



International Journal of Agricultural and
Environmental Research
FREE AND OPEN ACCESS
Available online at www.ijaaer.com
ISSN 2414-8245 (Online)
ISSN 2518-6116 (Print)



GROWTH BEHAVIOR OF DIFFERENT PLUM VARIETIES ON PEACH ROOTSTOCK IN THE NURSERY UNDER THE AGRO CLIMATIC CONDITIONS OF DISTRICT SWAT

FAZAL RABI*¹, MUHAMMAD SAJID¹, KHALIL UR RAHMAN²,
NADIA BOSTAN² AND JAVED RAHMAN²

¹Department of Horticulture, The University of Agricultural Peshawar

²Agricultural Research Institute Mingora Swat

*Corresponding author's Email: fazalhort@gmail.com

Abstract

An experiment on the "Growth behavior of different plum varieties on peach rootstock in the nursery under the agro climatic conditions of district Swat" was conducted at Agriculture Research Institute Mingora Swat. The experiment was carried out in randomized complete block design with three replications. Six plum varieties (AU-Producer, Ruby Red, Stanley, Red Beaute, Fazli Manani and D-Agen) were budded as scion varieties on one year old peach rootstocks (Swat Local). The experimental results showed that significant differences were found in various plum cultivars budded on peach rootstock. Early sprouting (14.66 days), maximum bud take success (89.60%), number of leaves (122.14), shoot thickness (5.55 mm) and number of branches (4.86) was noted in variety, AU-Producer budded on swat local peach rootstock. Maximum budding growth (85.19 cm) was recorded in Red Beaute. AU-Producer and Red Beaute are recommended for June budding as these varieties attained salable budding growth during one growing season while rest of the varieties could be recommended for dormant budding because these varieties require two growing seasons to attain salable size.

Key words: Plum varieties, Bud take success, Buddling growth, Peach rootstock

INTRODUCTION

Plum botanically known as *Prunus domestica* L. belongs to family Rosaceae. The family consists of 100 genera and 3000 species. It belongs to the group of deciduous fruits commonly known as stone fruits. Plum tree is native to China and Europe. There are many species of plums and hundreds of varieties that are cultivated throughout the world (Hickey and King, 1981). Plum occupied 7600 hectare of land in Pakistan and producing 60400 tons of fruits. While in Khyber Pakhtunkhwa it covers an area of 3500 hectare with a total production of 33800 tons (Agric. statistics of Pakistan (2006-2007). Plum is propagated by vegetative methods. Normally peach stones are sown in November and when the seedlings attain the pencil size thickness, these are budded in summer. Stones are commonly used for growing rootstock while T- budding and chip budding are the most successful methods of propagation for producing plum scion varieties.

However, tongue grafting is also practiced in plum to some extent and is done during late winter. Swat valley is considered the best area for growing plum, peach, apricot, apple and pear. The diverse climatic condition of Swat is suitable for growing high, medium and low chilling plum varieties (Hussain *et al.*, 2004). Majority of the Peach growers (78%) in the study area sold their produce to pre harvest contractors (Zeb and Khan, 2008) Plum can be grown on a wide range of soil depending upon the rootstock used. On light sandy loam soil, it can be successfully grown using local peach rootstock however, if the soil is heavy and moist, local plum rootstock is the most suitable. In general, well-drained sandy loam deep soil is most suitable for plum cultivation. Soils with poor drainage should be avoided due to root rot problem. It can be grown in soil with pH range of 5.5-8 (Bailey, 1963; Westwood, 1978 and Chaudhary, 1994).

METHODS AND MATERIALS

The experiment “Growth behavior of different plum varieties on peach rootstock in the nursery under the agro climatic conditions of district Swat” was conducted at Agriculture Research Institute Mingora Swat. The experiment was laid out in randomized complete block design with three replications. Six plum varieties (AU- Producer, Ruby Red, Stanley, Red Beaute, Fazli Manani and D-Agen) were budded as scion varieties on one year old peach rootstocks (Swat Local). The pencil size thick rootstocks were budded in the last week of June. Budding (T-type) was done at a height of 15 cm from the ground level facing north to protect it from direct sunlight and desiccation. After budding, the budded portion of the stock was wrapped with plastic in such a way so that the buds remained exposed and free to sprout. The experimental plants were bent in opposite direction of the bud and after 20 days from the date of budding the plastic was removed. When the bud reached to the length of 15-20 cm, the stock above the union was removed. Same cultural practices i.e. fertilizer application, irrigation, hoeing and weeding etc. was carried out uniformly in all treatments. Data were taken on days to sprouting, bud take success (%), budding growth (cm), budling diameter (mm), No. of leaves plant⁻¹ and no. of branches plant⁻¹

