

THE INFLUENCE OF COLD STORAGE ON THE ROOTING ABILITY OF SOME OLIVE CVS CUTTINGS

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ABSTRACT

The effect of different cold storage period 3 or 6 days , after or before IBA treatments on the rooting percentage of Picual, Manzanillo and Aggizi olive cuttings was studied through two successive seasons (1998 and 1999).

Generally, the longer the period that cuttings were stored the lower the percentage of rooting were obtained. Rooting ability of cuttings was greatly affected by the hormonal treatment time (before or after storage). Highest rooting percentage was obtained with cutting initially treated with IBA and then stored for 3 days at 4 °C. Moreover, August. planting gave high increase in rooting percentage as compared with May planting. In addition. Manzanillo cultivar gave high increase in rooting percentage as compared with the other two cultivars in both seasons.

Cutting treated with IBA then 3 days cold storage gave the highest total indoles and soluble sugars content. Manzanillo and Picual cultivars had the greatest values while Aggizi c.v. was the lowest ones as compared to control. However, total phenols content followed a reverse trend.

INTRODUCTION

Few olive nurseries have a stock mother plant collection at their disposal. Most nurseries obtain cuttings from orchards placed far away from the nursery. In this case it is often impossible to take cuttings and stick them into rooting medium during the same period because of time constraints and space limitation. Thus, it is important to preserve these cuttings several days at cold storage in the nursery.

Hartmann and Kester (1990) reported that it may be convenient to collect cuttings when nursery plant are being sheared and shaped then store them for later propagation. Nurseries must have refrigerated storage facilities (4 to 8 ° c) for holding cutting one to two days or longer before processing for propagation.

Prestorage cuttings of many plants have been investigated previously by several workers for more convenient time to stick (Pryor and Setwart,1963 on azalea; Davis and Potter, 1989 on Rho dodendron; Briccoli – Bati, and Lombardo 1988 on olive).

Thus, this study was carried out to investigate the possibility storage of some olive cutting (Picual, Manzanillo and Aggizi) for different storage period (3 or 6 days) before or after hormonal treatments without altering the rooting percentage.

MATERIALS AND METHODS

The investigation was carried out through two successive seasons of 1998 and 1999 in the Experimental station of the Horticulture Research

Institute at Giza Governorate on Picual, Manzanillo and Aggizi olive trees. Cuttings were prepared from trees similar in growth vigor free from any physiological and pathological disorders and were subjected to the same agricultural practices. Leafy cuttings of each cultivar were prepared from partially mature shoots of the current growth about 12 cm with 4 leaves on May 1st and Aug1st. and subjected to the following treatments in 1998 and 1999 seasons:

- Control
- IBA
- 3 days cold storage
- IBA then 3 days cold storage
- 3 days cold storage then IBA
- 6 days cold storage
- IBA then 6 days cold storage
- 6 days cold storage then IBA

The stored period (3 or 6 days was the refrigerator at 4° C). The basal end about 2 cm of the cutting (before or after) storage was quickly applied dipped for 5 seconds in IBA solution at 3500 ppm. concentration. All prepared cuttings received the different treatments were planted in boxes filled with clean wash quartz sand and peat-moss (2:1V/V) and placed in a greenhouse. Each treatment was replicated three times and each replicate contain 50 cuttings and examined 3 month after planting and the number of rooted and unrooted ones were recorded then the percentage of rooted cuttings was calculated.

For chemical studies, samples were taken from the three cultivars cuttings previously cold storage for 3 or 6 days as well as untreated (control). The following determinations were applied.

Total soluble indoles, estimated coloremometrically at 530 um by applying the P-dimethyl amino benzaldehyde test according to Gorden and Webber (1951) . The concentration was calculated as mg-indole acetic acid per 100 gs. Dry weight.

