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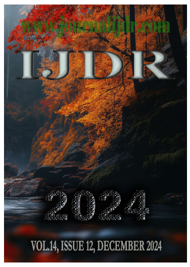

RESEARCH ARTICLE OPEN ACCESS

EVALUATION OF BANANA PLANTS GENOTYPES UNDER CONVENTIONAL AND ORGANIC PRODUCTION SYSTEM IN MATO GROSSO STATE, BRAZIL

***Givanildo Roncatto**

Embrapa Agrossilvipastoril, Sinop/MT, Brasil

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****Corresponding Author:***
Givanildo Roncatto

ABSTRACT

Banana crop is important for Mato Grosso State both for domestic consumption and for sale in other states; however, the occurrence of diseases, such as black Sigatoka, caused problems for its cultivation. Thus, introduction and evaluation of resistant genotypes to pests and diseases are required. Agronomic characteristics of banana genotypes were evaluated under two cropping system in the north of Mato Grosso State, Brazil. The experimental design was a 2 x 7 factorial, with two cropping systems (conventional and organic) and seven banana genotypes (BRS Platina, BRS Princesa, BRS Tropical, PA-9401; BRS Pacovan Ken, FHIA-17 and Thap Maeo). Seedlings were cultivated at 4.0 x 2.5 x 1.7 m spacing and irrigated by microsprinkler. In the first crop cycle vegetative and productive genotypes attributes were evaluated. The results showed, at flowering time, that cropping system affected the agronomic attributes, except number of suckers. The genotypes flowered earlier in the conventional system than in the organic, and had smallest pseudostem height, except 'BRS Princesa' and 'FHIA-17'. The genotypes 'FHIA-17' produced heavier bunches (49.5 kg), but in a longer cycle (410 days). Banana 'Thap Maeo' showed cycle of 360 days, bunches of 24.3 kg and is resistant to black Sigatoka.

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INTRODUCTION

The banana tree (Musa spp.) is a native species from Asia, which has great economic importance and it is cultivated throughout Brazil (BORGES, 2004; BORGES *et al*., 2006). Its cultivation ranks second position in terms of production volume and consumption, with the Northeast region being the largest producer of this fruit (CORDEIRO, 2012). In 2012, Brazilian production reached 6.9 million tons, making the country the fifth largest global producer (FAO, 2012). In Brazil, conventional, organic, and integrated production systems are stood out. Intensive soil management predominates in conventional system and the use of fertilizers and pesticides is not always correct. The organic system aims to offer healthy products with high nutritional value, free from contaminants that could endanger the lives of consumers, farmers, and the environment, in addition to preserving and expanding biodiversity. Integrated production of fruit focuses on sustainability, the use of natural resources, and regulating mechanisms for replacing polluting inputs, as well as the use of appropriate monitoring tools for all procedures, ensuring proper product traceability (CORDEIRO & MOREIRA, 2006). However, the expansion of national banana cultivation faces serious phytosanitary problems, such as Panama disease (Fusarium oxysporum f. sp. Cubense), Yellow Sigatoka (Mycosphaerella musicola), and Black Sigatoka (Mycosphaerella fijiensis), the latter one is considered the main phytosanitary problem for banana cultivation worldwide (CORDEIRO *et al*., 2004; CORDEIRO & MATOS, 2012). The state of Mato Grosso produced approximately 57 thousand tons of bananas in 2012 (IBGE, 2013), which were used for domestic consumption and commercialized in other states. However, the occurrence of Black Sigatoka in Cáceres in 1999 caused significant losses to the activity (SOUZA & FEGURI, 2004). Genetic improvement of banana tree, resulting in new genotypes that are more productive, of better quality, and resistant to diseases, is an economically viable and environmentally a correct strategy for phytosanitary control (SILVA *et al*., 2004; BORGES *et al*., 2011; XAVIER *et al*., 2012). Embrapa Mandioca and Fruticultura has developed and recommended banana genotypes resistant to main diseases, such as BRS Platina, BRS Tropical, BRS Princesa, among others (SILVA *et al*., 2002; 2004; AMORIM *et al*., 2011; BORGES *et al*., 2011; LÊDO *et al*., 2011; XAVIER *et al*., 2012). The organic banana production system has been growing in recent years (BORGES *et al*., 2006; 2012). Some varieties, such as 'Prata Anã', have shown good productive performance after five cycles when fertilized with organic compost (DAMATTO JR. *et al*., 2011). Therefore, it is necessary periodically evaluate the agronomic characteristics of new banana genotypes in the main producing regions, both in conventional and organic systems. The aim of this study was to evaluate the agronomic characteristics of banana genotypes in conventional and organic production systems in northern of Mato Grosso during the first cycle.

