New banana genotypes and cultivars more productive for southern Minas, Brazil

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Abstract— *Southern of Minas state, is a important producer of banana, especially the cultivars Prata-Anã, Nanicão and Maçã. These cultivars present low productivity, great plant height and are susceptible to major banana diseases. The objective of this study was to evaluate the vegetative and productive behavior of banana cultivars as Prata, Nanicão and Maçã, in Lavras, MG, Brazil to select those with the best features, of bunch and fruit size, lower production cycle and disease resistance in high land conditions. Were evaluated the following materials: type: 'Prata': 'Prata-Anã' (control), 'BRS Maravilha', 'BRS Vitoria', PA 94-01; type 'Nanicão': 'Grande Naine' (control) and FHIA 17 and type 'Maçã': 'Maçã' (control) and YB 42-03. The experiment was conducted in a completely randomized block design with three replications and 16 plants per plot. Regarding the type 'Prata-Anã', 'BRS Maravilha' and PA 94-01 are recommended by their greater productivity, plant height, production cycle, flavor and fruit appearance in relation to cv 'Prata-Anã' traditionally grown in region. PV 94-01 and 'Vitoria', despite the greats plant height, are recommended due to the greater productivity. The YB 42-03 genotype is an alternative to 'Maçã' because it is similar to productivity, size and production cycle.*

Keywords— Musa, Banana, Production cycle, Yield.

I. INTRODUCTION

There are more than 125 countries that are dedicated to the cultivation of bananas in the world. This fruit stands out in the first position of the world ranking around 106.5 million tons in 2011, according to Vieira (2015).

The banana is the second most consumed fruit in the world with 11.4 kg/hab/year, losing only to the orange with 12.2 kg/hab/year (FAO, 2014). The expansion of banana farming in most countries from 35 million tonnes in 1978 to 106.5 million tonnes in 2011 was made possible thanks to the intensive use of technologies (VIEIRA, 2015).

The productivity of banana growing in Minas Gerais increased from 14.103 t ha-1 in 2001 to 16.936 t ha-1 in 2012 (IBGE, 2013). This increase in productivity is mainly due to the adoption of new technologies such as fertirrigation, adequate crop management, and the introduction of new, more productive cultivars.

Several banana cultivars have been evaluated and recommended in all regions of Brazil. Among these, there are those of the type 'Prata': 'Pioneira', 'Prata Graúda', 'BRS Pacovan Ken', 'BRS Maravilha', 'BRS Platina', 'BRS Conquista', 'BRS Vitória'; tipo 'Maçã': 'Thap Maeo', 'Mysore' e 'Caipira'; type 'Ouro': 'Prata Baby' or 'Nam' and type 'Nanicão': 'Grande Naine' (SILVA; PEREIRA; RODRIGUES, 2008).

However, obtaining new, more productive banana cultivars is not enough to determine success in terms of adoption by producers. Besides the agronomic aspects, the new cultivars must present fruits with good market characteristics (Silva, et al., 2013). An improved cultivar should increase productivity, reduce production costs due to the decrease in the use of pesticides, thus increasing the income of the producer (Amorim et al., 2011).

The cultivar BRS Maravilha in dry conditions was more productive than Prata-Anã, its mother in the first two cycles in Jataí (GO) (SANTOS; CARNEIRO, 2012), in Goiânia (GO) (MENDONÇA et al., 2013), in Aquidauana (GO) (VIEIRA, 2011), in Botucatu (SP) (RAMOS et al., 2009) and in Lavras (MG) (PEREIRA et al., 2003).

Borges et al. (2011) report that the genotype FHIA 17 was highlighted in rainy conditions in production among the 14 genotypes evaluated in northern Paraná and that the cultivars BRS Maravilha, PV 94-01 and YB 42-03 presented similar behavior to the cultivars of the Same type Prata-Anã, Pacovan and Maçã, respectively.

