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Rooting of Avocado Cuttings *(Persea americana* Mill.) cvs. Fuerte and Colin V-33

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INTRODUCTION

Brokaw (1982) suggested the control of tree size by using clonal stocks. The avocado cv. Colin V-33 is a dwarf tree and it should be tested if its dwarfing habit of growth will appear if used as a rootstock. For this, vegetative propagation is required to secure uniformity of root characters. Also necessary is an effective method of donation of rootstocks compared to that of Salazar and Borys (1983).

This study was done in order to have an effective method of rooting avocado cuttings of cvs. Fuerte and Colin V-33.

MATERIAL AND METHODS

Two experiments were carried out, each one with different cultivar. Etiolation, ring barking, and auxins were used. The experimental design was a factorial 2^3 resulting in the following treatments: etiolation + ring barking + auxins, etiolation + ring barking, etiolation + auxins, etiolation, ring barking + auxins, ring barking, auxins, and the control. Ten cuttings were used per experimental plot with four replications.

The etiolation was done using the Frolich and Platt (1971) method. To obtain etiolated shoots of the scion, plants of the two cultivars (11 months old) were cut back near the union of the graft and placed in a dark chamber with high humidity at 26°C. After these shoots reached in the dark 15 cm. (18 days for cv. Fuerte and 24 days for cv. Colin V-33), the plants were placed again in the light, and a black plastic collar was placed around the stems and filled with soil to continue the exclusion of light from the base of the shoots. Just the tip of the shoots was left exposed to the light until several leaves attained maturity (4V2 months). After this, the shoots were detached as cuttings. The ring barking consisted in removing a ring of 3 mm. of the cortical tissue. In etiolated shoots, the ring barking was done before covering the shoots with the collar; and to non-etiolated shoots, it was done 90 days before detaching them as cuttings. The auxin application was done with wood pieces treated with IBA at 10,000 ppm and 300 ppm of NAA as Salazar and Borys (1983), which were incrusted in the cuttings before they were placed in a propagating bed with bottom heat at 27°C under intermittent mist.

The experiments were evaluated at the 36th day. Percent of rooted cutting, number of

roots per cutting, and length of roots per cutting were recorded.

Table 1. Rooting and components of roots size of avocado (*Persea americana* Mill.) cvs. Fuerte and Colin V-33 as a result of treatments.

Treatment	Rooted cuttings (%)		Number of roots		Length of roots	
	Fuerte	Colín V-33	Fuerte	Colín V-33	Fuerte	Colín V-33
1. Etiolation + ring barking + auxins	90.0 a[1/]	92.5 a	3.9 a	5.4 a	2.8 a	1.6 a
2. Etiolation + ring barking	62.5 b	60.0 b	2.4 ab	2.5 b	1.8 b	0.8 ab
3. Etiolation + auxins	17.5 c	17.5 c	0.4 b	0.4 c	0.3 c	0.7 ab
4. Etiolation	25.0 c	22.5 c	1.0 b	0.7 c	0.4 c	0.3 b
5. Ring barking + auxins	0	0	0	0	0	0
6. Ring barking	0	0	0	0	0	0
7. Auxins	0	0	0	0	0	0
8. Control	0	0	0	0	0	0
Tukey's Test at 1%	22.06	27.77	3.1	1.36	0.92	1.17
C. V.	16.27%	20.99%	58.27%	21.66%	23.92%	23.92%

[1/] Values with same letter are statisticaly equal.

RESULTS

The treatments ring barking + auxins, ring barking, auxins, and the control did not show any rooting; so it was decided to analyze the other half of the treatments as a factorial 2^2 in both experiments.

For percent of rooted cutting, the treatment etiolation + ring barking + auxins was the best in percentage of rooted cutting in both cultivars (Table 1), followed by etiolation + ring barking. Treatment etiolation + auxins was not different from etiolation.

In number of roots per cutting, the treatment etiolation + ring barking + auxins, showed the greatest number of roots per cutting (Table 1), with the cv. Colin V-33 showing a better response than cv. Fuerte. In both cultivars, the treatment etiolation + ring barking was greater than etiolation + auxins or etiolation treatments.

For length of roots per cutting with the etiolation + ring barking + auxins treatment, the cuttings reached the major length of root in both cultivars. However the cv. Fuerte showed greater length than the cv. Colin V-33 (Table 1); even in the etiolation + ring barking treatment the cv. Fuerte had greater length of roots. The etiolation + auxins treatment is no different than etiolation.

The combination of etiolation and auxins did not enhance the percent of rooted cuttings, number of roots, and the length of roots per cutting, in both cultivars.

The interaction between etiolation and ring barking enhanced the percent of rooted

cuttings, number of roots, and length of roots per cutting, and it was found highly significant in both cultivars.

A highly significant interaction was found between etiolation, ring barking, and auxins (Fig. 1) for percent of rooted cuttings in both cultivars. For number of roots per cutting, the interaction was found in both cultivars; however, no significance was found for cv. Fuerte (Fig. *2).* For length of roots per cutting, a highly significant interaction was found for cv. Fuerte, and no interaction was found for cv. Colin V-33 (Fig. 3}.

In both cultivars, no correlation was found between size of the cuttings-rooting, number of roots, length of roots, and number of roots-length of roots.

