Genotypic variability of rooting capacity in *Coffea arabica* L. cuttings

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ABSTRACT

Cutting propagation of coffee trees has been used for several years in *Coffea canephora* because of the advantages of this technique compared to seed propagation. Recently, the production of heterotic arabic coffee hybrid genotypes increased the importance of conventional and biotechnological cloning also for *C. arabica*. Two experiments were carried out to assess cutting rooting of several *C. arabica* genotypes. In greater detail, the potential of two types of cutting of several hybrid genotypes compared to *C. canephora* genotypes was investigated. The experiment was carried out under shading with automatic misting in boxes of partially burnt rice husks during the summer months. There is genetic variability for cutting rooting capacity among the *C. arabica* genotypes. The F_1 hybrids tended to perform better than the lines. Single-node soft-wood cuttings were superior to the tip cuttings. Selection only for cutting rooting characteristics and useable cuttings resulted in efficient selection especially among single-node soft-wood cuttings. In spite of the large observed difference between the cutting production of *C. arabica* and *C. canephora*, in some cases *C. arabica* genotypes can be obtained with rooting performance very close that observed in *C. canephora*.

KEY WORDS: Coffee breeding, cuttings, hybrid, heterosis.

INTRODUCTION

Over 70 species of the Coffea genus are identified. However, only *C. arabica* and *C. canephora* are cultivated in the coffee producing countries.

Most of the genetic breeding studies on *C. arabica,* which is an allotetraploid species with a variable self-pollination rate, have been concerned with selection for greater yield and other complementary characteristics such as improved quality and pest and disease resistance. However, because *C. arabica* is a predominantly self-pollinating species, it is expected that the use of intrapopulational selection methods would not provide considerable genetic gains due to low variability. Therefore, an important alternative for genetic breeding is hybridization, which will allow gene recombination and use of the existing variability to produce new cultivars adapted to different growing conditions (Fontes, 2001).

Most current genetic breeding programs in the world for *C. canephora*, which is a diploid, cross-pollinating and self-incompatible species, have given priority to superior genotypes that are cutting propagated. Presently, the main genetic breeding center of this species has given special emphasis on a reciprocal recurrent selection program to exploit hybrid vigor at inter-group cross level (Montagnon et al., 1998).

As the coffee tree life cycle is very long, any genetic breeding program requires a period of time for selection that can reach 30 years (Sera, 2001). Plant propagation techniques using cuttings or conventional cloning can reduce selection time and overcome other difficulties of a traditional breeding program.

Asexual coffee tree propagation by cuttings has been recommended for several years for *C. canephora* because of the advantages of this technique compared with seed propagation, which include plantation uniformity and possibility of use of superior hybrid genotypes. Asexual *C. arabica* propagation has not been practiced on a large scale although advanced techniques have existed for a long time (Sylvain, 1979). *C. arabica* large scale reproduction, therefore, is restricted to sexual propagation by seed. Recently, heterotic arabic coffee genotypes showing characteristics superior to the commercial cultivars were obtained (Srinivasan and Vishveshvara, 1978; Walyaro, 1983; Ameha and Bellachew, 1985; Bertrand et al., 1997; Fontes et al., 2000). Consequently, greater importance is being given to the conventional and biotechnological cloning techniques also for this species. Romiro (1973), Van Der Vossen and Laak (1976), Sylvain (1979) and Bergo et al. (1996) indicate the use of rooting cuttings for *C. arabica*.

The importance of *C. arabica* plant propagation is the possibility of forming commercial plantations derived from superior hybrid genotypes (high yielding, pest and disease resistant and carriers of other desirable traits) at low cost (Fadelli and Sera, 2001). There is also the added advantage of greater flexibility in the formation of commercial plantations due to fewer operational difficulties compared with sexual propagation of F_1 hybrids by hand produced seeds. According to Söndhal et al. (2000), plant propagation would bring a new dimension to arabic coffee production in the world.