According to the Capixaba Institute for Research, Technical Assistance and Rural Extension - INCAPER (2010); SILVA et al. (2008) and PEREIRA et al. (2005) the BRS Vitória cultivar was more productive than Prata and Pacovan in the states of Espírito Santo, Bahia and Amazonas, respectively. In irrigated conditions the 'BRS Maravilha' presented superior yield twice as much as the cultivar Prata-Anã in the Jaíba projects (MG) (RODRIGUES et al., 2006) and Gorutuba (MG) (SOUTO et al., 2001).

The influence of the environment, mainly temperature, on the banana production cycle, can be observed in experiments conducted in Lavras (MG), Maria da Fé (MG) and Jaíba (MG). In Lavras, with average annual minimum temperatures of 15.4ºC and altitude of 900 m, the 'Prata-Anã' cycle was 510 days (PEREIRA et al., 2002). In Maria da Fé, with an average annual minimum temperature of 10.7ºC and altitude of 1270 m, the production cycle of Prata-Anã was 620 days (PEREIRA et al., 2002). On the other hand, in Jaíba with a minimum annual average temperature of 18.5ºC and altitude of 500 m, the production cycle of this cultivar was 320 days (RODRIGUES; SOUTO; SILVA, 2006).

This work was conducted with the objective of evaluating new cultivars and genotypes of bananas of the types Prata, Nanicão and Maçã in the southern region of the state of Minas Gerais, Brazil, regarding the increase of productivity and fruit quality.

II. MATERIAL AND METHOD

The experiment was conducted at the Experimental Farm of AGROTESTE in Lavras (MG), Brazil, from January 2013 to December 2015, and the first two cycles were evaluated. The altitude of the place is 918 m.

According to the climatic classification of Koppen (DANTAS; CARVALHO; FERREIRA, 2007), the climate of Lavras - MG is cwa, that is, temperate rainy season (mesothermic) with dry winter and subtropical rainy summer. The average temperature of the coldest month is below 18ºC and the hottest month is over 22ºC, with the average annual temperature of 19.4ºC and relative humidity of 76.2%. The average annual rainfall is 1,529 mm, with the driest months being from June to September.

Soil of the experimental area was classified as type 3, Red Latosol Ferric 62, 15 and 23 dag kg-1 of clay, silt and sand, respectively.

The experiment was installed in randomized blocks with three replications and plots with 16 plants per cultivar or genotype planted in the 3.0 x 3.0 m spacing.

The following genotypes and cultivars were evaluated: Prata type: Prata Anã (control), BRS Maravilha and PA 94-01 (genitor Prata Anã), BRS Vitória and PV 94-01 (Pacovan); Nanicão type: Grande Naine (control, Cavendish type), FHIA 17 (Hybrid of Gros Michel), and Type Maçã: Maçã (control) and YB 42-03.

The cycle of production of the mother and daughter plants and the accumulated one (from the planting of the mother plant to the harvest of the daughter plant) were evaluated, the periods being expressed in months. Production characteristics were as follows: fresh mass of the bunch (kg), number of fruits per bunch, length and diameter of the fruit (cm) and fresh mass of the fruit (g) of the medium bunch. The bunches were harvested when the fruits presented without pistils or floral remains, sharp corners, that is, ideal point of cut for the local market.

Plant development data were taken by measuring the diameter of the pseudocaule (cm) at 50 cm of the soil level and height of the plant (m), at the time of flowering.

It was also evaluated the incidence of yellow Sigatoka in the mother plant in flowering and harvest, through the number of leaves attacked, leaves without symptoms and leaves functional or alive. It was considered as functional leaf that presented in the flowering and harvest at least 2/3 of leaf area totally green.

Statistical analysis was performed using the Variance Analysis System software for the SISVAR balanced data (FERREIRA, 2011) and the comparison of means of treatments was performed using the Scott-Knott test at 5% probability.

