https://doi.org/10.26682/ajuod.2021.24.1.13

Journal of University of Duhok., Vol. 24, No.1(Agri. and Vet. Sciences),Pp 134-142, 2021

EFFECT OF CULTIVARS, DATE, AND IBA ON VEGETATIVE GROWTH OF SEMI-HARD WOOD OLIVE CUTTINGS (*OLEA EUROPAEA L.*)

GULALA **M. A. S**AEED
Halabja Technical College of Applied Sciences, Sulaimani Polytechnic University, Kurdistan Region- Iraq

(Received: March 29, 2021; Accepted for Publication: July 1, 2021)

ABSTRACT

This research was conducted in Bakrajo Nursery Station/ Sulaimani/ Kurdistan Region-Iraq through the growing season of 2016. We used Shami and Qaisi olive CVs. which were uniform to test the effects of concentrations of IBA hormone (0, 1000, 2000, and 3000 ppm) and during three dates (15/3, 1/4, and 15/4) on the vegetative growth of semi-hardwood olive cuttings CVs. 'Shami' and 'Qaisi.' The following is a brief of the results: IBA hormone therapy had a major impact on most vegetative characteristics. On the majority of the vegetative development, Shami cv. significantly outperformed Qaisi cv

KEYWORDS**:** *Olea Europea Variety 'Shami '* and ' Qaisi'; Indole Butyric Acid; Semi-hardwood cuttings.

1. INTRODUCTION

Olive belongs to the Oleaceae family, is a slow-growing, long-lived plant with a lifecycle of thousands of years (**Awan *et al.*, 2001**). It is the oldest grown fruit tree in the Mediterranean basin's arid and semi-arid regions (**Isfendiyaroglu, 2009**). Olives are a Mediterranean, African, and Asian fruit. (**Mohammed and Noori, 2008),** Olive trees vary in size from medium to tall, with some reaching 15 meters or more in height. It's a tough tree that regenerates quickly after being cut or injured above, and it can live for centuries while still producing well. It has lanceolate, dark green, thick, leathery leaves that are arranged oppositely. (**Aslmoshtaghi *et al.*, 2014).** A country's economic growth is dependent on the success of its olive farming industry. The leading producer of olive trees, with cultivation extending to villages such as **(Baashiqa, Bahzany, Fadiliya, Sheikh Uday, Dhecan, Sinjar)**, Diyala, Kirkuk, Baghdad, Erbil, Duhok, **(Mahdi,2007 and Shaymaa, 2012).**

Olive cultivars may be propagated by grafting or budding on seedling rootstocks, from 1- or 2-year-old woody cuttings. (**Hartmann *et al.*, 1990**). Although self-rooted cultivars can be planted in new olive groves, some cultivars have the low rooting capability, poor viability, and poor rooting quality of cuttings. (**Wiesman and Lavee, 1995**). Olives are primarily propagated by cuttings. Stem cuttings are the most common method of vegetative propagation in olives. Major parts of the olive tree (shoots, ovules, and suckers) have been used to propagate the plant since ancient times. (**Fabbri *et al.*, 2004).** Cultivars or clones within cultivars had substantially different rooting abilities. In some olive cultivars, the main problem with vegetative propagation is a lack of rooting ability, which results in a low percentage of rooting. (**Rugini *et al.*, 1990).** Wounding the base of olive cuttings has been recognized as a tool for enhancing the effect of auxin treatments. (**Fabbri *et al.*, 2004**). **Maghsudlu *et al.* (2013)** Different concentrations of IBA and cutting styles were tested on the rooting of two compatible olive cultivar cuttings. On two olive cultivars (mission and koroneiki), five levels of IBA treatment as a rooting hormone (0, 2500, 3000, 3500, and 4000 ppm) were tested. The results showed that there was a significant difference between the different levels of IBA, with the treatment of cutting with IBA at (3500 ppm) concentration having the greatest effect on the increase in the olive cultivars mission and koroneiki. IBA has long been used to facilitate rooting in a variety of plant species' cuttings (**Hartmann *et al.*, 2002**). Influenced by various groups of plant growth regulators. Auxins have been shown to have the most effects on rooting so far (**Basra, 2000**). Olive cuttings root well when given the synthetic auxin indole-3-butyric acid (IBA) (**Fabbri *et al.*, 2004**), but the auxin fails to encourage rooting in difficult-to-root cultivars (**Wiesman and Lavee, 1995**).

gulan.zana@yahoo.com

Hartmann *et al.* (2011) When comparing IBA-treated cuttings to untreated cuttings, researchers noticed that although the number of roots in IBA-treated cuttings was high, their growth was reduced.

Cutting rooting is one of the most widely olive propagation techniques. **Cintas gerakakis (2005**). Rooting hormones should be applied to the base of cuttings to increase overall rooting percentages, hasten root initiation, increase the number and consistency of roots, and encourage uniformity of rooting. The most widely used hormone is indole butyric acid (IBA). (**Bartolini *et al.*, 2008). Ibrahim *et al.* (1991)** The application of 500 or 1000 ppm IBA to Ascolano and Frantoio hardwood cuttings improved olive rooting, and cuttings taken in March had better rooting than those taken in late summer and early autumn. **Khattak et al. (1981)** IBA at a rate of 6000 ppm induced rapid rooting and 9000 ppm hormone increased the number and length of the roots, resulting in 22.5 percent rooting of Latino olive semi-hardwood cuttings.

The aimed to:

Study effect of cultivars, date and IBA on vegetative characteristics of semi hard wood olive cutting**.**

2. MATERIAL AND METHODS

The research was conducted in the Bakrejo station/ Suleimania nursery in 2016. The nursery is located in the Kurdistan region of Iraq, about 15 kilometers from Suleimania city center, at an elevation of 760 meters above sea level and latitudes 35 ^{o}, 55 o, 09 ^{o} N, and longitudes 45 ^{o}, 35 o, 18 ^{o} E. Since olive is a difficult-to-root plant, the experiments began on March 15th, 2016. Consisted of IBA Indole butyric acid) hormone therapy at three levels (0,1000, 2000, and 3000ppm), three dates (15/3, 1/4, and 15/4), and their interactions, which were treated on April 1st and repeated at the same concentrations on April 15th **Agha and Daoud (1991).**

Experimental design and statistical analysis:

The experiments in this study used a Total Randomized Block Design in a factorial experiment, with 72 treatments and three replicates each, each replication being presented by ten cuttings **Al-Rawi and Khalafalla 1980.** For each cultivar, the number of cuttings for each date (120).

The SAS method was used to tabulate and statistically evaluate the data collected (1996). Duncan multiple range tests were used to test the variations between different treatment means at a 5% stage. **(SAS Institute. Inc, 1996**).

The parameters were measured:

The following measurements were recorded on **15th Nove 2016**.

Vegetative characteristics:

1- Cutting height (cm)
2- Lateral shoots length (cm)
3- Lateral shoot number/cutting
4- Leaf numbers/ cutting
5- Leaf fresh weight (g)
6- Leaf dry weight (g)

3. RESULTS AND DISCUSSION

3.1 Cutting height (cm)

The results of (Table 1) showed that the comparing cultivars, the 'Qaisi' olive cutting cultivar yielded the highest cutting height (16.553cm) when compared to the 'Shami' olive cutting cultivar.

When compared to other dates, olive cuttings treated with the majority of IBA concentrations significantly increased cutting height.

Revealed that treating olive cuttings on Dates resulted in a significant increase in cutting height, particularly on Date (1/4) when compared to Date (15/3).

The treatment of the 'Qaisi' olive cutting cultivar with IBA at a rate of 3000ppm resulted in the highest cutting height, according to the results of IBA concentrations and cultivar interactions (17.444cm). The'Shami' olive cutting cultivar, on the other hand, yielded the lowest results (15.389 cm).

The treated 'Qaisi on the date (15/4) gave the highest cutting height, according to the results of date and cultivar interactions (17.118cm). However, the date (15/3)'Shami'olive cutting cultivar had the lowest cutting height (14.748 cm).

The most potent treatment appeared to be the combination of Date and IBA concentrations displayed on the date (1/4) with 3000ppm IBA, as it gave the highest cutting height (17.487cm).

gulan.zana@yahoo.com

Table (1): Effect of cultivars, date, and IBA on cutting height (cm) of semi-hardwood olive cutting CVs. 'Shami ' and ' Qaisi '.

cultivar	IBA	Date			CVs.* IBA	CVs.
		15/3	1/4	15/4		
Shami	0	14.457 kg	16.663 B-G	15.047 j-l	15.389 d	15.691 b
	1000	15.267 i-l	16.570 c-h	15.557 g-k	15.798 b-d	
	2000	14.210 l	16.877 a-f	15.687 f-j	15.591 cd	
	3000	15.057 j-l	17.190 a-d	15.713 f-j	15.987 b-d	
Qaisi	0	15.433 h-k	16.210 d-j	17.430 a-c	16.358 b	16.553 a
	1000	15.307 i-l	16.600 c-h	16.223 d-j	16.043 bc	
	2000	15.827 e-j	16.343 c-i	16.930 a-e	16.367 b	
	3000	16.663 b-g	17.783 ab	17.887 a	17.444 a	
Date		15.278 c	16.780 a	16.309 b	IBA	
CVs..* Date	Shami	14.748 c	16.825 a	15.501 b		
	Qaisi	15.808 b	16.734 a	17.118 a		
IBA* Date.	0	14.945 e	16.437 bc	16.238 bc	15.873 b	
	1000	15.287 de	16.585 bc	15.890 cd	15.921 b	
	2000	15.018 e	16.610 bc	16.308 bc	15.979 b	
	3000	15.860 cd	17.487 a	16.800 ab	16.716 a	

Means within a column, row, and their interactions followed by the same letters are not significantly different from each other, according to Duncan's multiple ranges test at the 5% level.

The most potent treatment was treated 'Qaisi' olive cutting cultivar on a date (15/4) with 3000ppm IBA, which gave 17.887cm cutting height, while the lowest cutting height was treated 'Shami' olive cutting cultivar on a date (15/3) with 2000ppm IBA, according to the results of date, IBA, and cultivars interactions.

3.2 Lateral shoots length (cm):

The results of (2) showed that the comparing cultivars, Shami yielded the highest value of lateral shoot length per cutting (8.340cm) when compared to Qaisi (5.701cm).

When olive cuttings were treated with IBA it produced the highest value when compared to other concentrations.

The results of the lateral shoot length per cutting increased significantly over time, with date (15/3) providing the highest value (9.145cm).

Table (2): Effect of cultivar, rs, date, and IBA on lateral shoot length/cutting (cm) of semi-hardwood olive cutting CVs 'Shami ' and ' Qaisi '.

cultivar.	IBA	Date			CVs..* IBA	CVs.
		15/3	¼	15/4		
Shami	0	8.443 ef	4.830 km	5.067 kg	6.113 d	8.340 a
	1000	7.177 GH	5.427 jk	4.637 k-n	5.747 d	
	2000	10.750 c	8.023 fg	7.963 fg	8.912 b	
	3000	15.400 b	16.253 a	6.110 ij	12.588 a	
Qaisi	0	9.120 de	4.977 kl	3.887 n	5.994 d	5.701 b
	1000	6.373 hi	4.640 k-n	3.997 mn	5.003 e	
	2000	6.047 ij	4.397 in	4.617 k-n	5.020 e	
	3000	9.850 d	8.233 f	2.273 o	6.786 c	
Date		9.145 a	7.098 b	4.819 c	IBA	
CVs..* Date	Shami	10.443 a	8.633 b	5.944 d		
	Qaisi	7.848 c	5.562 d	3.693 e		
IBA* Date.	0	8.782 b	4.903 de	4.477 of	6.054 c	

gulan.zana@yahoo.com

	1000	6.775 c	5.033 d	4.317 ef	5.375 d
	2000	8.398 b	6.210 c	6.290 c	6.966 b
	3000	12.625 a	12.243 a	4.192 f	9.687 a

Means within a column, row, and their interactions followed by the same letters are not significantly different from one another, according to Duncan's multiple ranges test at the 5% level.

Also, when comparing the effects of IBA and Cultivar, the Shami cutting produced the highest value (12.588cm) when compared to the other treatments. When Date and cultivars interacted, the CVs. Shami handled on the date (15/3) yielded the highest value when compared to other Dates.

In comparison to other interactions, the cutting when handled on the date (15/3) and 3000ppm IBA gave the highest value (12.625cm)lateral shoot length.

he highest value was found in the interactions between Date, IBA, and Cultivar Shami cultivar treated with 3000ppm IBA on a date (1/4) (16.253cm).

3.3 Lateral shoot number/cutting

Table (3) shows that the compared to Qaisi cultivar, the Shami cultivar had a slightly higher number of lateral shoots (2.120).

When the Shami olive cutting cultivar was treated with, it provided IBA gave the highest value when compared to other treatments.

The number of lateral shoots per cutting increased dramatically as the date (15/3) approached (2.365).

In comparison, interactions between IBA and Cultivar indicated that CVs. Shami treated with 3000ppm IBA had the highest lateral shoot number (2.757) and the lowest (1.540) in the Qaisi cultivar.

The Shami cultivar treated on Date (15/3) substantially increased lateral shoot numbers (2.388) per cutting, according to the data.

When handled on the date (15/3) and 3000ppm IBA, the cutting produced the highest value (2.663) lateral shoot number when compared to the other interactions.

Table (3): Effect of cultivars, date, and IBA on lateral shoots number/ cutting of semi-hardwood olive cutting CVs 'Shami ' and ' Qaisi'.

cultivar	IBA	Date			CVs..* IBA	CVs.
		15/3	¼	15/4		
Shami	0	2.400 cd	1.810 f-h	1.673 g-j	1.961 b	2.120 a
	1000	1.937 e-g	1.807 f-h	1.293 ij	1.679 cd	
	2000	2.353 c-e	2.210 c-f	1.687 g-i	2.083 b	
	3000	2.863 b	3.550 a	1.857 f-h	2.757 a	
Qaisi	0	1.963 d-g	1.757 f-h	1.847 f-h	1.856 bc	1.961 b
	1000	3.390 a	2.553 bc	1.887 e-g	2.610 a	
	2000	1.823 f-h	1.577 g-j	1.220 j	1.540 d	
	3000	2.193 c-f	1.400 h-j	1.917 e-g	1.837 bc	
Date		2.365 a	2.083 b	1.673 c	IBA	
CVs..* Date	Shami	2.388 a	2.344 a	1.628 b		
	Qaisi	2.343 a	1.822 b	1.718 b		
IBA* Date.	0	2.182 bc	1.783 de	1.760 e	1.908 b	
	1000	2.528a	2.180 bc	1.590 ef	2.144 a	
	2000	2.088 cd	1.893 c-e	1.453 f	1.812 b	
	3000	2.663 a	2.475 ab	1.887 c-e	2.297 a	

Means within a column, row, and their interactions followed by the same letters are not significantly different from each other, according to Duncan's multiple ranges test at the 5% level.

Date, IBA, and Cultivar interactions significantly increasing lateral shoot number per cutting, Shami cutting treated with 3000ppm IBA on the date (1/4) produced the highest number of lateral shoots per cutting (3.550).

3.4 Leaf numbers/ cutting:

gulan.zana@yahoo.com

Table (4): Effect of cultivars, date a, nd IBA on leaf number per cutting semi-hardwood wood olive cutti CVs 'Shami ' and ' Qais'.

cultivar .	IBA	Date			CVs..* IBA	CVs.
		15/3	¼	15/4		
Shami	0	8.907 f-h	6.567 hi	4.927 i	6.800 ef	17.322 a
	1000	8.173 gh	11.500 f	7.900 g-i	9.191 d	
	2000	24.093 c	15.800 e	9.867 fg	16.587 b	
	3000	41.367 b	56.997 a	11.767 f	36.710 a	
Qaisi	0	8.867 f-h	7.073 g-i	7.537 g-i	7.826 de	7.409 b
	1000	20.600 d	7.333 g-i	6.633 hi	11.522 c	
	2000	6.267 hi	1.867 j	6.133 hi	4.756 g	
	3000	9.200 f-h	1.367 j	6.033 hi	5.533 fg	
Date		15.934 a	13.563 b	7.600 c	IBA	
CVs..* Date	Shami	20.635 b	22.716 a	8.615 d		
	Qaisi	11.233 c	4.410 f	6.584 e		
IBA* Date.	0	8.887 de	6.820 ef	6.232 f	7.313 c	
	1000	14.387 c	9.417 d	7.267 d-f	10.357 b	
	2000	15.180 c	8.833 de	8.000 d-f	10.671 b	
	3000	25.283 b	29.182 a	8.900 de	21.122 a	

Means within a column, row, and their interactions followed by the same letters are not significantly different from each other, according to Duncan's multiple ranges test at the 5% level.

Table (4) showed that comparing the leaf number of Shami and Qaisi cultivars, the Shami cultivar had the highest value (17.322). (7.409). IBA hormone at 3000ppm substantially increased leaf number (21.122).

The increased leaf numbers per cutting (15.934) on a date (15/3). When compared to other therapies,

The interactions between IBA and Cultivar indicated tha CVs. Shami treated with 3000ppm IBA had the highest value of leaves per cutting (36.710). When compared to the other dates, the Shami cutting cultivar handled on n date (1/4) substantially increased the highest number of leaves (22.716) per cutting.

The highest number of leaves per cutting (29.182) was observed on a date (1/4) with 3000ppm IBA, according to the results on da ate and IBA.

The Shami cultivar treated with 3000ppm IBA on a date (1/4) developed the highest number of lenumbersber per cutting (56.997), with date, IBA, and cultivar interactions all significantly raising leaf number per cutting.

3.5 Leaf fresh weight (g):

Table (5) Effect of cultivars, date a, nd IBA on leaf fresh weight (g) of semi-hardwood olive cutting CVs. 'Shami ' and ' Qaisi'during growing season 2016.

cultivar.	IBA	Date			CVs..* IBA	CVs..
		15/3	1/4	15/4		
Shami	0	1.280 j	1.347 h-j	1.530 g-j	1.386 ef	1.899 a
	1000	1.753 e-g	1.640 f-i	1.773 e-g	1.722 c	
	2000	2.407 bc	1.900 ef	1.653 f-h	1.987 b	
	3000	2.630 ab	2.843 a	2.030 de	2.501 a	
Qaisi	0	1.303 ij	1.497 g-j	1.207 j	1.336 f	1.441 b
	1000	2.243 cd	1.260 j	1.317 h-j	1.607 cd	
	2000	1.243 j	1.400 h-j	1.207 j	1.283 f	
	3000	1.977 d-f	1.233 j	1.403 h-j	1.538 de	
Date		1.855 a	1.640 b	1.515 c	IBA	
CVs..* Date	Shami	2.018 a	1.933 a	1.747 b		
	Qaisi	1.692 b	1.348 c	1.283 c		
IBA* Date.	0	1.292 g	1.422 e-g	1.368 fg	1.361 c	
	1000	1.998 b	1.450 e-g	1.545 d-f	1.664 b	
	2000	1.825 bc	1.650 c-e	1.430 e-g	1.635 b	
	3000	2.303 a	2.038 b	1.717 cd	2.019 a	

gulan.zana@yahoo.com

According to Duncan's multiple ranges test at the 5% stage, means within a column, row, and their interactions followed by the same letters are not substantially different from each other.

Table (5) noted that the compared to the 'Qaisi' olive cutting cultivar, the 'Shami' olive cutting cultivar got the maximum leaf fresh weight (1.899 g) (1.441g).

Olive cuttings treated with the majority of IBA concentrations increased leaf fresh weight significantly when compared to the control.

The untreated olive cutting on the date (15/3) gave the highest leaf fresh weight content (1.855g) while the lowest value (1.515g) on a date (15/4).

The Shami olive cutting, when treated with 3000ppm IBA hormone, had the highest value (2.501g) and the lowest value (1.283g) in Qaisi olive cutting when treated with 2000ppm IBA hormone.

According to the results of cultivars and dates, the untreated 'Shami' on a date (15/3) had the highest leaf fresh weight (2.018g). However, the treated 'Qaisi on a date (15/4) provided the lowest leaf fresh weight (1.283g).

When IBA hormone concentrations were combined with dates, the results showed that 3000ppm IBA on Date (15/3) was the most effective therapy, yielding the highest leaf fresh weight (2.303g).

Treating the 'Shami' olive cutting cultivar with 3000ppm IBA on a date (1/4) was the most effective treatment, yielding (2.843g) leaf fresh weight while treating the Qaisi olive cutting with 0ppm and 2000ppm IBA on a date (15/4) yielded the lowest leaf fresh weight (1.207g).

3.6 Leaf dry weight (g):

Table (6): Effect of cultivars, dat,e, and IBA on leaf dry weight (g) of semi-hardwood olive cutting CVs. 'Shami ' and ' Qaisi'.

cultivar	IBA	Date			CVs..* IBA	CVs.
		15/3	**1/4**	15/4		
Shami	0	0.310 d	0.333 d	0.373 d	0.339 cd	0.464 a
	1000	0.370 d	0.340 d	0.397 cd	0.369 c	
	2000	0.710 a	0.523 bc	0.363 d	0.532 b	
	3000	0.733 a	0.707 a	0.413 cd	0.618 a	
Qaisi	0	0.363 d	0.380 d	0.263 d	0.336 cd	0.346 b
	1000	0.530 bc	0.293 d	0.297 d	0.373 c	
	2000	0.267 d	0.320 d	0.270 d	0.286 d	
	3000	0.563 b	0.280 d	0.320 d	0.388 c	
Date		0.481 a	0.397 b	0.337 c	IBA	
CVs..* Date	Shami	0.531 a	0.476 ab	0.387 c		
	Qaisi	0.431 bc	0.318 d	0.288 d		
IBA* Date.	0	0.337 de	0.357 c-e	0.318 e	0.337 c	
	1000	0.450 bc	0.317 e	0.347 de	0.371 bc	
	2000	0.488 b	0.422 b-d	0.317 e	0.409 b	
	3000	0.648 a	0.493 b	0.367 c-e	0.503 a	

Means within a column, row, and their interactions followed by the same letters are not significantly different from each other, according to Duncan's multiple ranges test at the 5% level.

Table (6) noted that the comparing the results of olive cutting, the 'Shami' cultivar produced the highest leaf dry weight (0.464g) when compared to the 'Qaisi' cultivar (0.346g).

When compared to other treatments, olive cuttings treated with IBA concentrations increased leaf dry weight significantly.

The untreated olive cutting on a date (15/3) gave the highest value of leaf dry weight(0.481g) while the lowest value (0.337g) of date (15/4).

When comparing the interactions between IBA and Cultivar, the Shami cutting cultivar yielded the highest value (0.618g) when compared to the others.

When comparing the Shami olive cutting cultivar on a date (15/3) to other dates, the interactions between date and cultivar revealed that the Shami olive cutting cultivar on a date (15/3) produced the highest value.

The most effective treatment appeared of date and IBA concentrations shown on a date (15/3)

gulan.zana@yahoo.com

and 3000ppm IBA, as it provided the highest leaf dry weight (0.648g).

The most potent treatment was the 'Shami'olive cutting cultivar on (15/3) with 3000ppm IBA, which gave (0.733g) leaf dry weight, while the lowest leaf dry weight coincided on a date (15/4) with untreated 'Qaisi olive cutting cultivar (0.263g).

The vegetative growth characteristics of the two cultivars differed significantly, as seen in most tables. Differences in genotype characteristics for root development, nutrient or hormone absorption ability, and photosynthesis process can explain differences in vegetation growth characteristics such as cutting height, lateral shoot length, lateral shoot number, and leaf number between cultivars (**Eryüce and Püskülcü, 1995; Jordao *et al.*, 1999**). Furthermore, the genetic integrity of the plant species can influence the efficiency of specific hormone or nutrient uptake (**Popovic *et al.*, 1999**). The differences in hormone or nutrient uptake efficiency between cultivars could then result in differences in vegetation growth characteristics.

Also, the differences in growth vigor between the two cultivars may be attributed to the response of different cultivars to the local environmental conditions according to the genetic variation between the cultivars (**Gaafer and Saker, 2006 and Khalifa, 2007**).

The findings may be due to the role of essential nutrients in cuttings such as photosynthesis reactions, nucleic acid metabolism, protein and carbohydrate biosynthesis due to increased leaf mineral content, as shown by the studied parameters. (**Hafez and El-Metwally, 2007**).

4. CONCLUSION

The results of this study show that:

1-Dates increased the majority of vegetative growth characteristics in two olive cutting cultivars, Shami and Qaisi.

2-A high-concentration IBA cutting procedure greatly improved most vegetative growth characteristics in two olive cutting cultivars, Shami and Qaisi.

3-When opposed to Cv. Qaisi, olive cutting Cv. Shami was preferred.

4-Dates with high levels of IBA care and two cultivars enhanced vegetative growth characteristics.

5. RECOMMENDATIONS

The following points of view can be suggested based on the conclusions listed above:

1-Conducting additional research on other cutting cultivars and IBA and Dates care at high concentrations.

2-Using IBA at a higher level to improve cutting vegetative growth.

3-Conducting anatomical experiments on the cuttings under study to determine the effect of the material used on tissue structure.

4- The impact of the application date to determine the best date for IBA care.

REFERENCES

Agha, J.T and D.A. Daoud. 1991. Evergreen Fruit production. Part 1. Mousl Univ.Iraq P. 567-630 [In Arabic].

Al-Rawi, K.M.and A. Khalafalla (1980). Analysis of Experimental Agriculture Design. Dar Al-Kutub for Printing and Publishing. Mosul Univ.

Aslmoshtaghi E, Reza Shahsavar A, Reza Taslimpour M (2014) Effects of IBA and Putrescine on Root Formation of Olive Cuttings. Agriculture Conspectus Scientificus 79(3): 191-194.

Awan, A.A., J. Iqbal and F. Wahab, 2001. Performance of olive (Olea europaea L.) cuttings taken from different varieties in the agro-climatic condition of Peshawar. J. Biol.Sci., 1(6): 440-441.

Bartolini, G., R. Petrucceli and P. Pestelli, 2008. Preliminary study on in vivo rooting of two Olea europaea L. genotypes. Acta Hort., 791:191-195.

Basra, A.S., Plant Growth Regulators in Agriculture and Horticulture: Their Role and Commercial Uses. Haworth Press. Inc. Binghamton, 2000.

Cetintas gerakakis, A., and M. Taha ozkaya, 2005. Effects of cutting size, rooting media, and planting time on rooting of Domat and Ayvalik olive (Olea Europaea L.) cultivars in shaded polyethylene tunnel. Tarim bilimleri dergisi., 11:334–338.

Eryüce, N. and G. Püskülcü .(1995). Mineral Nutrition and Some Quality Characteristics of the Main Olive Cultivars of Western Turkey. International Symposium on Quality of Fruit and Vegetables: Influence of Pre- and Post-Harvest Factors and Technology, Chania, Greece, 20-24 Sep. 1993. Acta Hortic. 379: 193-198.

Fabbri A; G. Bartolini; M. Lambardi and Kailis, S. 2004. Olive Propagation Manual. Landlinks Press, Collingwood. The USA. p 141.

gulan.zana@yahoo.com

Fabbri, A., G. Bartolini, M. Lombardi and S. Kailis, 2004. Olive propagation manual. CSIRO Publishing, Melbourne, Aust.

Gaafar, R. M. and M. M. Saker .(2006). Monitoring of cultivars identity and genetic stability in strawberry varieties grown in Egypt. World J. Agric. Sci. 2 (1): 29-36.

Gobara, A. A. (1998). The response of Le-Cont pear trees of foliar application of some nutrients, Egypt. J. Hort. 25: 55-70.

Hafez, O. M. and I. M. El-Metwally. (2007). The efficiency of Zinc and Potassium Sprays Alone or in Combination with Some Weed Control Treatments on Weed Growth, Yield and Fruit Quality of Washington Navel Orange Orchards. J. Sci. Res. Egypt., 3(7): 613-621.

Hopkins, W.G. (1999). Introduction to Plant Physiology. Second edition. John Wiley and Sons, Inc. New York.

Hartmann, H.T. Kester, D.E. and Davies J. 1990. Plant Propagation. Principles and Practices, 5th and. Prentice-Hall, New Jersey

Hartmann, H.T., D.E. Kester, F.T. Davies, and R.L. Geneve. 2002.

Plant Propagation, Principles and Practices. 7 th Ed., Prentice-Hall, New Jersey, 880 pp.

Hartmann, H.T., Kester, D.E., Davies, F.T. Jr., Geneve, R.L., Plant Propagation: Principles and Practices. Prentice-Hall, Englewood Cliffs, NJ, USA, 2011.

Ibrahim, A.M.F., M.E. Haikal and H.M. Sinbel, 1991. Root formation on hardwood cutting of two olive cultivars (Olea Europea L.). Alexender J. Agric. Res., 33: 137-250.

Isfendiyaroglu, M., E. Ozeker and S. Baser, 2009. Rooting of "Ayvalik" olive cutting in different media. Span. J. Agric. Res., 7(1): 165-172.

Jordao, P.V.; M.E. Marcelo and M.S.L. Centeno. (1999). Effect of cultivar on the leaf-mineral composition of the olive tree. Acta Hort. 474: 349-352. Proc. 3rd Int. ISHS Symp on Olive growing.

Khalifa, GH. F.H. (2007). Effect of planting date and on growth and yield characteristics of two varieties of strawberry (Fragaria x ananassa Duch), M.Sc. Thesis, Agriculture and Forest college, Mosul University, Ministry of Higher Education and Scientific Research. Iraq.

Khattak, M.S., H. Inayatullah and S. Khan, 1981. Rooting in the semi-hardwood cutting of olive (Olea Europea L.). Pak. J. Forest., 185-187.

Maghsudlu, M.; A. Hossein and Abolfazl, F. 2013. The Evaluation of the Effect of Different IBA (indole3-butyric acid) Hormone Concentration and Different Kinds of Cutting on Rooting of two Compatible Olive Cultivars Cuttings in Golestan Province. Bull. Env. Pharmacol. Life Sci., 2(6): 82 – 88.

Mahdi, F. T. (2007). Development of olive plantation. Popular company of Horticulture and Forestry. Ministry of Agriculture. Iraq.

Mohammed, B.K. and I.M. Noori, 2008. Effect of irrigation levels on the growth and yield of olive trees (Olea europaea L. cv. Ashrasie). J. Kirkuk Univ. – Sci. Stud., 3(1): 169-183.

Pio R; D. Costabastos and Berti, A. J. 2005. Rooting of different types

of olive tree cutting using indol butyric acid. Cienc Agrotec. LaCVs.as, 29: 562- 567.

Popovic, M.; D. Malencic; O. Gasic and B. Lazovic . (1999). The influence of different nitrogen concentrations on NO3 and protein content in olive leaves. Third international symposium on olive growing, Chania, Crete, Greece, 22-26 Sep. 1997. Acta-Horticulturae, 474: 329-331.

Rugini E.; V. Polit; C. Bignami; M. De Agazio and Grego S. 1990. Effect of polyamine treatments on rooting cutting of three olive cultivars. Acta Hort., 286, 97- 100.

Restrepo-Diaz, H., M. Benlloch, C. Navarro and R. Fernandez-Escobar. 2008. Potassium Fertilization of rain-fed olive orchards. Sci. Hort. 116: 399-403.

SAS Institute, Inc (1996). The SAS system. Release 6.12. Cary, NC.

Shaymaa Mahfodh Abdul-Qader. (2012). Effect of cultivar, organic manure, urea spray and their interactions on vegetative growth, flowering, quantitative and qualitative characteristics of Olive (Olea europaea L.). Ph D. Thesis, faculty of agriculture and forestry, Duhok University, Kurdistan-Iraq.

Wiesman, Z. and Lavee, S. 1995. Enhancement of IBA stimulatory effect on rooting of olive cultivar stem cuttings. Sci. Hortic. 62: 189–198.

gulan.zana@yahoo.com

پوختە

کوردستانی عێراق ئەنجامدراوە لە وەرزی گەشەی ساڵی 2016 , پۆلەکانی زەیتونی / ئەم توێژینەوەیە لە نەمامگەی بەکرەجۆ لە شاری سلێمانی

(بە خەستیەکانی (0 , 1000 , 2000 , 3000بەش لە ملیۆن) بەسێIBA شامی و قەیسی بەکارهێنران بۆ تاقیکردنەوەی کاریگەری هۆرمۆنی)

لەسەر گەشەی سەوزی قەڵەمی نیمچە ڕەقە تەختیەکانی ئەم پۆلانە. (3/15 , 4/4,15/1) بەرواری جیاواز

شەی کاریگەری زیاتری هەبووە لەسەر زۆرترین خەسڵەتەکانی گە IBAکورتەی ئەنجامەکانی توێژینەوەکە دەریدەخات کە چارەسەری هۆرمۆنی

سەوزی قەڵەمەکان , پۆلی شامی بەشێوەیەکی واتادار ئەنجام و وەڵامدانەوەی باشتربووە لە پۆلی قەیسی

الخلاصة

تم اجراء وتنفيذ هذا البحث في مشتل بكر جو بمحافظة السليمانية-كوردستان العراق وخلال موسم النمو 2016 واستخدم فيه اصناف من على النمو الخضري للعقل النصف الصلبة لهذه الاصناف بالتراكيز IBA الزيتون ،شامي والقيسي لمعرفة مدى تأثير هرمون

وتبين لنا من خلال نتائج الاختبار بان علاج (15/3, 1/4,15/4) (0,1000,2000,3000 وفي ثلاث فترات مختلفة ppm له تاثير اكبر على الخضرية للعقل. وان صنف شامي كان اكثر استجابة من صنف القيسي . IBA هرمون النمو

gulan.zana@yahoo.com