A commercial plantation from F_1 hybrids can further represent a great saving of time in obtaining cultivars by genetic breeding (Berthouly, 1997). The breeder can test various hybrid combination lines and release the most promising as cutting propagated cultivars in a much reduced time of eight years instead of more than 25 years by the traditional method (Sera and Alves, 1999).

There is evidence that the difference among the varieties in adventitious root formation on stem sections is genetically controlled (Assis and Teixeira, 1998). Thus, this study aimed to assess in two experiments the rooting of various *C. arabica* genotypes and, in greater detail, compare the potential of some *C. arabica* hybrids with two types of cuttings with *C. canephora* genotypes.

MATERIAL AND METHODS

Experiment 1

Ten genotypes were assessed: a) two *C. arabica*, ‘Mundo Novo IAC 376-4’ (‘Mundo Novo’) and ‘Catuaí Amarelo IAC 47’ (‘Catuaí’); b) four interspecific hybrids, *C. arabica x C. canephora,* “IAPAR 77054-40” (“Icatu x Catuaí”), ‘Tupi IAC 1669-33’ (‘Tupi’), ‘Iapar 59’ and ‘Icatu Precoce IAC 3282’ (‘Icatu Precoce’); and, c) four F_1 hybrids, “*C. arabica* Super Precoce” (“Super Precoce”) ´ ‘Tupi’, “Super Precoce” ´ ‘Iapar 59’, “(Icatu ´ Catuaí)” ´ ‘Iapar 59’ and ‘Mundo Novo’ ´ ‘Iapar 59’. The cuttings were prepared from soft-wood orthotropic branches taken from vigorous plants. The basal part of the cuttings was bevel cut and soaked in an indol-butiric acid solution (IBA) at 1,500 mg/dm^3 for approximately five minutes. They were then transferred to wooden boxes (60 cm x 25 cm x 40 cm) containing partially burnt rice husks.

A randomized complete block design with three replications and plots with 50 cuttings was used. The cuttings remained for 110 days during the summer under screening with 50% natural luminosity and an automatic misting system to maintain the moisture on the leaf surface close to saturation throughout the rooting period. After this period, the percentage of rooted plantlets, the percentage of these that were usable, and the percentage of cuttings with at least one root longer than 5 cm were assessed.

The results obtained were submitted to analyses of variance and their significance assessed by the F test. The means of the treatments were compared using the Duncan test at the 5% level of probability.

Genotypic coefficient of determination (b) were estimated for all traits from the genotype means and variances using the formula of Cruz (2001):

$$\mathbf{b} = \frac{\textbf{Genotipic Variance}}{\textbf{Phenotipic Variance}} = \frac{SM_{treat} - SM_{error}}{SM_{treat}}$$

Experiment 2

A factorial 5 x 2 experimental design of five genotypes and two types of cuttings was used. The experiment consisted of three replications and plots of eight cuttings.

Three of the five genotypes were F_1 hybrids, “*C. arabica* Etiópia” (“Etiópia”) x ‘Iapar 59’, “(Icatu × Catuaí)” x ‘Iapar 59’ and ‘Mundo Novo’ x ‘Iapar 59’ and two *C. canephora* var. *robusta* populations (Population A and Population B). Each genotype was assessed for the rooting characteristics using two types of cuttings: a) tip cutting with 1/3 of two to four leaves, two to three nodes and approximately 10 cm long; and, b) soft-wood cuttings with one to two nodes, with 1/3 of two leaves, 5-7 cm long, without the tip.

Green orthotropic branches taken from vigorous plants to prepare the cuttings were used. The cuttings were prepared and rooted in the same manner as the first experiment, but remained for a shorter period of 90 days under shading.

After this period, data from the following traits were recorded and analyzed: a) percentage of rooting cuttings (rooting %); b) percentage of rooting cuttings or with a callous at the cutting base (% of useable cuttings); c) percentage of cuttings with at least one root longer than 5cm (% of roots > 5cm); d) quantity of roots/cutting (roots/cutting), total root length in cm (root length); f) mean length/root in cm (length/root); and, g) scores of root system vigor (root vigor). The root vigor was assessed by subjective scores of 1–4, where 1: a few weak roots without ramification; 2: weak roots with little ramification; 3: roots with intermediary ramification; and, 4: roots with abundant ramification.