Data were compared using the L.S.D. (0.05) according to shedocor,1967.

b-Total soluble phenols;determined by using folin Denis coloremometric method (A.O.A.C.,1970) at 730 wave length. The concentration was calculated from a standard curve of pyrogallol as mg per 100 gs. Dry weight.

c-Total soluble sugars; determined coloremometrically by the method of Smith et al. (1956) and the concentration was calculated as g. glucose per 100g dry weight.

RESULTS AND DISCUSSION

1- Rooting ability:

Date in tables (1,2) show the effect of different storage periods on the rooting percentage of Picual, Manzanillo and Aggizi olive cuttings through the two successive seasons of 1998 and 1999.

Concerning the effect of IBA treatments (without storage), the data indicated clearly that, regardless of time of preparation or cultivars, induced increasing influence on rooting percentage compared with control (untreated). Moreover, untreated cuttings and stored 3 days in refrigerator rooted better than 6 days storage. This is clearly shown in the two successive seasons for all cultivars under study.

Data also indicated that the percentage of rooting ability of cuttings differed according to IBA treatment (before or after) storage. Higher percentage of rooting was obtained when cuttings were treated with IBA and then stored (3 or 6 days) as compared to prestorage and then IBA treated. Anyhow, highest rooting percentage was obtained with cuttings initially treated with IBA and then 3 days stored in the refrigerator. This was true in both seasons of study.

Finding of Bricclio - Bati and Lombardo (1988) on *Nocellora delbelic* and *Cassanese* olive cultivars were similar to our mentioned results.

Referring to the effect of treatments on the enhancing of olive cultivars, regardless of treatments or time of preparation, it is interesting to notice that the highest rooting percentage was obtained on *Manzanillo c.v.* followed *Picual c.v.*, then *Aggizi* through the two seasons of study.

When we consider the time of cuttings preparation, regardless of treatments or cultivars, it becomes clear that it becomes a marked difference could be detected between cuttings prepared in May or in Aug. Generally, all Aug. planting gave high increase in rooting percentage as compared with May planting. This comes true in both seasons. In this respect, it was reported that the ability of olive cuttings to develop adventitious roots in high percentage during a certain month than in another to the presence and mobility of high amount of endogenous auxins and / or other rooting cofactors which might be affected by the activity of growth on the time of cuttings preparation. Hartman and Loreti (1965).

2 – Chemical studies:

a – Indoles content:

Data in table (3) showed that, the effect of different storage period on total soluble indoles, phenols and total soluble sugar of *Picual*, *Manzanillo* and *Aggizi* olive cutting in 1999 season.

It is apparent that, all treatments increased total soluble indoles compared with the control. The highest increase was obtained when olive cuttings were treated with IBA then 3 days cold storage. While 6 day cold storage then IBA gave the lowest increase in total soluble indoles than the control.

Referring to olive cultivars it is clear from the present data in table (3) that cuttings from the three cultivars succeeded in forming roots but there was a wide variation in their indoles content. The maximum increase in total soluble indoles was noticed in *Manzanillo c.v.* and ranked first whereas *Picual c.v.* ranked second then came *Aggizi c.v.*

b - Phenols content:

It is evident that both indoles and phenols markedly fluctuated between either increase or decrease with a definite opposite relationship among each other. In general, all treatments reduced total soluble phenols than the control except 6 days cold storage then IBA treatment which showed the highest values in total phenols when compared with other treatments or control. However, the lowest values in total phenols was obtained when olive cutting were treated with IBA then 3 days cold storage.

Statistical analysis showed that phenol content in Aggizi c.v. cutting was significantly higher than Manzanillo and Picual cvs. These results are in agreement with the findings of Fayek and Sweidan (1981) on peach cuttings, Abo Shanab (1982) and Sanaa (1986) on olive cuttings, concluded that, high rooting ability of cuttings was proportioned with the high soluble indole and low concentration of phenolic compound.

c- Total soluble sugar:

As shown in table (3), sugar content in olive cutting increased in all treatments than the control.