MATERIAL AND METHODS

The experiment was conducted in the municipality of Sinop (MT), at geographic coordinates 11º 42' 12" South and 55º 27' 36" West, at an altitude of 380 meters. The region climate, according to Köppen, is of the Aw type, characterized by high temperatures and an average annual rainfall of 2,000 mm, with a well-defined dry season and an average annual temperature of 30º C. The biome is a transition between Cerrado and Amazon Rainforest. Before planting, granulometric and chemical analyses of the soil were performed at a depth of 0-20 cm. The sand content was 550 g kg-1, silt was 91 g kg-1, and clay was 359 g kg-1. The chemical analysis showed a pH (CaCl2) of 4.9, P (Mehlich-1) of 74 mg dm-3, Ca, Mg, K, Al3+, H+Al in cmolc dm-3 of 3.01, 0.77, 0.05, 0, respectively, and 4.66,; organic matter of 29.63 g dm-3; base saturation (V) of 45%; and micronutrients B, Cu, Fe, Mn, and Zn in mg dm-3, respectively ,of 0.93, 3.40, 71.00, 18.97, and 39.98. For this research a 2 x 7 factorial design was used, with two production systems (conventional and organic) and seven banana genotypes: BRS Pacovan Ken (AAAB, Pacovan hybrid); BRS Platina (AAAB, Prata Anã hybrid); BRS Princesa (AAAB, Maçã-type hybrid); BRS Tropical (AAAB, Maçã-type hybrid); FHIA-17 (AAAA, Gros Michel hybrid); PA-9401 (AAAB, Prata Anã hybrid); and Thap Maeo (AAB), with six useful plants per genotype, each plant was one repetition.

the area designated for the organic system, 5 L of composted pig manure per linear meter and 4,000 kg ha-1 of rock powder as a potassium source were applied. Every 20 days, 40 m3 ha-1 of composted pig manure was applied. In the first cycle, the following plant data were recorded: days to flowering; days to harvest the bunch; height and diameter of the pseudo-stem; number of suckers; number of live leaves at flowering and at bunch harvest; bunch weight; peduncle weight; hand weight; number of hands per bunch; number of fruits per hand; fruit weight; fruit length of the second hand; fruit perimeter of the second hand; and fruit diameter of the second hand. The number of days to flowering was determined by counting the days from planting to the emergence of the bunch. The number of days to harvest was calculated by counting the days from planting to harvest. Pseudo-stem height was measured with a metal tape measure from ground level to the leaf rosette, and the result was expressed in centimeters (cm). Pseudo-stem diameter was measured 0.30 m above the ground level with a measuring tape to determine the perimeter (in cm), and then the diameter was calculated using the formula $D = P/\pi$, where D = pseudo-stem diameter (cm) and P = pseudo-stem perimeter (cm).

Table 1. Analysis of variance with the sources of variation (SV) and their respective degrees of freedom (DF), mean squares (MS), and F-values for the attributes: days to flowering (DFL), plant height (ALT), pseudo-stem diameter (DPC), number of suckers (NPF), and number of living leaves at flowering (NFH) of seven banana tree genotypes in two production systems (conventional and organic), in the first cycle. Sinop, MT. 2012-2013.