Factorial analyses of variance were carried out and the significance of the sources of variation – genotype, two types of cuttings and the genotype x cutting interactions - was assessed using the F test. The treatment means were compared by the Duncan test at the 5% level of probability. The genotypic coefficient of determination (b) was estimated for all the traits as in experiment 1 and the phenotypic correlation coefficients were estimated among the assessed traits.

RESULTS AND DISCUSSION

Experiment 1

The rooting results obtained for 'Mundo Novo', 'Icatu Precoce' and 'Catuaí', 54.43%, 45.43% and 44.90%, respectively, although not significantly different, are in line with those obtained by Pereira et al. (1998), who showed that 'Catuaí' had better performance compared to 'Mundo Novo' and 'Icatu' in Minas Gerais. 'Iapar 59' (41.87%) and 'Tupi' (39.97%) were similar, and the only genotype that differed statistically was "Icatu x Catuaí" with 30.23%. Similar statistical differences were observed when the means of the endogamous genotypes were compared for percentage of useable cuttings and percentage of roots > 5cm. Thus, there are genotypes that differ for cutting rooting traits.

Table 1 shows that the F_1 hybrid 'Mundo Novo' x 'Iapar 59' was superior to the other genotypes for all the assessed traits, showing 62.0% heterosis when compared to the best parent for rooting percentage, 32.2% for percentage of useable cuttings and 72.1% for percentage of roots > 5cm. Similarly, the F_1 hybrid "(Icatu x Catuaí)" x 'Iapar 59' also presented considerable heterosis of 67.7%, 107.4% and 51.4%, respectively, for the three assessed traits, although it did not differ statistically from its parents.

Generally, the F_1 hybrids tended to present better performance than the lines for the three assessed traits (27.5% for rooted cuttings; 29.6% for useable cuttings and 23.8% for roots > 5cm).

The choice of parents showed to influence the hybrid rooting percentage performance as shown in the F_1 hybrid "Super Precoce" x ´Tupi´ (36.30%) and F_1 "Super Precoce" x 'Iapar 59' (54.43%). The sizeable difference of 8.1% among them, although not significant, indicated a tendency of the ´Iapar 59´ parent to be better for hybridization with "Super Precoce".

The genotypic coefficient of determination (b) values indicated that genetic gains from selection for the three assessed traits (b = 0.59 for rooting percentage; b = 0.65 for percentage of useable cuttings and b = 0.58 for percentage of roots > 5cm) are feasible. Although the means test indicated that only one

Table 1. Rooting performance of ten *C. arabica* genotypes[1/].

Genotypes	cuttings with roots (%)	useable cuttings (%)	Roots > 5cm
'Tupi'	39.97 ab	59.93 ab	29.67 ab
'Mundo Novo'	45.43 ab	69.97 ab	39.40 ab
'Catuaí'	54.43 ab	78.50 ab	53.70 ab
"(Icatu × Catuaí)"	30.23 c	37.93 c	26.60 c
'Icatu Precoce'	44.90 ab	56.03 ab	40.43 Ab
'Iapar 59'	41.87 ab	63.30 ab	34.30 ab
F_1 'Mundo Novo' × 'Iapar 59'	73.60 a	92.53 a	67.80 a
F_1 "(Icatu × Catuaí)"×'Iapar 59'	54.27 ab	78.67 ab	40.27 ab
F_1 "Super Precoce" × 'Tupi'	36.30 ab	66.47 ab	30.23 ab
F_1 "Super Precoce" × 'Iapar 59'	54.43 ab	78.37 ab	46.73 ab

[1/] Means followed by the same letter did not differ by the Duncan test at the 5% level of probability.

treatment or genotype differed statistically, the b values indicated that there was more genetic variability to be exploited by selection among the genotypes than indicated by the means test.

