

WEED INCIDENCE IN AN INTERCROPPING SYSTEM OF BANANA, TYPE PLANTAIN, CV. D'ANGOLA, WITH ASSAI PALM IN DIFFERENT ARRANGEMENTS

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ABSTRACT

The present study aimed at surveying weed species in the banana tree (*Musa* sp.) intercropping with assai (*Euterpe precatoria*). The experiment was performed using a randomized complete block design with six treatments (monocultures and intercropping) and four replications. The weed species were identified and quantified, enabling the calculation of phytosociological parameters. The soil cover and the dry mass of the weeds were evaluated. In general, *Mollugo verticillata* is one of the main species found in the essay. The *E. precatoria* palm monoculture showed a greater diversity of weed species and individuals and dry mass of the aerial part. Areas with banana monoculture or under a banana intercropping with *E. precatoria* palm in different planting arrangements displayed the same amount of dry matter of the aerial part and similar soil cover levels.

Keywords: Phytosociological survey, *Musa* sp., *Euterpe precatoria*

OCORRÊNCIA DE PLANTAS DANINHAS NO CONSÓRCIO DE BANANEIRA, CV. D'ANGOLA, COM AÇAIZEIRO EM DIFERENTES ARRANJOS

RESUMO

O presente estudo objetivou levantar espécies de plantas daninhas na bananeira (*Musa* sp.) consorciada com açaizeiro (*Euterpe precatoria*). O experimento foi conduzido em delineamento em blocos ao acaso, com seis tratamentos (monocultivos e consórcios) e quatro repetições. As espécies de plantas daninhas foram identificadas e quantificadas, possibilitando o cálculo de parâmetros fitossociológicos. A cobertura do solo e a massa seca das plantas daninhas foram

avaliadas. Em geral, *Mollugo verticillata* foi uma das principais espécies encontradas no ensaio. A monocultura de *E. precatoria* apresentou maior diversidade de espécies de plantas daninhas e indivíduos, assim como maior massa seca da parte aérea. Áreas com monocultivo de bananeira ou consorciada com *E. precatoria* em diferentes arranjos de plantio apresentaram a mesma quantidade de matéria seca da parte aérea de plantas daninhas e níveis de cobertura do solo semelhantes.

Palavras-chave: Levantamento fitossociológico, *Musa* sp., *Euterpe precatoria*

INTRODUCTION

Banana is the primary fruit species being produced in the State of Acre, with 102.949 tons for a harvested area of 8.118 ha, while *Euterpe precatoria* Mart. has an estimated production of 3.564 tons, equivalent to 0,8% of the national total (IBGE, 2019). Plantain tree (*Musa* sp.) and assai palm (*E. precatoria*) are strategic fruit plants for intercropping systems in the Amazon region, as the environmental conditions are favorable for crop growth.

One of the critical issues affecting plant cultivation, whether in monoculture, intercropping or agroforestry systems, is the negative interference of weed species (LANZA et al., 2017). These plants undermine agricultural profitability as they compete for resources that are essential to agricultural crops such as water, light, nutrients, space, and CO₂, in addition to releasing allelopathic substances and acting as alternative hosts for plagues and diseases (MOURA FILHO et al., 2015). Further, when the intercrop provides a good soil cover, soil temperature will stay relatively low. This prevents burning of the organic matter in the soil and loss of nutrients. It also provides a microclimate that can be favourable for associated crops (OUMA; JERUTO, 2010).

The intercropping system of fruit tree species with other crops, whether annual, semiperennial or perennial, is a good alternative to optimize land use and an important approach to recover degraded areas. Consequently, it is possible to obtain a more efficient control of weeds due to a better area occupation and shading (SILVA et al., 2013). After studying the effect of banana plant densities "BRS Princess" on weeds suppression, Lanza et al. (2017) concluded that the results of their study point out advantages in relation to crop densities, increasing banana yield per equivalent area and, consequently, optimizing land use. These benefits also add to the ability to promote the suppression of common weeds in tropical regions.

In order to adopt the best weed management system in a crop, it is necessary to identify the

species present in the area and classify them in terms of aggressiveness and class, taking into account primarily the phytosociological parameters, which are essential for the decision making regarding weed management and control (GOMES et al., 2010; OLIVEIRA; FREITAS, 2008; SOUZA et al., 2003), aiming at efficiency and economy.

The first stage of proper plant management in a crop involves the identification of the species present in the area, as well as those which are of greater importance, for that matter, are frequency, density and abundance. For this, phytosociological studies are carried out comparing the populations of weeds at a given time. Programmed repetitions of phytosociological studies may indicate trends in variation of the importance of one or more populations, and such variations may be associated with the agricultural practices adopted (SARMENTO et al., 2015), such as weed management, spacing, planting times, and cultural practices.

The objective of this work was to evaluate the occurrence of weeds in *E. precatoria* and plantain tree (*Musa* sp.), D'angola cultivar, in monoculture and intercropping systems in different planting arrangements.

MATERIALS AND METHODS

The study was carried out at the experimental field of Embrapa Acre, located in the municipality of Rio Branco, Acre, Brazil, at 10°01'30" S, 67°42'18" W, and at an altitude of 160 m. The regional climate is classified as Awi (hot and humid), according to Köppen, with maximum temperatures of 30.9°C and minimum of 20.8°C, an average of 1648.9 mm of annual rainfall and relative humidity of 83%. The survey was carried out on March 2014 in an experimental intercropping system of plantain tree, D'angola cv. (*Musa* sp., AAB - Terra subgroup) and single assai palm (*Euterpe precatoria*) in different planting arrangements.

The local soil is classified as dystrophic Red-Yellow Argisol, medium textured and well-drained, with the following physical-chemical characteristics in the 0-20 cm depth layer: pH (H₂O) = 4.52; Ca = 1.4 cmol_c dm⁻³; Mg = 0.79 cmol_c dm⁻³; K = 0.32 cmol_c dm⁻³; Al + H = 4.43 cmol_c dm⁻³; P (surplus) = 9.91 mg L⁻¹; base saturation = 36.18%; sand = 315.42 g kg⁻¹; silt = 319.88 g kg⁻¹; clay = 364.70 g kg⁻¹.