		DFL (days)		ALT (cm)		DPC (cm)		NPF		NFH	
FV	GL	QM	F	QM	F	QM	F	QM	F	QM	F
Genotypes	6	4171,24603	293,3562**	22997,746	79,543**	88,09273	70,92**	25,75	14,38**	14,24603	14,145*
Systems	1	12337,19048	867,6524**	13998,762	48,383**	32,24002	25,95**	0,04762	0,0266^{ns}	26,29762	26,111**
Gen x sist	6	192,19048	13,51641*	706,3175	2,44296*	3,10831	2,50237*	2,4643	1,37634^{ns}	1,76984	1,75729^{ns}
Residue	70	14,21905		289,1238		1,24215		1,79048		1,00714	
TOTAL	83										
CV (%)		1,5		4,6		4,3		21,1		7,4	

*significant 5%; **significant 1%

Table 2. Analysis of variance with the sources of variation (SV) and their respective degrees of freedom (DF), mean squares (MS), and F-values for the attributes: number of days from planting to harvest (NDC), number of living leaves at harvest (NCH), bunch weight (MCH), pseudo-stem weight (MEN), and bunch weight (MPE) of six banana trees genotypes in the conventional system, during the first cycle. Sinop, MT. 2012-2013.

		NCH (days)		NFC		MCH (kg)		MEN (kg)		MPE (kg)	
FV	GL	QM	F	QM	F	QM	F	QM	F	QM	F
Genótypes	5	4078,533	667,396**	10,3833	13,642*	874,3456	137,32**	5,1110	61,399*	748,083	132,55**
Residue	30	6,111		0,7611		6,3671		0,0833		5,6437	
TOTAL	35										
CV (%)		0,7		8,4		9,5		13,2		9,7	

*significant 5%; ** significant 1%

Table 3. Analysis of variance with the sources of variation (SV) and their respective degrees of freedom (DF), mean squares (MS), and F-values for the attributes: number of hands per bunch (NPE), number of fruits per bunch (NFR), fruit weight (MFR), length of the second hand fruit (CFR), perimeter of the second hand fruit (PFR), and diameter of the second hand fruit (DFR) of six banana tree genotypes in the conventional system, during the first cycle. Sinop, MT. 2012-2013.

		NPE		NFR		MFR (g)		CFR (cm)		PFR (cm)		DFR (cm)	
FV	GL	QM	F	QM	F	QM	F	QM	F	QM	F	QM	F
Genotypes	5	31,4277	79,676*	13548,57	72,95*	2219,292	31,54*	110,135	96,997*	5,5991	41,136*	0,469333	19,36*
Residue	30	0,3944		185,722		704,366		1,135		0,1361		0,024243	
TOTAL	35												
CV (%)		7,0		9,4		15,2		6,5		13,3			

*significant 5%; ** significant 1%

The banana seedlings, produced by micropropagation, were transplanted into polyethylene bags with a capacity of 700 cm3, containing a soil-based substrate. The acclimatization period lasted 50 days, when the seedlings reached 40 cm tall they were then planted in the final location. The spacing was 4.0 x 2.5 x 1.7 m (double rows), and micro-sprinkling was the irrigation system used. Fifteen hundred kg ha-1 of dolomitic limestone were applied 45 days before planting. In the area designated for the conventional system, 500 kg ha-1 of single superphosphate was broadcasted and incorporated with a harrow. At planting, furrows were opened, and 300 kg ha-1 of single superphosphate was applied, along with 300 kg ha-1 of Nutri Solo® (16% Ca, 2% Mg, 8% S, 0.30% B, 0.09% Cu, and 0.30% Zn). Every 20 days, 100 kg ha-1 of 16-06-16 (N-P-K) fertilizer was applied. In

The number of suckers was determined by counting them at flowering. The number of live leaves at flowering and harvest was determined by counting the live leaves present on the plant, considering as functional a leaf that was with more than 10% of its surface area green. The bunch and peduncle weights were measured with a dynamometer; the hand weight was determined by subtracting the peduncle weight from the total bunch weight; the number of hands per bunch and the number of fruits per hand were determined by counting; fruit weight was measured by weighing ten individual fruits on a semi-analytical balance and calculating the average; the length and perimeter of the second hand fruit were measured with a tape measure; and the diameter of the fruit from the second hand was measured with a digital caliper. The data were subjected to analysis of variance, and when there was a significant interaction between factors, the degrees of freedom were split. Treatment means were compared using the Scott-Knott test at a 5% of probability level, through the GENES software (Table 1). At harvest, intense attack from rhizome borer hampered data collection in the organic system, and visual symptoms of potassium deficiency were observed, making it impossible to harvest the plants in this system. Thus, only six genotypes were evaluated in the conventional system, as the 'BRS Tropical' plot was lost (Tables 2 and 3).

