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NEST ARCHITECTURE AND MANAGEMENT OF JANDAIRA BEE (*MELIPONA SUBNITIDA* DUCKE) IN THE SEMI-ARID OF PARAÍBA, BRAZIL

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ABSTRACT

Our objective was to study the nest architecture and management of *Jandaira bee* at a commercial cultivation, located in São José do Rio do Peixe, semi-arid region of Paraiba, Brazil. Data was collected in colonies housed in rational nesting boxes, "Nordestina" model, from November 2014 to July 2015. Parameters related to the brood and food area were measured. For the brood area, the length, width and height (cm), number of brood combs per colony, number of brood cells per cm^2, cell volume and cell height were measured. For the food area, the number of honey and pollen pots per colony, their height (cm) and diameter (cm), volume honey on pots (ml) and weight of pollen on pots (g) were evaluated. On average, 5.10 brood combs were found per colony, with 10.42cm in length and 5.58cm in width. We observed 4.10 brood cells per cm^2, with diameter and height of 0.52cm and 0.79cm, respectively; an average of 30.41 honey pots, the height, diameter and volume showed, respectively, the mean values of 3.07cm, 3.05cm and 6.73ml. The average number of pollen pots was 12.21 units per colony, with 3.04cm in height, 2.8cm in diameter and 7.23g of weight per pot. The farming of *Jandaíra* bee in rational nesting boxes provides a better use of products made by these insects, offering better handling conditions to the beekeeper and preventing the destruction of native vegetation.

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INTRODUCTION

Stingless bees are classified at the Apoidea super family, distributed at tropical and subtropical areas, occupying almost all Latin America, Africa, South West of Asia and North of Australia. The cultivation of this kind of bees is most common in America, where we can find the highest species diversity, around 400 described species (Villas-Bôas, 2012). In Brazil, they are the main group of native social bees, initially cultivated by indigenous communities, which commonly known as "stingless indigenous bees" (Campos, 1996). In the semi-arid region of Brazil, the farming of Jandaíra bees (*Meliponasubnitida*) is scarce. The reason for the reduced cultivation practices is the low abundance in nature. Jandaíra bees are regarded as excellent pollinators, responsible for most of the pollination of native plant species (40% to 90%) in the semi-arid of Brazil (Kerr *et al*., 1996). It is estimated that one-third of human feeding depends either directly or indirectly on bee pollination (Villas-Bôas, 2012). Bee cultivation is considered one of the few agricultural activities that me*et al*l the requirements of the sustainability tripod: economic, generating income for the farmer; social, providing family labor in the field; and, the ecological, once it does not need to deforest (AlcoforadoFilho, 1998). It is an activity considered to be self-sustaining, easy to handle and still possible for the whole family, especially women. The National Council for the Environment (CONAMA) disciplined, through Resolution No.

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346 of August 16, 2004, the use and protection of native wild bees, as well as the implementation of honeybee farms. The Jandaíra bee (*Meliponasubnitida* Ducke) is a typical species from the semiarid area of Brazil. However, there is limited literature about its ecology and cultivation. The book "Aabelha Jandaíra" from Bruening (1990) is the first and most important work about the species. In this book, Bruening (2001) states that Jandaíras only live on the Caatinga Biome, a semiarid area of Brazil. But even in that area, Jandaíras are not found in the mountains and a region called "Agreste". Their nests have the general characteristics of the nests of other species, the entrance door is always well cared for, without barbs, smooth, with clay finish forming streaks, whose diameter is calculated for workers with honey and pollen. Jandaíra honey is most used as medicine due to its antiseptic and therapeutic properties, reaching high commercial values. We have the aim to describe the nest architecture and the management of Jandaíra bees (*Meliponasubnitida* Ducke) cultivated in boxes of the model "Nordestina" at a honey bee farm from semi-arid region of Paraíba, Brazil. This work also contributes for the breeding and preservation of Jandaíra bees, which is a significant pollinating species.