The experiment was performed using a randomized complete block design with six treatments and four replications, covering a total area of 5200 m². The treatments consisted of crop systems, arranged as follows: Area 1 - *E. precatoria* monoculture in 4 x 3 m; Area 2 - Banana tree

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monoculture in 3 x 3 m; Area 3 – Banana tree in 3 x 2 m intercropped with *E. precatoria* in 3 x 4 m; Area 4 - Banana tree in 3 x 3 m intercropped with *E. precatoria* in 3 x 4 m; Area 5 - Banana tree in 4 x 2 x 2 m intercropped with *E. precatoria* in 6 x 3 m; Area 6 - Banana tree in 4 x 2 x 2 m intercropped with *E. precatoria* in 4 x 2 x 3 m.

The soil preparation was performed in a conventional manner, with one plowing and two harrowing operations. The planting holes, with dimensions of 0.4 x 0.4 x 0.4 m, were dug using a digger coupled to the tractor, 30 days before planting. To prepare the planting holes, 5 kg of chicken manure, 600g of 10-10-10 (NPK) fertilizer, 800g of dolomitic limestone and 50g of micronutrients (FTE BR 12) were applied.

In March 2013, the banana trees were planted using seedlings composed of pieces of rhizomes, with a mass of approximately 400g ($\pm$ 50g), previously treated with carbofuran syrup, to prevent the attack of *Cosmopolites sordidus* Germar. The *E. precatoria* seedlings were planted in November 2013, when the banana trees had an average height of 1.6 m, pseudo-stem perimeter at a height of 0.3 m from the soil of 0.4 m and 17 active leaves.

Topdressing fertilization was performed according to the technical recommendation for each crop, based on soil analysis. The banana plants were grown in a “mother, daughter and granddaughter” system, and the desiccation and defoliation were carried out when necessary. Weed management was initially performed using manual hoeing and later, with coastal brush cutter, every 30 days in the rainy season and 45-60 days in the dry season. Cultivation was conducted without irrigation.

To map out the weeds, a 0.25 per m² (0.5 x 0.5 m) cast square was used and thrown lengthways three times, and thus it was placed to the right, at the center and to the left end of each plot. During the weed community sampling, the banana trees were in full production, with an average height of 3.20 m, and the *E. precatoria* palms had an average height of 0.50 m, measured from the soil up to the youngest expanded leaf.

After defining the sampling point of each square, which was performed by three trained evaluators through visual evaluation, the percentage of soil cover by weeds was estimated (Table 1).

Subsequently, the weed community was identified in relation to family, species and common name through comparisons to photos or descriptions of existing named specimens in the specialized literature (KISSMANN; GROTH, 1997; LORENZI, 2008). Then, the plants of each

species were quantified separately, cut at ground level and stored in paper bags for drying in a forced air circulation oven at 60°C until a constant mass was reached. Afterwards, the material was weighed using an analytical balance (0.01 g) and the dry mass of each sample was converted into kg ha⁻¹.

Table 1 – Scale of visual assessment of soil cover by weeds. Rio Branco-AC, 2014.

Grade	Soil cover (%)	Level of cover
1	1.0	Lack of plants
2	1.0 – 3.5	Low incidence
3	3.5 – 7.0	Reasonable incidence
4	7.0 – 12.5	Average incidence
5	12.5 – 20.0	Averagely high incidence
6	20.0 – 30.0	High incidence
7	30.0 – 50.0	Very high incidence
8	50.0 – 90.0	Extremely high incidence
9	100.0	Total cover

Extracted and adapted from Deuber (1992).

Determination and counting of the species at each sampling point allowed the calculation of the following phytosociological variables: absolute density (D), relative density (Dr), absolute abundance (A), relative abundance (Ar), absolute frequency (F), relative frequency (Fr), importance value index (IVI), and relative importance (Ir), according to the procedure described by Carvalho & Pitelli, 1992; Gomes et al., 2010; Silva et al., 2013.

The similarity index was calculated using the equation: $IS = [2.A \div (B + C) \times 100]$, where A = number of species common to both areas; B = number of species from environment “B”; C = number of species from environment “C” (GOMES et al., 2010). Is ranges from 0 to 100%, reaching the maximum level when all species are common to both areas and the minimum level when there are none in common.

Aerial dry matter mass (MSPA) and soil cover grades (NCS) were transformed by log_x and, subsequently subjected to analysis of variance by the F test. Means were compared by the Tukey's test ($p \leq 0.05$).

RESULTS AND DISCUSSION

In the surveys carried out on *E. precatoria* and plantain monocultures, as well as in the intercropping areas with these fruits in different planting arrangements, 50 species, belonging to 17 families were identified (Table 2).

The families with the highest number of species were Poaceae (13), Cyperaceae (9) and Asteraceae (6), making up a total of 56% of the species identified. Of these species, 22% were common to all evaluated areas, regardless of the cropping system.

Regarding the classes, only areas 2 and 4 had a higher number of dicotyledonous species, with 55.17% and 59.26%, respectively (Table 2). In some phytosociological surveys carried out on banana cropping, it was observed that dicotyledonous species prevail in the culture (GOMES et al., 2010; LIMA et al., 2012).

However, the weed community can be altered according to the farming systems management and spacings (BELALCÁZAR CARJAVAL et al., 1991; ERASMO et al., 2004), a factor that probably allowed a balance in the other areas, with 50% monocotyledons and 50% of dicotyledons. In the *E. precatoria* palm monoculture (area 1), the diversity and weed quantity was superior to the other areas, with 2333 individuals distributed among 34 species (Table 3).

It can be observed that *Digitaria sanguinalis* and *Mollugo verticillata* species were predominant, with an absolute frequency of 0.8; density of 413.0 and 205.3 plants per m²; absolute abundance of 123.9 and 61.6; relative frequency of 9.2%; relative abundance of 35.9 and 17.9%; relative density of 53.1 and 26.4%; relative importance of 32.7 and 17.8%, and; importance value index of 98.2 and 53.4, respectively (Table 3). In cassava growing areas, Albuquerque et al. (2014) found that *Digitaria sanguinalis* was the main species, showing higher density and abundance values, similar to the crops observed in the present study.

Wider spacings and the low height of *E. precatoria* palms when the survey was performed favored a higher lighting level on the weeds in the monoculture, increasing the number of individuals of *Digitaria sanguinalis*. This species performs C4 photosynthesis, which under conditions of high light intensity may represent a strong competitive advantage in relation to C3 plants, due to a greater carboxylation efficiency (LARCHER, 2004), standing out in the evaluated phytosociological parameters. The high reproductive capacity of this species may also have influenced the relative density (53.11%), as it can produce up to 150,000 seeds per clump (LORENZI, 2008).

