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Agronomic performance of arabica coffee genotypes in northwest Rio de Janeiro State

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ABSTRACT. Considering the productive potential of arabica coffee in the Rio de Janeiro State and the shortage of breeding programs for this species in the state, this study aimed to evaluate the vegetative and productive characteristics of 25 arabica coffee genotypes to indicate 1 or more varieties for the northwest Rio de Janeiro region. The experiment was in Varre e Sai, RJ, Brazil, and plants were planted in 2007 with a spacing of 2.5 x 0.8 m. Five plots were used, consisting of 8 plants per plot to measure vegetative growth, height, stem diameter, and plagiotropic branch number characteristics and productivity in the biennia 2009/2010 and 2011/2012. The classification by sieve was performed at harvest in 2011. The variables were subjected to analysis of variance and means grouped by the Scott Knott test at 5% probability, and the productivity was subjected to joint analysis of variance. Pearson's correlation coefficients between growth and productivity variables were estimated. The best genotypes were Catucaí Amarelo 2 SL, Catiguá MG 02, Acauã, Palma II, Sabiá 398, IPR 103, IPR 100, Catucaí Amarelo 24/137, and Catucaí Amarelo 20/15.

Key words: *Coffea arabica*; Productivity; Physical quality; Growth

INTRODUCTION

The genus *Coffea* includes at least 124 species; of these, *Coffea arabica* and *C. canephora* are economically relevant (Davis et al., 2011). In recent years, coffee production in developing countries has yielded approximately 144 million 60-kg bags of processed coffee, and Brazil, as the largest producer and exporter, produced approximately 51 million bags (International Coffee Organization, 2014).

Rio de Janeiro State, which was once the largest national producer, only occupied the seventh ranking in the 2013 harvest, producing approximately 281,000 benefited bags of arabica coffee (*C. arabica* L.) in an area of 13.276 ha (Conab, 2014). Therefore, there are several areas with potential favorable conditions for the cultivation of *C. arabica*.

In addition to phytosanitary problems such as rust leaf (*Hemileia vastatrix* Berk et Br) and root-knot nematode (*Meloidogyne exigua* Goeldi, 1887) and the maintenance of old depleted fields (Barbosa et al., 2004, 2010), the absence of technologies such as adequate fertilization (Barbosa et al., 2006) and lack of improved cultivars contributed to the decay of the culture in the state (Conab, 2014). The breeding programs have developed varieties of coffee to increase productivity, aggregated agronomic traits for resistance to pests and diseases, developed plants of short height and adapted to local climate and soil conditions (Petek et al., 2006), and developed plants with desirable fruit characteristics. However, the coffee regions have different climatic conditions, and the cultivar responses differ in different environments because of genotype-environment interactions (Cucolotto et al., 2007; Pinto et al., 2012). Thus, despite the large number of available cultivars, we do not know which of these materials to use in different coffee growing regions of the country, including northwest Rio de Janeiro State. This lack of information contributes to a slow process using new cultivars (Carvalho et al., 2012).

Regional studies, such as those performed by Paiva et al. (2010) and Carvalho et al. (2012), are an important tool to determine the viability of new cultivars to minimize future risks that may cause losses to producers. Considering the productive potential of *C. arabica* in Rio de Janeiro State and the shortage of breeding programs for this species in the state, this study aimed to evaluate the vegetative and productive characteristics of 25 arabica coffee genotypes to indicate 1 or more cultivars for use in northwest Rio de Janeiro State.

MATERIAL AND METHODS

The experiment was installed in 2007 at Panorama Farm 1 in Varre e Sai, Rio de Janeiro, Brazil, on oxisol at -20°56'10" latitude and -41°54'43" longitude at an altitude of 780 m. It is a typical tropical climate with cool summers, colder winters, an average annual temperature of 19.0°C, and average annual rainfall of 1601 mm. The seeds of the genotypes that were used in the experiment (Table 1) were acquired from Empresa de Pesquisa Agropecuária de Minas Gerais.

Table 1. Summary of analysis of variance and variation coefficients for plant height, stem diameter, plagiotropic branch number, average biennium productivity, grains retained on sieve size 16, moca beans, and joint analysis of the productivity of 2009/2010 and 2011/2012 biennia of 25 arabica coffee genotypes in northwestern Rio de Janeiro State, Brazil.

