Original Research Article

Botanical Analysis of Seed Bank in a Cultivated Area of Integration Livestock Agriculture

ABSTRACT

The seed bank has an ecological role of great importance in the re-composition of new individuals in plant communities. In the integration system livestock agriculture, the seed bank usually presents a serious problem, the agricultural activity, because this type of activity favors weed infestations over a long period of time. The different soil management systems and cultures have decisive influence on germination and composition of the flora of an area and in the seed bank of the agricultural soil. The objective of this study was to identify weed species that emerged during the analyzed period of the seed bank at different depths in an area of integration livestock agriculture. The present study was conducted in an area of integration livestock agriculture in the Center of Agrarian Sciences, of the Federal University of Alagoas (CECA - UFAL), located in the municipality of Rio Largo - AL, Brazil, in the year 2017. 20 samples at each depth: 0.0 to 10.0 cm and of 10.0 to 20.0 cm were collected. In possession of the data, it was possible to determine several phytosociological characteristics. It was observed in the composition of the seed bank high diversity of species with great variability. The seed bank has a greater diversity in the first soil layer (0.0 to 10.0 cm), presenting in its total density a decrease to increase the depth.

Keywords: Infest plants, phytosociological indexes, phytosociological survey, Soil depth, Productive systems.

1. INTRODUCTION

The active seed bank of weeds consists of all viable diaspores present in the soil; all these components determine the composition of emerged plants in the area. Being characterized by presenting dynamic behavior, on the basis of the additions constant through of the production, dispersal and seed losses and its structure is closely related to diversity and abundance of species that make up weed populations over the soil. In cultivated soils, the seed bank is dominated, often, by few species of weeds, in which species of difficult control higher values or those more adapted to the cropping systems [1].

In cultivated soils, seeds of weeds annual are the main constituents of the bank, usually reaching 95% of the total, being the seeds of perennial weeds, little represented [2]. Weed communities can vary significantly in response to the edaphoclimatic characteristics, the adopted management of cultivation and the use of herbicides.

The process of infestation of weeds in growing areas depends directly on the germination of their seeds [3], which in turn, is influenced by external or environmental factors and internal to the seed. Each factor can act by itself or in interaction with the other [4]. Among the external factors, we can cite the temperature, influences the germination both by acting on the speed of water absorption, in the same way the biochemical reactions that determine the whole germination processes [5]. Another factor that affects germination is the depth at which the seed is in the soil profile [~~12~~6]. Yet, it is of fundamental importance to know the conditions imposed by the environment in the seed germination process, being of utmost importance for the development of efficient techniques what aimed at the integrated control of weeds. In this way weed control plays an extremely important role in the management of cultivated plants, presenting direct effects on crop yields per unit area and in production costs. Control methods should promote greater rationality, effectiveness and reduction in control costs [7~~13~~].

Therefore, the evaluation of the species that make up the seed bank of the soil is essential, serving as an indication for decision-making in which method or management strategies to be adopted in weed control. Being considered a dynamic system, where the total accumulated seeds It is variable according to the balance of inputs and outputs in seeds [~~14~~8]. According to [~~15~~9], the seed bank is the set of seeds available for germination in the soil, being found in various ways.

In view of the foregoing, the objective of this study was to botanical analysis of seed bank in a cultivated area of integration livestock agriculture.

2. MATERIALS AND METHODS

The study was conducted from January to May 2017, in the Agrarian Sciences Center of the Federal University of Alagoas (CECA-UFAL), located in the municipality of Rio Largo - AL. According to [~~16~~10] the soil of the experimental area was classified as Yellow Latosol argisolic cohesion of medium-clayey texture. The Municipality is situated at a Lat. 9° 27'S, Long. 35° 27'W, according to Köppen classification is type As, climate tropical rainy with dry summer, average altitude of 100 to 200 m above sea level, with temperature and rainfall, annual averages, between 24 to 26 °C and 1300 to 1600 mm, respectively [~~17~~11].

Table 1, presents the climatic data measured in the experiment during the conduction of same.

Table 1. Air temperature (average, minimum and maximum) and rainfall during the months of January to May, Rio Largo - AL, 2017.

Variables		**Months**				
		Jan	Feb	Mar	Apr	May
Air temperature (°C)	Average	25.9	26.5	26.5	25.7	24.6
	Minimum	20.7	20.4	20.6	21.3	21.0
	Maximum	32.4	33.0	33.7	31.6	33.3
Rainfall (mm)		41.9	12.2	45.7	168.1	584.7

Source: Agrometeorology Sector / Federal University of Alagoas – UFAL

A collection area of 0.5 ha^{-1} was selected to carry out the study. 40 soil samples were collected on January 25, 2017, of sector of sheep farming to evaluate the seed bank in an integrated system livestock agriculture.

The experiment was implemented in design entirely at random, in which the area was divided into 5 blocks, being collected 20 samples in the depth of 0.0 cm to 10.0 cm cm and 20 samples of 10.1 cm to 20.0 cm with spacings equidistant of 10 m x 10 m, between all sample points, in zig-zag. the inventory method that was divided into four quadrants (0.25 x 0.25) of form random in the area, to collect all samples.