Most of the assessed hybrids showed good potential for cutting formation in the commercial clone nursery, as indicated by the percentage of useable cuttings of 78.5% for the endogamous genotypes and of 92.5% among the F_1 hybrid genotypes. They can be indicated for planting mainly on small farms where the cost of the cutting makes the technique more accessible (Fadelli and Sera, 2001).

Experiment 2

The analyses of variance indicated significant statistical differences among genotypes for all the seven assessed traits and among types of cuttings for three of the seven traits (Table 2). There was interaction among genotypes and type of cuttings for five of the seven assessed traits.

Table 3 shows that the *C. canephora* genotypes rooted better, confirming the literature results. The F_1 genotypes 'Mundo Novo' x 'Iapar 59' and "(Icatu x Catuaí)" x 'Iapar 59' showed similar performance of rooting percentage and percentage of useable cutting to the *C. canephora* B population and did not differ statistically from the A population. These results indicated that genotypes with predominant contribution of *C. arabica* genes can show rooting potential similar to *C. canephora* and can be obtained in places where plant propagation by cuttings is a common practice.

The genotypic coefficient of determination estimates (Table 4) confirm the presence of variability among the genotypes, and the high values, over 90% for most of the assessed traits, suggest the possibility of considerable genetic gains from selection as in experiment 1. Single-node cuttings presented b values greater than 90% for the assessed traits, while tip cuttings showed smaller b values. Genetic variability was not detected for cutting rooting or for quantity of roots/cutting. The lower variability found for tip cuttings is probably due to the high water content in the tissues in the terminal nodes, that implies greater random environmental effects on the rooting performance of the propagated materials. Table 4 indicates that although there are no statistical differences among the types of cuttings for some

Table 2. Significance of the F tests in the analysis of variance of the traits assessed in Experiment 2 [1/].

S. V.	D.F.	EEN	EUT	E>5	CR [2/]	CMR	VR	NRE
Blocks	2							
Treatments	4	0.0172	0.0	0.0	0.0	0.0	0.0091	0.0
Cuttings	1	100.0	100.0	0.0019	0.00001	0.1444	0.0453	0.3673
Treat. x Cuttings	4	0.0259	100.0	0.0001	0.00001	0.0007	0.0720	0.0009
Error	18							
Total	29							

[1/] EEN: cutting rooting; EUT: useable cuttings; E>5: cuttings with at least one root longer than 5 cm; CR: accumulated root length; CMR: root mean length and VR: root vigor and NRE: mean number of roots/cutting; [2/] Cuttings with root + cuttings with callous without root.

Table 3. Rooting performance of *C. arabica* and *C. canephora* genotypes[1/].

Genotypes	Rooting percentage[2/]		percentage of useable cuttings[2/,3/]	
C. canephora var. *robusta* (Pop. A)	70.83 (100)	a	97.02 (100)	a
C. canephora var *robusta* (Pop. B)	52.08 (70.7)	ab	91.67 (99.7)	ab
F_1 "Etiópia" × 'Iapar 59'	20.83 (29.4)	b	27.08 (27.7)	c
F_1 "(Icatu × Catuaí)" × 'Iapar 59'	50.00 (70.6)	ab	91.67 (99.7)	ab
F_1 'Mundo Novo' × 'Iapar 59'	41.67 (58.8)	ab	70.83 (72.3)	b

[1/] Means followed by the same letter did not differ by the Duncan test at the 5% level of probability; [2/] Values in parentheses represent relative efficiency compared to the best performing genotype; [3/] Cuttings with root + cuttings with callous without root.

Table 4. Genotypic coefficient of determination estimates for several cutting rooting characteristics of *C. arabica* and *C. canephora*.

