

Effect of Different Medias through Mound Air Layering in Olive Variety Pandalino



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Abstract

An Experiment "Effect of Different Medias through Mound Air Layering in Olive Variety Pandalino" was Practiced at Olive Research Farm Sangbhathi, Agricultural Research Institute (ARI) Tarnab, Peshawar, during July, 2017. Mound-air-layering was planted in July on Various Medias i.e Garden soil, Silt, G.soil+silt, G.soil+silt+FYM, G.soil+Silt+FYM+Saw dust in Olive Variety Pandalino. RCB-Design (Randomized Complete Block Design) with 3 repetitions was used. The research given significant results for days to callus formation, Days to rooting, No of roots plant-1, Root length, Root weight through different medias. Maximum root length (4.1cm), No of roots plant-1 (8.633), Root weight (0.367) and Minimum days to rooting (39.667) was recorded for Silt media, while Maximum Root diameter (1.83) for local media (Garden soil) and Minimum days to callus formation (23.17) was recorded for T3 (silt+G.soil), Minimum root length(4.1), Root diameter (1.56) was recorded for T5 (G.soil+silt+Fym+Saw dust) and Maximum day to rooting(48 days) and callus(31 days) for T4 (G.soil+silt+Fym), Minimum root weight (0.210) and No of roots plant-1 (4.833) was recorded for T3(G.soil+silt). On the basis of these results it was found that Silt media performed best in response to rooting, Root length, No of roots per plant and root weight. Therefore Silt media May be the best Media through Mound-air-layering in olive Variety Pandalino.

Keywords: air layering; Olive, root length, root diameter, callus formation; Root weight

Introduction

Olive locally known as Zaitoon belongs to family Oleaceae is an attractive evergreen tree [1]. It is among the oldest known cultivated trees in the world being grown before the written language was invented. It was being grown on Crete by 3,000 BC and may have been the source of the wealth of the Minoan kingdom [2]. Olive is mentioned in the holy Quran and prophetic medicine also described health benefits of olive tree and olive oil. Muhammad is reported to have said; take oil of olive and message with it, it is a blessed tree [3].

It originated in the eastern Mediterranean area. Its cultivation began in Italy, Spain and North Africa later than in the eastern Mediterranean region [4]. Olive is successfully grown in climate having moderate cold winters and prolonged hot summers with low humidity. Temperature below 10 °C is injurious as it may kill the plant. Winter rest is considered essential for fruit bud differentiation. Most cultivars require at least two months of winter chilling for floral bud initiation. It is one of the most drought resistant trees and thrives well where the average rainfall is around 900-1000mm year⁻¹ without irrigation [5]. Olive oil is used for blood pressure, lowers the risk of heart attacks, have

laxative, anti-inflammatory, anti-carcinogenic and anti-oxidant benefits. Moreover Olive products help to satisfy the nutritional needs of the population. The fruit contain around 20% oil and has less cholesterol. Olive fruits contain 80% unsaturated fatty acid compared with 20% saturated ones. Ripe olive fruits are pressed for rich oil which is the best oil available on the world for edible purposes. The olive oil has twice as much energy value than sugar. Mature fruit are also eaten after being processed and preserved in salt solution the olive oil is used for cooking, salad dressing, food preparation, massage and for the manufacture of cosmetics, pharmaceutical [6].

Asexual propagation methods can probably be the most widely used commercial method of propagation in olive. Asexual propagation methods include cutting, budding, grafting and air-layering [7]. But mostly propagation is done through air-layering because it takes comparatively less time. In air-layering shoot is not buried in soil, first a small cut is given to shoot and then sphagnum moss is wrapped through polythene around the cutting portion. Since cutter portion is exposed not buried in soil, you may see root development, when roots develop detach shoot from parent plant and plant it.

Objectives

To determine the best media for Olive variety Pandalino in the Climatic condition of Mardan.

Materials and Methods

An Experiment “Effect of Different Medais on Mound Air Layering of Olive Variety Pandalino” was conducted at Olive Research Farm Sangbatti Agriculture Research Institute (ARI) Tarnab Peshawar, during 17th July 2017.