RESULTS AND DISCUSSION

Days to sprouting: The analysis of variance for days to sprouting revealed that rootstock and different cultivars had significantly affected days to sprouting (Table-1). The mean values for days to sprouting showed that late sprouting (29.66) were recorded for scion variety “D- Agen” while early sprouting (14.66 days) were counted for variety “AU Producer”. Difference in days to sprouting may be due to genetic makeup of the varieties. It is evident from Table-1 that early varieties i.e. Au Producer and Red Beaute took minimum days to sprouting than late maturing varieties, Rubi Red and D- Agen. The results are in harmony with Naeem *et al.*, (2002) who reported significant differences regarding percent bud take success, bud sprouting percentage, budding growth, number of branches, number of leaves and budling girth for plum budded on peach rootstock. Zeb *et al.*, (2002) documented that peach cultivar Florida King budded on Peshawar Local rootstock showed excellent compatibility regarding various growth variables.

Bud takes success (%): Statistical analysis showed that different varieties had significantly responded to bud take success (Table-1). Mean values for percent bud take success revealed that maximum bud take success (89.60%) was recorded in “AU Producer” followed by variety, Red Beaute (54.09%) while minimum bud take success (6.14%) was observed in “Rubi Red”. As all the varieties were budded on the same rootstock on the same date, the difference in bud take success may be due to the different genetic makeup and compatibility of the varieties to the rootstock, Swat Local as well as the response of scion varieties to the agro climatic condition of swat valley. The results are in harmony with Inayat *et al.*, (1997) who reported that plum variety budded on local peach rootstock significantly increased various growth parameters.

Budling growth (cm): Data regarding budling length indicates that plum varieties showed significantly different response to budling length (Table-1). The mean values for budling length revealed that maximum budling growth (85.19 cm) was recorded in variety “Red Beaute” followed by variety, AU Producer (74.80 cm) and minimum (16.44 cm) was observed in “D Agen”. Early sprouting varieties resulted in maximum budling length. It may also be due to different genetic makeup of these varieties and suitable environmental condition for the rootstock and scion interaction. Tsipouridis *et al.*, (2005) also grafted peach and nectarine cultivars, on the peach and almond rootstock and reported significant results regarding budling growth and other attributes.

Budling diameter (mm): The analysis of variance revealed that different varieties produced significantly different budling diameter when budded on peach rootstock (Table- 2). The mean values for shoot thickness showed that maximum thickness (5.55 mm) was recorded in variety; AU Producer while minimum shoot thickness (2.58 mm) was observed in “D-Agen” budded on Swat local peach rootstock. The varieties with more length had maximum budling diameter and vice versa. Zeb *et al.*, (2002) found maximum bud take success, budding growth, shoot thickness, number of leaves plant⁻¹, leaf area, root length, root thickness and number of roots per plant, when Florida King was budded as scion variety on Peshawar Local rootstock. Mukhtar *et al.*, (2002) reported that most of the growth and yield parameters were significantly increased by peach cultivars budded on Peshawar local plum.

Number of branches plant⁻¹: The number of branches plant⁻¹ of plum cultivars on peach rootstock (swat local) were significantly different (Table 2). The mean values for number of branches per plants revealed that maximum number of branches (4.86) was counted in variety, AU Producer and minimum numbers of branches (1.70) were counted in variety, Red Beaute budded on peach rootstock. The maximum number of branches might be due to the fact that variety, Au producer has spreading/bushy sort of growth habit in nature with more lateral buds and hence produced maximum number of branches than the rest of the varieties. The results in harmony with Shah *et al.*, (2013) who reported maximum branches plant⁻¹ in plum budded on peach rootstock under the agro climatic conditions of Mansera.

Number of leaves plant⁻¹: The analysis of variance revealed that number of leaves of different cultivars budded on Swat local peach root stock was significantly affected (Table 2). The mean values for number of leaves plant⁻¹ revealed that maximum leaves (122.14) was counted in variety, AU Producer and minimum leaves (22) were recorded in variety D-Agen. Maximum number of leaves in variety AU-Producer might be due to the maximum budling growth and its response to the environmental conditions of swat especially light and temperature. Naeem *et al.*, (2002) also reported significant differences regarding percent bud take success, bud sprouting percentage, budling growth, number of branches, number of leaves and budling girth for plum budded on peach rootstock

Table-1: Days to sprouting, bud take success (%) and budling growth (cm) of different plum cultivars, budded on peach rootstock.

Cultivars	Days to sprouting	Bud take success (%)	Budling growth (cm)
AU Producer	14.667 C	89.607 A	74.807 A
Rubi Red	41.667 A	6.143 E	40.033 B
Stanley	20.333 C	28.580 CD	30.323 BC
Red Beaute	18.667 C	54.093 B	85.190 A
Fazal-i-Manani	19.667 C	38.620 BC	71.683 A
D –Agen	29.667 B	11.997 DE	16.440 C
LSD values	8.707	19.01	23.56

Table-2: Budling diameter (mm), number of branches plant⁻¹ and number of leaves plant⁻¹ of different plum cultivars, budded on peach rootstock.

