

THE EFFECTS OF THE DIFFERENT DOSES OF IBA (INDOL BUTRIC ACID) ON THE ROOTING PERFORMANCES IN THE REPRODUCTION OF “GEMLIK” AND “DOMAT” OLIVE TREES BY USING THE GREEN TWIG PROCEDURE IN THE ECOLOGY OF ÇUKUROVA REGION

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ABSTRACT

The effects of the different doses (0, 2000, 4000 and 6000 ppm) of IBA (Indol Butric Acid) on the rooting performances in the reproduction of “Gemlik” and “Domat” olive trees by using the green twig procedure in the ecology of Çukurova region were investigated. The research was conducted in the research area of the Agricultural Faculty at Çukurova University. According to the obtained results, while rooting was not observed in “Domat” olive twigs, “Gemlik” olive twigs yielded better results in the 4000 and 6000 ppm of IBA procedures than those in the control group. Moreover, the conditions of the species of the olive trees, the application period and the dose of the hormone used, the time the twigs were collected, and the condition of the misting unit were also found to be effective in the rooting of the olive twigs.

KEY WORDS: *Olea Europaea* L., grafting twig, Indol Butric Acid

INTRODUCTION

The olive tree (*Olea Europaea L.*), native to the Mediterranean coastline is a plant which has been harvested for a very long time. The olive tree, a typical plant in the Mediterranean region, found the most appropriate growing and maturing conditions in Turkey. Olive fruit is consumed in two ways: olive oil and food. Olive fruit used as food is in two groups: black olives and green olives. Other parts of the olive tree are also used effectively. Oil used in soap making is obtained from the olive bagasse. Furthermore, the bagasse is also used as fertilizer and fuel. The trunk of the olive tree is used in furniture industry as well. Its leaves are used in medicine industry and they are consumed as cattle food. Olive is a kind of fruit which can be produced via generative (seeding), vegetal (twigs, tubers, and shoots) and grafting of the wild plants grown from the seeds of the wild and cultivated olive trees. Olive tree, which has the reputation of being the rich plant of the arid lands, is especially produced by means of grafting of the wild olive trees in the steep lands in Turkey. Yener (1994) stated that *Olea europaea L. spp. Sylvestris*, great in number especially in the Mediterranean region in our country is known as “Delice” (wild), uncultivated olive tree. It has a bushy appearance. Its leaves are oval and shorter than 4 cms. Thin branches are thorny and near to the ground. Its fruit is small and its oil percentage is rather low.

What makes olive tree different from many other fruit trees is that it has a rather long life. If the trunk of the olive tree somehow dies or is cut off, it is enough to have a tiny root and a small fresh shoot for that olive tree to grow again. Lavee (1999) stated that when one of the main limbs of the olive tree is cut off, the root feeding that limb gets weaker, and when a main limb grows, another root grows accordingly. Benlioğlu (1999) emphasized that any part of the olive tree can grow roots, especially tubers root easily, but he also claimed that tubers are not economical to produce olive trees. Dağ (1985) emphasized that the most suitable periods for collecting semi-wood twigs from the olive tree is February – April and July – September. Hartman and Kester (1983) stated that there are three important conditions to provide enough rooting in twig procedure:

- 1) the source of the twig and its inner condition
- 2) the procedures between the preparation and the planting of the twig
- 3) the environmental conditions in rooting period

The researchers also found that some physiological factors such as the age of the plant, the period the twig

was taken, the length and the type of the twig, presence of the leaves and buds, and the content of the nutrients and water in the main plant and the twig are also effective on the rooting of the twig.

The purpose of this study is to improve production techniques by experimenting on the production techniques of the olive trees using green twig and thus, to help increase the olive tree production. Besides, the effects of the olive tree species, the period the twig is taken, the environment of rooting and Indol Butric Acid (IBA) on the rooting of the green twigs were also investigated.