The maximum increase in total soluble sugar was noticed when olive cuttings were treated with IBA then 3 days cold storage whereas 6 days cold storage then IBA treatment gave the minimum increase in total sugar when compared with the control. Concerning the effect of cultivar, it is quite clear from the present data that, Manzanillo c.v. showed the highest values in total soluble sugar content followed by Picual c.v. then Aggizi c.v. at last.

In this respect, Fayek and Sweidan (1981) on peach cuttings, Abo Shanab (1982) and Sanaa (1986) on olive cuttings, found a positive correlation between the rooting ability of cuttings and their contents of sugars.

From the above mentioned results, one can conclude that pre treatment of leafy olive cuttings with IBA and placed for three days in cold storage is the best treatment for preserving the cuttings with no adverse effect. In fact, cold storage greatly enhanced rooting percentage compared to IBA treatment without storage. This could enable producers to store cuttings for a more convenient time to stick, and also reduce the time needed for propagating under mist.

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أثر التخزين البارد على مقدرة تجذير عقل بعض أصناف الزيتون عرفة على حامد الشريف

معهد بحوث البساتين - مركز البحوث الزراعية - جيزة

تحت ظروف الإكثار الخضري لإنتاج شتلات الزيتون بالعقلة تحت الضباب ومع عدم توفر مصدر قريب الحصول على العقل تلجأ إلى مزارع الزيتون والتي غالباً ما تكون بعيدة عن مكان الإكثار ولا يتم زراعتها في نفس اليوم ولهذا أجرى هذا البحث خلال موسمي 1998 ، 1999م لمعرفة مدى إمكانية تخزين العقل (في الثلجة 04 م) لفترة (3 أو 6 أيام قبل أو بعد معاملتها بحمض أندول بيوتريك في موعدي (مايو – أغسطس) لثلاث أصناف من العقل الورقية للزيتون (بيكوال – مانزانيللو – عجيزى) وأثر ذلك على نسبة التجذير . وقد أوضحت النتائج أن زيادة فترة التخزين من 3 إلى 6 أيام قلل من نسبة تجذير العقل وكان لمعاملة العقل بحمض أندول بيوتريك أثر في زيادة نسبة التجذير وأعلى نسبة للتجذير أمكن الحصول عليها عندما عوملت العقل بحمض أندول بيوتريك قبل التخزين بالثلجة لمدة 3 أيام في موعد أغسطس في جميع الأصناف خلال موسمي الدراسة . وعموماً فقد أظهرت النتائج أن الصنف مانزانيللو أعطى أعلى نسبة نجاح بينما الصنف العجيزى أقلها . وقد أعطت معاملة العقل بالأندول ثم التخزين ثلاث أيام بالثلجة أعلى محتوى من الأندولات والسكريات الكلية وعلى العكس من ذلك كان محتواها من الفينولات الكلية .

Table (3): Effect of different storage period on total soluble indoles, phenols and total soluble sugar of Picual, Manzanillo and Aggizi olive cutting 1999 season.