Table 2 – Identification of weed communities in different cropping systems, according to family, species and common name. Rio Branco-AC, 2014.

Species and common name: Rio Branco RS, 2017.							
Family/Species	Common name	Cropping systems					
		1	2	3	4	5	6
Amaranthaceae							
<i>Alternanthera tenella</i>	basil	x			x		
Asteraceae							
<i>Ageratum conyzoides</i>	billygoat weed		x				
<i>Corchorus olitorius</i>	jute mallow	x	x	x		x	x
<i>Emilia coccinea</i>	tasselflower	x					
<i>Emilia fosbergii</i>	florida tasselflower					x	
<i>Praxelis pauciflora</i>	praxelis	x	x	x	x	x	x
<i>Vernonia polyanthes</i>	ironweed			x	x		
Commelinaceae							
<i>Commelina benghalensis</i>	benghal dayflower	x			x	x	x
<i>Murdannia nudiflora</i>	dayflower	x	x	x		x	x
Convolvulaceae							
<i>Ipomoea triloba</i>	littlebell		x				x
Cyperaceae							
<i>Cyperus</i> sp.	sedge	x					
<i>Cyperus difusus</i>	diffused flatsedge						x
<i>Cyperus esculentus</i>	yellow nutsedge	x	x	x	x	x	x
<i>Cyperus flavus</i>	yellow flatsedge						x
<i>Cyperus iria</i>	ricefield flatsedge	x	x	x	x	x	x
<i>Fimbristylis dichotoma</i>	forked fimbry	x	x	x	x	x	x
<i>Kyllinga brevifolia</i>	shortleaf spikesedge		x	x		x	
<i>Kyllinga odorata</i>	fragrant spikesedge	x	x	x	x	x	x
<i>Rhychospora nervosa</i>	beakrush	x		x			
Euphorbiaceae							
<i>Acalypha arvensis</i>	field copperleaf	x	x	x	x	x	
Fabaceae							
<i>Pueraria phaseoloides</i>	tropical kudzu	x	x		x		
<i>Chamaecrista rotundifolia</i>	roundleaf sensitive pea						x
<i>Desmodium adscendens</i>	zarzabacoa galana	x	x				
<i>Desmodium barbatum</i>	zarzabacoa peluda				x		
Loganiaceae							
<i>Spigelia anthelmia</i>	west Indian pinkroot	x	x	x	x	x	x
Malvaceae							
<i>Malva</i> spp.	mallow	x					
<i>Anoda cristata</i>	crested anoda	x					
<i>Urena lobata</i>	caesarweed		x				

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Family/Species	Common name	Cropping systems					
		1	2	3	4	5	6
Molluginaceae							
<i>Mollugo verticillata</i>	green carpetweed	x	x	x	x	x	x
Phyllanthaceae							
<i>Phyllanthus niruri</i>	gale of the wind	x	x	x	x	x	x
<i>Phyllanthus tenellus</i>	mascarene island leaf-flower	x		x	x		x
Piperaceae							
<i>Pothomorphe umbellata</i>	monkey’s hand			x			
Plantaginaceae							
<i>Lindernia dubia</i>	yellowseed false pimpernel	x	x	x	x		
<i>Stemodia verticillata</i>	whorled twintip		x				
Poaceae							
<i>Brachiaria brizantha</i>	palisade grass	x	x		x		
<i>Brachiaria decumbens</i>	spreading liverseed grass	x			x		
<i>Digitaria bicornis</i>	asian crabgrass	x					
<i>Digitaria horizontalis</i>	jamaican crabgrass	x			x		
<i>Digitaria sanguinalis</i>	hairy crabgrass	x	x	x	x	x	x
<i>Eleusine indica</i>	indian goosegrass	x	x	x		x	x
<i>Leptochloa filiformis</i>	mucronate sprangeltop	x	x	x	x	x	
<i>Panicum maximum</i>	guineagrass	x					
<i>Paspalum conjugatum</i>	hilograss	x			x	x	x
<i>Paspalum maritimum</i>	coastal sand paspalum	x	x	x	x	x	x
<i>Paspalum notatum</i>	bahiagrass	x	x	x	x		x
<i>Paspalum paniculatum</i>	arrocillo		x	x		x	
<i>Sporobolus indicus</i>	smut grass		x	x			x
Portulacaceae							
<i>Talinum paniculatum</i>	jewels of opar				x	x	
Rubiaceae							
<i>Spermacoce latifolia</i>	oval-leaf false buttonweed	x	x	x	x	x	x
Urticaceae							
<i>Cecropia pachystachya</i>	yarumo		x	x	x		

Table 3 – Values of the number of squares (NQ), number of individuals (NI), absolute frequency (Fa), absolute density (Da), absolute abundance (Ab), relative frequency (Fr), relative abundance (Ar), relative density (Dr), relative importance (Ir) and importance value index (IVI) in area 1. Rio Branco-AC, 2014.