		MS			
Source of variation	d.f.	Plant height (cm)	Stem diameter (mm)	No. of plagiotropic branches	Average biennia
Block	4	342.83	167.45	119.90	6909.77
Genotype	24	36754.19**	3188.03**	8632.60**	22048.97**
Residue	96	7075.97	1623.23	40.12	204.74
CV (%)		4.20	8.12	7.86	17.46
Overall average		204.99	50.58	80.58	81.95
Source of variation	d.f.	Sieve size 16 (%)	Moca (%)	-	-
Block	2	38.59	70.64		
Genotype	24	2210.85**	11317.81**	-	-
Residue	48	398.74	1736.03	-	-
CV (%)		16.55	8.66	-	-
Overall average		17.41	69.44	-	-
Source of variation	d.f.	Productivity (bag/ha)	-	-	-
Block	4	13820.65			
Genotype	24	44097.64*	-	-	-
Residue	96	39314.05	-	-	-
Biennium	1	493.42	-	-	-
Genotype x Biennium	24	10703.72*	-	-	-
Residue	100	281.82	-	-	-
CV (%)		13.71	-	-	-
Overall average		81.95	-	-	-

d.f. = degrees of freedom; *, **significant at 1 and 5% probability, respectively.

For the formation of seedlings, 11 x 22 cm polyethylene bags and substrate were used. Crop management was performed according to specific literature. Assessments of vegetative development were made before harvests using a graduated scale to measure height, a Starrett® digital caliper to measure the stem diameter at the ground level, and counting of the plagiotropic branches. The productivity of the 2009/2010 biennium concerning the harvest totals for 2009 and 2010 and the 2011/2012 biennium concerning the harvest totals for 2011 and 2012 were evaluated, totaling 4 harvests, between May and July. The volume of harvested coffee cherries was transformed to benefit bags/ha using the scale of 480 L coffee cherries per 60-kg sack (Carvalho et al., 2009). The 25 genotypes were evaluated using a spacing of 2.5 x 0.8 m with random blocks and 5 plots with 8 plants per plot. For productivity, we used the split-plot array in time.

The classification was performed by sieve in samples obtained from the 2011 harvest with 3 replicates per genotype. The coffee was harvested and taken to the Panorama Farm 1 processing unit, where washing and separation of green coffee, cherry, and "boia" proceeded. The coffee cherries were peeled and pulped, and 1 L was removed and sent to the laboratory, where it was subjected to drying in a 45°C oven until the moisture content reached about 12%. After reaching the moisture content, 200 g of each sample was removed for classification. For this classification, 100 g coffee beans from each sample, which was free of defects, was placed on the sieves (Brasil, 2003). After passing through the sieves, beans were classified as flat grains (retained on sieve 16) and moca beans (retained on sieve 11), and the volume contained in the sieve was weighed and expressed as a percentage.

Vegetative variables were subjected to analysis of variance, and means were compared with the Scott Knott test at 5% probability. For productivity, a joint analysis of variance subdivided in time was performed with the plots representing the treatments and the subplots representing the set of 2 crops (biennium). Pearson's correlation coefficients between the growth and productivity variables were also estimated. All analyses were performed using the statistical analysis program Genes (Cruz, 2013).

RESULTS AND DISCUSSION

There were significant differences for vegetative variables and physical qualities of grains. Regarding productivity, there was a significant effect from the genotype and genotype x biennium interaction (Table 1).

For variable plant height, 5 groups were distinguished. Bourbon Amarelo had the highest average (Table 2), which was expected because it is tall type cultivar (Carvalho et al., 2008). Reducing the plant height, which would allow an increased density, mechanical harvesting, and would facilitate phytosanitary treatments, especially for leaf rust, is a relevant goal in breeding programs (Petek et al., 2008). Four groups were distinguished according to stem diameter. Bourbon Amarelo and Catiguá MG 01stood out among the genotypes (Table 2). Regarding the number of plagiotropic branches, 5 groups were distinguished, and Catiguá MG 01 stood out.

Table 2. Means of plant height, stem diameter, and number of plagiotropic branches from 25 coffee genotypes in northwestern Rio de Janeiro State.