RESULTS AND DISCUSSION

There was an effect of the cultivation system and genotype, as well as an interaction between factors, on the number of days to flowering, pseudo-stem height, and diameter (Table 4). In the conventional system, the genotypes BRS Platina (220 days) and BRS Pacovan Ken (223 days) were the earliest to flower, while the genotype FHIA-17 (280 days) was the latest. In the organic system, BRS Platina (250 days) and BRS Pacovan Ken (254 days) were also the earliest. FHIA-17 (293 days) was the latest, as in the conventional system (Table 4). A study in Mata Atlântica biome showed earlier flowering in the third cycle in the conventional system, only for FHIA-Maravilha, when compared to the organic system (RIBEIRO *et al*., 2013). In Cerrado biome (MS), in the first cycle, the banana trees Nanica (206 days) and São Tomé (207 days) were the earliest, while Prata (251 days) and Mysore (263 days) were the latest (SILVA *et al*., 2006). In Mata Atlântica biome (SP), Prata Aná was the earliest genotype (350 days), while Thap Maeo (413 days), Caipira (416 days), Grande Naine (429 days), and FHIA-18 (435 days) were the latest (RAMOS *et al*., 2009). In Cerrado biome (GO), the cv Thap Maeo had a shortened interval between planting and flowering, with a dose of 300 kg ha-1 of N and 450 kg ha-1 of K, when compared with the control and **Prata Anã** (RATKE *et al*., 2012). Regarding to pseudo-stem height, plants were taller in the organic system, except for BRS Princesa (average 363 cm) and FHIA-17 (average 351 cm). In both systems, BRS Pacovan Ken had the tallest plants, while BRS Platina had the shortest, which are characteristics of these genotypes, originating from Pacovan and Prata Anã, respectively (Table 4).

Four banana tree genotypes (Thap Maeo, Nam, Yangambi, and Mysore) were evaluated in an experiment in South of Bahia, Mata Atlântica biome, where Thap Maeo reached 204 cm tall in the first cycle and 337 cm in the second cycle (LEITE *et al*., 2003). In the conditions of the Recôncavo region of Bahia (Mata Atlânticc), Thap Maeo reached 271 cm of pseudo-stem height in the first cycle (SILVA *et al*., 2002). In Cerrado biome, this genotype showed 202 cm tall (RATKE *et al*., 2012); and in semi-arid conditions in North of Minas Gerais, it reached 246 cm in the first cycle, which was higher than Prata Anã (198 cm) and Caipira (180 cm) (GONÇALVES *et al*., 2008), showing that, despite being a characteristic of the variety, the environment influences the result. In Baiano semi-arid region, BRS Platina reached 285 cm tall in the first cycle, confirming its shorter stature compared to other Prata Anã hybrids (DONATO *et al*., 2009). In Paraná, in Mata Atlântica ecosystem, BRS Platina had the shortest pseudo-stem height, and BRS Pacovan Ken had the tallest, followed by BRS Princesa and FHIA 17 (BORGES *et al*., 2011). In São Paulo State, in a study among banana tree genotypes, the greatest height was achieved by BRS Tropical (320 cm), Prata Zulu (300 cm), and Grande Naine (270 cm); Prata Anã (210 cm) and Nanicão (240 cm) had the shortest heights (RAMOS *et al*., 2009). Souza *et al*. (2011) evaluated materials from three genomic groups (AAA, AAB, and AAAB), and found that for the AAAB group (FHIA-Maravilha, FHIA-18, Prata Graúda, and BRS Tropical), there was no height difference (average 350 cm), while in AAA, Grande Naine (304 cm) and Caipira (320 cm) were the tallest, and in the AAB group, the tallest were Prata Zulu (368 cm) and Thap Maeo (344 cm). Pseudo-stem height reflects the vegetative potential of the plant; however, tall plants make harvesting more difficult and are more susceptible to tipping (DONATO *et al*., 2003). Therefore, it is recommended to select genotypes with moderate height, as long as they have good productive potential and other desirable agronomic characteristics (SILVA *et al*., 1999; DONATO *et al*., 2003). Regarding pseudo-stem diameter, significant differences were observed between the conventional and organic systems for BRS Platina, PA-9401, and Thap Maeo, with larger values in the conventional system. FHIA-17 had the largest pseudo-stem diameter in both systems (Table 4). In the conventional system, the smallest pseudo-stem diameters were observed in Thap Maeo (24.0 cm) and BRS Platina (24.5 cm); and in the organic system in Thap Maeo (21.2 cm) (Table 4), higher values than those reported by Leite *et al*. (2003) (18.9 cm) and Silva *et al*. (2002) (18.3 cm) in the first cycle.