Species	NI	NQ	Fa	Da (p m ²)	Ab	Fr (%)	Ar (%)	Dr (%)	Ir (%)	IVI
<i>Acalypha arvensis</i>	1	1	0.1	0.3	1.0	0.9	0.3	0.0	0.4	1.3
<i>Alternanthera tenella</i>	4	2	0.2	1.3	2.0	1.8	0.6	0.2	0.9	2.6
<i>Anoda cristata</i>	1	1	0.1	0.3	1.0	0.9	0.3	0.0	0.4	1.3
<i>Brachiaria brizantha</i>	4	4	0.3	1.3	1.0	3.7	0.3	0.2	1.4	4.1
<i>Brachiaria decumbens</i>	1	1	0.1	0.3	1.0	0.9	0.3	0.0	0.4	1.3
<i>Commelina benghalensis</i>	2	2	0.2	0.7	1.0	1.8	0.3	0.1	0.7	2.2
<i>Corchorus olitorius</i>	11	5	0.4	3.7	2.2	4.6	0.6	0.5	1.9	5.7
<i>Cyperus esculentus</i>	5	3	0.3	1.7	1.7	2.8	0.5	0.2	1.2	3.5
<i>Cyperus iria</i>	3	2	0.2	1.0	1.5	1.8	0.4	0.1	0.8	2.4
<i>Cyperus spp.</i>	1	1	0.1	0.3	1.0	0.9	0.3	0.0	0.4	1.3
<i>Desmodium adscendens</i>	1	1	0.1	0.3	1.0	0.9	0.3	0.0	0.4	1.3
<i>Digitaria bicornis</i>	9	1	0.1	3.0	9.0	0.9	2.6	0.4	1.3	3.9
<i>Digitaria horizontalis</i>	7	2	0.2	2.3	3.5	1.8	1.0	0.3	1.1	3.2
<i>Digitaria sanguinalis</i>	1239	10	0.8	413.0	123.9	9.2	35.9	53.1	32.7	98.2
<i>Eleusine indica</i>	20	3	0.3	6.7	6.7	2.8	1.9	0.9	1.8	5.5
<i>Emilia coccinea</i>	11	2	0.2	3.7	5.5	1.8	1.6	0.5	1.3	3.9
<i>Fimbristylis dichotoma</i>	18	5	0.4	6.0	3.6	4.6	1.0	0.8	2.1	6.4
<i>Kyllinga odorata</i>	35	2	0.2	11.7	17.5	1.8	5.1	1.5	2.8	8.4
<i>Leptochloa filiformis</i>	16	3	0.3	5.3	5.3	2.8	1.5	0.7	1.7	5.0
<i>Lindernia dubia</i>	57	5	0.4	19.0	11.4	4.6	3.3	2.4	3.4	10.3
<i>Malva spp.</i>	4	2	0.2	1.3	2.0	1.8	0.6	0.2	0.9	2.6
<i>Mollugo verticillata</i>	616	10	0.8	205.3	61.6	9.2	17.9	26.4	17.8	53.4
<i>Murdannia nudiflora</i>	94	7	0.6	31.3	13.4	6.4	3.9	4.0	4.8	14.3
<i>Panicum maximum</i>	4	2	0.2	1.3	2.0	1.8	0.6	0.2	0.9	2.6
<i>Paspalum conjugatum</i>	46	2	0.2	15.3	23.0	1.8	6.7	2.0	3.5	10.5
<i>Paspalum maritimum</i>	46	5	0.4	15.3	9.2	4.6	2.7	2.0	3.1	9.2
<i>Paspalum notatum</i>	1	1	0.1	0.3	1.0	0.9	0.3	0.0	0.4	1.3
<i>Phyllanthus niruri</i>	15	5	0.4	5.0	3.0	4.6	0.9	0.6	2.0	6.1
<i>Phyllanthus tenellus</i>	4	2	0.2	1.3	2.0	1.8	0.6	0.2	0.9	2.6
<i>Praxelis pauciflora</i>	19	5	0.4	6.3	3.8	4.6	1.1	0.8	2.2	6.5
<i>Pueraria phaseoloides</i>	9	4	0.3	3.0	2.3	3.7	0.7	0.4	1.6	4.7
<i>Rhychospora nervosa</i>	17	1	0.1	5.7	17.0	0.9	4.9	0.7	2.2	6.6
<i>Spermacoce latifolia</i>	7	5	0.4	2.3	1.4	4.6	0.4	0.3	1.8	5.3
<i>Spigelia anthelmia</i>	5	2	0.2	1.7	2.5	1.8	0.7	0.2	0.9	2.8
Total	2333	-	9.1	777.7	344.9	100	100	100	100	-

In the banana tree monoculture (area 2), 770 individuals were identified and grouped into 14 families and 28 species (Tables 2 and 4).

The species with the highest absolute and relative frequencies in descending order were *Mollugo verticillata*, *Kyllinga odorata*, *Paspalum maritimum*, and *Digitaria sanguinalis*. Among these species showing a high frequency, two belong to Poaceae family, which can be explained by the greater efficiency of the soil production factors. In a study carried out by Silva et al. (2013) with the objective of evaluating the occurrence of weeds in intercropped coffee and macadamia nuts, a higher occurrence of weeds of the family Poaceae.

In relation to the other parameters, *Paspalum maritimum*, *Mollugo verticillata* and *Paspalum paniculatum* displayed higher absolute density values, 60.3, 55.7 and 53.3 plants per m²; absolute abundance rates of 30.2, 23.9 and 53.3; relative abundance rates of 15.5, 12.3 and 27.5%; relative density of 23.5, 21.7 and 20.8%; relative importance of 15.6, 14.3 and 17.4%, and; value index of importance of 46.7, 43.0 and 52.1; respectively. The tolerance to shaded and intense environments shown by some species of the genus *Paspalum* is confirmed in some studies, as it was observed in *Paspalum reginelli*, *P. dilatatum*, *P. notatum* (BARRO et al., 2010; SCHREINER, 1987), which may explain the predominance of these weeds.

In the 3 x 2 m banana intercropped with 3 x 4 m *E. precatoria* (area 3), *Mollugo verticillata* showed an absolute frequency of 0.7, followed by *Paspalum maritimum* and *Spigelia anthelmia* with a rate of 0.6, and these were also the species displaying the highest relative frequency (Table 5).

Mollugo verticillata also obtained higher values for absolute density, with 126 plants per m²; absolute abundance of 47.3; relative abundance of 29%; relative density of 57.4%; relative importance of 32.7%, and importance value index of 98.2. In Brazil, these species are characterized by infesting annual and perennial crops (LORENZI, 2008).

Table 6 also shows the survey carried out on weed found in the 3 x 3 m banana intercropped with 3 x 4 m *E. precatoria* palm (area 4), as well as the phytosociological parameters.

In descending order, the seven most frequent species in absolute and relative forms were: *Mollugo verticillata* with 0.9 and 13.4%, *Spigelia anthelmia* and *Praxelis pauciflora* with 0.5 and 7.3%, *Spermacoce latifolia*, *Cyperus esculentus*, *Kyllinga odorata*, and *Paspalum maritimum* with 0.4 and 6.1%, respectively. However, *Mollugo verticillata* showed the highest absolute density

(209 plants per m²), absolute abundance (57), relative abundance (43.3%), relative density (71.7%), relative importance (42.8%), and importance value index (128.4).

Table 4 - Values of the number of individuals (NI), number of squares (NQ), absolute frequency (Fa), absolute density (Da), absolute abundance (Ab), relative frequency (Fr), relative abundance (Ar), relative density (Dr), relative importance (Ir) and the importance value index (IVI) in area 2. Rio Branco-AC, 2014.