Samples for physical and chemical analysis were collected from random points at two depths of 0.0 cm to 20.0 cm and 20.1 cm to 40.0 cm, physical analysis showed the following characteristics: Total sand: 566 g.kg^{-1}; Silt: 125 g.kg^{-1}; Clay: 308 g.kg^{-1}.Already for the result of the chemical analysis of the soil it can be observed to follow: pH = 5.3, organic matter = 1.26 %, Na = 7 ppm, P = 2 ppm, K = 40 ppm, Ca+Mg = 1.7 meq/100 mL, Al = 0.15 meq/100 mL, H+Al = 3.0 meq/100 mL, sum of bases (SB) = 1.8 meq/100 mL, cation exchange capacity = 4.8 meq/100 mL, base saturation (V) = 37,9 % (Source: Central Analytical of Alagoas).

Formatted: Highlight

Soon after the samples collection, the same were listed and routed for drying the shadow during 4 days, under a plastic canvas. After drying the samples were fragmented and standardized, in followed were removed remains of branches, dead leaves and animal feces, of 500 g of soil that were distributed in plastic trays with dimensions of 20.0 x 26.0 x 7.0 cm and allocated on rails under normal conditions of humidity, precipitation and temperature, that is: without cover, exposed to the climatic effects. The trays were perforated to drain excess water.

The determination of the seed bank was made after the emergence of the seedlings, whose identification and counting were performed every 7 days, up to a total period of 60 days. after the first evaluation the samples were removed from the trays, homogenised and made a new breaking of clods and the revolving of the soil and the samples were reseated for the second experimental stage, for another 60 days. following the same intervals assessments (Figure 1), after the implementation of the experiment were used the sum of all the observations to make the analysis of the variables under study.

1 - A **1 - B**

1 - C **1 - D**

Figure 1. A) Depth samples 0.0 to 10.0 cm in the first step; B) Depth samples 10.0 to 20.0 cm in the first stage; C) Depth samples 0.0 to 10.0 cm in the second stage; D) Depth samples 10.0 to 20.0 cm in the second stage.

The analysis for the study of phytosociological indices was performed starting from the count of the species after a period of 120 days, with all data collected in hand were used to calculate the values of phytosociological indexes: the Frequency (F) with which the species were germinating, in %; Density (D), in plants per m^2; Abundance (A), in unit; Relative frequency (FR), in %; Relative density (DR), in %; Relative abundance (AR), in %; Index of value of importance (IVI), in %; importance value index of relative (IVIR), in %. For these the following formulas were used [182]:

Formatted: Highlight

$$\text{Frequency (F)} = \frac{\text{N° of plots which contains the species x 100}}{\text{N° total of plots used}}$$

$$\text{Density (D)} = \frac{\text{N° total of individuals per species}}{\text{Total area collected}}$$

$$\text{Abundance (A)} = \frac{\text{N° total of individuals per speciese}}{\text{N° total of parcels containing the species}}$$

$$\text{Relative Frequency (FR)} = \frac{\text{Frequency of species x 100}}{\text{Frequency total of species}}$$

$$\text{Relative density (DR)} = \frac{\text{Density of species x 100}}{\text{Density total of species}}$$

$$\text{Relative Abundance (AR)} = \frac{\text{Abundance x 100}}{\text{Abundance total of species}}$$

Importance Value Index (IVI) = FR + DR + AR

$$\text{Index of Value of Relative Importance (IVIR)} = \frac{\text{IVI of specie x 100}}{\text{IVI total of all the species}}$$

3. RESULTS AND DISCUSSION

In the composition of the seed bank, it was observed that there was great diversity of weed species presenting a great variability between them, with the presence of 33 plant species with distribution in 15 botanical families.

Among the families found, Poaceae with greater significance among the others with 11 species, followed by the Asteraceae family with 04 species; Euphorbiaceae with 03 species; Cyperaceae with 03 species and Solanaceae with 02 and Fabaceae; Molluginaceae, Lamiaceae, Brassicaceae, Loganiaceae, Nyctaginaceae, Portulacea, Convolvulaceae, Amaranthaceae, Phyllanthaceae with only one species each (Table 2).

Table 2. List of species identified in the seed bank at two depths of soil in cultivated area with the system livestock agriculture, Rio Largo - AL, 2017.