Pseudo-stem diameter is related to plant vigor, and it is interesting to present higher values. Pseudo-stem diameter, plant height, and bunch weight are key factors in the genotype's resistance to tipping.

Table 4. Number of days to flowering, pseudo-stem height, and diameter as a function of banana trees genotypes and production system, in the first cycle (Average of six repetitions). Sinop, MT. 2012-2013.

GENOTYPE	Days to flowering			Pseudo-stem height (cm)			Pseudo-stem diameter (cm)		
	CON[1]	ORG	Média	CON	ORG	Média	CON	ORG	Média
BRS Platina	220 Be	250 Ae	235	297 Bd	335 Ad	316	24,5 Ad	22,5 Bd	23,5
BRS Pacovan Ken	223 Be	254 Ae	238	429 Ba	476 Aa	452	25,6 Ac	25,6 Ac	25,6
BRS Tropical	230 Bd	261 Ad	245	385 Bb	408 Ab	396	25,3 Ac	24,6 Ac	24,9
PA-9401	231 Bd	262 Ad	246	333 Bc	360 Ac	346	28,9 Ab	27,0 Bb	27,9
Thap Maeo	250 Bc	266 Ac	258	342 Bc	373 Ac	358	24,0 Ad	21,2 Be	22,6
BRS Princesa	261 Bb	280 Ab	270	358 Ac	367 Ac	363	25,7 Ac	25,0 Ac	25,4
FHIA-17	280 Ba	293 Aa	287	349 Ac	354 Ac	351	30,9 Aa	30,3 Aa	30,6
Average	242,2	266,4	254,3	356	382	369	26,4	25,2	25,8

1CON: conventional; ORG: organic. Means followed by the same lowercase letter in the column do not differ statistically by the Scott-Knott test at 5% of probability. Means followed by the same capital letter in the row do not differ statistically by the F test of ANOVA at 5% probability.

Table 5. Number of suckers and living leaves at flowering as a function of banana trees genotypes and production system (Conventional - CON and Organic - ORG), in the first cycle (Average of six repetitions). Sinop, MT. 2012-2013

GENOTYPE	Number of suckers			Number of living leaves		
	CON	ORG	Means	CON	ORG	Means
BRS Platina	5,0	5,8	5,4 c	13,3	12,3	12,8 b
BRS Pacovan Ken	5,2	5,7	5,4 c	13,8	12,5	13,2 b
BRS Tropical	6,5	7,3	6,9 b	15,0	13,0	14,0 a
PA-9401	5,8	6,3	6,1 c	14,2	12,0	13,1 b
Thap Maeo	5,5	5,3	5,4 c	13,0	12,8	12,9 b
BRS Princesa	6,5	4,8	5,7 c	14,2	13,8	14,0 a
FHIA-17	9,7	9,2	9,4 a	11,2	10,3	10,8 c
Average	6,3 A	6,4 A	6,3	13,5 A	12,4 B	13,0

Means followed by the same lowercase letter in the column do not differ statistically by the Scott-Knott test at 5% probability. Means followed by the same capital letter in the row do not differ statistically by the F test at 5% of probability.