Genotype	Plant height (cm)	Stem diameter (mm)	No. of plagiotropic branches
1-Catucaí Vermelho 785/15	213.60^{c}	53.90^{c}	76.40^{d}
2-Catucaí Amarelo 2 SL	240.40^{b}	51.64^{c}	72.10^{d}
3-IPR	195.20^{e}	47.88^{d}	77.40^{d}
4-Catiguá MG 02	219.40^{c}	56.86^{b}	81.58^{c}
5-IPR 99	186.40^{e}	49.86^{c}	78.00^{d}
6-Acauã	201.00^{d}	50.86^{c}	85.20^{c}
7-Araponga MG 01	205.60^{d}	48.42^{d}	82.00^{c}
8-Palma II	210.60^{d}	45.92^{d}	80.40^{c}
9-Sabiá 398	184.60^{e}	49.44^{c}	85.20^{c}
10-IPR 103	197.40^{e}	51.48^{c}	86.40^{c}
11-IPR 100	205.80^{d}	49.34^{c}	86.80^{c}
12-H-4193-3-3-716-4-1	206.20^{d}	47.44^{d}	75.80^{d}
13-H-419-10-6-2-12-1	194.00^{e}	44.90^{d}	84.40^{c}
14-Catucaí Amarelo 24/137	223.80^{c}	49.54^{c}	92.00^{b}
15-Iapar 59	185.00^{e}	52.94^{c}	76.60^{d}
16-Oeiras	194.60^{e}	45.86^{d}	60.00^{e}
17-Catuaí Vermelho 144	203.60^{d}	48.32^{d}	89.00^{c}
18-Catucaí Amarelo 20/15	216.40^{c}	45.96^{d}	66.00^{e}
19-Catiguá MG 01	217.40^{c}	62.34^{a}	100.00^{a}
20-H-419-10-6-2-5-10-1	195.40^{e}	45.72^{d}	69.60^{e}
21-IPR104	189.40^{e}	47.08^{d}	76.20^{d}
22-Sacramento	192.80^{e}	54.84^{c}	76.80^{d}
23-Bourbon Amarelo JCL 10 IAC	257.80^{a}	66.34^{a}	86.00^{c}
24-Pau Brasil	200.40^{d}	50.16^{c}	85.60^{c}
25-H-419-10-6-2-5-1	188.00^{e}	47.46^{d}	84.80^{c}

Means followed by the same letter do not differ by the Scott Knott test at 5% probability.

The variability of vegetative characteristics probably occurred because of the combination of genetic effects of each material and the environment (weather conditions, spacing, etc.), indicating the need to interpret these interaction and recommend cultivars for each region and management. According to Carvalho et al. (2010), the height and number of plagiotropic branches have strong environmental effects that are greater than those observed for productivity.

The main selection criterion in coffee is productivity (Oliveira et al., 2011). Other agronomic traits related to yield potential have been studied to increase the indirect selection efficiency (Severino et al., 2002; Petek et al., 2008; Pinto et al., 2012).

Two groups were distinguished when analyzing the productivity in the 2009/2010 biennium, highlighting the Catiguá MG 02 and IPR 103 cultivars (Table 3). The Catucaí group, with the exception of Catucaí Vermelho 785/15, also showed high productivity. Paiva et al. (2010), working with genotypes of arabica coffee in Varginha, MG, Brazil, observed higher productivity in the first biennium for Sabiá 398, Catucaí Amarelo 24/137, Acauã, Palma II, and Catucaí Amarelo 20/15, which also showed higher average productivity in this study.

Table 3. Means of productivity of the 2009/2010 and 2011/2012 biennia, average biennial grains retained on the sieve size 16, and moca grains from 25 arabica coffee genotypes in northwestern Rio de Janeiro State, Brazil.