Characteristic	Genotypic coefficient of determination (b)	
	Tip cuttings	Single-node cutting
Rooting	0	93.00
Percentage of useable cuttings	88.4	96.15
Percentage of roots > 5cm	17.44	98.5
Root lenght	92.99	96.96
Mean lenght / root	95.34	97.88
Roots/cutting	0	97.5
Root vigor	79.01	97.35

rooting traits, preference should be given to the use of single-node cuttings because of the possibility of greater genetic gains in selection, as greater b values were obtained compared to tip cuttings.

The use of single-node cuttings also represents gain in clonal gardens because of their greater multiplication rate, which allows several collections (three to four) during the year. This distributes the production along time and results in greater efficiency in the process.

The difference among the worst and the best *C. arabica* genotypes was 29.17% for cutting rooting and 70.46% for useable cuttings, showing that there are marked differences among the genotypes. The 'Mundo Novo' x 'Iapar 59' genotype rooted better, with 50% rooting and 91.67% useable cuttings, probably because it was more vigorous than the others. The "Etiopia" x 'Iapar 59' genotype rooted worst with 20.83% rooted cuttings and 27.08% useable cuttings, probably because it was less vigorous than the others.

There were no statistically significant differences among the types of cutting for rooting percentage, useable cutting percentage, mean length/root and roots/cutting traits (Table 2). The statistical difference among the types of cuttings detected for the root > 5cm trait, root length and root vigor indicates that the difference among the cuttings is in the rooting quality and not quantity.

The interaction among cutting types and genotypes was statistically significant at the 5% level of probability for all the traits, indicating that the rooting capacity differs according to the type of cutting for the different genotypes. For example, for the cutting rooting trait, three of the five genotypes performed better with single-node cuttings and for the percentage of useable cuttings three of the five genotypes showed better performance with tip cuttings (Table 5).

As for some genotypes the type of cutting is important (Table 5), for example rooting percentage of the F_1 "Ethiopia" x 'Iapar 59' and F_1 'Mundo Novo' x 'Iapar 59', it is necessary to further study this interaction (cutting type x genotypes) to select the best type of cutting for each specific genotype and improve the asexual propagation efficiency, which would make

Table 5. Rooting performance of two types of cuttings in *C. arabica* and *C. canephora* genotypes [1/, 2/].

Treatment	EEN	EUT	E>5 [3/]	CR	CMR	VR	NRE
T1 – *C.canephora* var. *robusta* (pop. A), Tip cutting	50.0 ab	100.0 a	20.8 cd	72.6 bc	5.3 b	2.4 b	3.5 ab
T2 – *C. canephora* var. *robusta* (pop. A), Single node cutting	91.7 a	95.8 a	83.3 a	248.5 a	11.6 a	3.3 a	2.9 ab
T3 – Robusta (pop. B), Tip cutting	37.5 bc	87.5 ab	33.3 c	95.0 b	12.8 a	3.4 a	3.4 ab
T4 – Robusta (pop. B), Single node cutting	66.7 ab	95.8 a	54.2 b	276.6 a	11.9 a	2.3 b	4.4 a
T5 – "Etiópia" × 'Iapar 59', Tip cutting	41.7 bc	26.2 c	16.7 cd	17.4 cd	2.5 cd	1.9 bc	2.9 ab
T6 – "Etiópia" × 'Iapar 59', Single node cutting	0 c	25.0 c	0 d	0 d	0 d	0 d	0 c
T7 – "(Icatu × Catuaí)" × 'Iapar 59', Tip cutting	41.7 bc	95.8 a	12.5 cd	21.2 cd	2.4 cd	1.4 bc	2.8 ab
T8 –"(Icatu × Catuaí)" × 'Iapar 59', Single node cutting	58.3 ab	87.5 ab	12.5 cd	26.0 cd	2.0 cd	1.3 c	2.2 b
T9 – ´Mundo Novo` × 'Iapar 59', Tip cutting	50.0 ab	66.7 b	12.5 cd	21.2 cd	2.8 bc	2.1 bc	2.9 ab
T10 – ´Mundo Novo` × 'Iapar 59', Single node cutting	33.3 ab	75.0 ab	20.8 cd	25.5 cd	4.4 bc	2.2 bc	2.0 b

[1/] EEN: cutting rooting; EUT: useable cuttings; E>5: cuttings with at least one root longer than 5 cm; CR: accumulated root length; CMR: root mean length; VR: root vigor and NRE: mean number of roots/cutting; [2/] Means followed by the same letter did not differ by the Duncan test at the 5% level of probability; [3/] Cuttings with root plus cuttings with callous without roots.

the process more economic for coffee producers.