Experimental Layout

The experiment was laid out randomized complete block (RCB) design having single factors. In which each treatment were repeated 3 times. 9 mound air layers tree⁻¹ were practiced. In this way a single replication had 54 air layers (6 trees x 9 layers), thus a total of 162 mound-air-layers were made in three replications

The experimental study consist of the following single factor

Factor (Different Growing Media)

T1: Garden soil (Local soil)

T2: Silt

T3: Silt + Garden soil

T4: silt+Garden soil+FYM

T5: G.soil + Silt + Fym + Saw dust

Preparation of Mound Air Layers

In order to produce rooting through Mound-air-layering in olive Plant branches are circular strip of bark having 3.5 cm size was completely removed below the buds from one year old shoots. The plants selected for experiment they are max Seven years old and are selected from ground. Olive branches used for air layering had 1.5 m length and the thickness of the branches like pencil size. The bark of the selected branch is removed with Knife in such a way that the Cambium layer were not disturbed. The cut Portion is covered with media. All the air layered branches readily after the removal of bark to reduce moisture loss from the opened portion. The air layered plants were frequently irrigated after the completion of air layering practice. Data were collected after 20 to 40 days. Those branches which showed successful development of fruits in media they were cut off carefully below the layered portion from the parent plants and the data were recorded for different parameters. The data on following growth parameters were recorded accordingly.

Days to Callus Formation

Layering days to callus formation were calculated from the date of Mound air layering to the appearance of callus in layering. This method was repeated for all the air layers in each replication and then average was calculated.

Days to Rooting

The rooting days were counted from the date of Mound air layering to the appearance of roots. This method was repeated

for all the air layers in each replication and then average was calculated.

Root Diameters (mm)

The root diameter was measured with the help of screw gauge after the roots were cleaned from media with water. For all treatments in each replication data was recorded and average diameter was calculated for statistical analysis.

Root Length (cm)

After cleaning the roots, the length of roots was measured in centimeters the vernier calipers were used for the root lengths from the point of emergence to the apex of highest root. The data was recorded for all treatments in each replications and average length was calculated.

Number of Roots per Plant

Mound Air layered shoots were cut and the media attached with roots was removed by washing with water and the number of roots per Mound air layered shoots per plant were counted and the average was worked out.

Root Weight (g)

Data was recorded by cutting Mound air layered shoots and the media attached with roots they was removed with the help of water and weight of roots per Mound air layered shoots was measured in grams by digital balance. The average was calculated after recording to the roots measurement in each replication.

Results and Discussion

Days to Callus Formation

The data recorded for days to callus formation is given in Table 1 and analysis of variance is presented in Table 2. The analyses of variance showed that data related to days to callus formation were high significantly different.

Table 1: Effect of Mound air layering with different Medias on days to callus formation Olive variety Pandalino.

Media	Replications			Mean
	R1	R2	R3	
T1	29	27	25.2	27.067 b
T2	26	25	24	25.000 bc
T3	27.5	22	20	23.167 c
T4	34	32	27	31.000 a
T5	30	26.5	24.8	27.100 b

Table 2: analysis of variance for days to callus formation through mound air layering with different olive Medias.

Source	DF	SS	MS	F	P
Replicat	2	65.233	32.6167		
Media	4	102.460	25.6150	14.41	0.0010
Error	8	14.220	1.7775		
Total	14	181.14.220			

Grand Mean: 26.667 CV: 5.00

LSD value at 5% of probability=2.5103

Randomized Complete Block AOV Table for days to callus formation.

The mean table showed that minimum days to callus formation were recorded for T3 (G.soil+silt) as 23.167 days, followed by Garden soil (25.000), while maximum days to callus formation were in G.soil+silt+Fym (27 days).

G.soil+Silt+FYM does not have more favorable climatic condition compared to Garden soil+ silt. G.soil+Silt is more favorable to the Climate of Mardan then that of other Medias that's why Garden soil+silt (T3) Media showed better results for callus formation. It is noticed that early callus formation occurred in Garden soil+silt. While late callus formation occurred in G.soil+silt+Fym

Days to Rooting

The data recorded for days to rooting is given in Table 3 and analysis of variance is presented in Table 4. The analysis of variance showed that data is related to days rooting was highly significantly different. The mean table showed that minimum days to rooting were recorded for silt (39.6 days), followed by G.soil+silt (40.3 days), while maximum days to rooting were T4 (48 days).

Table 3: Effect of mound air layering with different Medias on days to rooting in olive variety pendalino.

Media	Replications			Mean
	R1	R2	R3	
T1	45	42	47	44.667 ab
T2	40	41	38	39.667 c
T3	43	39	39	40.333 bc
T4	50	45	49	48.000 a
T5	47	42	50	46.333 a

Table 4: Analysis of variance for days to rooting through mound air layering with different olive Medias.