III. RESULTS AND DISCUSSION

The results concerning the bunch and the fruit weight, number of fruits per bunch, length and diameter of these in the two cycles of the evaluated cultivars and genotypes are in Table 1.

TABLE 1

MEAN VALUES OF BUNCH AND FRUIT WEIGHT, NUMBER OF FRUITS PER BUNCH, LENGTH AND DIAMETER OF THE FRUIT OF THE FIRST AND SECOND CYCLES OF BANANA CULTIVARS AND GENOTYPES IN THE SOUTHERN REGION OF MINAS GERAIS, BRAZIL, 2016.

Cultivars / Genotypes	Bunch weight (kg)		Fruit weight (g)		Fruits by bunch		Length of fruit (cm)		Diameter of fruit (cm)	
	Mother plant	Daughter plant	Mother plant	Daughter plant	Mother plant	Daughter plant	Mother plant	Daughter plant	Mother plant	Daughter plant
FHIA 17 (N)	19,1 a	20,2 a	142,3 b	147,0 b	135,6 a	137,4 a	21,3 a	21,4a	4,0 a	4,0 a
Grande Naine (N)	17,2 b	17,8 b	146,3 b	144,0 b	118,2 b	125,0 b	20,2 b	20,2 b	3,9 b	3,9 b
PA 94-01 (P)	16,1 bc	17,8 b	120,3 c	126,1 c	134,3 a	141,5 a	19,5 b	19,8 d	3,9 b	3,9 a
Maravilha (P)	15,3 c	17,8 b	171,1 a	187,6 a	89,3 d	95,1 d	21,6 a	21,6 a	4,0 a	4,1 a
Vitória (P)	14,6 cd	16,1 b	155,0 b	158,6 b	95,0 c	101,5 c	20,3 b	20,5 b	3,8 b	3,9 b
PV 94-01 (P)	13,5 d	17,6 b	153,8 b	187,1 a	87,3 d	94,2 d	21,1 a	21,8 a	4,0 a	4,1 a
Prata Anã (P)	10,5 e	12,2 c	103,0 de	111,5 ed	104,0 b	110,2 c	15,2 c	15,6 c	3,5 c	3,5 c
YB – 42-03 (M)	8,8 f	9,5 d	98,8 ef	102,8 de	89,7 d	90,2 de	13,2 d	13,5 d	3,3 c	3,3 d
Maçã (M)	7 ,0 e	7,9 e	91,8 f	95,7 e	76,0 d	82,6 e	13,1 d	13,4 d	2,8 d	2,8 e
CV (%)	4,29	3,96	2,40	2,72	3,30	3,58	2,82	2,35	3,10	2,85

In the column, the averages followed by the same letter do not differ from each other to 5% by the Scott-Knott test.
N: Type Nanicão; P: Type Prata; M: Type Maçã

The genotype FHIA 17 produced higher fresh weight, number of fruits per bunch, length and diameter of the fruit, being overcome in fresh weight only by PV 94-01 and 'BRS Maravilha', in the second cycle.

The length and diameter of the fruits of the genotypes of FHIA 17, PV 94-01 and cultivar BRS Maravilha were significantly higher than the other evaluated materials.

The values of bunch and fruit weight, number of fruits per bunch, length and diameter of fruits observed in this study were significantly lower than those reported by Borges et al. (2011). These differences can be attributed to management, soil fertility and annual distribution and amount of rainfall (ALVES, 1999), since the trials were conducted in fairly distinct edaphoclimatic regions.

The cultivar Grande Naine, unique of the Cavendish type, produced bunches with superior weight to the genotypes of the 'Prata' type, only in the first cycle and number of fruits per cluster inferior to the one of PA 94-01, in the two cycles. The weight of the fruit was also lower than that of PV 94-01 and cultivar BRS Maravilha. The values of bunch and fruit weight and number of fruits per bunch of 'Grande Naine' obtained in this study are lower than those obtained by Donato et al. (2006) in Guanambi (BA), under irrigation and those reported by Silva, Pereira and Rodrigues (2008) in Cruz das Almas (BA) and by Borges et al. (2011) in Andirá (PR) under rainfed conditions. It is noteworthy that in Lavras (MG) and in much of the state of Minas Gerais, rainfall has been very low, even in the rainy season (from October to March). This causes water deficit in the soil and, consequently, lower utilization of fertilizers by plants.