Family	Botanical Name	Common name	Class	Life cycle

Asteraceae	*Ageratum conyzóides*	Mentrasto	Dicotyledon	Annual
	Eclipta alba	Lanceta	Dicotyledon	Perennial
	Eupatorium ballotaefolium	Maria pretinha	Dicotyledon	Annual
	Emilia coccínea	Pincel	Dicotyledon	Annual
Amaranthaceae	*Alternanthera tenella*	Apaga Fogo	Dicotyledon	Perennial / Annual
Brassicaceae	*Cleome affinis*	Mussambê	Dicotyledon	Annual
Cyperaceae	*Cyperus rotundus*	Tiririca	Monocotyledon	Perennial
	Cyperus iria	Junquinho	Dicotyledon	Perennial
	Fimbristylis miliaceae	Cominho	Dicotyledon	Perennial
Convolvulaceae	*Ipomoea cairica*	Jitirana	Dicotyledon	Annual
Euphorbiaceae	*Euphorbia heterophylla*	Burra Leiteira	Dicotyledon	Annual
	Croton lobatos	Erva-de-Rola	Dicotyledon	Annual
	Chamaesyce hyssopifolia	Erva-de-Santa Luzia	Dicotyledon	Annual
Fabaceae	*Calopogonium mucunoides*	Calopogônio	Dicotyledon	Annual
Loganiaceae	*Spigelia anthelmia*	Lombrigueira	Dicotyledon	Annual
Lamiaceae	*Marsypianthes chamaedrys*	Hortelã-do-Campo	Dicotyledon	Annual
Molluginaceae	*Mollugo verticillata*	Capim Tapete	Dicotyledon	Annual
Nyctaginaceae	*Boerhavia diffusa*	Pega Pinto	Dicotyledon	Perennial
Poaceae	*Digitaria sanguinalis*	Capim-Colchão	Monocotyledon	Annual
	Eragrostis pilosa	Capim Mimoso	Monocotyledon	Annual
	Brachiaria mutica	Capim fino	Monocotyledon	Annual
	Cenchrus echinatus	Carrapicho	Monocotyledon	Annual
	Dactyloctenium aegyptium	Capim Mão de Sapo	Monocotyledon	Perennial
	Paspalum notatum	Grama Batatais	Monocotyledon	Perennial
	Brachiaria decumbens	Capim Brachiária	Monocotyledon	Perennial
	Digitaria horizontalis	Capim-Milhã	Monocotyledon	Annual
	Eleusine indica	Capim-pé-de-Galinha	Monocotyledon	Annual
	Digitaria insularis	Capim-Amargoso	Monocotyledon	Perennial

	Setaria geniculata	Capim-rabo-de-Raposa	Monocotyledon	Annual
Phyllanthaceae	*Phyllanthus tenellus*	Quebra-pedra	Dicotyledon	Annual
Portualacaceae	*Portulaca oleracea*	Beldroega	Monocotyledon	Annual
Solanaceae	*Solanum paniculatum*	Jurubeba	Dicotyledon	Annual
	Streptosolen jamesonii	Marianinha	Dicotyledon	Perennial

According to [1~~9~~3] they observed that Asteraceae and Poaceae are the main families of weeds predominant in Brazil. These families are present in traditional areas of production of sunflower, soybean, corn, being found in cultures of great economic importance, as in areas of crops such as sugarcane and pasture.

Among the species observed, greater predominance of dicotyledonous plants with 60.6% of the total plants were identified, represented by 13 botanical families, covering 20 species, while monocotyledons had 39.4% of representativeness in 03 families (Cyperaceae, Poaceae, Portualacaceae) with a total of 13 species, in areas cultivated with the integration system livestock agriculture.

According to [~~2~~14] a greater diversity of dicotyledonous weeds in competition with the cultivated areas. On the other hand, [~~22~~15] have verified in sugar cane cultivation that the species most found were *Amaranthus spp.*, *Cyperus spp.*, *Cassia patellaria*, *Ipomoea spp.*, *Chamaesyce hissopifolia*, *Sida spp.* and *Phylantus tenellus*, being that 85% of the species were dicotyledons. [~~23~~16] most of the weed species present a rapid germination, with a short cycle and large production of diaspores and increases the partition of resources in reproduction structures, can be extremely aggressive in competition with agricultural crops. According to [~~20~~17] in grazing areas with intense weed infestation reduce the animal support capacity of pastures preventing the adequate use of pastures by the animal.

Formatted: Highlight

Among the observed species some were only seen at specific depths, developing only in samples of depth of 0.0 to 10.0 cm, with 09 species that stood out among the others: *Eclipta alba*, *Eupatorium ballotaefolium*, *Cleome affinis*, *Chamaesyce hyssopifolia*, *Diffuse Boerhavia*, *Paspalum notatum*, *Brachiaria decumbens*, *Digitaria horizontalis* and *Streptosolen jamesonii*. On the other hand, at depth of 10.0 to 20.0 cm only 03 species if highlight: *Digitaria sanguinalis*, *Cenchrus echinatus* and *Solanum paniculatum*. These species may have arisen due to agricultural activities in the areas and the use of implements that make the soil revolving making with what the seeds that if find in layers more deep come to the surface of the soil.

The systems of cultivation in the dynamics of the weed population they are amended in accordance with the seasons of the year, the first rains promote seed germination present in the active seed bank of the soil [~~24~~18]. What was evidenced by [~~25~~19] when they analyzed the monthly distribution of weed emergence, also noted that, due to the first rains, on average 70% of seedling emergence results from the first seed germination flow which make up the active bank of viable soil seeds.

