EFFECT OF SOIL MEDIA ON PEACH SEED GERMINATION AND SEEDLING GROWTH IN CLIMATIC CONDITIONS OF ORAKZAI AGENCY (FATA)

Hafeez-ur-Rahman[*], Muhammad Rafiq[**], Ghulam Nabi[*] and Abdul Samad *

ABSTRACT

An experiment was conducted to study the effects of different soil media on seed germination and seedling growth of peach during 2001 and 2002 in Orakzai Agency. Different soil media alone and in combination used for seed germination of peach were Farm Yard Manure, Saw dust, Canal silt, FYM + Sawdust, FYM + Canal silt, Sawdust + Silt and FYM + Sawdust +Silt. Different media showed non significant effect on seed germination of peach. However, the highest percent seed germination (44%) was observed in combination of sawdust + Canal silt followed by silt alone (36.66%). While the lowest seed germination (26.66%) was recorded in ordinary soil. Significant effect of different media was observed on seedling height and seedling girth. Maximum seedling height (98.67cm) was recorded in combination of FYM + Sawdust, while maximum seedling girth (5.25 cm) was found in FYM alone closely followed by FYM + Sawdust (5.24 cm). Minimum seedling height (57.00 cm) and girth (2.87 cm) were recorded in Canal silt alone. The soil media used in combination improved both germination and subsequently growth compared to soil media used alone in peach nursery at Orakzai Agency.

INTRODUCTION

The production of healthy and vigorous rootstock is most important factor in successful plant propagation. Peach seeds are in common use for raising the rootstock used for propagation of stone fruits. In Orakzai Agency, the poor germination of peach seed reported leading to very poor stand of seedlings, although the chilling requirements of the seed were fulfilled and the seed from the same lot gave better result grown in other sites of the agency. Germination of the seed is a critical stage, because rest of the plant life is directly dependent upon the rate of its germination (Qadir and Shahzadi, 1969). Soil media play a key role in enhancing soil physical and chemical properties and there by increasing the penetrating capacity of roots in silt + clay media. When suitable environment with proper aeration, sufficient water and nutrient availability was offered by the medium, excellent roots system developed which in turn result the luxurious growth of plants, (Neelam and Ishtiaq, 2001).

Henley (1974) found root penetration of two Pilea species grown in light soil, timely grounded sphagnum peat moss were four times greater than that of plants grown in compact peat moss. Similarly shoot lengths were 50% greater in non-compact treatments. Conover *et al*. (1981) studied Pilea grown in various potting media and reported that plant height and grades were generally better in peat and lowest in bark, probably due to their higher water holding capacity. Wootton *et al.* (1981) reported that several compost media tested were found best for plant growth, aeration, good moisture retention and suitable nutrient retention. Edwards *et al.* (1982) reported that both growth and nutrient uptake were increased in different cultivars of peach seedlings by increasing the NH_4 concentration in nutrient solution. Hendromono (1988) studied the effect of soil media and of adding dolomite at 5 or 10 Kg/m^3 of media. The best seedling growth and survival was found in 1: 1 soil + peat with or with out 5 Kg/m^3 dolomite. Neelam *et al.* (2001) conducted an experiment on response of *E. comaldulensis* seedlings to different soil media and found the maximum plant height (90.41 cm), more number of leaves per plant (31.89) and stem thickness (0.521 cm) were observed in silt + clay media. Vineeta *et al* (2005) reported that soil structural stability increased due to straw addition with better aggregate size distribution and reduction in soil disturbance. He further added that soil organic matter acts as a reservoir for plant nutrients and prevents leaching of elements, necessary for plants growth. Keeping in view the response of seedling growth to various soil and climatic conditions, this trial was conducted to study the effect of different soil media on the germination of peach seed and subsequently on the growth of seedlings.

MATERIALS AND METHODS

A research trial was conducted at Orakzai Agency in nursery grown by Agricultural Research FATA during 2001and 2002. The peach seed of cultivars Swat Local was sown in November 15, 2001. Fresh, uniform and healthy seed were selected for this purpose. Seeds collected from the local market were sown in medium size clay pots having length of 7 inches and width of 6 inches containing eight different types of soil media. The clay pots were arranged in randomized complete block design with three replications. Ten pots per treatment in each replication were arranged in randomized complete block design with three replications. Ten pots per

[*] Agricultural Research Institute, Tarnab, Peshawar - Pakistan
[**] Agricultural Research (FATA), Agricultural Research Institute, Tarnab, Peshawar - Pakistan

treatment in each replication were selected. Total 240 pots were used in the whole experiment. Soil samples collected from the experimental area were used as ordinary soil (Control). Soil analysis of the samples were carried out giving the following results as average (Soil pH =8.5, lime content=55.5%, Organic matter = 0.74 %, Class =Clay loam). All nursery management practices were carried out as usual. The data on percent germination, average seedling height and vigor were recorded and analyzed by using LSD test.