Considering the percentage of useable cuttings for clonal cutting production (cuttings with roots and cuttings with callous – Bragança et al., 1995), the *C. canephora* genotypes reached 94.78% and were 33.2% more efficient than the *C. arabica* genotypes (62.70%). When the best *C. canephora* genotype (pop. A) and the best F_1 genotype "(Icatu x Catuaí)" x 'Iapar 59' were compared, the percentages of rooted cuttings and useable cuttings (obtained after a little more time was given to the callous to become roots) were similar, respectively, 97.92% and 91.67%, indicating that the genotypes are very important in rooting (Table 5).

C. canephora genotypes presented greater percentage of cuttings with at least one root longer than 5 cm, greater root length, greater number of roots/cutting, greater root length and greater root vigor (Table 6), confirming the better rooting trait of this species. In *C. arabica*, or in predominantly *C. arabica* genotypes, there were also differences in the quality of the root system for some traits that can be submitted to selection in genetic breeding programs.

There was interaction among genotypes and cutting type for all the root system traits, except quantity of roots/cutting and root vigor. This indicates that the genotypes respond differently for the root system traits, and there are genotypes that perform better for a certain trait in tip cuttings and other genotypes that perform better for the same trait in single-node cuttings. This behavior is observed in *C. arabica* and *C. canephora*.

The differences among the b coefficients in Table 4 confirm that the cutting type influences the rooting performance in the different genotypes and that single-node cuttings are better because of the higher expression of the rooting traits in the genotypes. Single-node cuttings rooted 22.7% better than tip cuttings in *C. arabica* and 44.7% better in *C. canephora*, confirming the results by Snoeck (1968).

Table 6. Performance of *C. arabica* and *C. canephora* genotypes for some rooting traits [1/, 2/].

Genotypes	root > 5cm (%) [3/]	roots/cutting (cm)	Roots / cutting	length/root (cm)	root vigor
C. canephora var. *robusta* (Pop. A)	52.1 a	160.5 a	3.2 ab	8.5 b	2.9 a
	(100)	(100)	(81.9)	(68.5)	(99.3)
C. canephora var. *robusta* (Pop. B)	43.7 a	185.8 a	3.9 a	12.3 a	2.9 a
	(84.0)	(86.4)	(100)	(100)	(100)
"Etiópia"×'Iapar 59'	8.3 b	8.7 b	1.4 b	1.2 c	1.0 c
	(16.0)	(0.5)	(36.7)	(10.1)	(33.9)
"(Icatu×Catuaí)"×'Iapar 59'	12.5 b	23.6 b	2.5 ab	2.2 c	1.4 bc
	(24.0)	(12.7)	(64.2)	(18.0)	(47.9)
'Mundo Novo' ×'Iapar 59'	16.7 b	23.4 b	4.6 ab	3.6 c	2.2 ab
	(32.0)	(12.6)	(63.0)	(29.1)	(75.2)

1/ Means followed by the same letter did not differ by the Duncan test at the 5% level of probability; 2/ Values in parentheses represent the relative efficiency (%) compared to the best performing genotype; 3/ Cuttings with at least one root longer than 5 cm.

Table 7. Phenotypic correlation obtained for cutting rooting.