Regarding the production of 'Prata' type materials, genotypes PV 94-01 and PA 94-01 and cultivars BRS Maravilha and BRS Vitória produced larger bunches and fruits in terms of weight than the cultivar Prata-Anã in the two cycles evaluated. The PV 94-01 along with the cultivar BRS Maravilha had the largest increases in bunch weight and fruit size from the first to the second cycle.

Among the materials of the 'Prata' type, PA 94-01 was the one that produced clusters with the highest number of fruits being these, similar in appearance and taste to the cultivar Prata-Anã.

Analyzing plant height, pseudocaule diameter and PA 94-01 production cycle (Table 2), it can be observed that this genotype was similar to the Prata-Anã cultivar. Although the plant height, pseudocaule diameter and number of live leaves in flowering PA 94-01 were considered adequate. However, Nomura et al. (2013) report that the production cycle of this genotype was later, resulting in lower productivity. The BRS Maravilha cultivar in terms of bunch weight, together with PA 94-01, were superior to BRS Vitória and PV 94-01 only in the first production cycle.

As regards weight, length and diameter, BRS Maravilha and PV 94-01, cultivar BRS Maravilha presented the highest weight in both cycles, and in the second cycle the fruits of PV 94-01 produced larger fruits in weight, length and weight. Diameter in the two cycles evaluated. The highest weight of the bunch and size of the BRS Maravilha fruits in relation to the Prata-Anã obtained in this work in dry conditions are confirmed by the reports of Silva et al. (2003) in Lavras (MG), by Ramos et al. (2009) in Botucatu (SP), by Vieira (2011) in Aquidauana (MS), by Santos and Carneiro (2012) in Jataí (GO) and by Mendonça et al. (2013) in Goiânia (GO). BRS Maravilha also surpassed Prata-Anã in the region of Jaíba (MG) (RODRIGUES; SOUTO; SILVA, 2006) and in southwestern Bahia (DONATO et al., 2009).

The genotype PV 94-01 and cultivar BRS Maravilha had the largest increases in bunch and fruit weight and number of fruits per bunch in the second cycle. This increase is also reported by Rodrigues, Souto e Silva (2006) for BRS Maravilha, SH 36-40 (Prata Graúda MG).

The genotype YB 42-03 and the cultivar Maçã produced the smallest clusters and fruits in terms of size, number of fruits per cluster. The YB 42-03 was slightly higher in these characteristics than the cultivar Maçã, its similar. These results corroborate with those reported by Silva, Pereira and Rodrigues (2008).

The cultivars Grande Naine and Prata Anã showed the lowest heights, inferior to 2.3 m in the mother plant and 2.7 m in the daughter plant (Table 2), results similar to those reported by Nomura et al. (2013). The largest size of these BRS Vitória cultivars was 3.5 m and 4.1 m followed by the PV 94-01 genotype with 3.1 m and 3.8 m, respectively, in the 1st and 2nd cycle. The larger size of the cultivars Vitória and PV 94-01 were also reported by Nomura et al. (2013). These results are already expected, since this characteristic is inherited from her mother-in-law Pacovan.

TABLE 2

MEAN VALUES OF PLANT HEIGHT, PSEUDOCAULE DIAMETER AND CYCLE OF PRODUCTION OF MOTHER AND DAUGHTER PLANTS OF BANANA CULTIVARS AND GENOTYPES IN SOUTHERN MINAS GERAIS. LAVRAS, BRAZIL, 2016.