Formatted: Highlight

So, over time, the decrease in the number of emerged plants is more pronounced than the number of viable seeds present in the soil bank, due, mainly, to the fact that these seeds are

Formatted: Highlight

not always strong enough to germinate, giving rise to normal seedlings with a significant survival capacity [2~~6~~0].

The frequency (F) in which the species presented the highest occurrence indexes for the integration system for livestock agriculture in the depth of 0.0 to 10 cm were *Eleusine indica*, *Cyperus iria* go with 100%, *Portulaca oleracea*, *Calopogonium mucunoides* with 60%, *Cyperus rotundus* and *Ageratum conyzoides* presenting 50% were observed in all samples analyzed, indicating uniform distribution in the area. According to [2~~7~~1] these heterogeneities of species are attributed to edaphoclimatic factors and the microhabitats in the soil (Table 3).

Formatted: Highlight

Table 3. Weed phytosociological indexes in the soil seed bank under integration system for livestock agriculture of species found in the depth 0.0 to 10.0 cm, Rio Largo - AL, 2017.

Species	F	D	A	FR	DR	AR	IVI	IVIR
Eleusine indica	1.00	30.90	13.43	13.43	17.62	7.55	38.70	10.95
Croton lobatos	0.40	6.20	7.75	4.70	3.53	4.35	12.59	3.50
Chamaesyce hyssopifolia	0.30	1.30	2.16	3.52	0.74	1.21	5.48	1.55
Cleome affinis	0.25	1.00	2.00	2.94	0.57	1.12	4.63	1.31
Eupatorium ballotaefolium	0.10	0.20	1.00	1.17	0.11	0.56	1.85	0.52
Portulaca oleracea	0.60	3.50	2.91	7.05	1.99	1.63	10.72	3.03
Calopogonium mucunoides	0.60	2.10	1.75	7.05	1.19	0.98	9.24	2.61
Ipomoea cairica	0.10	0.20	1.00	1.17	0.11	0.56	1.85	0.52
Digitaria insularis	0.30	3.40	5.66	3.52	1.93	3.18	8.65	2.44
Mollugo verticillata	0.25	1.80	3.60	2.94	1.02	2.02	5.99	1.69
Brachiaria mutica	0.20	1.20	3.00	2.35	0.68	1.68	4.72	1.33
Eragrostis pilosa	0.25	7.60	15.20	2.94	4.33	8.54	15.82	4.47
Digitaria horizontalis	0.15	2.40	8.00	1.76	1.36	4.49	7.63	2.15
Cyperus rotundus	0.50	16.80	16.80	5.88	9.58	9.44	25.18	7.12
Paspalum notatum	0.10	0.50	2.50	1.17	0.28	1.40	2.91	0.82
Cyperus iria	1.00	5.09	25.45	11.76	29.03	14.30	55.10	15.59
Streptosolen jamesonii	0.15	0.60	2.00	1.76	0.34	1.12	4.83	1.36
Dactyloctenium aegyptium	0.25	2.90	5.80	2.94	1.65	3.26	27.00	7.63
Ageratum conyzóides	0.50	34.70	34.70	5.88	19.79	19.50	45.78	12.95
Alternanthera tenella	0.20	1.10	2.75	2.35	0.62	1.54	4.80	1.35
Boerhavia diffusa	0.10	0.50	2.50	1.17	0.28	1.40	3.69	1.04
Setaria geniculata	0.15	1.50	5.00	1.76	0.85	2.81	6.36	1.80
Spigelia anthelmia	0.20	1.70	4.25	2.35	0.96	2.38	5.93	1.67
Euphorbia heterophylla	0.15	0.40	1.33	1.76	0.22	0.74	3.51	0.99
Phyllanthus tenellus	0.30	1.40	2.33	3.52	0.79	1.31	5.69	1.61
Eclipta alba	0.05	0.10	1.00	0.58	0.05	0.56	1.26	0.35
Emilia coccínea	0.05	0.10	1.00	0.58	0.05	0.56	1.26	0.35
Brachiaria decumbens	0.05	0.10	1.00	0.58	0.05	0.56	1.26	0.35
Fimbristylis miliaceae	0.05	0.10	1.00	0.58	0.05	0.56	1.26	0.35
Marsypianthes chamaedrys	0.05	0.10	1.00	0.58	0.05	0.56	1.20	0.34
TOTAL	8.5	173.30	177.90	100	100	100	353.42	100

Frequency (F) with which the species were germinating, in %; Density (D), in plants per m^2; Abundance (A), in unit; Relative frequency (FR), in %; Relative density (DR), in %; Relative abundance (AR), in %; Index of value of importance (IVI), in %; importance value index of relative (IVIR), in %.

In a study carried out by [22~~8~~] observed that the highest predominance of dicotyledonous species with 79.41% of the total plants identified, represented by 15 botanical families covering 27 species, while monocotyledons were represented only by two families (Cyperaceae and Poaceae) with a total of 7 species in areas where, predominantly, they were cultured with vegetables. [~~2~~14] observed the greatest diversity of dicotyledonous weeds in competition with the cultivated areas.