cvs.	Total soluble indoles (mg/ 100 gm. D.W.)				Total soluble phenols (mg/ 100 gm. D.W.)				Total soluble sugar %			
	Picual	Manz	Aggozi	Mean	Picual	Manz	Aggozi	Mean	Picual	Manz.	Aggozi	Mean
Control	1.53	1.68	0.93	1.38	27.90	25.70	43.00	32.20	4.50	5.17	2.98	4.22
IBA	2.28	2.13	1.33	1.91	20.10	19.00	28.20	22.43	6.84	6.26	3.93	5.67
3 days cold storage	1.85	2.78	0.93	1.85	26.20	20.93	40.00	29.04	5.78	7.98	2.80	5.52
IBA then 3 days cold storage	3.16	3.95	1.70	2.94	15.03	14.10	30.30	19.81	10.68	12.48	5.15	9.44
3 days cold storage then IBA	2.70	3.41	1.48	2.53	19.93	16.83	33.00	23.25	8.24	10.24	4.35	7.61
6 days cold storage	2.10	1.96	0.91	1.66	20.30	19.90	35.03	25.08	6.12	6.02	2.70	4.95
IBA ther 6 days cold storage	1.65	2.40	1.25	1.77	27.70	20.43	35.70	27.94	5.67	7.20	3.67	5.51
6 days cold storage then IBA	1.60	2.06	0.76	1.47	25.73	27.16	46.63	33.17	5.60	6.24	2.14	4.66
Mean	2.11	2.55	1.16		22.86	20.51	36.48		6.68	7.70	3.47	
L . S. D. at 0.05	T = 0.133 Cv. = N.S Tx cv. = 0.34				T = 4.12 Cv. = 5.01 Tx cv. = 6.32				T = 0.69 cv. = 1.65 Tx cv. = 2.16			

Table (1): Effect of different storage period on the rooting percentage of Picual, Manzanillo and Aggizi olive cutting (1998,season).

Cultivars	Picual		Mean	Manzanillo		Mean	Aggizi		Mean
	May	Aug.		May	Aug.		May	Aug.	
Control (untreated)	20.00	26.47	23.24	28.57	39.30	33.93	13.92	16.66	15.29
IBA	29.30	35.32	32.31	50.60	56.17	53.39	17.73	20.23	18.98
3 days cold storage	30.00	30.00	30.00	39.28	43.30	41.29	11.37	12.35	11.86
IBA then 3 day cold storage	33.00	51.03	42.02	59.77	83.80	71.79	34.14	36.83	35.49
3 days cold storage then IBA	17.77	40.65	29.21	55.68	65.00	60.34	27.50	28.08	27.79
6 days cold storage	8.00	25.13	16.57	2.17	32.22	17.20	1.14	2.50	1.82
IBA then 6 days cold storage	17.00	23.51	25.26	19.10	28.88	23.99	7.50	7.95	7.72
6 days cold storage then IBA	6.00	21.46	13.73	15.73	17.79	16.75	2.59	3.37	2.98
Mean	20.13	31.94		33.86	45.81		14.49	15.99	
L. S. D. at 0.05	T = 2.11 D = 1.60 TXD = 1.75		T = 2.89 D = 1.45 TXD = 2.35			T = 2.10 D = 1.50 TXD = 1.71			

Table (2): Effect of different storage period on the rooting percentage of Picual, Manzanillo and Aggizi olive cutting (1999,season).

Cultivars	Picual		Mean	Manzanillo		Mean	Aggizi		Mean
	May	Aug.		May	Aug.		May	Aug.	
Control	26.00	28.66	27.33	18.66	38.00	28.33	14.66	15.33	14.99
IBA	33.13	36.66	34.90	37.33	48.60	42.67	20.00	29.33	24.67
3 days cold storage	26.00	30.33	28.17	23.33	48.66	35.99	12.00	17.33	14.67
IBA then 3 day cold storage	50.66	51.33	50.99	48.66	64.66	56.66	28.00	38.00	33.00
3 days cold storage then IBA	36.00	44.66	40.33	42.33	56.66	49.49	18.66	32.66	25.66
6 days cold storage	26.00	42.66	34.33	18.00	40.00	29.00	9.33	12.66	10.99
IBA then 6 days cold storage	30.66	40.66	35.66	40.00	52.00	46.00	14.00	16.00	15.00
6 days cold storage then IBA	20.00	30.00	25.00	40.00	46.00	43.00	10.66	14.00	12.33
Mean	31.05	38.12		33.66	49.25		15.91	21.91	
L.S.D. at 0.05	T = 2.08 D = 1.04 TXD = 1.69			T = 2.36 D = 1.18 TXD = 1.92			T = 2.24 D = 1.12 TXD = 1.82		