Species	NI	NQ	Fa	Da (p m ²)	Ab	Fr (%)	Ar (%)	Dr (%)	Ir (%)	IVI
<i>Acalypha arvensis</i>	2	2	0.2	0.7	1.0	2.6	0.5	0.3	1.1	3.3
<i>Agetarum conyzoides</i>	7	2	0.2	2.3	3.5	2.6	1.8	0.9	1.8	5.3
<i>Brachiaria brizantha</i>	5	2	0.2	1.7	2.5	2.6	1.3	0.6	1.5	4.5
<i>Cecropia pachystachya</i>	4	2	0.2	1.3	2.0	2.6	1.0	0.5	1.4	4.1
<i>Corchorus olitorius</i>	1	1	0.1	0.3	1.0	1.3	0.5	0.1	0.6	1.9
<i>Cyperus esculentus</i>	5	2	0.2	1.7	2.5	2.6	1.3	0.6	1.5	4.5
<i>Cyperus iria</i>	20	2	0.2	6.7	10.0	2.6	5.2	2.6	3.4	10.3
<i>Desmodium adscendens</i>	2	1	0.1	0.7	2.0	1.3	1.0	0.3	0.9	2.6
<i>Digitaria sanguinalis</i>	40	5	0.4	13.3	8.0	6.4	4.1	5.2	5.2	15.7
<i>Eleusine indica</i>	1	1	0.1	0.3	1.0	1.3	0.5	0.1	0.6	1.9
<i>Fimbristylis dichotoma</i>	15	3	0.3	5.0	5.0	3.8	2.6	1.9	2.8	8.4
<i>Ipomoea triloba</i>	2	2	0.2	0.7	1.0	2.6	0.5	0.3	1.1	3.3
<i>Kyllinga brevifolia</i>	4	1	0.1	1.3	4.0	1.3	2.1	0.5	1.3	3.9
<i>Kyllinga odorata</i>	72	7	0.6	24.0	10.3	9.0	5.3	9.4	7.9	23.6
<i>Leptochloa filiformis</i>	14	3	0.3	4.7	4.7	3.8	2.4	1.8	2.7	8.1
<i>Lindernia dubia</i>	8	4	0.3	2.7	2.0	5.1	1.0	1.0	2.4	7.2
<i>Mollugo verticillata</i>	167	7	0.6	55.7	23.9	9.0	12.3	21.7	14.3	43.0
<i>Murdannia nudiflora</i>	4	2	0.2	1.3	2.0	2.6	1.0	0.5	1.4	4.1
<i>Paspalum maritimum</i>	181	6	0.5	60.3	30.2	7.7	15.5	23.5	15.6	46.7
<i>Paspalum notatum</i>	8	2	0.2	2.7	4.0	2.6	2.1	1.0	1.9	5.7
<i>Paspalum paniculatum</i>	160	3	0.3	53.3	53.3	3.8	27.5	20.8	17.4	52.1
<i>Phyllanthus niruri</i>	10	4	0.3	3.3	2.5	5.1	1.3	1.3	2.6	7.7
<i>Praxelis pauciflora</i>	10	3	0.3	3.3	3.3	3.8	1.7	1.3	2.3	6.9
<i>Pueraria phaseoloides</i>	1	1	0.1	0.3	1.0	1.3	0.5	0.1	0.6	1.9
<i>Spermacoce latifolia</i>	10	3	0.3	3.3	3.3	3.8	1.7	1.3	2.3	6.9
<i>Spigelia anthelmia</i>	8	3	0.3	2.7	2.7	3.8	1.4	1.0	2.1	6.3
<i>Sporobolus indicus</i>	2	1	0.1	0.7	2.0	1.3	1.0	0.3	0.9	2.6
<i>Stemodia verticillata</i>	4	1	0.1	1.3	4.0	1.3	2.1	0.5	1.3	3.9
<i>Urena lobata</i>	3	2	0.2	1.0	1.5	2.6	0.8	0.4	1.2	3.7
Total	770	-	6.5	256.7	194.1	100	100	100	100	-

**WEED INCIDENCE IN AN INTERCROPPING SYSTEM OF BANANA, TYPE PLANTAIN, CV.
D'ANGOLA, WITH ASSAI PALM IN DIFFERENT ARRANGEMENTS**

Table 5 - Values of the number of individuals (NI), number of squares (NQ), absolute frequency (Fa), absolute density (Da), absolute abundance (Ab), relative frequency (Fr), relative abundance (Ar), relative density (Dr), relative importance (Ir) and the importance value index (IVI) in area 3. Rio Branco-AC, 2014.

Species	NI	NQ	Fa	Da (p m ²)	Ab	Fr (%)	Ar (%)	Dr (%)	Ir (%)	IVI
<i>Acalypha arvensis</i>	1	1	0.1	0.3	1.0	1.5	0.6	0.2	0.7	2.2
<i>Cecropia pachystachya</i>	2	1	0.1	0.7	2.0	1.5	1.2	0.3	1.0	3.0
<i>Corchorus olitorius</i>	1	1	0.1	0.3	1.0	1.5	0.6	0.2	0.7	2.2
<i>Cyperus esculentus</i>	1	1	0.1	0.3	1.0	1.5	0.6	0.2	0.7	2.2
<i>Cyperus iria</i>	3	1	0.1	1.0	3.0	1.5	1.8	0.5	1.3	3.8
<i>Digitaria sanguinalis</i>	39	4	0.3	13.0	9.8	5.9	6.0	5.9	5.9	17.8
<i>Eleusine indica</i>	2	2	0.2	0.7	1.0	2.9	0.6	0.3	1.3	3.9
<i>Fimbristylis dichotoma</i>	19	3	0.3	6.3	6.3	4.4	3.9	2.9	3.7	11.2
<i>Kyllinga brevifolia</i>	11	2	0.2	3.7	5.5	2.9	3.4	1.7	2.7	8.0
<i>Kyllinga odorata</i>	25	4	0.3	8.3	6.3	5.9	3.8	3.8	4.5	13.5
<i>Leptochloa filiformis</i>	3	1	0.1	1.0	3.0	1.5	1.8	0.5	1.3	3.8
<i>Lindernia dubia</i>	4	1	0.1	1.3	4.0	1.5	2.5	0.6	1.5	4.5
<i>Mollugo verticillata</i>	378	8	0.7	126.0	47.3	11.8	29.0	57.4	32.7	98.2
<i>Murdannia nudiflora</i>	3	2	0.2	1.0	1.5	2.9	0.9	0.5	1.4	4.3
<i>Paspalum maritimum</i>	24	7	0.6	8.0	3.4	10.3	2.1	3.6	5.3	16.0
<i>Paspalum notatum</i>	6	4	0.3	2.0	1.5	5.9	0.9	0.9	2.6	7.7
<i>Paspalum paniculatum</i>	57	2	0.2	19.0	28.5	2.9	17.5	8.7	9.7	29.1
<i>Phyllanthus niruri</i>	3	3	0.3	1.0	1.0	4.4	0.6	0.5	1.8	5.5
<i>Phyllanthus tenellus</i>	1	1	0.1	0.3	1.0	1.5	0.6	0.2	0.7	2.2
<i>Pothomorphe umbellata</i>	7	2	0.2	2.3	3.5	2.9	2.1	1.1	2.1	6.2
<i>Praxeliz pauciflora</i>	5	1	0.1	1.7	5.0	1.5	3.1	0.8	1.8	5.3
<i>Rhychospora nervosa</i>	43	2	0.2	14.3	21.5	2.9	13.2	6.5	7.6	22.7
<i>Spermacoce latifolia</i>	10	5	0.4	3.3	2.0	7.4	1.2	1.5	3.4	10.1
<i>Spigelia anthelmia</i>	8	7	0.6	2.7	1.1	10.3	0.7	1.2	4.1	12.2
<i>Sporobolus indicus</i>	1	1	0.1	0.3	1.0	1.5	0.6	0.2	0.7	2.2
<i>Vernonia polyanthes</i>	1	1	0.1	0.3	1.0	1.5	0.6	0.2	0.7	2.2
Total	658	-	5.7	219.3	163.2	100	100	100	100	-