Formatted: Highlight

Regarding the index of importance value (IVI), it is verified that the species *Eleusine indica*, *Cyperus rotundus*, *Ageratum conyzoides*, *Chamaesyce hyssopifolia* and *Cyperus iria*, had constant presence with the highest indexes in depth 0.0 to 10.0 cm.

IVI is directly related to the occurrence, quantity and concentration of individuals in the different points sampled in the total area, of a determined species, related to all the others found in the areas [~~29~~23]. Thus, the importance value index (IVI) It is further defined as being the combination of values phytosociological relative to each species, with the purpose of assigning a value to them within the plant community to which they belong.

Formatted: Highlight

[~~30~~24, ~~31~~25, ~~32~~26, ~~33~~27] achieved similar results, in which the specie *Digitaria horizontalis* was the main or the second most important when dealing with IVI. However, must tue concern with species that present low IVI, because according to [~~34~~28] there are species that even with IVI not so high, should already be considered a relevant species.

Formatted: Highlight

The observed that the species *Eupatorium ballotaefolium*, *Phyllanthus tenellus*, *Alternanthera tenella*, *Streptosolen jamesonii*, *Brachiaria mutica*, *Ipomoea cairica*, *Calopogonium mucunoides*, *Portulaca oleracea*, *Cleome affinis* and *Chamaesyce hyssopifolia* occurred in the samples evaluated in the depth of 0.0 to 10.0 cm (Figure 2). it was also observed that the relative frequency (FR) is higher among these species, thus obtaining a significant percentage when compared to other species of the same depth.

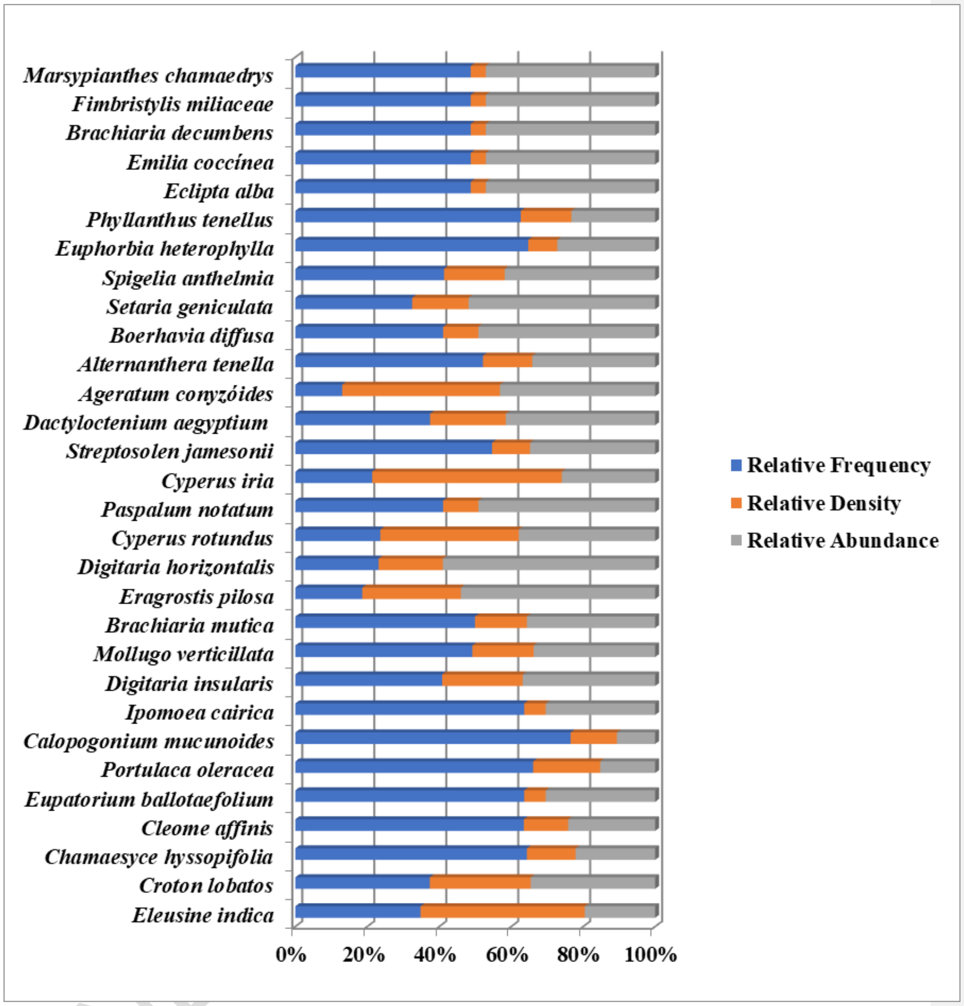

Figure 2. Phytosociological indexes of weeds in the soil seed bank under integration system for livestock agriculture of the species found in depth 0.0 to 10.0 cm, in the municipality of Rio Largo - AL, 2017.