Characteristics [1/]	EEN	EUT	E>5	CR	CMR	VR	NRE
EEN	-	0.93**	0.82**	0.72**	0.64**	0.78**	0.38**
EUT		-	0.67**	0.64**	0.62**	0.72**	0.90**
E>5			-	0.96**	0.90**	0.92**	0.53**
CR				-	0.85**	0.89**	0.36 *
CMR					-	0.91**	0.16 ns
VSR						-	0.29 ns
NRE							-

1/ EEN: cutting rooting; EUT: useable cuttings; E>5/: cuttings with at least one root longer than 5cm; CR: accumulated root length; CMR: mean root length; VR: root vigor and NRE: mean number of roots/cutting.

Single-node cuttings showed 43.9% more roots > 5 cm and root length 60.6% greater than tip cuttings. The root system of tip cuttings was 9.3% more vigorous and showed 7.7% greater roots/cutting ratio than single-node cuttings. There was no statistical rooting difference among cutting types, percentage of useable cuttings or mean root length. Table 7 shows that the phenotypic correlation is high and significant between most of the assessed traits.

The correlation among the percentage of rooted cuttings and the percentage of useable cuttings was high (0.93) and statistically significant at the 1% level of probability, suggesting that the percentage of useable cuttings can be taken as a reliable measure of rooting efficiency. The various indicator of rooting quality can be reliably assessed by the percentage of useable cuttings given the phenotypic correlations greater than 0.62 that are statistically significant at the 1% level of probability.

These high correlations indicate that selection only for rooted cuttings will select indirectly for all the other traits. This implies lower costs in the selection of genotypes with high rooting potential, as the other traits need not be assessed.

CONCLUSIONS

There is genetic variability for cutting rooting among the *C. arabica* or predominantly *C. arabica* genotypes. The F_1 hybrids tended to perform better than the endogamous genotypes or lines. Soft-wood single-node cuttings were superior to tip cuttings. There are genotypes that, although rooting generally better in single-node cuttings, root best in tip cuttings. Selection only for cutting rooting traits and useable cuttings will result in efficient selection, especially with single-node soft-wood cuttings, given the high genotypic determination coefficient (b = 0.93). In spite of the large differences observed between *C. arabica*, or predominantly *C. arabica*, and *C. canephora* genotypes in cutting production, rooting capacity very close to that observed in *C. canephora* can be obtained in some *C. arabica* or predominantly *C. arabica* genotypes.

AKNOWLEDGMENTS

The authors express appreciation for the financial support provided by CNPq and IAPAR and also grateful for the participation of technician José Alves de Azevedo.

RESUMO

Variabilidade genotípica para capacidade de enraizamento na propagação por estaquia em *Coffea arabica* L.

A propagação de cafeeiros através de estaquia vem sendo utilizada há vários anos para *Coffea canephora*, devido às vantagens proporcionadas por esta técnica em relação à propagação por sementes. Recentemente, com a obtenção de genótipos híbridos com heterose em cafeeiros arábicos está sendo dado maior importância à clonagem, tanto convencional como biotecnológica, também para *Coffea arabica*. Este trabalho objetivou avaliar através de dois experimentos, o enraizamento de diversos genótipos de *C. arabica* e de forma mais detalhada o potencial de alguns híbridos com dois tipos de estacas em comparação com genótipos de *C. canephora*. O experimento foi conduzido em telado com sistema de nebulização automático em caixas com carvão de casca de arroz (combustão parcial) durante o período de verão. Existe variabilidade genética para enraizamento de estacas entre os genótipos de *C. arabica.* Os híbridos F_1 tendem a melhor desempenho do que as linhagens. A estaca semi-lenhosa de um nó foi superior à estaca de ponteiro. A seleção apenas para as características de enraizamento de estacas e estacas utilizáveis promovem seleção eficiente especialmente com estacas semi-lenhosas de um nó. Apesar da grande diferença observada entre *C. arabica* e *C. canephora* na produção de mudas estaquiadas, pode-se obter em alguns casos, genótipos de *C. arabica* com enraizamento muito próximo ao observado em *C. canephora.*

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Received: February 01, 2001;

Accepted: August 02, 2001.