Cyperus esculentus and *Kyllinga odorata* (Cyperaceae) species are mainly herbaceous perennials, and their propagation occurs by seeds or rhizomes and subterranean tubers. A prolonged permanence of tubers in the soil makes it difficult to control these weeds, resulting in costly consequences and causing damage to the agricultural sector. The shade provided by the banana

canopy promotes a reduction in the number of sprouts, tubers and dry matter production (KEELEY; THULLEN, 1978), which may be responsible for the low density of these plants in the area.

Table 6 - Values of the number of individuals (NI), number of squares (NQ), absolute frequency (Fa), absolute density (Da), absolute abundance (Ab), relative frequency (Fr), relative abundance (Ar), relative density (Dr), relative importance (Ir) and the importance value index (IVI) in area 4. Rio Branco-AC, 2014.

Species	NI	NQ	Fa	Da (p m ²)	Ab	Fr (%)	Ar (%)	Dr (%)	Ir (%)	IVI
<i>Acalypha arvensis</i>	2	2	0.2	0.7	1.0	2.4	0.8	0.2	1.1	3.4
<i>Alternanthera tenella</i>	1	1	0.1	0.3	1.0	1.2	0.8	0.1	0.7	2.1
<i>Brachiaria brizantha</i>	5	1	0.1	1.7	5.0	1.2	3.8	0.6	1.9	5.6
<i>Brachiaria decumbens</i>	1	1	0.1	0.3	1.0	1.2	0.8	0.1	0.7	2.1
<i>Cecropia pachystachya</i>	5	2	0.2	1.7	2.5	2.4	1.9	0.6	1.6	4.9
<i>Commelina benghalensis</i>	2	2	0.2	0.7	1.0	2.4	0.8	0.2	1.1	3.4
<i>Cyperus esculentus</i>	7	5	0.4	2.3	1.4	6.1	1.1	0.8	2.7	8.0
<i>Cyperus iria</i>	9	3	0.3	3.0	3.0	3.7	2.3	1.0	2.3	7.0
<i>Desmodium barbatum</i>	1	1	0.1	0.3	1.0	1.2	0.8	0.1	0.7	2.1
<i>Digitaria horizontalis</i>	7	3	0.3	2.3	2.3	3.7	1.8	0.8	2.1	6.2
<i>Digitaria sanguinalis</i>	19	3	0.3	6.3	6.3	3.7	4.8	2.2	3.5	10.6
<i>Fimbristylis dichotoma</i>	3	3	0.3	1.0	1.0	3.7	0.8	0.3	1.6	4.8
<i>Kyllinga odorata</i>	19	5	0.4	6.3	3.8	6.1	2.9	2.2	3.7	11.2
<i>Leptochloa filiformis</i>	40	4	0.3	13.3	10.0	4.9	7.6	4.6	5.7	17.1
<i>Lindernia dubia</i>	4	2	0.2	1.3	2.0	2.4	1.5	0.5	1.5	4.4
<i>Mollugo verticillata</i>	627	11	0.9	209.0	57.0	13.4	43.3	71.7	42.8	128.4
<i>Paspalum conjugatum</i>	1	1	0.1	0.3	1.0	1.2	0.8	0.1	0.7	2.1
<i>Paspalum maritimum</i>	40	5	0.4	13.3	8.0	6.1	6.1	4.6	5.6	16.7
<i>Paspalum notatum</i>	1	1	0.1	0.3	1.0	1.2	0.8	0.1	0.7	2.1
<i>Phyllanthus niruri</i>	9	2	0.2	3.0	4.5	2.4	3.4	1.0	2.3	6.9
<i>Phyllanthus tenellus</i>	8	2	0.2	2.7	4.0	2.4	3.0	0.9	2.1	6.4
<i>Praxeliz pauciflora</i>	39	6	0.5	13.0	6.5	7.3	4.9	4.5	5.6	16.7
<i>Pueraria phaseoloides</i>	2	2	0.2	0.7	1.0	2.4	0.8	0.2	1.1	3.4
<i>Spermacoce latifolia</i>	6	5	0.4	2.0	1.2	6.1	0.9	0.7	2.6	7.7
<i>Spigelia anthelmia</i>	12	6	0.5	4.0	2.0	7.3	1.5	1.4	3.4	10.2
<i>Talinum paniculatum</i>	4	2	0.2	1.3	2.0	2.4	1.5	0.5	1.5	4.4
<i>Vernonia polyanthes</i>	1	1	0.1	0.3	1.0	1.2	0.8	0.1	0.7	2.1
Total	875	-	6.8	291.7	131.6	100	100	100	100	-

Although *Spermacoce latifolia* (oval-leaf false buttonweed) displayed high absolute and relative frequencies and tolerated a certain degree of shading, it was not one of the main weeds in

area 4, with an absolute density of 2.0 plants m², possibly due to an improvement in the fertility levels (LORENZI, 2008).

The use of banana plant remains is an important means of control, since it reduces weed density through light reduction or suppression, affecting weed germination and development when residues remain on the soil (OLIVEIRA; SOUZA, 2003). Consequently, the use of post-emergent herbicides can be rationalized, since some species are tolerant and require higher doses or herbicide combinations for control, such as *Spermacoce latifolia* and *Commelina benghalensis*.

The weed species with the highest absolute and relative frequencies in 4 x 2 x 2 m banana intercropped with 6 x 3 m *E. precatoria* (area 5) were *Paspalum maritimum*, *Spigelia anthelmia*, *Digitaria sanguinalis*, *Cyperus iria*, *Paspalum conjugatum*, *Fimbristylis dichotoma*, and *Praxelis pauciflora* (Table 7).

It was observed that *Digitaria sanguinalis* had a higher phytosociological parameter for absolute density (55.0 plants per m²), absolute abundance (33.0%), relative abundance (24.1%), relative density (29.6%), relative importance (20.2%) and importance value index (60.6). Lima et al. (2012) and Gomes et al. (2010) demonstrated that this species is one of the main weeds found amid banana crops.

Table 8 shows that *Mollugo verticillata*, *Fimbristylis dichotoma*, *Kylinga odorata* and *Phyllanthus niruri* were the most frequent species in area 6 (4 x 2 x 2 m banana intercropped with 4 x 2 x 3 m *E. precatoria* palm), presenting higher absolute and relative frequencies.

In relation to the number of plants per m², *Mollugo verticillata* and *Paspalum notatum* showed an absolute density of 60.3 and 24.0 plants per m², relative density of 39.6% and 15.8%, respectively, above the other results. Regarding absolute and relative abundance, relative importance and importance value index, one can observe that *Digitaria sanguinalis*, as well as *Mollugo verticillata* and *Paspalum notatum* stand out in this crop area.

Several phytosociological surveys carried out on banana crops and agroforestry intercroppings have identified many weed species belonging to different families (LIMA et al., 2012; GOMES et al., 2010; SILVA et al., 2013), which may be influenced by farming practices, soil management systems, location and time of survey, planting densities, among other factors.

Table 7 – Values of the number of individuals (NI), number of squares (NQ), absolute frequency (Fa), absolute density (Da), absolute abundance (Ab), relative frequency (Fr), relative abundance (Ar), relative density (Dr), relative importance (Ir) and the importance value index (IVI) in area 5. Rio Branco-AC, 2014.

Species	NI	NQ	Fa	Da	Ab	Fr (%)	Ar (%)	Dr (%)	Ir (%)	IVI
				(p m ²)						
<i>Acalypha arvensis</i>	1	1	0.1	0.3	1.0	1.4	0.7	0.2	0.8	2.3
<i>Commelina benghalensis</i>	2	1	0.1	0.7	2.0	1.4	1.5	0.4	1.1	3.2
<i>Corchorus olitorius</i>	2	1	0.1	0.7	2.0	1.4	1.5	0.4	1.1	3.2
<i>Cyperus esculentus</i>	2	2	0.2	0.7	1.0	2.7	0.7	0.4	1.3	3.8
<i>Cyperus iria</i>	27	5	0.4	9.0	5.4	6.8	3.9	4.8	5.2	15.6
<i>Digitaria sanguinalis</i>	165	5	0.4	55.0	33.0	6.8	24.1	29.6	20.2	60.6
<i>Eleusine indica</i>	37	2	0.2	12.3	18.5	2.7	13.5	6.6	7.6	22.9
<i>Emilia fosbergii</i>	1	1	0.1	0.3	1.0	1.4	0.7	0.2	0.8	2.3
<i>Fimbristylis dichotoma</i>	10	5	0.4	3.3	2.0	6.8	1.5	1.8	3.4	10.1
<i>Kyllinga brevifolia</i>	9	3	0.3	3.0	3.0	4.1	2.2	1.6	2.6	7.9
<i>Kyllinga odorata</i>	11	4	0.3	3.7	2.8	5.5	2.0	2.0	3.2	9.5
<i>Leptochloa filiformis</i>	55	4	0.3	18.3	13.8	5.5	10.1	9.9	8.5	25.4
<i>Mollugo verticillata</i>	60	4	0.3	20.0	15.0	5.5	11.0	10.8	9.1	27.2
<i>Murdannia nudiflora</i>	7	4	0.3	2.3	1.8	5.5	1.3	1.3	2.7	8.0
<i>Paspalum conjugatum</i>	25	5	0.4	8.3	5.0	6.8	3.7	4.5	5.0	15.0
<i>Paspalum maritimum</i>	38	7	0.6	12.7	5.4	9.6	4.0	6.8	6.8	20.4
<i>Paspalum paniculatum</i>	2	1	0.1	0.7	2.0	1.4	1.5	0.4	1.1	3.2
<i>Phyllanthus niruri</i>	8	3	0.3	2.7	2.7	4.1	2.0	1.4	2.5	7.5
<i>Praxeliz pauciflora</i>	44	5	0.4	14.7	8.8	6.8	6.4	7.9	7.1	21.2
<i>Spermacoce latifolia</i>	3	3	0.3	1.0	1.0	4.1	0.7	0.5	1.8	5.4
<i>Spigelia anthelmia</i>	46	6	0.5	15.3	7.7	8.2	5.6	8.3	7.4	22.1
<i>Talinum paniculatum</i>	2	1	0.1	0.7	2.0	1.4	1.5	0.4	1.1	3.2
Total	557	-	6.1	185.7	136.7	100	100	100	100	-

**WEED INCIDENCE IN AN INTERCROPPING SYSTEM OF BANANA, TYPE PLANTAIN, CV.
D'ANGOLA, WITH ASSAI PALM IN DIFFERENT ARRANGEMENTS**

Table 8 - Values of the number of individuals (NI), number of squares (NQ), absolute frequency (Fa), absolute density (Da), absolute abundance (Ab), relative frequency (Fr), relative abundance (Ar), relative density (Dr), relative importance (Ir) and the importance value index (IVI) in area 6. Rio Branco-AC, 2014.