MATERIALS E METHODS

The work was developed at the honey bee farm of mister Antônio Belo de Albuquerque, Baixio dos Albuquerques farm, rural area of the city São João do Rio do Peixe, Paraíba State. São João do Rio do Peixe is one of the 83 cities from the semi-arid region of Paraíba, Brazil, located at the extreme West of Paraíba State. It is located at an altitude of 287m, at the coordinates 38º 26' 56'' of longitude and 06º 43' 44'' of latitude. The city occupies an area of 474, 430 Km^2, a population density of 38.36 in habitants/Km^2 and has a population of 18,201 inhabitants, of which 11,316 are rural residents (IBGE, 2010). The landscape is characteristic of semi-arid, with a reasonably monotonous pediplantation. The mountainous relief is predominantly soft-wavy, cut by narrow valleys with dissected slopes. These isolated reliefs lead to great cycles of erosion that affected much of the northeastern semi-arid (Mascarenhas *et al*., 2005). Vegetation is classified as Hypererophilic Caatinga with deciduous forest. The climate is Tropical Semi-arid, with summer rains. Rainy period occurs between November and April, with an annual precipitation of 431.8mm (Mascarenhas *et al*., 2005). Agriculture and livestock farming are the main economic activities of the community. Studied colonies were cultivated in rustic boxes made by the breeder, with pine wood – soft and simple to work, suitable for bee farming. The dimensions of the boxes were 70 cm of length by 11 cm in width and 13 cm of height. A hole is made in the front, with a diameter of 9 mm, which allows the traffic of a bee at a time. The front board is nailed with a slight slope forming a small stop on the lower outer surface which, according to the breeder, is used for the bee to land before entering the house. At the back, an opening of approximately 20 mm is made, where a piece of a barrel is placed to collect the honey and to place the feeder when there is need of artificially feeding the colony. The sampling of honey is made through the perforation of the pots. The boxes have an internal partition separating the brood area (nest area) from the feeding area (honey and pollen area). The barrier has an opening at the side or at the top to allow the traffic of bees between the areas. Contrary to Bruening (2001) that relates that there is no need to divide the boxes, once it just difficult the work of the breeder to split the colony and limits the available space. However, the model of boxes used here has been used since the 19th century in the Brazilian States of Pernambuco, Rio Grande do Norte and Bahia (Nogueira-Neto 1997). According to Bruening (2001), Jandaíras need a space of 15x15x15 cm (3.375cm3) to deposit their nests, consisting of a small difference from the boxes used here.

The sampling of 30% of the colonies of Jandaíra was performed during November 2014 and July 2015. Due to the long periods of drought in the region, the number of sampling data was limited, mainly in the area of food (volume of honey pots and weighing the pollen pots). During this period, colonies were divided, and none of them were destroyed, keeping the colonies in their best preservation conditions. The evaluated parameters used to characterize the colony were: the number of combs or discs of brood per colony (unity); length of combs or brood (cm); width of combs or brood (cm); nest height (cm); diameter of brood' cells (cm); height of brood' cells (cm); number of cells per cm^2 in brood' disc (un); and volume of the brood cells (ml). To measure the length, width, and height of combs and discs, we used a ruler graduated in centimeters. The cell diameter and height were measured with the aid of a digital caliper with 0.01 cm of precision. The number of cells per cm^2 in the brood comb was measured using the diameter of each cell, calculating their respective areas and, finally, calculating the ratio between 1 cm^2 and the area occupied by each cell. The method of counting cells created by Aidair (1996), which decreases the damage of cells during the counting, was not used here due to the rectangular dimensions of the boxes. The volume of brood cells (ml) was measured using the diameter and height of each cell. For the characterization of the feeding area, we used the following parameters: height (cm), diameter (cm) and volume (ml) of pots of honey, height (cm), diameter (cm) and weight (g) of pollen pots. Only the fully operculated pots were measured. The space occupied by the feeding area was measured with a graduated ruler, and the height and diameter of honey and pollen pots measured with a digital caliper with 0.01 cm of precision. The volume of honey in the pots was measured by suction using disposable graduated syringes. To facilitate the sampling of honey, a piece hose measuring approximately 10 cm in length was attached to the syringe nozzle. The collected honey was deposited in plastic pots. An analytical balance with a precision of 0.001g was used to measure the weight of pollen pots (Bioscale brand).

RESULTS AND DISCUSSION

Brood area and population estimation

The structure of the nest of Jandaíra bees (*Melipona subnitida* Ducke) has the general characteristics of other bees nest. The hive has a brood area with the nest in the form of overlapping discs. Pillars constructed with cerumen separate the discs. A food area consisting of honey pots and pollen, made with a thin layer of wax or cerumen (wax + resin), and the inlet, the inflow tunnel, the batume, and the casing. We observed working in the entrance hole to smooth the passage. The entrance is made with fluted clay. At each flowering, the opening is filled with pollen, which may be due to the impact at the time of landing of the bee or even for the guidance of the bees and nest defense. In this opening, there is always a guard bee that moves away to allow entry or exit of another bee. At the honey bee farm, there was only one hive housed in a trunk of wood taken from nature.