Cultivars / Genotypes	Height (m)		Pseudocaule diameter (cm)		Production cycle (months)		
	Mother plant	Daughter plant	Mother plant	Daughter plant	Mother plant	Daughter plant *	Accumulated**
Grande Naine (N)	2,0 a	2,2 a	18,0 b	19,2 b	19,4 c	18,5 c	25,6 c
Prata Anã (P)	2,2 b	2,6 b	17,2 a	17,5 a	18,4 b	17,3 b	24,0 b
Maravilha (P)	2,5 c	2,7 b	22,0 d	22,7 d	18,2 b	17,2 b	24,3 b
Maçã (M)	2,6 c	2,9 c	16,9 a	17,6 a	16,6 a	15,7 a	21,7 a
FHIA 17 (N)	2,6 c	2,9 c	23,0 e	23,1 d	19,1 c	18,3 c	25,5 c
PA 94-01 (P)	2,6 c	2,8 c	22,1 d	22,9 d	18,1 b	17,1 b	23,8 b
YB 42-03 (M)	2,7 c	3,1 d	17,6 b	17,7 a	16,3 a	15,2 a	22,0 a
PV94-01 (P)	3,1 d	3,8 e	22,3 d	26,9 e	18,7 b	17,8 b	24,7 b
Vitória (P)	3,5 e	4,1 f	19,8 c	21,0 c	18,4 b	17,5 b	24,7 b
CV (%)	3,22	3,16	2,27	2,79	1,24	1,41	2,44

In the column, the averages followed by the same letter do not differ from each other to 5% by the Scott-Knott test.

**** Elapsed period of the appearance of the daughter plant until the harvest of the bunch***

***** Elapsed time from the planting of mother plant to the harvest of the daughter plant***

N: Type Nanicão; P: Type Prata; M: Type Maçã

Despite the larger size of the plant and the longer production cycle of BRS Vitória and PV 94-01 in relation to Prata-Anã, they may be a good option for producers because they are more productive and resistant to yellow and black Sigatoka Mal from Panama, as reported by Pereira et al. (2005) and Silva, Pereira and Rodrigues (2008).

Among the genotypes and cultivars of the Prata type, PA 94-01 and BRS Maravilha presented plant height and pseudocaule diameter superior to those of their Prata-Anã genitora. Rodrigues, Souto e Silva (2006) also report higher height of BRS Maravilha in relation to Prata-Anã.

The genotypes FHIA 17, PA 94-01 and PV 94-01 and cultivar BRS Maravilha presented the highest diameters of pseudocaule in both cycles, results similar to those reported by Nomura et al. (2013). The largest diameter increase from the first to the second cycle was observed in genotype PV 94-01.

The cycle of the Grande Naine cultivar in this work was significantly higher than that observed in the Ribeira Valley by Nomura et al. (2000) and lower than in Viçosa-MG, Cruz das Almas-BA, Guanambi-BA (SILVA et al., 2003) presented the lowest cycles, between 16.3 and 16.7 months in the first cycle and 15.2 a 15.7 months to 30.46 months in the second, with the daughter plant cycle being about one month shorter than that of the parent plant.

The largest production cycle of the mother plant in relation to the daughter plant is due to the period of readaptation and emission of new roots, since the seedlings from spontaneous shoots undergo the descortication or elimination of the adherent roots (ALVES, 1999).

The production cycle of PA 94-01 and the 'BRS Maravilha' in the first two cycles did not differ from their 'Prata-Anã' genitor, corroborating the results reported by Donato et al. (2009).

Comparing the production cycle of cultivars and genotypes produced in different regions, a great variation can be observed in the period between planting and harvesting. Thus, it is observed that the production cycle of the cultivars Prata Anã, Vitória, Grande Naine and genotypes PA 94-01, PV 94-01 in Lavras was between 0.5 and 3.0 months higher than in Goiânia - GO (MENDONÇA et al., 2013), in Botucatu (SP) (RAMOS et al., 2009) and in Jaíba (MG) (RODRIGUES; SOUTO; SILVA, 2006) and in Vale do Ribeira (SP) (NOMURA et al., 2013). However, it should be considered that in Jaiba and Botucatu, the crop was irrigated, a fact that favors the development of the plants and, consequently, anticipating the harvest, in addition to the inherent edaphoclimatic conditions of each place.