Cultivar	Budling diameter (mm)	Number of shoots plant ⁻¹	Number of leaves plant ⁻¹
AU Producer	5.550 A	4.867 A	122.143 A
Rubi Red	3.350 B	1.800 B	43.777 C
Stanley	2.907 B	1.733 B	34.333 CD
Red Beaute	4.403 AB	1.700 B	64.203 B
Fazal-i-Manani	4.037 AB	2.500 B	77.780 B
D –Agen	2.587 B	1.767 B	22.783 D
LSD values	1.871	1.555	19.10

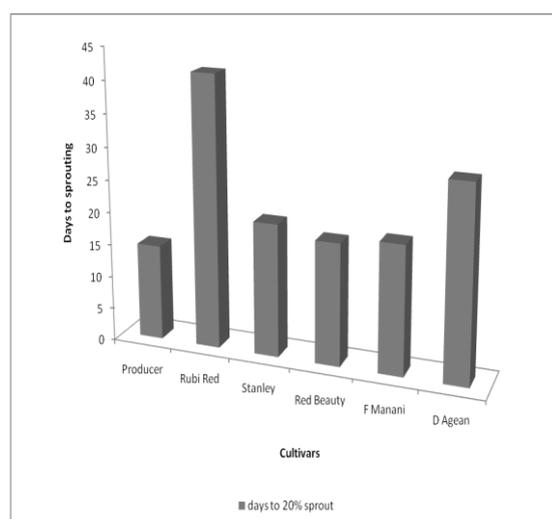


Fig 1: Days to sprouting as affected by different plum varieties budded on peach rootstock

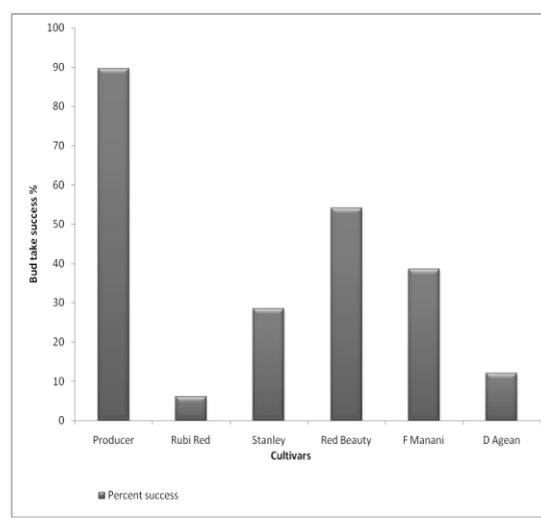


Fig 2: Percent success as affected by different plum varieties budded on peach rootstock

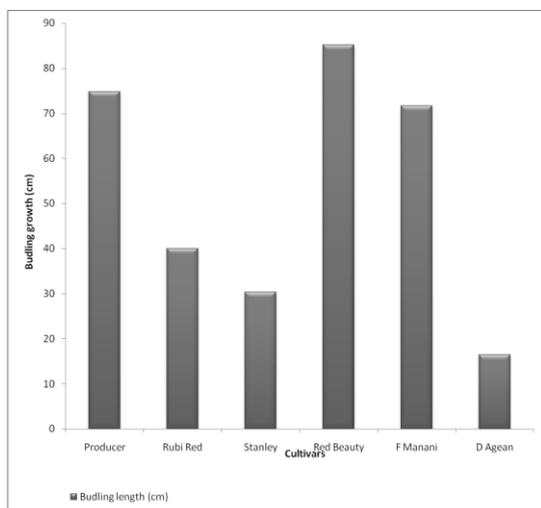


Fig 3: Budling length as affected by different plum varieties budded on peach rootstock

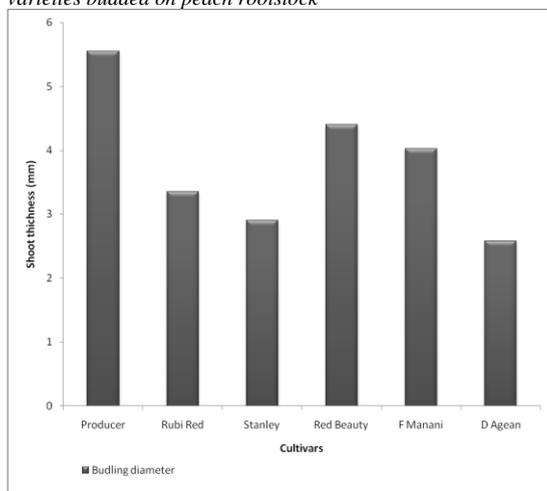


Fig 4: Budling diameter as affected by different plum varieties budded on peach rootstock

