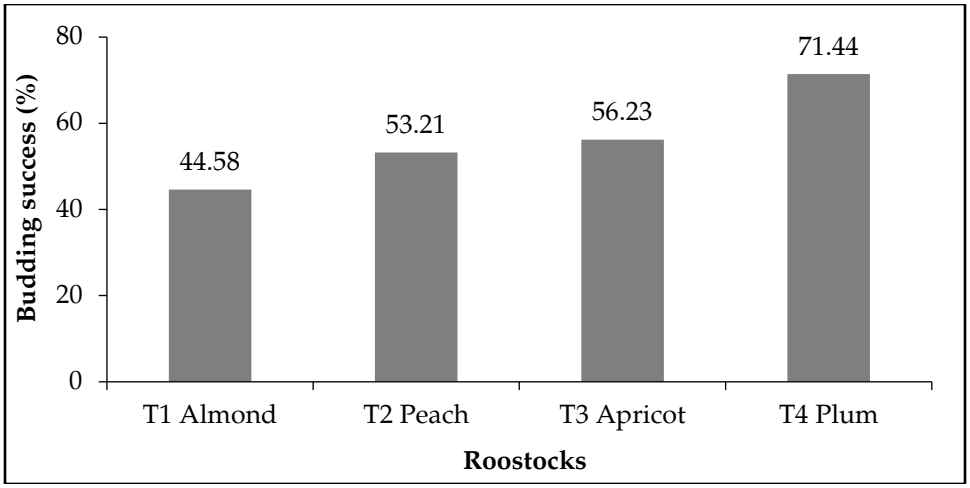

Figure 3: Effect of rootstock on budding success percentage.

CONCLUSION

It was proved that Red Leaf Nemaguard is successful rootstock for commercial nursery production of peach, plum and apricot where nematodes and excess soil moisture are problem for nursery production. almond nursery production may not be economical when budded on Red Leaf Nemaguard due to poor stock – scion union.

Table 1: Performance evaluation of exotic peach rootstock on nursery growth.

Treat.	**Germination percentage**	**Scion Sprouting percentage**	**Growth rate of scion**	**Scion girth growth rate**	**Rootstock girth growth rate**	**Plant height**	**Success percentage**
T_1 almond	96.0 a	64.81 c	4.29b	1.90a	1.21a	31.21b	44.58c
T_2 peach	89.0 a	82.39 a	6.68a	1.96a	1.31a	46.39a	53.21b
T_3 apricot	94.25 a	67.15 c	6.11ab	1.81a	1.22a	41.57a	56.23b
T_4 plum	91.0 a	72.36 b	6.33ab	1.92a	1.20a	46.71a	71.44a
LSD	**12.36**	**8.57**	**2.25**	**0.49**	**0.62**	**9.70**	**6.56**

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