Table 1. Physical characterization of colonies of Jandaíra bee (*Melipona subnitida* Ducke). UFCG, 2016

Parameters	Unity	Nº of samplings	Min-Max	Mean	Standard deviation
Number of brood comb per colony (unity)	Colony	21	2 - 8	5.10	1.88
Length of brood comb (cm)	Disc	30	4.0 - 16.5	10.42	3.57
Width of brood comb (cm)	Disc	19	3.0 – 8.0	5.58	1.25
Height of all brood comb (cm)	Beehive	14	4.0 – 10.0	7.32	1.45
Diameter of brood cells (cm)	Cell	13	0.40 – 0.61	0.52	0.06
Height of brood cells (cm)	Cell	24	0.45 – 1.00	0.79	0.14
Number of cells at each disc by cm² (unity)	Disc	13	3.42 – 7.96	4.10	1.44
Volume of brood cells (ml)	Cell	13	0.10 – 0.24	0.16	0.04

In this hive, we observed two guard bee at the entrance, and there was no finishing material. According to Almendra (2007), variation in the construction of entrance is common within the same species, there are skillful colonies, which build well-characterized access, and others in which this structure is little worked. However, the entrance of the hive of Jandaíra seems to be, usually, well cared, without barbs, with clay finish forming streaks, whose diameter is calculated for workers carrying honey and pollen (Bruening, 2001). The entrance tunnel was observed in all the studied hives, being constructed from the entrance and extending until the area of brood. The bees use cerumen and geopropolis in the construction of the tunnel. In the brood area, we found the entrance tunnel, the honey comb, and the pollen pots sequentially, but in some hives, this sequence was not respected, and it was possible to observe honey pots before the nests. The colonies positioned at the western side of the bee farm were weak, and nests were moved to the back of the box, where, usually is the place of food pots (honey and pollen). This change in position is assigned to the high temperatures at the western side of the farm. Regarding the brood, they were horizontally overlapping, separated by pillars made of wax or cerumen with a height that allows the passage of the bees. The pillars also serve to connect the nest to the edges and the floor of the box. It can be seen that the pillars leave the nest practically isolated from the walls of the box. The construction of the disc cells was initiated from the central part to its periphery. Discs with new offspring have a dark chocolate brown color while mature brood shows a very light color.

The pillars leave the nest isolated from the walls of the box. According to Villas-Bôas (2012), the honeycombs in the egg phase up to pre-pupal are called of "green breeding" or "posture", while those from the pre-pupal phase to adult bee are called "hatching pup" or "mature". We found a high amplitude of the measures of brood area of Jandaíra hives (Table 1). The expressive variation is probably a consequence of prolonged drought periods and high local temperature. The number of discs found per colony varies from 2 to 8 units, with a mean of 5.10 (sd = 1.88). The number of discs was observed in 21 colonies (Figure 1A). A similar number of discs were found for the bee species *M. compressipesfasciculata*, *M. Scutellaris* and *M. asilvai* (Almendra, 2007; Alves, 1010; Souza *et al*., 2009). A higher number of discs (11.10) was found for the species *Geotrigonasubterranea* (Barbosa *et al*., 2013). The length of brood comb was measured in 30 colonies, showing a mean of 10.42 cm with a variation between 4.0 and 16.5cm and standard deviation 3.57cm (Figure 1B). The width varied between 3.0 and 8.0cm, mean of 5.58 and standard deviation of 1.25 (Figure 1C). Higher values of length of brood comb were found by Almendra (2007) for the species *Meliponacompressipes*, but this species also showed a high variation in the length (2 to 29 cm). Similar results for brood comb length were found by Souza *et al*. (2009) for the Mundiribee (*Meliponaasilvai*). The height of all combs together showed a mean of 7.32 (sd = 1.35) and varied from 4 to 10 cm (Figura 1D).

These values are lower than the results found for Mundiri bee (*M. asilvai*), whose minimum and maximum values found were 12 and 16cm, respectively (Souza *et al*., 2009). We found a mean value of 0.79 cm for the height of brood cells (sd = 0.14cm, min = 0.45cm, max = 1cm) (Figure 1E). This parameter was measured in 24 colonies. The cell diameter had a mean of 0.52 (sd = 0.06) varying between 0.4 and 0.61 (Figure 1F). Similar values of diameter were found for *Meliponamondury* Smith (Viana *et al*., 2015), but another bee genus, as *Oxitrigonatataíra* may show smaller values of comb height and cell diameter (Souza *et al*. 2007). The genus *Oxitrigona* is known by the small sizes in comparison to *Melipona*. We visited 13 colonies to calculate the cell number by cm^2 of brood discs. A mean value of 4.10 (sd = 1.44) cells per cm^2 of brood disc was found (Figure 1G). Similar results of number of cells were found for other species from the genus *Melipona* (Almentra, 2007; Alves, Souza E Carvalho, 2007; Souza *et al*., 2009). *Oxitrigona* species have a higher number of cells (12.33 cells per cm^2) (SOUZA *et al*., 2007). Mean volume of brood cells was 0.16 ml (sd = 0.04) (Figure 1H). A similar result was found for Mundiri bee (0.10 ml, varying from 0.09 to 0.12ml) (Souza *et al*., 2009). The population of a colony is related to the amount of food storage at the colony and the condition of the queen bee. The higher the amount of food, higher the number of individuals, stimulating the reproduction by the queen bee (Aidair, 1996). The bee pastures also have fundamental importance for the colony, providing better nutrition for the development of bees and enhance honey quality (Imperatriz-Fonseca, 2012). Mean brood cell population was 1482.66, based on the measures of length and width of brood discs, number of discs per colony and number of cells per cm^2. According to Ihering (1932), the number of individuals in a colony is equal to the number of brood cells added to its half. We estimate that apopulation of Jandaíra in a colony can reach 2223 individuals, including eggs, larvae, pups and adults. Souza and Carvalho (2007) found similar population size for the species *Meliponamandacaia*, and Souza *et al*. (2009) estimated smaller populationsizes for the species *Meliponaasilvai*. Comparing the results of *Meliponasubnitida* concerning other species, we found lower variation in the parameters related to brood cells, while discs parameters showed higher variation than the ones found for other species (Table 2). Environmental condition and measurement difficulties might be responsible for the high variations.

