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Seasonal Variation in Rooting of Leafy Olive Cuttings

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Abstract: This study was conducted to assess the influence of season on rooting ability of olive cuttings during the year 2000-2001. Leafy semi-hard wood cuttings were taken from 10 years old olive tree of cultivar "Leccino". The length of cuttings ranged from 10 to 12 cm, with at least 3 to 4 leaves/cutting. The cuttings were collected at fortnightly interval commencing from 15th February to 1st April, 15th July to 1st November and 15th October to 1st December, 2000. The basal portion of the cuttings were treated with talcum powder containing 0.3% Indolebutyric acid (IBA). The treated cuttings were planted in coarse sand in fiber glasshouse under mist. The maximum temperature and relative humidity in fiber glasshouse was 25 to 35°C and 75 to 85% respectively. The highest rooting percentage (82%) was obtained in spring season cuttings on 15th February which was significantly higher than those obtained on the other times of the year. The other times of the years showing promise were 15th July and 1st March, where 70 and 65% of rooting was obtained respectively. The cuttings planted on 1st April produced significantly higher number of roots/cutting (13.5) than rest of planting period of the year. The higher plant survival percentage (90 to 93%) was observed in the cuttings planted during 15th Oct to 1st December.

Key words: Rooting ability, olive cutting, Leccino, rooting percentage, relative humidity

Introduction

Olive (*Olea europaea* L) is an important fruit crop which is a good source of high quality edible oil and is also used for pickle purpose. Olive can be propagated by rooting leafy cuttings under mist (Loreti, 1962 and Morettini, 1941). However, this method is unreliable since the rooting obtained has often been quite inconsistent. Loreti and Hortman (1964) have shown that several factors like clonal variation of material used for rooting, the type of wood cuttings, the concentration of Indole butyric acid (IBA) in which base of the cuttings are dipped and kind of rooting medium can influence the rooting success in olive. In addition to these, seasonal temperature and moisture fluctuations can also affect the rooting percentage of cuttings (Lamphear and Meahl, 1963; Wally *et al.*, 1981; Sachs *et al.*, 1988) Gautam and Chuhan, 1990, Rahman *et al.*, 1991). Considering the importance of seasonal influence on rooting ability in olive cuttings the experiment was designed to find out optimum times for obtaining rooting of leafy cuttings in olive so that a comprehensive programme for olive propagation could be set up to meet the year round demand of farmers for olive plants.

Materials and Methods

An experiment to study the effect of seasonal influence on rooting ability of olive cuttings was conducted in the fiber glasshouse at NARC, Islamabad during the year 2000-2001. Leafy semi-hardwood cuttings were taken from the growth of 10 years old olive tree of cultivar "Leccino". The length of the cuttings ranged from 10 to 12 cm, with at least 3 to 4 leaves/cutting. The cuttings were collected at fortnightly intervals commencing from 15th Feb to 1st April, 2000, 15th July to 1st November, 2000 and 15th October to 1st December 2000. The basal portion of the cuttings were treated with talcum powder containing 0.3% Indolebutyric acid (IBA). The treated cuttings were planted in propagation bed filled with coarse sand. The maximum temperature in fiber glasshouse was 25 to 35°C and relative humidity 75 to 85%. The experiment was laid out in complete randomized block design. The mist was applied for 20 seconds after an interval of half an hour during day hours. The data with regard to percentage of rooted cuttings, the number

of roots/cutting and average root length/cutting were recorded 75 days after planting the cuttings during spring (15 Feb. to 1st April, 2000) and summer (15th July to 1st September). The data for cuttings planted during winter season (15th October to 1st December, 2000) were recorded on 3rd week of February, 2001. The rooted cuttings were shifted in a growing media of sand soil and farm yard manure mixed in equal proportion. The rooted cuttings that kept on growing for more than ten weeks were considered to be established/survived. The establishment percentage was calculated out of rooted cuttings only.