Genotype	Biennium(1) 2009/2010 (bag/ha)	Biennium 2011/2012 (bag/ha)	Average biennia (bag/ha)	Sieve size 16 (%)	Moca (%)
1-Catucaí Vermelho 785/15	61.79^{bA}	48.99^{cA}	55.38^{c}	82.00^{a}	16.00^{c}
2-Catucaí Amarelo 2 SL	89.86^{aA}	84.37^{bA}	87.12^{a}	83.00^{a}	18.00^{c}
3-IPR	71.31^{bA}	67.32^{cA}	69.31^{b}	72.00^{b}	15.00^{c}
4-Catiguá MG 02(2)	115.00^{aA}	83.85^{bA}	99.43^{a}	69.66^{b}	14.00^{c}
5-IPR 99	81.93^{bA}	64.85^{cA}	73.39^{b}	87.00^{a}	14.00^{c}
6-Acauã	89.58^{aA}	78.12^{bA}	83.85^{a}	67.66^{b}	25.66^{b}
7-Araponga MG 01	71.95^{bA}	75.52^{bA}	73.73^{b}	82.33^{a}	14.00^{c}
8-Palma II	91.63^{aA}	85.68^{bA}	88.65^{a}	73.00^{b}	23.00^{b}
9-Sabiá 398	97.78^{aA}	103.52^{aA}	100.65^{a}	71.33^{c}	11.66^{c}
10-IPR 103	103.61^{aA}	90.36^{bA}	96.99^{a}	81.66^{a}	12.66^{c}
11-IPR 100	92.50^{aA}	87.37^{bA}	89.93^{a}	82.66^{a}	17.66^{c}
12-H-4193-3-3-716-4-1	81.39^{bA}	77.08^{bA}	79.24^{b}	77.33^{a}	16.33^{c}
13-H-419-10-6-2-12-1	84.17^{aA}	82.94^{bA}	83.56^{a}	51.00^{c}	22.33^{b}
14-Catucaí Amarelo 24/137	91.11^{aA}	104.17^{aA}	97.64^{a}	78.00^{a}	14.33^{c}
15-Iapar 59(2)	87.68^{aA}	58.85^{cA}	73.27^{b}	67.00^{b}	8.00^{c}
16-Oeiras(2)	74.44^{bA}	95.05^{aA}	84.75^{a}	65.00^{b}	15.66^{c}
17-Catuaí Vermelho 144(2)	69.60^{bA}	90.37^{bA}	80.01^{b}	71.33^{b}	16.66^{c}
18-Catucaí Amarelo 20/15	96.94^{aA}	107.03^{aA}	101.99^{a}	72.00^{b}	11.33^{c}
19-Catiguá MG 01	67.08^{bA}	68.49^{cA}	67.79^{b}	55.33^{c}	31.33^{a}
20-H-419-10-6-2-5-10-1	89.65^{aA}	100.00^{aA}	94.83^{a}	41.66^{d}	29.00^{a}
21-IPR104	79.82^{bA}	76.82^{bA}	78.32^{b}	70.00^{b}	13.66^{c}
22-Sacramento	74.44^{bA}	81.78^{bA}	78.11^{b}	63.00^{b}	21.66^{b}
23-Bourbon Amarelo IAC	53.84^{bA}	44.27^{cA}	49.05^{c}	66.66^{b}	15.00^{c}
24-Pau Brasil	80.55^{bA}	63.28^{cA}	71.92^{b}	68.66^{b}	20.33^{b}
25-H-419-10-6-2-5-1	86.11^{aA}	93.49^{aA}	89.80^{a}	36.66^{d}	18.00^{c}

Means followed by the same letter in a column and capital letter in a row do not differ by the Scott Knott test at 5% probability. (1)The 2009/2010 biennium is composed of the sum of the harvests of 2009 and 2010, and the 2011/2012 biennium is composed of the sum of the harvests of 2011 and 2012. (2)Values of Pr > F = 0.0042, 0.0078, 0.0051, and 0.0053 for Catiguá MG 02, Iapar 59, Catucaí Vermelho 144, and Oeiras, respectively, which contributed to the significance genotype x biennium interaction.

In the 2011/2012 biennium, 3 groups were distinguished when analyzing the productivity, highlighting Catucaí Amarelo 20/15, Catucaí Amarelo 24/137, Sabiá 398, and H-419-10-6-2-5-10-1 (Table 4). The Sabiá 398, Catucaí Amarelo 24/137, Catucaí Amarelo 20/15, H-419-10-6-2-5-10-1, and H-419-10-6-2-5-1 cultivars showed high productivity in the 2 biennia. In split biennia, there were not significant differences between genotypes. However, Catiguá MG 02, Iapar 59, Oeiras, and Catucaí Vermelho 144 contributed to the significance of the genotype x biennium interaction. Paiva et al. (2010) also observed variability for productivity in biennia for various genotypes, including Iapar 59. The same authors observed that there was no significant difference in the productivity of Sabiá 398 in biennia, corroborating the data of this study.

Table 4. Phenotypic correlation between stem diameter, plant height, number of plagiotropic branches, and productivity of 25 arabica coffee genotypes in northwest Rio de Janeiro State, Brazil, in 2011.

	Plant height	Stem diameter	No. of plagiotropic branches	Productivity
Plant height	-	0.5827**	0.4497*	0.1573^{NS}
Stem diameter		-	0.1502^{NS}	-0.0087^{NS}
No. of plagiotropic branches			-	0.016^{NS}
Productivity				-

*, **Significant at 1 and 5% probability; NS = not significant.

Considering the average biennial productivity, 3 groups were distinguished, and Catucaí Amarelo 20/15, Sabiá 398, Catiguá MG 02, Catucaí Amarelo 24/137, and IPR 103 were highlighted (Table 3). Carvalho et al. (2012) studied the performance of coffee genotypes over 3 biennia in 4 regions of Minas Gerais, Brazil; they found Catucaí Amarelo 24/137, Sabiá 398, and IPR 103 stood out. Over 3 biennia, Paiva et al. (2010) found high average productivity only for Sabiá 398.

Other genotypes in this study also had high average biennial productivity. For example, Catucaí Amarelo 20/15 and Catucaí Amarelo 2 SL, unlike the observations of the previously mentioned authors, demonstrated variable productivity that depended on the planting region. The genotypes that presented a highest average productivity showed a smallest biennial effect, which was characterized by an annual alternation of high and low productivity. Bourbon Amarelo had low productivity; however, Ferreira et al. (2013) observed that Bourbon genotypes exhibited satisfactory productivity and presented genetic variability within the group.

The biennial effect is attributed to the depletion of plant reserves in years of high yield, causing the production of the next year to be low because of the slower growth of plagiotropic branches (DaMatta et al., 2007). Pereira et al. (2011) evaluated the effect of spacing on growth, productivity, and bienniality of coffee and found that there was a reduction in the productive oscillation between harvests with increased spacing between planting lines (2 to 3.5 m). However, the same authors concluded that there was an increase in productivity with reduced spacing. Probably, until the fourth harvest, the spacing may have provided good yields for genotypes that were highlighted in the 2 biennia without leading to plant depletion.

Catuaí 144 is the genotype that is commonly planted in the region. In the first biennium, it produced 65.22 and 48.85% less than Catiguá MG 02 and IPR 103, respectively (Table 3). In the second biennium, it produced 18.43, 15.27, 14.55, and 10.66% less than Catucaí Amarelo 20/15, Catucaí Amarelo 24/137, Sabiá 398, and H-419-10-6-2-5-10-1, respectively. This suggests that other genotypes, including some that are tolerant to leaf rust such as Sabiá 398 (Paiva et al., 2010), appear to be an option for future plantations in the region. Furthermore, it is noteworthy that Acauã, which showed good yield in relation to average biennia, presents resistance to root-knot nematode (*M. exigua*) (Carvalho et al., 2008), making it an option for infested areas. This is important because Barbosa et al. (2004) observed that 50% of the areas of northwest Rio de Janeiro State were infested by *M. exigua*.

The sieve coffee classification is one of the criteria to market this product. The importance is given mainly by the performance and the possibility of standardizing the beans for the roasting process. Unevenness result in uneven roasting, causing the occurrence of burnt flavor in the product. Thus, separating coffee beans by size provides a better quality final product, enabling greater uniformity in roasting and greater uniformity in bean color.

The genotypes Catucaí Vermelho 785/15, Catucaí Amarelo 2 SL, IPR 99, Araponga MG 01, IPR 103, IPR 100, H-4193-3-3-716-4-1, and Catucaí Amarelo 24/137 showed the highest values for sieve size 16 (between 78 and 87%) (Table 3). Pailva et al. (2010) also reported satisfactory results for flat grain in Catucaí Vermelho 785/15 and Catucaí Amarelo 24/137. It is worth noting that Catucaí Amarelo 24/137 also appears in the higher averages productivity group in the 2 biennia, unlike Catucaí Vermelho 785/15, which did not show good productivity in biennia. These observations also corroborate those of Paiva et al. (2010) and Carvalho et al. (2012).

The genotypes Catiguá MG 02, Acauã, Palma II, and Catucaí Amarelo 20/15, which also stood out in biennial productivity, appear in the second group for sieve classification, indicating a satisfactory response to this variable. However, Sabiá 398, which appeared in the third group of averages, showed a good percentage in the sieve classification (71.33%). The H-419-10-6-2-5-10-1 and H-419-10-6-2-5-1 genotypes, despite good yield in biennia, did not show satisfactory means for this variable. Further evaluations are needed to confirm the viability of these genotypes for the region.