Source	Df	SS	MS	F	P
Replicat	2	30.400	15.2000		
Media	4	161.733	40.4333	7.31	0.0088
Error	8	44.267	5.5333		
Total	14	236.400			

Grand Mean: 43.800 CV: 5.37

LSD value at 5% of probability=4.4290

Randomized Complete Block AOV Table for days to Rooting.

T4 (G.soil+silt+Fym) does not have more favorable climatic condition compared to the T2 (Silt). Silt is more favorable to climate of Mardan then that of other Medias that's why T2 media showed better results for rooting. It is noticed that early occurred in T2. While late rooting occurred in T4 media.

Gohil (2014) carried out an experiment "to investigate the effect of different concentrations of IBA and NAA on air layering of cashewnut cv. Vengurla 4" found that 4000 mg/l IBA + 4000 mg/l NAA had taken minimum days (32.10) for root formation as compared to other treatments in air layering of cashewnut cv.

Root Diameter (mm)

The data recorded for root diameter is given in Table 5 and analysis of variance is presented in Table 6. The analysis of variance showed that data related to root diameter were not significantly different.

Table 5: Effect of mound air layering with different medias on root diameter (mm) in olive variety pendalino.

Media	Replications			Mean
	R1	R2	R3	
T1	1.90	1.85	1.73	1.83
T2	1.75	1.58	1.83	1.72
T3	1.45	1.61	1.61	1.68
T4	1.80	1.70	1.45	1.65
T5	1.70	1.67	1.68	1.56

Table 6: Analysis of variance for root diameter (mm) through mound air layering with different olive Medias.

Source	Df	SS	MS	F	P
Replicat	2	0.00921	0.00461		
Media	4	0.11689	0.02922	1.93	0.1990
Error	8	0.12119	0.01515		
Total	14	0.24729			

Grand Mean: 1.6873 CV: 7.29

LSD value at 5% of probability= 0.2317

Randomized Complete Block AOV Table for Root Diameter.

Rahman et al., (2013) carried out an experiment "to study the response of olive cultivars to rooting through air layering in different growth media" showed maximum root diameter were recorded for silt media.

Root Length (cm)

Table 7: Effect of mound air layering with different Medias on root length (cm) in olive variety pendalino.

Media	Replications			Mean
	R1	R2	R3	
T1	5.1	5.8	6.1	5.67 a
T2	6	4.5	6.8	5.97 a
T3	5.5	4.3	5.1	4.97 ab
T4	3.9	4.3	4.7	4.30 b
T5	3.8	4.5	4.2	4.16 b

The data recorded for root diameter is given in Table 7 and analysis of variance is presented in Table 8. The analysis of variance showed that data related to root diameter were significantly different. The mean table showed that maximum root length was

recorded for Silt T2 Media (5.97 cm), followed by Local media T1 (5.67 cm), while minimum root diameter were in T5 (4.16 cm).

Table 8: Analysis of variance for root length (cm) through mound air layering with different olive medias.

Source	Df	SS	MS	F	P
Replicat	2	1.2413	0.62067		
Media	4	7.5027	1.87567	4.03	0.0445
Error	8	3.7253	0.4656		
Total	14	12.4693			

Grand Mean: 5.0067 CV: 13.63

LSD value at 5% of probability= 1.2848

Randomized Complete Block AOV Table for Root length.

T5 (silt+garden soil+ Fym+Saw dust) does not have more favorable climatic condition compared to Silt. Silt media is more favorable to the Climate of Mardan then that of other Media that's why Silt media showed better results for root length. It is noticed that maximum root length occurred in T2 (silt) media. While minimum root length occurred in T5 (silt+garden soil+ Fym+Saw dust) media.

Number of Roots per Plant¹

The data recorded for number of root plant⁻¹ is given in Table 9 and analysis of variance is given in Table 10. The analysis of variance showed that data related to number of root plant⁻¹ were Highly significantly different.

Table 9: Effect of mound air layering with different medias on number of roots plant-1 in olive Pentalino.

Media	Replications			Mean
	R1	R2	R3	
T1	5.5	5.2	5.7	5.467 b
T2	7.5	9.6	8.8	8.333 a
T3	4.3	6.5	3.7	4.833 b
T4	6.3	8.1	8.5	7.633 a
T5	7.5	9.1	8.9	8.500 a

Table 10: Analysis of variance for number of roots plant-1 through mound air layering with different olive medias.

