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INTERACTION OF BENZYLAMINOPURINE (BAP) AND INDOL BUTIRIC ACID (IBA) ON ROOT INDUCTION IN OLEA EUROPEA L.

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Abstract

Olive var. *"Kokërr Madhi i Beratit"* is an important table variety for Albania despite major difficulties with respect to vegetative propagation from leafy stem cuttings. Leafy stem cuttings were obtained from 1-year-old olive shoots sampled on 25 April 2012 during the growing season. The shoots were collected at the same height of tree crown to avoid the effect of juvenility on root induction. To improve the rooting of olive cuttings, different concentrations of BAP (6-Benzyl aminopurine), 100ppm, 150ppm, 200ppm and250ppm were tested in combination with IBA (Indol Butiric Acid) 4000ppm. After treatments the stem cuttings were planted in greenhouse equipped with an automatic mist system. Fifty days after the beginning of rooting treatments, cuttings were scored for the presence of callus, percentage of rooted cuttings, root number per cutting and root length. BAP inhibits adventitious root formation, but adding it to IBA in a small ratio (1:30-1:40) improved the rooting. The combination of IBA 4000ppm + 100ppm (40:1) and IBA 4000ppm+150ppm BAP modified significantly higher rooting of cuttings. Those combinations of growth stimulators induce also a higher number of roots per cutting in comparison with those treated with IBA alone.

Key words: olive, root, shoot, Benzylaminopurine, Indol Butyric Acid

Introduction

The propagation of the olive up to now has been realized by various ways, such as seeds, hardwood cuttings, leafy stem cuttings, spheroblasts, etc. Propagation with leafy stem cuttings under mist system is the most accepted method in the world. Olive, var. "Kokerr Madhi i Beratit" expose major difficulties with respect to vegetative propagation from leafy stem cuttings. This experiment aimed at increasing the rooting ability of olive cuttings of this variety using IBA with different concentrations of BAP. GA_3 and BAP inhibits adventitious root formation, but in some cases stimulate it (7,6.8).

Auxins play a central role during lateral root development (1). Also, has been reported that cytokinins are important endogenous regulators of lateral root initiation (4).Cytokinins and auxins have been implicated in the regulation of root development, being the principal players (3). Cytokinins regulate root meristem activity via modulation of the polar auxin transport. Auxins and cytokinins modulate the root meristem size, but they differ in concentration range at which they can act either in a stimulatory or an inhibitory mode (3). The phytohormones auxins and cytokinins are important regulators of the developmental fate of pluripotent plant cells (5). Cytokinins influence cell-to-cell auxin transport by modification of expression of several auxin transport components and thus modulate auxin distribution important for regulation of activity and size of the root meristem (3).The study reported in this paper was carried out to examine any possible interaction between IBA and BAP which might influence the rooting activity of stem cuttings in *Qlea europea*, cv. "Kokërr Madhi i Beratit".

Materials and Method

Leafy stem cuttings (15-20 cm long each) from one year old olive shoots of “Kokërr Madhi i Beratit”, grown in Levan village (Fieri district) were conducted to examine the influence of the combination IBA with BAP on the root initiation. The shoots were sampled in spring (25 April) during the 2012 growing season. Leafy stem cuttings with four leaves were prepared in the morning and their bases were dipped for 7 sec in solution of 4,000 ppm IBA, the appropriate concentration on rooting of olive stems, in combination with different treatment of BAP as follows:

Experiment one:
1st treatment 0ppm IBA
2nd treatment 2000ppmIBA
3rd treatment 4000ppmIBA
4th treatment 6000ppmIBA
5th treatment 10000ppmIBA

Experiment two:
1st treatment 4000ppm IBA+0BAP
2nd treatment 4000ppm IBA+100ppm BAP
3rd treatment 4000ppm IBA+150ppm BAP
4th treatment 4000ppm IBA+200ppm BAP
5th treatment 4000ppm IBA+250ppm BAP

After treatments, the stem cuttings were planted in greenhouse equipped with an automatic moist system. The layout of experimental design was completely randomized with 4 replications of 100 cuttings per treatment. Cuttings were evaluated 50 days after planting for percentage of rooted cuttings, primary root number and mean primary root length. Differences between means of each treatment were analyzed by the Duncan multiple range test ($P < 0.05$).