For the depth of 10.0 to 20.0 cm, it can be observed (Table 4) the occurrence of 24 species being distributed in 12 families presenting a total density of 244.30 plants per m^2. Highlighting the following species *Cyperus iria*, *Eleusine indica*, *Ageratum conyzoides* and *Cyperus rotundus* which had densities of 79.9; 58.3; 51.8; 19.8; of plants per m^2, respectively, these species stood out also with respect to their frequency (F), occurring in 100 % in the sampled plots. The botanical composition and frequency of plants were quite variable among agroecosystems.

Table 4. Phytosociological indexes of weeds in the soil of seed bank under system of integration livestock agriculture of the species found in depth 10.0 to 20.0 cm, Rio Largo - AL, 2017.

Species	F	D	A	FR	DR	AR	IVI	IVIR
Portulaca oleracea	1.00	2.00	1.00	10.15	0.81	0.16	11.13	3.71
Eleusine indica	0.40	58.30	72.87	4.06	23.86	11.83	39.75	13.25
Digitaria insularis	0.30	2.60	4.33	3.04	1.06	0.70	4.81	1.60
Mollugoverticillata	0.10	5.50	27.50	1.01	2.25	4.46	7.73	2.57
Eragrostis pilosa	0.50	4.40	4.40	5.07	1.80	0.71	7.59	2.53
Digitaria sanguinalis	0.65	0.90	0.69	6.59	0.36	0.11	7.07	2.35
Brachiaria mutica	0.60	0.50	0.41	6.09	0.20	0.06	6.36	2.12
Calopogonium mucunoides	0.10	0.90	4.50	1.01	0.36	0.73	2.11	0.70
Croton lobatos	1.00	1.20	0.41	14.72	0.49	0.06	15.27	5.09
Cyperus rotundus	0.60	19.80	16.50	6.09	8.10	2.67	16.87	5.60
Cyperus iria	0.10	79.90	394.50	1.01	32.29	64.06	97.37	32.45
Dactyloctenium aegyptium	0.30	0.30	0.50	3.04	0.12	0.08	3.24	1.08
Alternanthera tenella	0.40	3.50	4.37	4.06	1.43	0.71	6.20	2.06
Ageratum conyzóides	0.45	51.80	57.55	4.56	21.20	9.34	35.11	11.70
Setaria geniculata	0.30	1.50	2.50	3.04	0.61	0.40	4.06	1.35
Phyllanthus tenellus	0.20	2.70	6.75	2.03	1.10	1.09	4.23	1.41
Euphorbia heterophylla	0.45	1.30	1.44	4.56	0.53	0.23	5.33	1.77
Marsypianthes chamaedrys	0.45	4.70	5.22	4.56	1.92	0.84	7.34	2.44
Spigelia anthelmia	0.45	0.50	0.55	4.56	0.20	0.09	4.86	1.62
Cenchrus echinatus	0.50	0.90	0.90	5.07	0.36	0.14	5..59	1.86
Ipomoea cairica	0.10	1.10	5.50	1.01	0.45	0.89	2.35	0.78
Emilia coccínea	0.15	0.10	0.33	1.52	0.04	0.05	1.61	0.53
Solanum paniculatum	0.15	0.40	1.33	1.52	0.16	0.21	1.90	0.63
Fimbristylis miliaceae	0.15	0.50	1.66	1.52	0.20	0.27	1.99	0.66
TOTAL	9.85	244.30	615.76	100	100	100	300	100

Frequency (F) with which the species were germinating, in %; Density (D), in plants per m^2; Abundance (A), in unit; Relative frequency (FR), in %; Relative density (DR), in %; Relative abundance (AR), in %; Index of value of importance (IVI), in %; importance value index of relative (IVIR), in %.

However, the species that presented the highest of importance value index (IVI) still at this same depth, infesting plants that obtained highlight were *Cyperus iria*, *Eleusine indica*, *Ageratum conyzóides*, *Cyperus rotundus* and *Croton lobatos*, with 97.37 %, 39.75 %, 35.11 %, 16.87 % and 15.27 % respectively. Weed communities can vary their floristic composition depending on the type and the intensity of them cultural imposed [~~35~~29]. The choice of appropriate management can change the population of weeds, the dynamics of the soil seed bank, the efficiency of applied herbicides and, consequently, the periods of interference [3~~6~~0].

[3~~7~~1] demonstrated that different management systems lead to different weed infestations. Comparing no-tillage, minimum crop and conventional, the authors observed a large difference between the dominant species at the end of the study, in which the composition of the initial population was the same. In no-tillage, as early as the first years of cultivation, there was a large increase of broad leaves, showing clearly the adaptation of these weeds to the system. Such adaptation is also observed depending on the herbicide used in the area.

Formatted: Highlight

Comparing the two depths analyzed, it is observed that in the first layer of 0.0 to 10.0 cm the density (D) was reduced by 70.93 % over the second layer of 10.1 to 20.0 cm. This reduction may be due to the isolated effects or various factors fundamental for germination in relation to the depth at which the seed is in the soil profile, its exposure to light effects, thermal variation, the availability of oxygen and water, as well as for the development of emersion, thus using all its reserve to tolerate its growth by the soil layer, making with what weed plants have a lower index in the germination process.