Results and Discussion

The time of year at which cuttings of olive cultivar "Leccino" were taken had significant effect on percentage of rooted cuttings (Table I). The rooting success percentage ranged from 6.33 to 82% for different dates. Maximum rooting percentage (82%) was obtained when cuttings were taken during spring on 15th February which was significantly higher than those obtained on other times of year. The other times of years showing promise were 15th July and 1st March, where 70 and 65% of rooting was obtained respectively. The rooting percentage of cuttings planted during 1st September to 1st November was significantly lower (6.33 to 10%) than the cuttings planted on other times of year. The very low rooting percentage during this period could be due to improper physiological condition of plants. The high rooting percentage in other times of the year could be attributed to favorable physiological conditions when cuttings were taken from the tree. The other season attributed for higher percentage of rooting in these cuttings could be due to callus formation during winter and the rise in temperature from 15th January to 15th February stimulated root development. Maqbool and Khan (1973) and Wally *et al.* (1981) also reported failure or low rooting success percentage during some period of the year. The inability of cuttings to root may be attributed to the improper physiological conditions of cuttings (continuation of new flushes) and unfavorable climatic conditions which prevented growth hormones to stimulate the rooting. Lanphear and Meahl (1963) also reported the root stimulating effects of growth regulators on

Table 1: Seasonal variation in rooting of olive leafy cuttings

Dates	Rooted cutting %age	No. of roots/cutting	Root length/cutting	Survival %age
15.2.2000	82.0a	8.23f	4.11d	83.0bc
1.3.2000	65.0c	11.95c	3.50e	72.0d
15.3.2000	57.0d	12.30b	3.13efg	67.33e
1.4.2000	21.0h	13.15a	2.68g	60.00f
15.7.2000	70.0b	10.28d	2.88fg	85.00b
1.8.2000	60.0d	8.40e	3.13efg	81.67c
15.8.2000	42.0f	6.29g	3.22ef	82.33bc
1.9.2000	8.0i	6.20g	3.39e	81.33c
15.10.2000	6.33i	6.04h	5.23c	92.00a
1.11.2000	10.0i	4.59i	5.91b	90.00a
15.11.2000	25.0g	4.20j	6.22ab	91.00a
1.12.2000	50.0e	4.11j	6.63a	93.00a

Values followed by the same letters are not significantly different at P=0.05 by Duncan Multiple Range Test.

cuttings when the micro-climatic conditions were favorable. Seasonal variation also influenced the number of roots and root length per cutting. The cuttings planted on 1st April produced significantly higher number of roots/cutting (13.5) than rest of planting period of the year. The cuttings planted during 15th August to 1st December performed poorly with respect to root number, where number of roots/cuttings ranged from 4.11 to 6.29. The lower number of roots initiated during winter might be due to low temperature, which prevented root development. The number of roots/cuttings developed fairly well when cuttings were planted from 15th February to 1st August. At moderate temperature cell in the cambium region divide actively and physiological condition of the cambium suitable for root initiation and development. Anand and Heberlein (1975) reported that the best rooting during spring and summer when cambium activity was highest and poor rooting or no rooting during fall and winter when cambium activity stopped.

Comparatively longer roots were recorded from the cuttings planted during winter than during spring and summer. However, maximum root length (6.63 cm) was observed from the cutting planted on 1st December which was statistically at par with these of planted on 15th November. The longer root development during 15th October - 1st December (winter) might be due to longer time taken in the rooting medium than the cutting planted in other period of the year.

The data on plant survival percentage showed significantly higher plant survival percentage (90 to 93%) in the cuttings planted during 15th October to 1st December than rest of planting times. The plant survival percentage was also fairly high (81 to 85%) in the cutting planted from 15th July to 1st September and on 15th February. However, the lowest plant survival percentage (60%) was observed in the cuttings planted on 1st April. The higher survival percentage might be due to moderate temperature at the time

when cuttings were shifted from rooting to growing medium. Mukhtar *et al.* (2001) also reported higher plant survival percentage when cuttings were planted on 15th February.

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