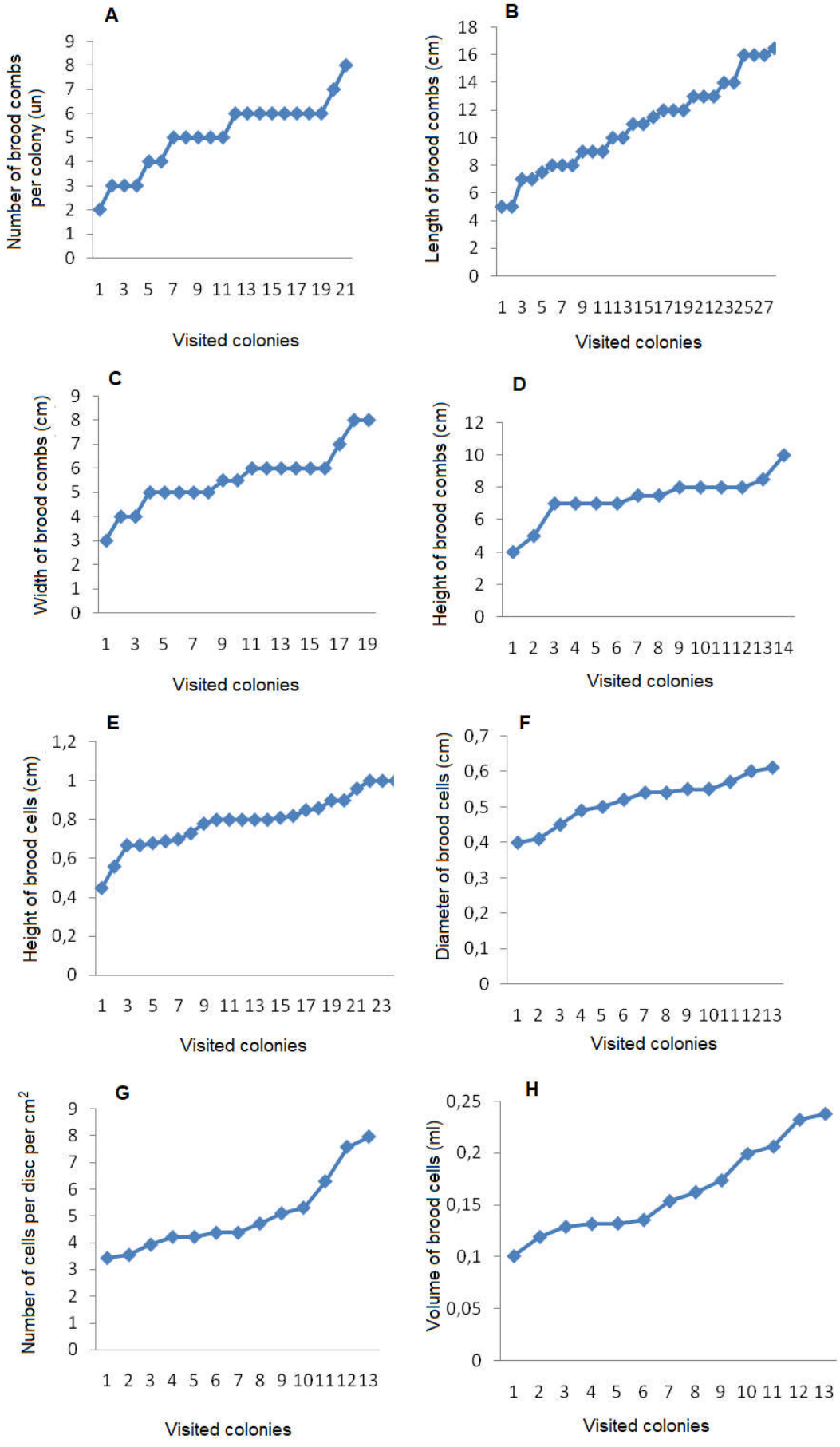

Figure 1. Variation of studied parameters in relation to the visited colonies: number (A), length (B) and width of brood combs (C), height of all combs (D), height of brood cells (E) and diameter of brood cells (F), number of cells per cm^2 of disc (G) and volume of brood cells (H). UFCG, 2016