It is important to point out that the precocity of shoots and the time of selection of the follower together with their vigor are factors that influence the time of the bunch issue of the following generations. In the banana cultivars with good tillering, such as those of the types Prata, Nanicão and Maçã, the lateral shoots (daughters) begin to appear 30 to 45 days after planting. In cultivars of the Plantain subgroup (Terra, Terrinha and D'angola), shoots usually occur at the time of the bunch (ALVES, 1999).

The production cycle of the cultivar Prata-Anã in Botucatu-SP was 15.5 months (RAMOS et al., 2009), in Lavras-MG, 17.0 months (PEREIRA et al., 2002; PEREIRA et al., 2003) and in Maria da Fé-MG, 22.6 months (PEREIRA et al., 2002). It can be observed that in Lavras, the cycle was 1.5 months larger than in Botucatu, a difference that can be attributed to irrigation, management and planting time, and bunch emission and climate. However, in Maria da Fé, this cycle was about 5.5 months higher than in Lavras and 7.0 months higher than in Botucatu. This longer cycle in Maria da Fé can be attributed to the colder climate with average minimum temperatures of 10.7º C and altitude above 1,250 m (PEREIRA et al., 2002).

IV. CONCLUSION

The cultivars BRS Maravilha and PA 94-01 are recommended because they present greater productivity and similarity in the size, production cycle, flavor and appearance of the fruit in relation to Prata-Anã, traditionally cultivated in the region.

The genotype PV 94-01 and the cultivar Vitória, despite the greater size, can be recommended because it presents good productivity.

The genotype YB 42-03 is an alternative in relation to 'Maçã', being similar in productivity, size and production cycle.

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REFERENCES

[1] ALVES, E.J. (1999) A cultura da bananeira: aspectos técnicos, socioeconômicos e agroindustriais. 2. ed. Brasília: EMBRAPA/CNPMF. 585 p.

[2] AMORIM, E.P. et al. (2011) Banana Breeding: Progress and Challenger. New York: CRC Press, p. 252-280.

[3] BORGES, R.S. et al. (2011) Avaliação de genótipos de bananeira no norte do Estado do Paraná. Revista Brasileira de Fruticultura, v.33, n.1, p.291-296.

[4] CENTRAL DE ABASTECIMENTO DE MINAS GERAIS – CEASAMINAS (2015). Oferta de produtos/variedades: banana. Disponível em www.ceasaminas.com.br. Accessed in june 30, 2015.

[5] DANTAS, A.A.; CARVALHO, L.G.; FERREIRA, E. (2007) Classificação e tendências climáticas em Lavras, MG. Ciência e Agrotecnologia, v.31, n.6, p.186-1866.

[6] DONATO, S.L.R.; ARANTES, A.M.; SILVA, S.O.; CORDEIRO, Z.J.M. (2009) Comportamento fitotécnico da bananeira 'Prata-Anã' e de seus híbridos. Pesquisa Agropecuária Brasileira, v.44, n.12, p. 1608-1615.

[7] FOOD AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO) (2014). Faostat 2014. Disponivel em http://www.faostat3.fao.org. Accessed in june 10, 2015.

[8] FERREIRA, D.F. (2011) Sisvar: a computer statistical analysis system. Ciência e Agrotecnologia, v.35, n.6, p.1039-1042.

[9] INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATISTICA – IBGE (2013). Banco de dados. Produção agrícola municipal. Disponível em <http//www.sidra.ibge.gov.br/bda/agric>. Accessed in dec. 10, 2015.