Species	NI	NQ	Fa	Da	Ab	Fr (%)	Ar (%)	Dr (%)	Ir (%)	IVI
				(p m ²)						
<i>Mollugo verticillata</i>	181	8	0.7	60.3	22.6	14.0	15.4	39.6	23.0	69.0
<i>Paspalum notatum</i>	72	3	0.3	24.0	24.0	5.3	16.3	15.8	12.4	37.3
<i>Digitaria sanguinalis</i>	35	1	0.1	11.7	35.0	1.8	23.8	7.7	11.1	33.2
<i>Paspalum maritimum</i>	34	4	0.3	11.3	8.5	7.0	5.8	7.4	6.7	20.2
<i>Fimbristylis dichotoma</i>	31	5	0.4	10.3	6.2	8.8	4.2	6.8	6.6	19.8
<i>Kyllinga odorata</i>	23	5	0.4	7.7	4.6	8.8	3.1	5.0	5.6	16.9
<i>Cyperus iria</i>	20	3	0.3	6.7	6.7	5.3	4.5	4.4	4.7	14.2
<i>Cyperus difusus</i>	11	1	0.1	3.7	11.0	1.8	7.5	2.4	3.9	11.6
<i>Praxeliz pauciflora</i>	11	3	0.3	3.7	3.7	5.3	2.5	2.4	3.4	10.2
<i>Phyllanthus niruri</i>	8	5	0.4	2.7	1.6	8.8	1.1	1.8	3.9	11.6
<i>Commelina benghalensis</i>	7	1	0.1	2.3	7.0	1.8	4.8	1.5	2.7	8.0
<i>Cyperus esculentus</i>	5	4	0.3	1.7	1.3	7.0	0.8	1.1	3.0	9.0
<i>Murdannia nudiflora</i>	4	2	0.2	1.3	2.0	3.5	1.4	0.9	1.9	5.7
<i>Paspalum conjugatum</i>	4	1	0.1	1.3	4.0	1.8	2.7	0.9	1.8	5.3
<i>Spermacoce latifolia</i>	3	3	0.3	1.0	1.0	5.3	0.7	0.7	2.2	6.6
<i>Phyllanthus tenellus</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Chamaecrista rotundifolia</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Spigelia anthelmia</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Eleusine indica</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Corchorus olitorius</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Ipomoea triloba</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Sporobolus indicus</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
<i>Cyperus flavus</i>	1	1	0.1	0.3	1.0	1.8	0.7	0.2	0.9	2.7
Total	457	-	4.8	152.3	147.1	100	100	100	100	-

In general, *Mollugo verticillata* stood out in all the assessed areas as the main weed in three areas (4, 5 and 6) regarding the phytosociological parameters (Tables 6, 7 and 8). The importance of this species in both intercropping and monoculture systems can be explained by its adaptation to carbon metabolism occurring in an intermediate form (C₃-C₄), with C₃ e C₄ acids as the primary products of photosynthesis, the intermediate photorespiration and perivascular sheath containing chloroplasts, enabling a successful development in a shaded or sunny environment.

The *E. precatoria* palm monoculture favored a better weed development, resulting in a greater amount of dry matter, reaching a value of 2676.8 kg ha⁻¹ and, as a consequence, the percentage of soil cover was also higher, achieving 8.3 points on the grade scale (Tables 1 and 9).

Table 9 – Dry matter of the aerial part (MSPA) and grades related to the visual evaluation of the soil cover (NCS) in the *E. precatoria* palm intercropping with banana and monocultures. Rio Branco-AC, 2014.

Treatments	MSPA (kg ha ⁻¹)	NCS (%)
<i>E. precatoria</i> palm monoculture (3 x 4 m)	2676.80a	8.37a
Banana monoculture (3 x 3 m)	555.87b	4.45b
Banana (3 x 2 m) with <i>E. precatoria</i> palm (3 x 4 m)	379.13b	2.57b
Banana (3x 3 m) with <i>E. precatoria</i> palm (3 x 4 m)	353.80b	3.63b
Banana (4 x 2 x 2 m) with <i>E. precatoria</i> palm (6 x 3 m)	272.33b	2.39b
Banana (4 x 2 x 2 m) with <i>E. precatoria</i> palm (4 x 2 x 3 m)	331.80b	2.39b
CV (%)	10.69	14.96

Thus, the soil cover values ranged between 90 and 100% with the presence of weeds above the extremely high incidence, in which monocotyledon species were favored by the high solar radiation, a consequence of the spacing and low height of the *E. precatoria* palms at the moment of the survey (LARCHER, 2004).

In areas with banana trees, both in monoculture and in an intercropping system with *E. precatoria* palm in different planting arrangements, there was no statistical difference in the production of dry mass and visual evaluation scores (Tables 1 and 9). The grades ranged from 2.39 to 4.45 (1 to 12.5% of the soil cover), indicating that the shading imposed by banana leaves promoted an efficient reduction in the soil cover levels, and was also responsible for the decrease of species diversity and for the reduction in the dry mass of the aerial part of the weeds. Such

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influence on the weed community occurred due to the low-intensity light in relation to the *E. precatoria* palm monoculture.

The similarity index indicated similarities in the weed communities found in *E. precatoria* palm and banana monocultures, as well as in intercropping systems with different planting arrangements, which achieved a value above 60% (Table 10).

Table 10 – Similarity index values (IS%) obtained from the survey carried out on the floristic communities of different areas under banana intercropping with *E. precatoria* palm and monocultures in different planting densities.

IS%	Area 1	Area 2	Area 3	Area 4	Area 5
Area 2	67.74				
Area 3	65.57	80.00			
Area 4	76.67	70.37	71.70		
Area 5	64.29	72.00	73.47	66.67	
Area 6	63.16	66.67	64.00	61.22	75.56

The major similarities were found between the species of area 2 and area 3 (80.0%), area 1 and area 4 (76.67%), area 5 and area 6 (75.56%), which can be explained in part by the management practices adopted, the proximity between areas and the same type of soil (CARVALHO; PITELLI, 1992).

Comparing the banana monoculture (area 2) with the intercropping system in different planting densities, it was observed that there was less similarity between the species in area 6, with a similarity index of 66.67%, due to the greater density of *E. precatoria* palms and banana trees. Likewise, Souza et al. (2003) found a lower similarity index when comparing peach-palm and cupuaçu monocultures with an agroforestry system of these crops in the Amazonian environmental conditions. Contrasting with the present study, Gomes et al. (2010) observed a low similarity between weed species when comparing drained floodplain and banana dry farming areas (35.70%).

CONCLUSIONS

In general, *Mollugo verticillata* is one of the main species found in *E. precatoria* palm and banana monocultures and in intercropping systems with different planting arrangements.

The *E. precatoria* palm monoculture shows a greater diversity of weed species and individuals, dry mass of the aerial part and provides a considerable soil cover.

Areas with banana monoculture or under a banana intercropping with *E. precatoria* palm in different planting arrangements display the same amount of dry matter of the aerial part and similar soil cover levels.

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