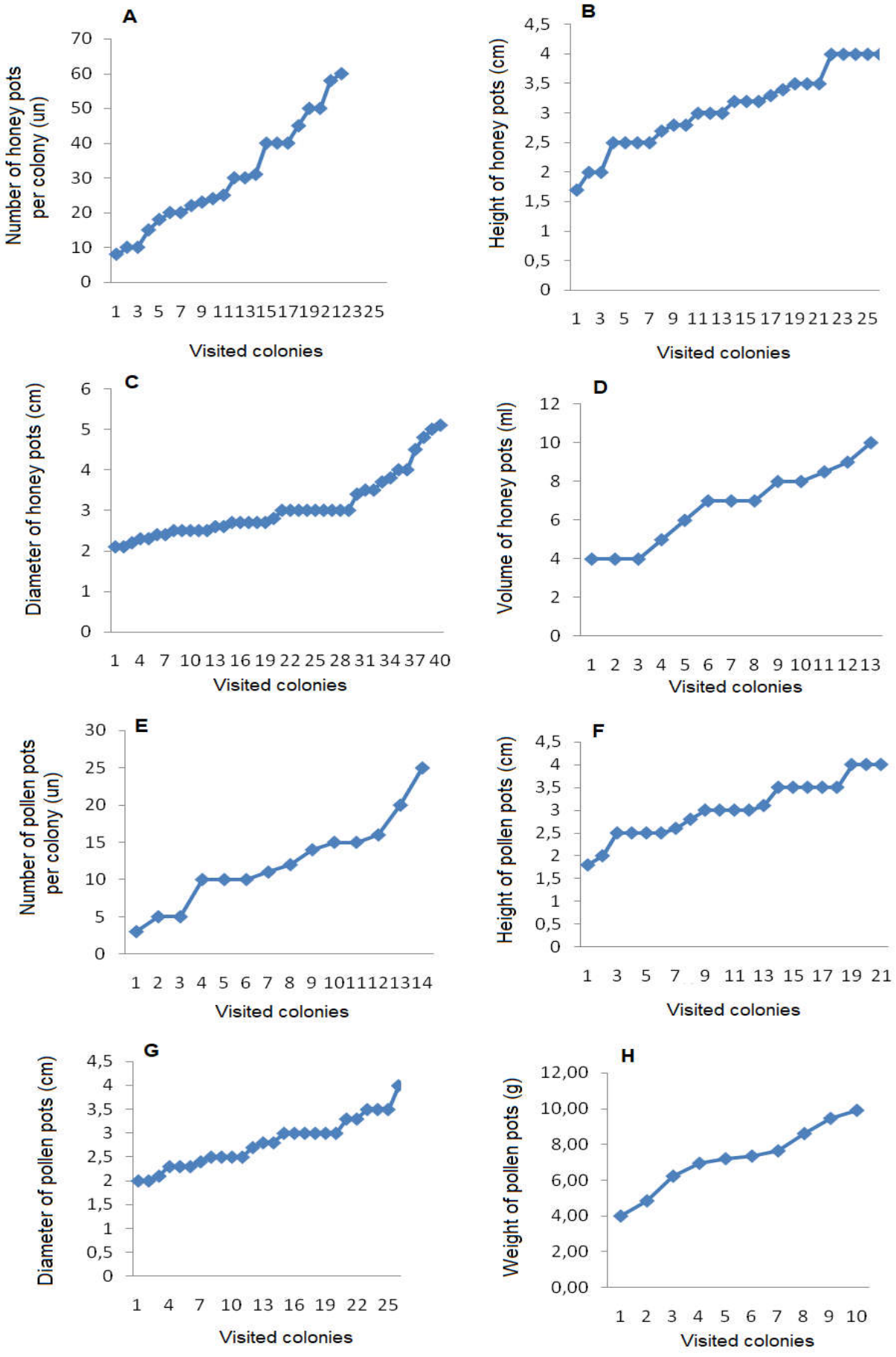

Figure 2. Variation of the number (A), height (B), diameter (C) and volume of honey pots (D), variaton of the number (E), height (F), diameter and weight of pollen pots (H) in relation to the visited colonies of Jandaíra.

Table 2. Characteristics of the nests of *Meliponasubnitida* (Jandaíra) concerning the nests of other *Melipona* species

Species	Brooddiscs per Colony				Broodcells				References
	ND (un)	LD (cm)	WD (cm)	HD (cm)	DC (cm)	HC (cm)	NC (un)	VC (mL)	
M. subnitida	5.10	10.42	5.58	7.32	0.52	0.79	4.10	0.6	Thisresearch
M. compressipes	6.60	11.20	7.40	-	-	-	-	-	Almendra (2007)
M. scutellaris	6.26	-	-	-	-	-	-	-	Alves *et al*. (2012)
M. mondury	9.26	12.03	9.75	-	0.52	1.00	3.75	-	Viana *et al*. (2015)
M. asilvai	5.55	5.44	4.13	-	0.45	0.76	5.87	0.10	Souza *et al*.(2009)
M. mandacaia	6.13	6.32	5.74	-	0.57	0.76	4.23	-	Alves *et al*. (2007)

ND: Number of discs; LD: Length of discs; WD: Width of discs; HD: Height of disc set; DC: Diameter of brood cells; HC: Height of brood cells; NC: Number of cells per cm^2; VC: Volume of brood cells.