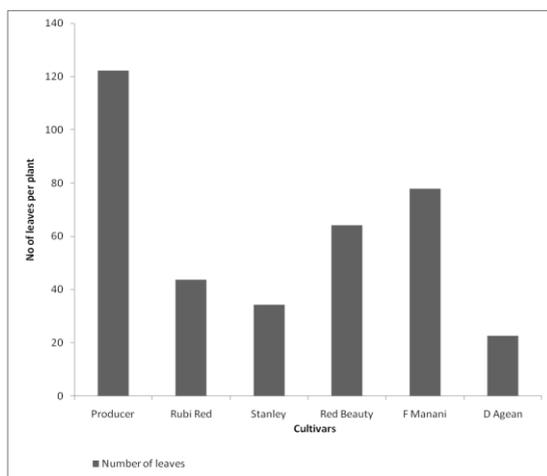


Fig 5: Number of leaves as affected by different plum varieties budded on peach rootstock

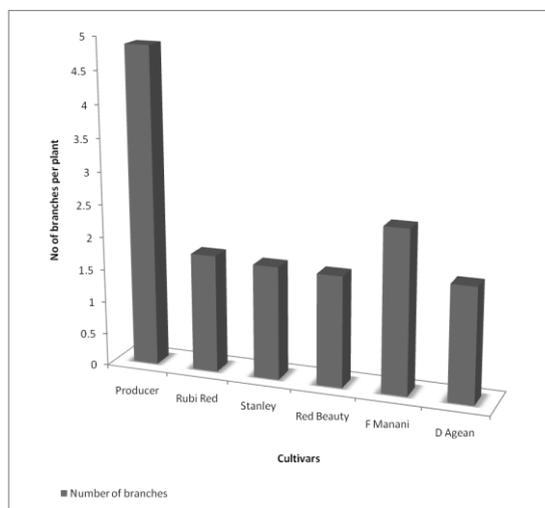


Fig 6: Number of branches as affected by different plum varieties budded on peach rootstock

CONCLUSIONS

Form the results it is concluded that maximum bud take success was obtained in cultivar AU Producer, budded on Swat local rootstock. Maximum budling growth was noted in cultivar Red Beaute, budded on Swat local rootstock which was statistically similar with AU-Producer and Fazali manani. Poor results were obtained in varieties Rubi Red and D Agen when budded on Swat local rootstock of peach.

LITERATURE CITED

- Agriculture Statistics of NWFP. 2006-07. Ministry for Food, Agriculture and Livestock, Economic Wing, Islamabad, Pakistan. P. 34.
- Bailey, L. H. 1963. The Standard Cyclopedia of Horticulture. The MacMillan Company, New York.
- Chaudhary, M. A. 1994. Fruit crops. Horticulture National Book Foundation. Islamabad. Pp 474-476.
- Hickey, M and C. King. 1981. 100 families of flowering plants. New York, Cambridge University Press.
- Hussain, F., H. Sher and M. Ibrar. 2004. Ethnobotanical profile of some plants of District Swat, Pakistan. Pak. J. Pl. Sci. 10:85-104.
- Inayat, U., S. Muhammad and N. Naeem 1997. Effect of different budding heights from the ground level on the growth of 'FazaliManani' plum on local peach root stock. Sarhad J. of Agric.; 13(1): 35-39.
- Mukhtar, A., H. Ur-Rahman, A. Iftikhar, K. M. Kokhar and K. M. Qureshi. 2002. Adoptability of peaches under sub-tropical region of Islamabad. Pakistan J. Agric. Res. 17 (1):42-45.
- Naeem, N., M. Jamroz., S. Muhammad., N. Rehman and A. Rauf. 2002. Performance of different stone fruits (peach, plum, apricot and almond) budded on peach rootstock under the agro-climatic conditions of Peshawar. Sarhad J. of Agric. 18(4): 379-381.

- Shah. M.A., A. Nawaz., A.U. Rehman and J.U. Rehman. 2013. Morphological study of different stone fruit species budded on peach rootstock under agro-climatic conditions of Mansehra, Pakistan. *Sarhad. J. Agric.* 29(4): 543-546
- Tsipouridis. C., T. Thomidis., I. Therios and D. Stylianides. (2005). Evaluation of peach and nectarine cultivars in Northern Greece. *J. of the American Pomological Society.* 59(1): 57-61.
- Westwood M. N. 1978. *Temperate zone pomology.* Timber Press. Portland, Oregon., p. 428.
- Zeb. A., I .Ahmad and M., Rehman. 2002. Bud take success and budding growth of peach cultivars on different rootstocks. *Sarhad J. of Agric,* 18(2): 193-197.
- Zeb, J and Z. han. 2008. Peach marketing in NWFP. *S. J. Agric.* 24(2):161-168.