The depth of 10.0 to 20.0 cm highlighted the following species *Emilia coccinea*, *Cenchrus echinatus*, *Spigelia anthelmia*, *Euphorbia heterophylla*, *Dactyloctenium aegyptium*, *Croton lobate*, *Setaria geniculata*, *Brachiaria mutica*, *Digitaria sanguinalis* and *Portulaca oleracea* (Figure 3), can be observed in the analyzes made, presenting high relative value index (IVI) which shows the uniform distribution in the studied area. On the other hand, species with high density and low frequency presented unequal distribution in the area.

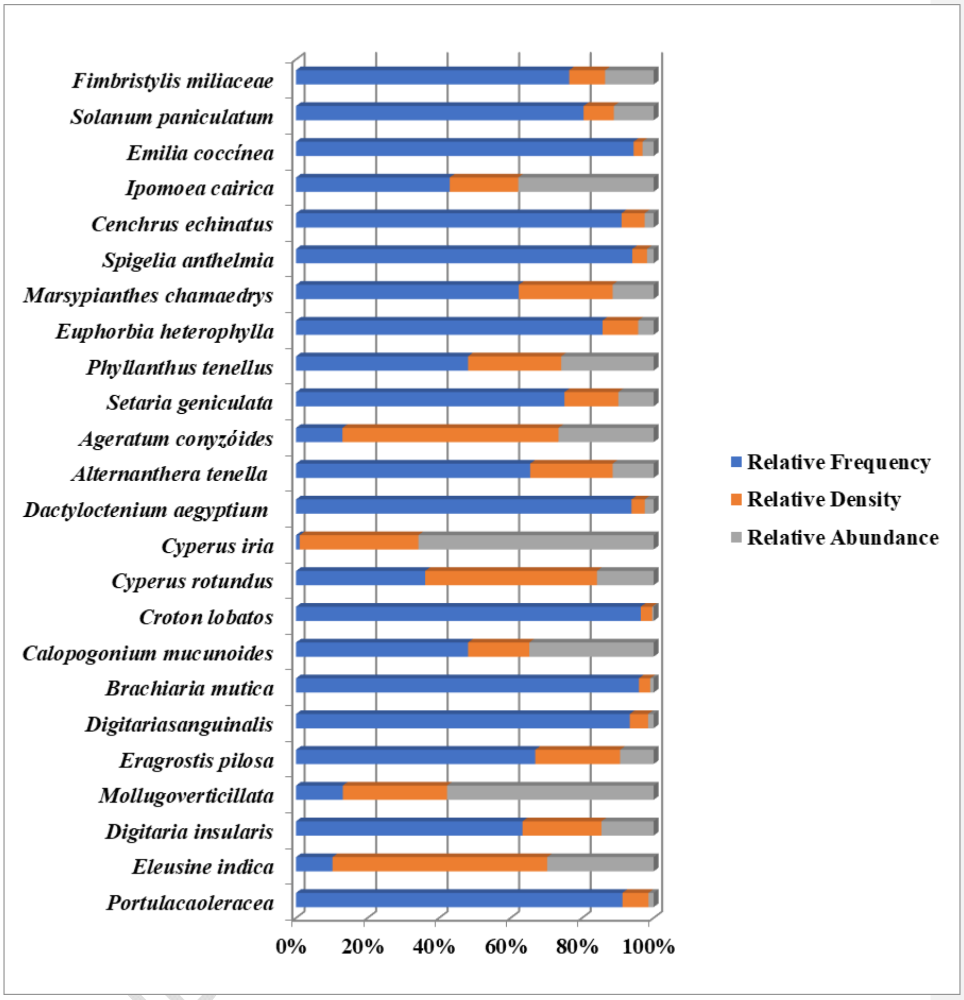

Figure 3. Phytosociological indexes of weeds in the soil seed bank under integration system for livestock agriculture of the species found in depth 10.0 to 20.0 cm, in the municipality of Rio Largo - AL, 2017.

4. CONCLUSION

The seed bank is most active in the most superficial layer of 0.0 to 10.0 cm in all analyzed samples when compared to the second layer of 10.1 to 20.0 cm.The population of emerged seeds the depth of 0.0 to 10.0 cm shows values higher than the other depths.

The total plant density decreased with increasing soil depth, modifying the dynamics of the existing flora.

REFERENCES

1. Gomes Júnior FG, Christoffoleti PJ. Biology and weed management in no-tillage areas. Plant. Dan. 2008;26(4):789-798. English.

2. Martins CC, Silva WR. Soil seed bank studies. Inf. Abra. 1994;4(1):49-56. English.

3. Roberts EH. A search for patten and form. See. Sci. Res. 1999;9(1):181-208. English.

4. Nassif SML, Vieira IG, Fernades GD. External factors (environmental) that influence seed germination. Piracicaba: IPEF/LCF/ESALQ/USP; 1998. English.

5. Carvalho NM, Nakagawa J. Seed Germination. In: Carvalho NM, Nakagawa J. Seeds: science, technology and production. 4 [rd]. Jaboticabal: FUNEP; 2000. English.