Table 3. Characterization of spaces occupied by food in the boxes of Jandaírabees (*Meliponasubnitida* Ducke)

Parameters	Unity	Nº of samples	Variation	Mean	Standard deviation
Number of honey pots per colony (un)	Colony	22	08 - 60	30.41	15.48
Height of honey pots (cm)	Pots	26	1.7 – 4.0	3.07	0.66
Diameter of honey pots (cm)	Pots	40	2.1 – 5.1	3.05	0.78
Volume of honey pots (ml)	Pots	13	4.0 – 10.0	6.73	2.01
Number of pollen pots per colony (un)	Colony	14	3.0 – 25.0	12.21	5.96
Height of pollen pots (cm)	Pots	21	1.8 – 4.0	3.04	0.63
Diameter of pollen pots (cm)	Pots	26	2.0 – 4.0	2.80	0.52
Weight of pollen pots (g)	Pots	13	3.99 – 9.88	7.23	1.84

Table 4. Comparison of the measurements of honey and pollen pots among different species of the genus *Melipona*

Species	Honeypots			Pollenpots					References
	NHP (un)	HHP (cm)	DHP (cm)	VHP (mL)	NPP (cm)	HPP (cm)	DPP (cm)	WPP (g)	
M. subnitida	30.41	3.07	3.05	6.73	12.21	3.04	2.80	7.23	Thisresearch
M. compressipes	-	3.70	2.90	15.80	-	3.50	2.80	14.10	Almendra (2007)
M. scutellaris	19.29	-	-	16.10	10.47	-	-	15.53	Alves *et al*. (2012)
M. mondury		3.29	2.81	15.85	-	3.21	2.93	12.56	Viana *et al*. (2015)
M. asilvai		2.40	2.03	4.10	-	2.67	2.28	4.46	Souza*et al*. (2009)
M. mandacaia		2.78	2.53	6.47	-	3.02	2.48	6.66	Alves *et al*. (2007)

Notes: NHP: number of honey pots per colony; HHP: Height of honey pots; DHP: Diameter of honey pots; VHP: Volume of honey pots; NPP: Number of pollen pots; HPP: Height of pollen pots; DHP: Diameter of pollen pots; WPP: Weight of pollen pots.

According to Fonseca and Keer (2006), it is common the high variation in the parameters of insect populations.

Food area

The pots of honey and pollen are usually ovoid, but some have an irregular shape, filling the gaps between pots. The construction of the walls was variable, showing cells with thin walls and cells with a denser material. Pollen pots are differentiated by a whitish surface at the top and are usually closer to the nest. Mean, standard deviation, minimum and maximum values of pots are shown in Table 3. According to Faquinello *et al*. (2013), there is a direct relationship among number, diameter, height and volume of honey pots and the honey production, while population size is related to the number of brood discs and pollen pots. The number of honey pots varied between 8 and 60, with a mean of 30.41 (standard deviation of 15.48) (Figure 2A). Lower amounts of honey pots were found for the species *M. scutellaris* (19.2) (Alves *et al*., 2012), while the species *Oxitrigonatataira* seems to produce a higher amount of pots (73) (Souza, Alves and Carvalho 2007). The honey pots had a mean height of 3.07 cm (sd = 0.66) and variation between 1.7 and 4 (Figure 2B). A height of 3.2 and 3.7 was found for the species *M. mondury* and *M. compressispesfasciculata* (Viana *et al*. 2015; Almendra 2007). The mean diameter was 3.05 (sd = 0.78) with a variation from 2.1 to 5.1 (Figure 2C). Similar diameter size was found for the species *M. compressipes* and *M. mondury* (Almentra, 2007; Viana *et al*., 2005). The species *M. alsivai* seems to show a lower diameter of pots than *M. subnitida* (Souza *et al*., 2009). We measured the volume of honey pots, emptying 13 pots of different colonies. A mean value of 6.73ml (sd = 2.01), with values between 4 to 10ml was found (Figure 2D). Souza *et al*. (2009) described a lower volume of honey for the species *M. alsivai*, while high volume were found fo the species *M. mondury*, *M. scutellaris* and *M. compressipes* (Viana *et al*., 2015; Alves *et al*., 2012; Almendra, 2007). Volume of honey per pot indicates a greater efficiency in honey production, with less use of wax for pots construction. Pollen is indispensable to the life of bees and necessary for the production of fruits of many cultivated and wild plants (Nogueira-Neto, 1997). Pollen is essential to increase the number of brood and the number of workers to collect food (Alves, 2010). In this study, we analysed the number of pollen pots per colony and the height, diameter and weight (Figure 2E-H). To count the pollen pots per colony we studied 14 colonies. We found a variation from 3 to 25 units per colony, with a mean of 12.21 pots (sd = 5.96) (Figure 2E). Alves *et al*. (2012) found a value of 10.47 pots per colony for the species *M. scutellaris*. The height of pollen pots was verified in 21 colonies, showing a mean value of 3.04cm (sd = 0.63) and variation from 1.8 to 3.5cm (Figure 2F). The mean diameter was 2.8 cm (sd = 0.52), varying from 2 to 4 cm (Figure 2G). Similar results of diameter were found for the species *M. compressipes* (Almendra, 2007). A value of 7.23g was found for the weight of pollen pots (sd = 1.84g), and variation of 3.99 to 9.88g (Figure 2H). Thirteen potted pots from different colonies were weighed. Lower weight values were found for the species *M. asilvai* and *M. Mandacaia* (Souza *et al*., 2009; Alves *et al*., 2007) while the species *M. scutellaris* showed a much great weight of pollen per pot (15.53g) (Alves *et al*., 2012). According to the results found here for the food area, we can see similarities between the