Results and discussion

As it can be seen in Table 1 the olive var. Koker Madhi i Beratit has major difficulties with respect to vegetative propagation from leafy stem cuttings. The percentage of rooting without IBA and with different concentrations of IBA was very low (6,75% maximum). The percentage of rooting was higher in the treatment of 4000ppm IBA, but the difference was not significant however, we supposed the concentration of 4000ppm IBA as the best, and we used this concentration of IBA in combination with different concentrations of BAP to see the interaction of these two hormones on the root induction of this olive variety.

Table 1. Effect of IBA on rooting of “Kokerr Madhi i Beratit” olive cuttings

Treatments/Replications	R1	R2	R3	R4	Means
0%IBA	0	2	1	4	1,75a
2000ppmIBA	4	11	1	7	5,75a
4000ppmIBA	5	6	7	9	6,75a
6000ppmIBA	0	1	8	3	3,00a
10000ppmIBA	5	2	0	1	2,00a

The number (percentage) of rooted cuttings, using of IBA alone and in combination with BAP on rooting of “Kokerr Madhi i Beratit” olive cuttings are summarized in Table2.In determining the optimum of benzylaminopurine (BAP) requirements for rooting, the best result was obtained when 4000ppm IBA (control) was combined with 100ppm and 150ppm BAP (respectively,22% and 24,75 higher than the control).The percentage of rooting was decreased considerably by increasing the BAP concentration to 200 and 250ppm. This means that auxins and cytokinins modulate the root meristem size, but they differ in concentration range at which they can act either in a stimulatory or an inhibitory mode (3) The promotion of BAP on rooting appears to be due to stimulation of juvenility in tissues of cuttings, or perhaps cytokinin regulates root meristem activity via modulation of the polar auxin transport (3). Also, may be, BAP increased the sprouting buds, and consequently, the synthesis of any rooting cofactor. The stimulation of rooting by combination of IBA with BAP reported in this paper is shows that the stem cuttings of olive var, Kokërr Madhi i Beratit has little or has not at all BAB.
To promote root induction of leafy stem cuttings of olive var.“Kokërr Madhi i Beratit” must used as root induction hormones the combination of auxins and cytokinins at appropriate concentration

Table 2. Effect of IBA alone and in combination with BAP on rooting of “Kokërr Madhi i Beratit” olive cuttings

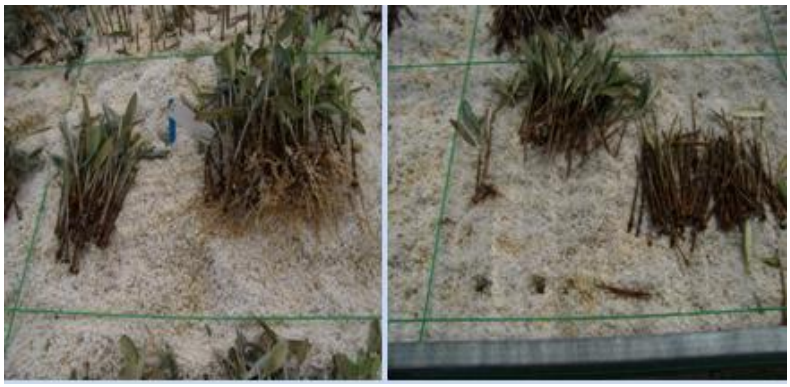
Variante/perseritje	R1	R2	R3	R4	Mean
4000ppmIBA+0BAP	6	7	9	8	7,5a
4000ppmIBA+100ppmBAP	49	36	15	18	29,5b
4000ppmIBA+150ppmBAP	38	16	45	30	32,25b
4000ppmIBA+200ppmBAP	16	9	21	11	14,25c
4000ppmIBA+250ppmBAP	25	3	29	2	14,75c

* Separation by Duncan’s multiple range test, at P< 0. 05, +Mean of three replications

Conclusion

The stimulation of rooting by combination of IBA with BAP reported in this paper is shows that the stem cuttings of olive var.Kokër rmadhi i Beratit has little or has not at all cytokinins.
To promote root induction of leafy stem cuttings of olive var. “Kokërr Madhi i Beratit” must used as root induction hormones the combination of auxins and cytokinins at appropriate concentration.

Figure-1. Cuttings planted in mist propagation(40 days after planting)
Left (IBA+BAP). Right(IBA)



a b

Figure-2 Rooted cuttings(50 days after planting

a- (IBA+BAP) b-(IBA)

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