6. ~~Kendrick RE, Frankland B. Phytochrome and plant growth. São Paulo: EPU; 1981. English.~~

~~7. Toledo REB, Kuva MA, Alves PLCA. Factors affecting the germination and emergence of *Xanthium strumarium* L.: dormancy, light quality and depth of sowing. Plant. Dan. 1993;11(1/2):15-20. English.~~

~~8. Ballare CL, Casal JJ. Light signals perceived by crop and weed plants. Fie. Crop. Res. 2000;67(2):149-160. English.~~

~~9. Yamashita OM, Albuquerque MCF, Guimarães SC, Silva JL, Carvalho MAC. Influence of temperature and light on seed germination of clove seeds (*Porophyllum ruderale* (Jacq.) Cass.). Rev. Bras. Sem. 2008;30(3):202-206. English.~~

~~10. Ikeda FS, Carmona R, Mitja D, Guimaraes RM. Light and KNO3 on germination of seeds of Tridax procumbens under constant and alternating temperature. Plant. Dan. 2008;26(4):751-756. English.~~

~~11. Nandula VK, Eubank TW, Poston DH, Koger CH, Reddy KN. Factors affecting germination of horseweed (*Conyza canadensis*). Wee. Sci. 2006;54(5):898-902. English.~~

~~12.~~ Medeiros RA. Dynamics of secondary succession in transition forest in southern Amazonia. Cuiabá, Universidade Federal de Mato Grosso; 2004. English.

~~13~~7. Melloni R, Belleze G, Pinto AMS, Dias LBP, Silve EM, Melloni EGP, Alvarenga MIN, Alcântara EN. Weed control methods and their impacts on the microbial quality of soil under coffee. Rev. Bra. Sci. Sol. 2013;37(1):66-75. English.

8~~14~~. Gasparino D, Malavasi UC, Malavasi MM, Souza I. Quantification of the seed bank under different land uses in a ciliar domain area. Rev. Arv. 2006;30(1):1-9. English.

9~~15~~. Silva JO, Fagan EB, Teixeira WF, Sousa MC, Silva JR. Analysis of seed bank and soil fertility as tools for the recovery of disturbed areas. Rev. Biot. 2012;25(1):23-29. English.

Formatted: Highlight

Formatted: Normal, Pattern: Clear, Tab stops: 0.39", Left + 1.27", Left + 1.91", Left + 2.54", Left + 3.18", Left + 3.82", Left + 4.45", Left + 5.09", Left + 5.73", Left + 6.36", Left + 7", Left + 7.63", Left + 8.27", Left + 8.91", Left + 9.54", Left + 10.18",

Formatted: Normal, Pattern: Clear, Tab stops: 0.39", Left + 1.27", Left + 1.91", Left + 2.54", Left + 3.18", Left + 3.82", Left + 4.45", Left + 5.09", Left + 5.73", Left + 6.36", Left + 7", Left + 7.63", Left + 8.27", Left + 8.91", Left + 9.54", Left + 10.18",

Formatted: Normal, Pattern: Clear, Tab stops: 0.39", Left + 1.27", Left + 1.91", Left + 2.54", Left + 3.18", Left + 3.82", Left + 4.45", Left + 5.09", Left + 5.73", Left + 6.36", Left + 7", Left + 7.63", Left + 8.27", Left + 8.91", Left + 9.54", Left + 10.18",

Formatted: Normal, Justified

Formatted: Normal, Pattern: Clear, Tab stops: 0.39", Left + 1.27", Left + 1.91", Left + 2.54", Left + 3.18", Left + 3.82", Left + 4.45", Left + 5.09", Left + 5.73", Left + 6.36", Left + 7", Left + 7.63", Left + 8.27", Left + 8.91", Left + 9.54", Left + 10.18",

10~~6~~. Costa CTS, Ferreira VM, Endres L, Ferreira DTRG, Gonçalves ER. Growth and productivity of four sugarcane varieties in the fourth growing cycle. Rev. Caat. 2011;24(3):56-63. English.

11~~7~~. Alvares CA, Stape JL, Sentelhas PC, Gonçalves JLM, Sparovek G. Köppen's climate classification map for Brazil. Meteorologische Zeitschrift. 2014;22(6):711-728. English.

12~~8~~. Silva J, Cunha JLXL, Oliveira FS, Silva RG, Gomes CB, Carvalho APV, Silva Júnior AB, Silva CA. Composition of the seed bank at different depths of an area cultivated with Aruana grass. Agrar. 2018;11(40)140-149. English.

13~~9~~. Oliveira AR, Freitas SP. Phytosociological survey of weeds in areas of sugarcane production. Plant. Dan. 2008;26(1):33-46. English.

14~~20~~. Santos LDT, Santos IC, Oliveira CH, Santos MV, Ferreira FA, Queiroz DS. Phytosociological survey on degraded pastures under várzea conditions. Plant. Dan. 2004; 22(3):343-349. English.

15~~21~~. Zanatta JF, Figueredo S, Fontana LC, Procópio SO. Interference of weeds in olive groves. