

ORIGINAL ARTICLE

The Evaluation of the Effect of Different IBA (indole-3-butyric acid) Hormone Concentration and Different Kinds of Cutting on Rooting of two Compatible Olive Cultivars Cuttings in Golestan Province

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ABSTRACT

For development of the olive gardens in Iran, producing needful plant of various commercial cultivars are relatively difficult, which has got different reasons, therefore, a survey was conducted in split plot factors, the type of cutting in two levels of (soft and semi-hard wood), with five levels of IBA treatment as a rooting hormones (Control, 2500, 3000, 3500 and 4000 ppm) on two olive cultivars (mission and koroneiki) in every replication with the aims of obtaining the highest rooting percentage in olive cuttings rooting and evaluation of the effect of IBA and the type of cutting on index of the olive cutting rootings. The results indicated that in terms of rooting there is a considerable difference between the different level of IBA hormone concentrations and treatment and the treatment of cutting with IBA by 3500 ppm concentration itself in comparison with other concentration itself in comparison with other treatments (control, 2500, 3000, 4000) has got the highest effect on the increase in the rooting indexes of the olive cultivars mission and koroneiki in Golestan province climate. Moreover, the treatments (soft and semi-hard wood) have got significant effects on the rooting indexes regarding semi-hard wood cuttings and Golestan province climate. There wasn't any significant difference between the percentage of rooting for mission and koroneiki cultivars.

Key words: indole, butyric acid, rooting, cutting, olive, soft, semi-hardwood

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INTRODUCTION

Olive a planet from oleaceae family and olea type. The family oleaceae possesses 30-50 kind and about 600 species which the majority of them are scattered over the tropical areas in the world as industrial and ornamental trees and only olea european olive species has got edible fruit levels of olive tree are green gray, elliptical and long on the top and they are settled in a reciprocal way on the stalk. The leaves are always green and they become yellow every two or four years, where the young leaves appear every year [1][2]. Olive trees are always green and they have got height around 3 meters which can grow up to 12 meters in a suitable situation. The wood of olive tree is so hard and resistant it has the color of yellow with brown lines. Its wood is applied for constructing delicate wooden objects [3]. Olive has got small white flowers with a small bowl and cup flowers with calyx four-seam, two frags and the stigma is split into cluster which gradually appears along the leaves on the last year woods [4]. Olive fruit is fleshy with stone which in different varieties is in the shape of circle, ellips, sphere, long, pointed with curve in one side [1]. Olive tree can be multiplied in many ways, but cutting and softening the branches are preferred and the usual method in cutting specially semi-hard wood cutting. This is one of the most important methods of asexual reproduction for olive by using the cutting extracted from mother stock [5] for producing healthy and standard plant, the extracted cutting must be from fruitful trees with suitable nutrition and irrigation and without any pests and plant diseases [6].

The extracted cutting must be from the middle or the bottom part of one or two years old branches and the length of cutting must be around 15-17 cm and the thickness must be around 0.5 -1.5 cm (just like pencil) and they must have 4 - 6 leaves at the end part [7] the best time for cutting in the

spring is before the trees blossom and in the fall is before the trees go sleep[8] hormones and growth regulators are usually used for rooting [9] one of the most important hormones for rooting is IBA with ration of 3000ppm In water , IBA is the best , the most common material which is recently used for increasing the rooting in labratories . this acid has got weak auxin effecr and can be gradually destroyed by the enzyme monoamine oxidase(MAO). Chemical material which must be stable . having great impaction rooting , that is why it is widely used in greenhouses providing olive [9]. Hence , the survey was conducted in factorial way of completely random blocks design basis(RCDB)with 30 treatments and 3 replications . in this survey different concentrations of IBA is used as rooting hormone in five level of treatments(control ,2500,3500,3000,4000pmm)on two cultivars Mission and koroneiki with the aim of obtaining the highest percentage of rooting for cutting and evaluating the effect of IBA on rooting indexes.

METHODOLOGY

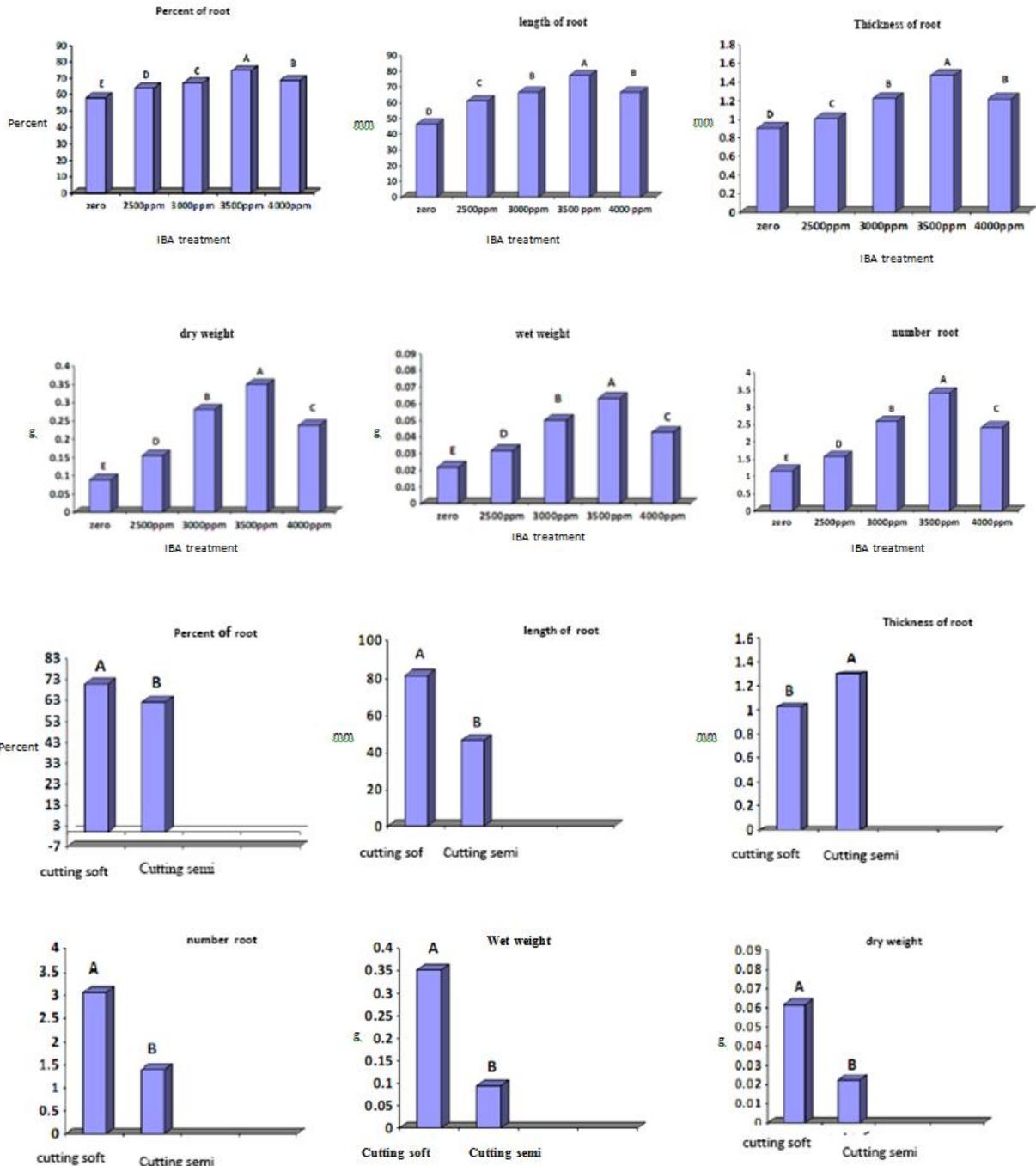
In this design two type of cutting soft and semi – hard wood of twocultivars Mission and koroneiki, which shows more compatibility in Golestan province climate, were extracted from olive collection of agriculture and natural resources research center if Gorgan in 15th of aban 1930, used for this survey . the survey conducted in spilit plot factorial design based on completely random blockswith tree replications of factors ,two type of cutting s(soft and semi-hard wood)with five levels of IBA treatments as a rooting hormone(control , 2500,3500,3000,4000pmm) on two cultivars Mission and koroneiki in every replication , that all together to cuttings were settled in substrates for rooting which 2-4 leaves were kept on cuttings. The cuttings were treated with different concentrotion of IBA for 3-5 seconds after disinfection by fungieides which every treatment included 3 replicaiton. For producing IBA solution with different concentration 2500,3000,3500,4000pmm,around 250,300,400 mg pure IBA were solved in 50 mg ethanol. By 50 ml distilled water(twice disiffled)the solutions reached to 100cc.before being settled in substrates ,the cutting were disinfected by Benomyl fungicides(2*1000)then setted in peat moss and perlite substrates.in order to provide the suitable temprature (23 – 25 centigrade degrees) program system was used and the greenhouse temperaturoots , the number of the roots, the weight of wet and re was considered around 20. The essential attributes as rooting indexes in this survey included length and tickness of the roots, the number of the roots , the weight of wet and dry types and percentage of rooting . the statistics analysis offer performance and collection of data was done by SAS soft ware and means were evaluation by SAS software and mean were evaluated by Duncan’s multiple test in 5% levels.

RESULT

The findings show that applying different concentration of IBA has got significant difference between the percentages of rooting . according to the variance analysis chart , the treatments used has got considerable effect on length and the thickness of the root ,the number of the roots . wet and dry weight and the percentage of rooting . the treat mean by IBA has got a great impact on the number of rooted cutting as well as the result of means analysis show that the highest percentage of rooting is for IBA hormone that treatment by the concentration of 3500 ppm which makes considerable different from other treatments . the rooting percentage of cuttings treated by IBA of concentration 3500 ppm was 74.58. the length of roots of cuttings treated by IBA ob concentration 3500 ppm showed a significant difference by the average of 77.58 cm and the number of roots cutting treated by IBA of concentration 3500ppm expressed a considerable difference by the average of 3.42 in comparison to other treatments. The wet weight and dry weight of roots cutting treats by IBA of concentration 3500 ppm showed a more significant difference in comparison to other treatments, the average of the wet weight of roots of cutting treated by IBA of concentration 3500 ppm was 0.35 g and the average of the dry weight of roots of cuttings treated by IBA of concentration 3500 ppm was 0.06 g .

Furthermore, the finding express the fact that there is a considerable difference between the rooting percentage of soft cutting and semi-hard wood cutting . the highest average was for the rooting percentage of soft cutting was 71% and the average of the rooting percentage of semi-hard cutting was 62.17% . according to the statistics analysis findings the difference between the average of length of roots for cuttings of soft kind and semi-hard kind was significant .the highest average of the length of root of cutting was for cuttings of soft kind .the average of length of root of soft cuttings 81.57 cm and the average of the length of root of semi – hard wood cutting was 46.30 cm as well as

the highest average of the thickness of root of cuttings was for semi – hard wood cuttings by the average of 1.03 cm . Moreover there was a considerable difference between the average of the number of roots of cuttings of soft kind and semi – hard wood kind . The highest average of the number of roots was for cuttings of soft kind by the average of 3.07 and the average of number of roots of semi hard wood cutting was 1.40. The wet weight of the soft kind by the average of 0.35 made a considerable difference in comparison to the wet weight of cuttings of semi – hard wood type by the average of 0.10 g . Also there was a significant difference between the average of dry weight of soft cuttings by the average of 0.06 and the average of dry weight of semi – hard wood cuttings by the average of 0.02.



DISCUSSION AND CONCLUSION

The findings of the survey indicated that the treatment of cutting by IBA hormone has got a positive effect on the percentage of rooting and there was a significant difference between the different concentration of IBA and control treatment regarding the percentage of rooting. Moreover, the findings showed that the hormone treatment by IBA of concentration 3500 ppm itself in comparison to the other treatments (control, 2500, 3000, 4000) has got a positive effect on increase in the rooting index of cutting of cultivars Mission and Koroneiki.

However, the growth of semi-hard wood cuttings was less in high level of IBA concentration, regarding an experiment conducted by Jafari and Buzary, because in assessment of the effect of different levels of hormone concentration on

rooting of hard wood and semi-hard wood cuttings in the base of cherry number Gizella6, it is observed that semi-hard wood cuttings in low levels of IBA concentration have the highest rate of rooting which among the different levels of concentration, IBA 1000 mg in a liter played a role as a beginner of rooting while in higher levels as an obstacle [10]. In terms of the impact of treatments on the percentage of different types of cuttings rooting in previous surveys it is distinguished that the application of IBA with concentration of 3500 ppm is related to the positive effect this level has on stimulating the division of the early cells of rooting beginners and in higher levels because of hormone balance destruction we encounter a drop in the percentage of rooting, wet weight, dry weight and the number of roots [11]. It is agreed according to some surveys, because the application of synthesized Auxin with high level of concentration on cuttings can stop the growth of buds or even shoots and result in wet weight and dry weight decrease in cuttings [11]. Fabbri *et al* reported in 2004 that the rooting effect of different levels of hormone Auxin concentration used is influenced by the amount of existing hormone in cutting and the amount of inner hormone in fruit trees may differ as in cold seasons by the decrease of the trees metabolic activities the amount of inner hormone diminishes and in warm season the amount of inner hormone increases. Moreover it is distinguished that the treatment of IBA with concentration of 3500 ppm causes increase in the length of roots, thickness of roots, wet and dry weight in comparison to control and other treatments, therefore the application of this level of concentration is recommended for increase the indexes of olive cuttings.

According to the obtained results from the survey it is distinguished that the soft cuttings of olive has higher percentage of rooting in Golestan province climate and it is because of the fact that semi-hard wood cuttings have more Auxin hormone which the increase of the amount of the hormone disturbs the plant hormone balance and decreases the percentage of rooting [12].

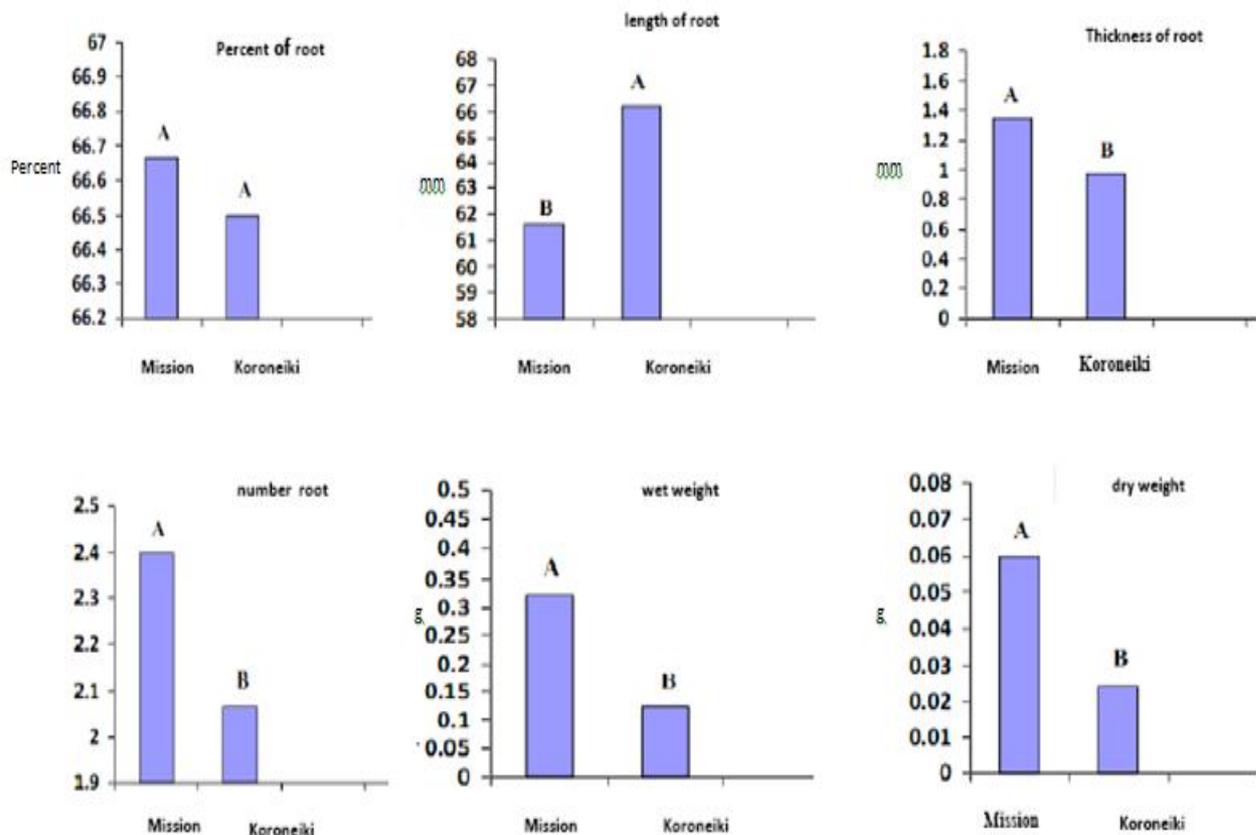
It is obvious that the Auxin caused increase in the indexes of rooting by induction and cell division stimulation, the treatment of IBA with concentration of 3500 ppm causes increase in the length of roots, the number of roots, wet and dry weight in comparison to control and other treatments, therefore the application of this level of concentration is recommended for increase the indexes of olive cuttings. It is obvious that the Auxin caused increase in the indexes of rooting by induction and cell division stimulation (table 1). Also the treatment of the cultivars cuttings (soft and semi-hard wood) has a considerable effect on rooting increase in cultivars cuttings Mission and Koroneiki. Stehertman reported in his surveys on soft and semi-hard wood olive cuttings rooting that the application of semi-hard wood cuttings has positive effect on the percentage of rooting [5].