A large amount of moca grain is indicative of a deficiency at fertilization that is mainly related to genetic and climatic factors (Laviola et al., 2006). Thus, the estimated yield also suffers considerable influence from the amount of fruit that contains moca grains (Vaccarelli et al., 2003). Catiguá MG 01 and H-419-10-6-2-5-10-1 showed the highest percentages of moca beans (Table 4). H-419-10-6-2-5-10-1 also showed a low percentage of sieve size 16, reinforcing the possibility of not being recommended for the region. Except Palma II and H 419-10-6-2-12-1, genotypes that showed good yields in the two biennia, were in the lower averages group for the moca beans percentage.

Among the genotypes that stood out in productivity and grain quality, Catiguá MG 02, Acauã, Palma II, Sabiá 398, and IPR 100 are derived from crosses involving Timor Hybrid, which has a high yield potential and leaf rust resistance (Bonomo et al., 2004; Oliveira et al., 2011). On the other hand, Catucaí Amarelo 2SL, IPR 103, Catucaí Amarelo 24/137, and Catucaí Amarelo 20/15 are derived from crosses involving Icatú, which also exhibit high productivity and leaf rust resistance (Carvalho et al., 2008). It is worth noting that these genotypes also showed high stability and adaptability over 4 harvests (Rodrigues et al., 2013). However, studies regarding the next harvest and management through pruning should be performed to support the recommendation of these genotypes.

Until the second harvest, positive correlations were observed between vegetative and productivity characteristics (Rodrigues et al., 2012). However, no correlation between productivity and vegetative characteristics were observed for the third harvest, in 2011 (Table 4). There was only a positive correlation between plant height and stem diameter and between plant height and plagiotropic branch number. This illustrates an adjustment of plant architecture that showed no result in the increase of production, probably due to the dense spacing. Reduced spacing may lead to a rapid development in height, as observed by Rena et al. (1998).

Unlike the results obtained in this study, Miranda et al. (2005) evaluated the first 3 harvests of F5 progenies from crosses between Catuaí Amarelo and Timor Hybrid, and they observed a correlation between productivity and vegetative characteristics. Furthermore, they found that the vegetative attributes that contributed most to the increase in productivity were the plagiotropic branch length, plant height, and stem diameter. However, Severino et al. (2002) found a low magnitude, negative genotypic correlation between productivity and plant height when evaluating the first 3 harvests Catimor lines.

In the fourth harvest, in 2012, negative correlations were observed between plant height and productivity and between stem diameter and productivity (Table 5). In the dense spacing used in this study, the plants tended to reach greater height growth because of the increasing competition for light (Melo et al., 2005; Pereira et al., 2011), which may lead to crop intensification and thus reduce the productivity because of a self-shading effect, reducing photosynthetic rates. Furthermore, light is important for the early stages of floral development of arabica coffee (Queiroz-Voltan et al., 2011).

Table 5. Phenotypic correlation between plant height, stem diameter, number of plagiotropic branches, and productivity of 25 arabica coffee genotypes in northwest Rio de Janeiro State, Brazil, in 2012.

	Plant height	Stem diameter	No. of plagiotropic branches	Productivity
Plant height	-	0.5806**	0.1522^{NS}	-0.4417*
Stem diameter		-	0.4348*	-0.4788*
No. of plagiotropic branches			-	0.0188^{NS}
Productivity				-

*, **Significant at 1 and 5% probability; NS = not significant.

Silvarolla et al. (1997) evaluated 57 progenies of Timor Hybrid and found a positive correlation between productivity and vegetative characteristics. In the average of 4 harvests, the authors obtained a high phenotypic correlation between productivity and the plant height and canopy diameter. These observations are different from those of this study, probably because of the genotypes that were used and the experimental and environmental conditions.

The results obtained in this study corroborate those obtained by Martinez et al. (2007), who studied 4 cultivars of arabica coffee in Ervália, MG, Brazil, and observed that, with a spacing of 2.5 x 0.75 m, the correlation between productivity and plagiotropic branch number was not significant 48 months after planting. Thus, the results indicate that predictable measures for possible interventions by pruning must be taken to avoid a sharp decline in productivity. To avoid the adverse problems caused by crop intensification, crop management techniques, through pruning, are required to rejuvenate and maintain crop productivity, increasing the profitability of the crop (Pereira et al., 2007).

CONCLUSION

The genotypes Catucaí Amarelo 2 SL, Catiguá MG 02, Acauã, Palma II, Sabiá 398, IPR 103, IPR 100, Catucaí Amarelo 24/137, and Catucaí Amarelo 20/15 showed superior agronomic characteristics and can be recommended for the study region.

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