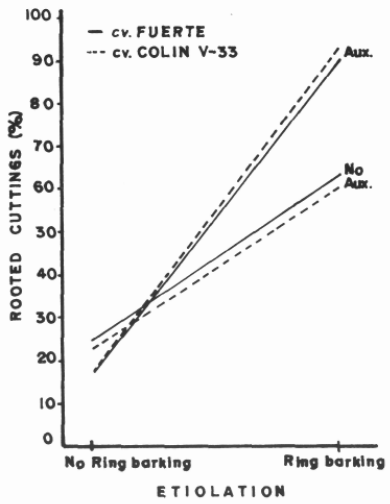

Fig. 1. *Results of the interaction etiolation + ring barking + auxins over the percent of rooting of avocado (*Persea americana *Mill.) cuttings cvs. Fuerte and Colin V-33.*

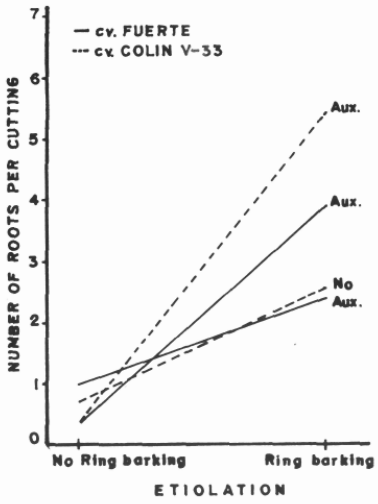

Fig. 2. *Results of the interaction etiolation + ring barking + auxins over the number of roots per cutting of avocado (*Persea americana *Mill.) cvs. Fuerte and Colin V-33.*

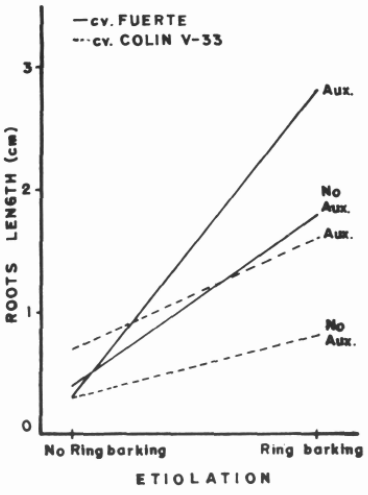

Fig. 3. *Results of the interaction etiolation + ring barking + auxins over the length of roots per cutting of avocado (*Persea americana *Mill.) cvs. Fuerte and Colin V-33.*

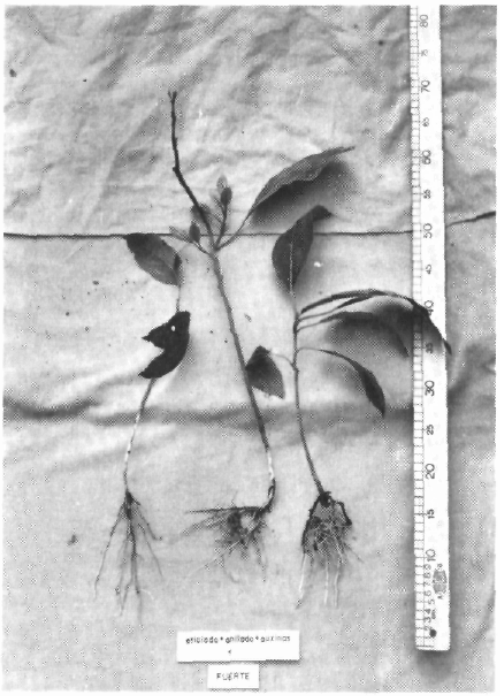

Fig. 4. *Cuttings of avocado cv. Fuerte with etiolation + ring barking + auxins, at day 46.*

Fig. 5. *Cuttings of avocado cv. Colin V-33 with etiolation + ring barking + auxins, at day 46.*

DISCUSSION

Avocado propagation has been the object of several works. Through cutting, there have been trials to establish clonal rootstocks or cultivars on their own root system. The results of donation are from 0 to 95% of rooted cuttings, depending upon the genotype, rooting factors, and the stage of ontogenic development of the material.

In the present work, the objective was to determine the rooting condition of cultivars, that is from mature material, to start the mass production of plants with the major possibility of success using the available information as Frolich and Platt (1972), Loebel (1978), Ernst and Holtzhausen (1978), Kadman and Ben-Ya'acov (1970), Toerien (1979), Kossuth *et al.* (1982), and Salazar and Borys (1983).

Treatments included etiolation, ring barking, and auxins with the purpose of increasing and accelerating the rooting of cuttings, as well as the evaluation of the results and interaction of the basic factors. The 2 results indicate that it is possible to increase the number of etiolated cuttings per plant, with modification to the conditions established by Frolich and Platt (1972) or Salazar and Borys (1981); also, that it is possible to obtain nearly 100% of rooted cuttings and in a shorter time, as etiolation, ring barking, and auxins are used, in comparison with the methods of other authors (Gillespie, 1956; Leal, 1966; Gustafson and Kadman, 1969; Shafrir, 1970; Loebel, 1978; Ernst and Holtzhausen, 1978; and Toerien, 1979).

It is also possible to obtain rooted plants with a well formed adventitious root system in both cultivars as shown in Figs. 4 and 5. It is obvious that is necessary to confirm the

value of this procedure with other genotypes and in other species of avocado (for example, in *Persea schiedeana* or *Persea floccosa),* and with representative plants of all the three races of *Persea americana* Mill,

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