Ramezani also reported the same findings in his survey. Although in this design there were some other results which indicated that the soft cuttings regarding their rooting indexes in comparison to semi-hard wood cuttings in Golestan province climate has the higher average of rooting that this result is obtained from a comparison of the average the rooting indexes of soft cuttings included length of the roots, thickness of roots, the number of roots and wet and dry weight which was higher in soft cuttings in comparison to semi-hardwood cuttings (table 2)

Between cultivars cuttings Mission and Koroneiki in terms of the percentage of rooting a considerable difference wasn't perceived, although generally researches have reported a difference in potential of rooting in diverse cultivars in many cases [13]. Besides, it is assumed that olive cultivars according to their anatomy have an exclusive potential for rooting (table 3). The average of the length of roots of the cultivar cuttings Koroneiki in excess of 25.66 cm and had a considerable difference to the average of the length of the cultivar cuttings Mission with 61.61 cm, the average of the thickness of roots of the cultivar cuttings Mission in excess of 35.1 cm and had a considerable difference to the average of thickness of the cultivars cuttings Koroneiki with 98.0 cm, the average of

the number of the roots in the cultivar cuttings Mission in excess of 2.40 units and had a considerable difference to the average of the number of roots in the cultivar cuttings Koroneiki with 2.06 units , the average of the wet weight in the cultivars cuttings Mission in the excess of 0.32 g and had a considerable difference to the average of the wet weight in the cultivar cuttings Koroneiki with 0.13 g and the average of the dry weight in the cultivars cuttings Mission in the excess of 0.06 g and had a considerable difference to the average of the dry weight in the cultivar cuttings Koroneiki with 0.02. Generally it is concluded that the existence of the young leaves and active buds in the soft cuttings causes rooting induction and also the existence of the cells more active in terms metabolism than adult textures whose wall has become less stiff cause more absorption of artificial hormone , water and nutritious materials and therefore the potential for rooting is higher for soft cuttings than for semi-hard wood and hard wood cuttings [14].

According to Golestan province climate which has higher humidity in comparison to other areas planting olive the cultivars cuttings Mission and Koroneiki possess more growth capability, hence the cultivar Koroneiki sensitive to cold and vulnerable in low temperatures and express less resistance to cold has better growth in warm and humid area and that's why it has higher indexes of rooting in comparison to others in Golestan province climate . these results are achieved from studying the amount of resistance of diverse olive cultivars chlorophyll fluorescence design of experiment [15].



To conclude according to Golestan province climate the beest treatment and suitable concentration of IBA for obtaining the highest level of rooting or rooting indexes is IBA treatment with concentration of 3500 ppm and application of soft cuttings.

Table 1- Average indices treatment rooting Different treatments IBA

dry weight	wet weight	number of root	Thickness of root	length of root	Percent of root	Index IBA treatments
^E 0/02	^E 0/09	^E 1/17	^D 0/90	^D 46/50	^E 58/33	control
^D 0/03	^D 0/16	^D 1/60	^C 1/01	^C 61/32	^D 64/17	ppm2500
^B 0/05	^B 0/28	^B 2/60	^B 1/23	^B 67/70	^C 67/10	Ppm3000
^A 0/06	^A 0/35	^A 3/42	^A 1/47	^A 77/40	^A 74/60	Ppm3500
^C 0/04	^C 0/24	^C 2/42	^B 1/22	^B 66/74	^B 68/80	Ppm4000

Table2- Average indices The treatment of rooting cuttings

dry weight	wet weigh	number of root	Thickness of root	length of root	Percent of root	Index IBA treatments
^A 0/06	^A 0/35	^A 3/06	^B 1/03	^A 81/57	^A 71/00	cutting soft
^B 0/02	^B 0/09	^B 1/40	^A 1/30	^B 46/30	^B 62/17	Cutting semi hard wood

Table3- Average indices of rooting variety Treatments

dry weight	wet weight	number of root	Thickness of root	length of root	Percent of root	Index IBA treatments
^A 0/06	^A 0/32	^A 2/4	^A 1/35	^B 61/61	^A 66/70	Mission
^B 0/02	^B 0/13	^B 2/10	^B 0/98	^A 66/30	^A 66/50	Koroneiki

In each column, means with different letters are significantly different at the 5% level are Duncan's multiple range test

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