Table 6. Production attributes as a function of banana trees genotypes in the conventional system, in the first cycle (Average of six repetitions). Sinop, MT. 2012-2013

GENOTYPE	[1]DCH (dias)	NFC	MCH (kg)	MEN (kg)	MPE (kg)	NPE	NFR	MFR (g)	CFR (cm)	PFR (cm)	DFR (cm)
BRS Platina	330 e	9,0 c	20,50 c	1,66 c	18,84 c	7,7 d	105 d	180,29 b	15,9 c	13,8 b	4,4 a
BRS Pacovan Ken	378 b	9,3 c	22,70 c	1,85 c	20,85 c	6,2 e	89,7 e	237,47 a	20,6 a	14,6 a	3,8 c
PA-9401	361 d	9,7 c	28,18 b	2,38 b	25,81 b	9,3 c	157,5 c	163,95 b	17,4 b	13,0 c	4,1 b
Thap Maeo	360 d	11,5 a	24,30 c	1,76 c	22,55 c	12,2 a	212 a	107,25 c	11,4 d	12,1 d	3,9 c
BRS Princesa	371 c	12,3 a	14,60 d	1,54 c	13,06 d	7,5 d	120 d	109,91 c	11,4 d	12,3 d	3,9 c
FHIA-17	410 a	10,7 b	49,50 a	3,98 a	45,52 a	11,0 b	182 b	250,08 a	21,2 a	13,9 b	4,5 a
Average	368	10,4	26,63	2,19	24,44	9,0	144,4	174,83	16,3	13,3	4,2

Means followed by the same lowercase letter in the column do not differ statistically by the Scott-Knott test at 5% probability.
1DCH: days from planting to harvest; NFC: number of living leaves at harvest; MCH: bunch weight; MEN: pseudo-stem weight; MPE: hand weight; NPE: number of hands per bunch; NFR: number of fruits per bunch; MFR: fruit weight; CFR: length of the second-hand fruit; PFR: perimeter of the second-hand fruit; and DFR: diameter of the second-hand fruit.

This is particularly important in regions with strong winds. Therefore, a genotype with medium or short height, coupled with a larger pseudo-stem diameter, will be less susceptible to tipping (SILVA *et al*., 1999; 2002; 2004; RAMOS *et al*., 2009). In Amazon biome (AC), Siviero *et al*. (2006) found that Thap Maeo had a larger diameter (24.2 cm) compared to BRS Pacovan (16.9 cm), which was different from the results found in this study in both production systems, where BRS Pacovan Ken had the largest pseudo-stem diameter (Table 4). Similar values were observed for BRS Tropical (24.5 cm) and Thap Maeo (20.6 cm) in Mata Atlântica biome (PA) (NASCIMENTO *et al*., 2009). In Baiano semi-arid region, in the first cycle, the Prata Anã banana tree had a pseudo-stem diameter of 26.1 cm, BRS Platina had 26.4 cm, and FHIA-18 reached 30.6 cm (DONATO *et al*., 2009). In Cerrado biome (GO), the pseudo-stem diameter of Thap Maeo was 15.6 cm (SANTOS & CARNEIRO, 2012). In Mata Atlântica biome (PR), FHIA-17 reached the largest pseudo-stem diameter, while BRS Platina had the smallest (BORGES *et al*., 2011). There was an effect of the genotype on the number of suckers, and cultivation system and genotype on the number of living leaves, with no interaction between the factors; however, there were no significant differences between the conventional and organic systems for the number of suckers. The highest number of suckers was observed in FHIA-17 (9.4), followed by BRS Tropical (6.9) (Table 5). In Mata Atlântica biome (AC), 6.2 suckers were observed in Thap Maeo and 4.6 in BRS Pacovan Ken at flowering (SIVIERO *et al*., 2006).