dimensions of the pots used for honey and pollen in the architecture of Jandaíra bee nests. This similarity was also observed in a study on the architecture of bee nests Tiúba, *M. compressipes* (Almendra, 2007). Souza *et al*. (2009) studied the architecture of Munduri bee nests, finding average results for height and diameter of honey pots corresponding to 2.40 and 2.03 cm respectively, and average results for height and diameter of the pollen pots of 2.67 and 2.28 cm respectively. It is observed that for this bee also there is a similarity between the dimensions of the pots of honey and pollen, which seems a common characteristic for the genus *Melipona*. Species from another genus, as *Oxitrigonatataira*, also show similar architeture of honey and pollen pots (Souza; Alves; Carvalho, 2007). The results found for Jandaíra bee food area (*M. subnitida*) were compared with results found for other species of *Melipona* and presented in the Table 4.

Concerning the honey pots, we observed that the height and diameter dimensions presented similar results among the species, while the volume of honey in pots presented a significant variation. The volume of the honey pots of *M. subnitida* was similar to that of *M. mandacaia*. About the pollen pots, a high variation in the weight parameter was observed. The height and diameter parameters showed similar results among species, and the average height of the pollen pots of *M. subnitida* is equivalent to that of *M. mandacaia*. The average diameters of the pollen pots of *M. subnitida* and *M. compressipes* were the same.

Conclusion

The length, width, height of the set of combs, number of cells per square centimeter, verified in this research, characterize the colony by estimating the population and provide valuable information to draw a box model based on the characteristics presented. The colonies followed in this evaluation ranged from strong to weak, according to the designation of the breeder. They presented defensive behaviors, the stronger they were more defensive, but they did not prevent the management of the planned procedures. The parameters related to the production of honey (height, diameter, volume and number of pots) and pollen (height, diameter, volume and number of pots), express similar results to those found for other species of the genus *Melipona*. The results suggest that the creation of Jandaíra bee in rational boxes provides a good use of the products elaborated by these insects, without damaging the nest area nor compromising the development of the colonies; offers good management conditions to the breeder and avoids the destruction of native vegetation. The Jandaíra bee colonies exude compounds of pleasant odors, incomparable and unmistakable, present both in the area of pups and in the area of food, which acts as a stimulant for the execution of the activities.

REFERENCES

Aidair, D.S. 1996. A mandaçaia: biologia das abelhas, manejo e multiplicação artificial de colônias de Meliponaquadrifasciata. Sociedade Brasileira de Genética. Série Monografias, nº 4. Ribeirão Preto. p. 104.

Alcoforado Filho, F.G. 1998. Sustentabilidade do Semiárido através da Apicultura. In: CONGRESSO BRASILEIRO DE APICULTURA, 12., Salvador-BA. Anais... Salvador, p. 61.

Almendra, E.C.A. 2007. Caracterização da arquitetura de ninho e proposta de colmeia da abelha Tiúba (*Meliponacompressipes*). 2007. Dissertação (Mestrado em Ciência Animal). Universidade Federal do Piauí - PI.

Alves, R.M.O. 2010. Avaliação de parâmetros biométricos e produtivos para seleção de colônias da Abelha Uruçu (*Meliponascutellaris Latreille*, 1811). Tese (Doutorado) - Universidade Federal do Recôncavo da Bahia-BA, Centro de Ciências Agrárias, Ambientais e Biológicas, Área de Concentração: Fototecnia.