[10] INSTITUTO CAPIXABA DE PESQUISA, ASSISTÊNCIA TÉCNICA E EXTENSÃO RURAL – INCAPER (2010). Bananas 'Japira' e 'Vitória' resistentes às doenças. Incaper em revista. Vitória, Informativo especial, ano 1, n.1, jan./dez.2010. Disponível em <http//incaes.web407.unis.net/revista.php?ideap=97> Accessed in july 27, 2015.

[11] MENDONÇA, K.H.; DUARTE, D.A.S.; COSTA, V.A.M.; MATOS, G.R.; SELEGUINI, A. (2013) Avaliação de genótipos de bananeira em Goiânia, Estado de Goiás. Revista Ciência Agronômica, v.44, n.3, p.652-660.

[12] NOMURA, E.S.; DAMATTO JUNIOR, E.R.; FUZITANI, E.J.; AMORIM, E.P.; SILVA, S.O. (2013) Avaliação agronômica de genótipos de bananeira em condições subtropicais do Vale da Ribeira, São Paulo. Revista Brasileira de Fruticultura, v.35, n.1, p.111-122.

[13] PEREIRA, L.V.; ALVARENGA, A.A.; MATOS, L.E.S; SILVA, C.R.R. (2002) Avaliação de cultivares de bananeira (Musa sp., AAB) em três locais do Estado de Minas Gerais. Ciência e Agrotecnologia, Edição Especial, p.1373-1382.

[14] PEREIRA, L.V.; SILVA, S.O.; ALVES, E.J.; SILVA, C.R.R. (2003) Avaliação de cultivares e híbridos de bananeira em Lavras, MG. Ciência e Agrotecnologia, v.27, n.1, p.17-25.

[15] PEREIRA, J.C.R.; GASPAROTTO, L.; PEREIRA, M.C.N. (2005) BRS Vitória: nova cultivar de bananeira do subgrupo Prata para o agronegócio no Estado do Amazonas. Brasília: Embrapa, 2p. (Embrapa. Comunicado Técnico, 34).

[16] RAMOS, D.P.; SARITA, L.; MISHAM, M.M.; DAMATTA JUNIOR, E.R. (2009) Avaliação de genótipos de bananeira em Botucatu, SP. Revista Brasileira de Fruticultura, v.31, n.4, p.1092-1101.

[17] RODRIGUES, M.G.V.; SOUTO, R.F.; SILVA, S.O. (2006) Avaliação de genótipos de bananeira sob irrigação. Revista Brasileira de Fruticultura, v.28, n.3, p.449-453.

[18] SANTOS, S.C.; CARNEIRO, C.C. (2012) Desempenho de genótipos de bananeira na região de Jataí-GO. Revista Brasileira de Fruticultura, v.34, n.3, p.783-791.

[19] SILVA, S.O.; PASSOS, A.R.; DONATO, S.L.R.; SALOMÃO, L.C.C.; PEREIRA, L.V.; RODRIGUES, M.G.V.; LIMA NETO, F.P.; LIMA, M.B. (2003) Avaliação de genótipos de bananeira em diferentes ambientes. Ciência e Agrotecnologia, v.27, n.4, p.737-748.

[20] SILVA, S.O.; PEREIRA, L.V.; RODRIGUES, M.G.R. (2008) Variedades. Informe Agropecuário, v.29, n.245, p.78-83.

[21] SILVA, S.O.; AMORIM, E.P.; SANTOS-SEREJO, J.A.; FERREIRA, C.F.; RODRIGUEZ, M.A.D. (2013) Melhoramento genético da bananeira: estratégias e tecnologias disponíveis. Revista Brasileira de Fruticultura, v.35, n.3, p. 919-931.

[22] VIEIRA, L.C.R. (2011) Avaliação de cultivares de bananeira na microrregião de Aquidauana-MS. Dissertação de Mestrado. Unidade Universitária de Aquidauana, Universidade Estadual do Mato Grosso do Sul, Aquidauana, 36p.