The following soil media were used:

T1	Farm yard manure 100%
T2	Sawdust 100%
T3	Canal silt 100%
T4	Farm yard manure + Sawdust 50%+50%
T5	Farm yard manure + Silt 50%+50%
T6	Sawdust + Silt 50%+50%
T7	Farm yard manure + Sawdust + Silt 33%+33%+33%
T8	Control Ordinary soil*.

* Soil samples collected from the experimental area.

RESULTS AND DISCUSSION

The results obtained are discussed briefly as under.

Germination Percentage

The data pertaining to germination percentage is given in table revealed that different soil media did not affect the germination of seed significantly. However sawdust in combination with canal silt produced maximum seed germination (44.00%) followed by canal silt (36.66%) and Farm yard manure (35.33%). The control treatment gave the lowest germination (26.66%). Mean values given in the table showed that all the treatments included in the trial proved their superiority over control treatment. This superiority can be attributed to the fact that in mixed soil media, the soil structure and texture was improved which in turn increases the metabolic activity in germinating seed leading to better germination of seed. These results are in agreement with the finding of Neelam *et al*. (2001) who reported that media improved soil physical and chemical properties, aeration and resulted luxurious plant growth.

Seedling Height (cm)

The data indicated that seedling height was significantly affected by different soil media. Mean values given in table revealed that maximum seedling height (98.67cm) was recorded in FYM + sawdust followed by Farm yard manure alone (94.00cm). While minimum seedling height (57.00 cm) was recorded in canal silt. The vigorous and fast growth of seedlings may be attributed to better water holding capacity and availability of nutrients for plant growth in FYM +sawdust. While poor growth in canal silt may be due to low nutritional status for plant growth offered by the medium. Similar results were reported by Conover *et al*. (1981) who reported better plant height in mixes and lowest in bark.

Seedling Girth (cm)

The data showed that different soil media had a significant effect on seedling girth. Mean values given in table showed that the highest girth (5.25 cm) was recorded in Farm yard manure followed by Farm yard manure + sawdust (5.24 cm). A minimum value for seedling girth (3.11 cm) was observed in control having ordinary soil. The best performance of Farm yard manure alone and its combination with sawdust might be attributed to its richer nutritional status which enhanced photosynthetic activity resulted in more plant stored material, there by increasing seedling girth. Similarly minimum seedling girth in control soil may be due to less soil aeration and poor root penetration which restricted plant growth. These results coincide with the finding of Henley, (1974) who reported poor root penetration and reduced shoot growth in compact peat moss compared in non compact treatment.

CONCLUSION AND RECOMMENDATIONS

From the results of this study it is concluded that media applied by adding Farm yard manure, sawdust and canal silt in combinations improved both seed germination and growth of peach seedlings. Hence the above media mixed in equal combinations are recommended for peach nursery growers as soil media.

Table. I ***Effect of different soil media on seed germination, seedling girth and seedling height in climatic condition of Orakzai Agency.***

Soil media	%Seed germination	Seedlings height (cm)	Seedlings girth(cm)
Farm yard manure	35.33	94.00 a	5.25 a
Sawdust	31.33	70.00 b c	4.20 b
Canal silt	36.66	57.00 d	2.87 c
Farm yard manure + Sawdust	33.33	98.67 a	5.24 a
Farm yard manure + Canal silt	34.66	81.33 b	4.82 a b
Sawdust + canal silt	44.00	70.67 b c	4.32 b
Farm yard manure + Sawdust + Canal silt	31.33	81.33 b	4.82 a b
Control (soil)	26.66	61.33 c d	3.11 c
LSD 5%	N.S	12.29	0.69

Means followed by similar letters are not significantly different at 5% level of significance using L.S.D. test.

REFERENCES

Conover, C.A. and R.T. Poole. 1981. Effect of soil compaction on Physical properties of Potting media and growth of silver tree. J. Amer. Soc. Hort. Sci. 106(5): 604-607.

Edwards, J.H., and B.D. Horton. 1982. Interaction of Peach Seedlings to No3: NH4 Nutrient Solution. J. Amer. Soc. Hort. Sci.107(1): 142-147.

Henley, R.W. 1974. Don't squeeze the mix. Florida Foliage grower. Tech. Bullet. 11(9):3-4.

Hendromono. 1988. Utilization of Peat and saw dust as mixer material for growing medium for Eucalyptus deglupta seedling. Bulletin-Peneliton. Hutan. 500: 15-25.

Neelam, A. and M.Ishtiaq. 2001. Response of *Eucalyptus camaldulensis* seedlings to different soil media. Sarhad J. Agric. 17(1): 75-79.

Qadir, S.A. and H.N. Shahzadi. 1969. Seed germination of common cultivated trees, shrubs and some wild grass. Pak. J. Forestry 19:195-220.

Vineeta, M. and A.K. Agnihotri. 2005. Source of organic manure. Agrobios. Newsletter, Jodphur, India. 4(7): 11-12.

Wootton, R.D., F.R. Gouin., and F.C. Stark. 1981. Composted, Disgested sludge as a medium for flowering annuals. J. Amer. Soc. Hort. Sci. 106(1): 46-49.