The number of living leaves at flowering was 9% higher in the conventional system (13.5 leaves) than in the organic system (12.4 leaves), with BRS Tropical and BRS Princesa showing the highest number (14.0 leaves), while FHIA-17 had the lowest number of leaves (10.8) (Table 5). Ramos *et al*. (2009) also found a higher number of living leaves in the conventional production system. Siviero *et al*. (2006) observed 9.9 leaves for Thap Maeo and 10.2 for BRS Pacovan Ken at flowering in Mata Atlântica biome (AC). In the same biome (PA), value was 14 for both Thap Maeo and BRS Tropical (NASCIMENTO *et al*., 2009). The number of leaves is important because it reflects the productive potential of the genotype. In other words, a higher number of leaves at flowering suggests that the bunch may have satisfactory conditions for its development (RAMOS *et al*., 2009). Souza *et al*. (2011) consider a number above eight leaves per plant to be sufficient for the normal development of the bunch. Regarding the plant cycle (days from planting to harvest), the genotype BRS Platina (330 days) was the earliest, while FHIA-17 was the latest (410 days) (Table 6). In Mata Atlântica biome (BA), the genotypes Thap Maeo and Caipira were the earliest in the conventional cultivation system, compared to FHIA-Maravilha, Pacovan Ken, Prata Anã, and Tropical (RIBEIRO *et al*., 2013). In Cerrado biome (GO), the longest cycle was for FHIA-17 (571 days), followed by Pacovan Ken (546 days), Thap Maeo (458 days), PA-9401 (456 days), and BRS Platina (448 days) (MENDONÇA *et al*., 2013). A shorter time interval between flowering and harvest results in a shorter stay of the fruits in the field, reducing the chances of injury and loss of economic value (SANTOS *et al*., 2006; RIBEIRO *et al*., 2013). The highest number of living leaves at harvest was recorded in BRS Princesa (12.3) and Thap Maeo (11.5), and the lowest in BRS Platina, BRS Pacovan Ken, and PA-9401 (average of 9 leaves) (Table 6).

These values were higher than those found in Mata Atlântica biome (BA), where 7.6 living leaves at harvest were observed for Thap Maeo and 5.6 living leaves at harvest for Pacovan Ken (RIBEIRO et al., 2013). In Cerrado biome (GO), 6.4 living leaves were observed at harvest in FHIA-17, 7.0 leaves in Thap Maeo, 7.2 leaves in BRS Platina, 4.4 leaves in PA-9401, and 4.0 leaves in Pacovan Ken (MENDONÇA et al., 2013). The banana tree FHIA-17 had the highest bunch weight (49.50 kg), almost twice as much as the others; and BRS Princesa had the lowest (14.60 kg), which was also observed for the pseudo-stem weight and hand weight for the genotypes FHIA-17 (Table 6). These results are in line with the literature. In a study conducted in Eastern Tanzania, FHIA-17 reached a bunch weight of 36.5 kg, with 13.6 hands per bunch, 16.6 fruits per hand, and an average fruit weight of 161.80 g (MSOGOYA et al., 2006). In Rwanda, in the province of Uganda, FHIA-17 produced bunches weighing 53.4 kg, with 14.2 hands per bunch, 21.6 fruits in the second hand, and a total of 266 fruits (GAIDASHOVA et al., 2008). In Mata Atlântica biome (SP), the bunch weight of FHIA-17 ranged from 30 to 36 kg, with 10 to 12 hands per bunch and 180 to 210 fruits (NOMURA et al., 2013). In Cerrado biome (GO), FHIA-17 produced bunches weighing 28.6 kg, hand weight of 26.2 kg, with 9.6 hands per bunch and a total of 146 fruits, with an average fruit weight of 214 g (MENDONÇA et al., 2013). Meanwhile, BRS Princesa produced bunches weighing 10 to 15 kg in Mata Atlântica biome (SP) and BRS Platina produced bunches weighing 16 to 20 kg (NOMURA et al., 2013).

CONCLUSIONS

The production system influenced the agronomic characteristics of the genotypes, except for the number of suckers at flowering. The genotypes flowered earlier in the conventional system than in the organic system and showed shorter stature, except for BRS Princesa and FHIA-17**.** It was not possible to harvest plants in the organic system. The genotype FHIA-17 produced larger bunches but in a longer cycle. The banana tree Thap Maeo had a short cycle (less than a year), medium-sized bunches, and it is resistant to Black Sigatoka. The genotypes evaluated can be cultivated in Mato Grosso state, in a conventional system.

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