Source	Df	SS	MS	F	P
Replicat	2	5.5613	2.78067		
Media	4	37.0907	9.27267	13.67	0.0012
Error	8	5.4253	0.67817		
Total	14	48.0773			

Grand Mean: 7.0133 CV: 11.74

LSD value at 5% of probability= 1.5505

Randomized Complete Block AOV Table for Number of roots per pant.

The mean table showed that maximum number of roots plant⁻¹ were recorded for Silt+garden soil+ Fym+Saw dust media (8.5) followed by silt (8.3), while minimum number of roots plant⁻¹ were in Silt+G.soil (4.83).

Silt+Garden soil media does not have more favorable climatic condition compared to T5. T5 is more favorable in climate of Mardan than that of other Medias that's why T5 (silt+garden soil+ Fym+Saw dust) media showed better results for number of roots plant⁻¹. It is noticed that maximum number of roots plant⁻¹ occurred in Silt+G.soil+FYM+Saw dust. While minimum number of roots plant⁻¹ occurs in T3 (silt+ garden soil) media.

Rahman [8] carried out an experiment "to study the response of olive cultivars to rooting through air layering in different growth media" concluded that maximam Number of roots plant⁻¹ were recorded for silt media.

Root Weight (gm)

The data recorded for number of root weight is given in Table 11 and analysis of variance is given in Table 12. The analysis of variance showed that data related to number of root weight were significantly different.

Table 11: Effect of mound air layering with different medias on root weight in olive variety penalino.

Media	Replications			Mean
	R1	R2	R3	
T1	0.35	0.29	0.34	0.327 ab
T2	0.47	0.31	0.32	0.367 a
T3	0.31	0.16	0.16	0.210 c
T4	0.23	0.25	0.23	0.237 bc
T5	0.25	0.33	0.27	0.283 abc

Table 12: Analysis of variance for root weight through mound air layering with different olive medias.

Source	Df	SS	MS	F	P
Replicat	2	0.01049	0.00525		
Media	4	0.04911	0.01228	3.72	0.0537
Error	8	0.02637	0.00330		
Total	14	0.08597			

Grand Mean: 0.2847 CV: 20.17

LSD value at 5% of probability= 0.1081

Randomized Complete Block AOV Table for Root weight.

The mean table showed that maximum number of root weight was recorded for T2 (0.37 gm), followed by Local Media T1 (0.32 gm), while minimum number of root weight were in T3 (0.210gm).

T3 (silt+garden soil) does not have more favorable climatic condition compared to Silt. Silt is more favorable in climate of Mardan than that of other Medias that's why T2 (Silt) Media showed better results for root weight. It is noticed that maximum root weight occurred in T2 (silt). While minimum root weight occurs in T3 (silt+garden soil) Media.

Chawla [9] studied the influence of different concentration of plant growth regulators (PGR's) on rooting of litchi air layers. The result of their study indicated that application of IBA 5000 ppm treated layers given high weight of roots.

Conclusion

An experiment on "Effect of Different Medias on Mound Air-Layering Of Olive Variety Pandalino" was conducted at Olive Research Farm Sangbatti, Agricultural Research Institute (ARI) Tarnab, Peshawar, Pakistan during 17 July 2017 Mound Air layering was done in June Olive medias i-e local Soil, silt, silt + G.soil + FYM , Silt + G.soil , G.soil + Fym + Silt + Saw dust were compared. The experiment was laid out on a single factor RCB-design (randomized complete block design) having three replications. The research revealed significantly different results for days to callus formation, Days to rooting, number of roots per plant, root length, root weight while root diameter was not significant. Maximum root length (4.1cm), number of roots per plant (8.633), root weight (0.367) and minimum days to rooting (39.667) was recorded for silt media While Maximum root diameter (1.83) for local media (Garden soil) and minimum days to callus formation (23.17) was recorded for T3 (silt+G.soil), While minimum root length (4.1), root diameter (1.56) was recorded for T5 (G.soil+silt+Fym+Saw dust) and Maximum day to rooting(48 days) and callus(31 days) for T4 (G.soil+silt+Fym), minimum root weight (0.210) and number of roots per plant (4.833) was recorded for T3(G.soil+silt) On the basis of these results we found that Silt media performed best in response to rooting, Root length, no of roots per plant and root weight. On the basis of these results it was concluded that Silt Media performed best in response to days callus formation, rooting, diameter, and Length, Root Weight and Number of root per plants through Mound air layering in different Olive Media for Pandalino.

Recommendation

On the basis of the present findings the following recommendations can be given:

Silt media should be used under the agro-climatic conditions of Mardan for Mound air-layering in Olive Variety Pandalino.

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