MATERIALS AND METHODS

This study was set up and conducted in the research area of the Agricultural Faculty at Çukurova University between 2003 – 2004. In the study, the species of “Domat” and “Gemlik” olive trees, whose ages ranged from 16 to 20, were used. The native of “Domat” olive tree is the district of Akhisar in Manisa. The fruit of this species is big and cylinder in shape and is consumed as green olives. These olive trees flower between May 16th and June 6th and produce fruit between May 20th and June 10th. The oil in the fruit is 20,57 %. The native of “Gemlik” olive tree is the district of Gemlik in Kocaeli. The fruit of this species is medium-size and almost circular in shape and is consumed as black olives. These olive trees flower between May 12th and June 9th and produce fruit between May 16th and June 13th. The oil in the fruit is 29,98 %. The green twigs were prepared from the one-year-old branches and they were 12-15 cm long and had 2-4 leaves on them. Obtaining and planting time of the twigs have the effect on rooting and growing of the roots in some species. The twigs, obtained at the beginning of autumn and spring and left to misting unit, yield better results (Scaramuzzi and Loreti, 1971). In our study, the green twigs were obtained in two periods: October 2003 and February 2004. Indol Butric Acid (IBA) as chemical was utilized in the study. IBA was first dissolved in 96 % alcohol, and then decreased to 50 %. The 2000, 4000 and 6000 ppm solutions of the IBA were used.

The twigs were planted into the rooting beds in four recurrence according to randomly plot experimental design (Bek, 1986). In every recurrence, 50 (fifty) twigs were used. Before planting, 2 cm-part of the bottom side of the twigs were moisturized and 0,5 cm-part of the moistened part of the twigs were exposed to the 2000, 4000, and 6000 ppm IBA solutions prepared beforehand for 5 seconds. The twigs planted in the rooting beds in the greenhouse were exposed to misting at determined

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Table 1: The rooting performances of the green twigs obtained in October 2003.

Species	Doses of IBA (ppm)	Number of twigs obtained (number)	Number of twigs rooted (number)
Gemlik	0	50	2
	2000	50	9
	4000	50	19
	6000	50	28
Domat	0	50	0
	2000	50	3
	4000	50	4
	6000	50	6

Table 2: The rooting performances of the green twigs obtained in February 2004.

Species	Doses of IBA (ppm)	Number of twigs obtained (number)	Number of twigs rooted (number)
Gemlik	0	50	1
	2000	50	3
	4000	50	10
	6000	50	12
Domat	0	50	0
	2000	50	0
	4000	50	1
	6000	50	0

intervals. The temperature was set to 20 – 25 °C and the humidity was 85 %. The twigs were taken out 90 days after the plantation and transplanted to small plastic bags, then they were moved to sclerosis greenhouse. After dismantling of the twigs, we determined the percentage of the rooting and the number of the roots.

RESULTS AND DISCUSSION

At the end of the study, the time length and the dose of the hormone used, the species, the time the twigs are collected, and the condition of the misting unit were found to have effects on the rooting of the olive twigs. 4000 and 6000 ppm of IBA procedures applied especially to the green twigs of "Gemlik" olive trees revealed better rooting performance than those in the control

group. However, the green twigs of "Domat" olive trees did not create desired effect on the rooting (Table 1). Accordingly, Luma et al. (1981) used 4000 ppm IBA dose in their studies on rooting of the "Domat" and "Gemlik" olive species and observed that unlike "Domat" olive species whose rooting performance was only 10 % at most, Gemlik" olive species' rooting performance was between 60 % and 100 %.

The green twigs obtained in autumn showed higher and better rooting performances than those obtained in spring (Table 1 and 2). Scaramuzzi and Loretta (1971), in their studies, stated that the green twigs of the olive trees obtained at the beginning of autumn and spring and exposed to misting revealed better results.

The root numbers of each twig were different between

the olive tree species and when the dose of the IBA increased, the root numbers also increased accordingly. In our study, IBA also caused the roots of the twigs to be longer than those in the controlled group. The twigs collected in spring grew longer roots than those obtained in autumn. We also found that the difficulty to keep the moisture of the atmosphere at the same level in working times and dehydration in extremely hot periods is an important factor decreasing the rooting percentage. Mencuccini et al. (1988) conducted a study related to this factor. They tried to root the twigs they obtained from the olive trees at the beginning of November at 18 °C, 25 °C, and 30 °C temperatures. The researchers found that while the rooting performance at 24 °C was 34 %, the rooting was increased to 70 % at 30 °C. In Today's olive tree production, the highest importance and care is given to the selection of the production materials and controlling. An important study on "selection" can make a change in the olive tree culture. To sum up, it can be recommended that olive trees be produced via green twigs because vegetal materials can be used more economically.

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