Alves, R.M.O., Carvalho, C.A.L., Faquinello, P., Ledo, C.A.S. and Figueredo, L. 2012. Parâmetros biométricos e produtivos de colônias de *MeliponascutellarisLatreille*, 1811 (Hymenoptera: Apidae) em diferentes gerações. Semana Entomológica da Bahia (SINSECTA). Magistra, Cruz das Almas-BA, v. 24, número especial, p.105- 111.

Alves, R.M.O., Souza B.A. and Carvalho, C.A.L. 2007. Notas sobre a bionomia da *Meliponamandacaia* (Apidae: Meliponina). Revista Magistra, Cruz das Almas-BA, v. 19, n. 3, p. 204-212.

Barbosa, F.M., Alves, R.M.O., Souza, B.A. and Carvalho, C.A.L. 2013. Nest architecture of the stingless bee *Geotrigonasubterranea* (Friese, 1901) Hymenoptera: Apidae: Meliponini). Biota Neotrop. Vol.13, nº 1.

Bruening, H. Abelha Jandaíra, 2001. Mossoró- RN. Coleção Mossoroense - Série C- V.1189.

Campos, L.A.O. 1996. Introdução a Meliponicultura; Meliponicultura: aspectos gerais. In: Congresso Brasileiro de Apicultura 11, Teresina. Anais... Teresina: CBA, p. 87-94.

Faquinello, P., Brito, B.B.P., Carvalho, C.A.O.L., Paula-Leite, M.C. and Alves, R.M.O. 2013. Correlação entre os parâmetros biométricos e produtivos em colônias de Melipona Quadrifasciataanthidioides Lepeletier (Himinoptera Apidae). Ciência Animal Brasileira, V.14, N.3. Disponível em: <http://www.revistas.ufg.br/index.php/vet/rt/printerFriendly/18603/15203>. Acesso em 23 de nov. de 2015.

Fonseca, V.M.O. and Kerr, W.E. 2006. Influência da troca de rainhas entre colônias de abelhas africanizadas na produção de pólen. BioscienceJournal, v.22. n.1, p.107-118, Disponível em: <http://www.seer.ufu.br/index.php/biosciencejournal/article/view/6646>. Acesso em 07 de fev. de 2016.

IBGE. Instituto Brasileiro de Geografia e Estatística. Cidades. Censo Demográfico. 2010. Disponível em: <http://cod.ibge.gov.br/234FQ>. Acesso em 23 de maio de 2015.

Ihering. H. 1932. A Uruçu na Apicultura Nordestina. Chácaras e Quintais: São Paulo, v.46.

Imperatriz-Fonseca, V. L. 2012. Meliponicultura e clima. 19º Congresso Brasileiro de Apicultura e 5º Congresso Brasileiro de Meliponicultura, Anais. Gramado- RS, p108.

Kerr, W. E., Carvalho, G.A., Nascimento, V. A. and Abelha Uruçu, 1996. Biologia, Manejo e Conservação – Belo Horizonte-MG: Acangaú, 144 p.: il., (Coleção Manejo da vida silvestre; 2).

Mascarenhas, J.C., Beltrão, B.A., Souza Júnior, L. C., Morais, F., Mendes, V. A. and Miranda, J. L. F. 2005. Projeto Cadastro de fontes de Abastecimento por água subterrânea. Diagnóstico do Município de São João do Rio do Peixe-Paraíba. Recife: CPRM/PRODEEM.

Nogueira-Neto, P. 1997. Vida e Criação de Abelhas indígenas sem Ferrão. São Paulo: Ed. Nogueirapis.

Souza, B. A., Alves, R.M.O. and Carvalho, C.A.L. 2007. Diagnóstico da arquitetura de ninho de Oxytrigonatataira

(Smith, 1863) (Hymenoptera: Meliponinae). Biota Neotrop. May/Aug. vol.7, no. 2. ISSN 1676-0603.

Souza, B. A., Carvalho, C. A. L., Alves, R.M.O., Dias, C.S. and Clarton, L. 2009. Munduri (*Meliponaasilvai*): A abelha sestrosa. Cruz das Almas: Universidade Federal do Recôncavo da Bahia. 46p.: il. (Série Meliponicultura; 7).

Souza, D. C. 2007. Apicultura: Manual do Agente de Desenvolvimento Rural. 2ª Ed. Rev. Brasília: SEBRAE, 186p.

Viana, J.L., Sousa, H.A.C., Alves, R.M.O., Pereira, D.G., Silva J.R., J.C., Paixão, J.F. and Waldschmidt, A.M. 2015. Bionomics of Meliponamondury Smith 1863 (Hymenoptera: Apidae,Meliponini) in relationto its nestingbehavior. *Biota Neotropica*., 15(3): 1–7.

Villas-Bôas, J. 2012. Manual Tecnológico: Mel de Abelhas sem Ferrão. Brasília – DF. Instituto Sociedade, População e Natureza (ISPN). Brasil.

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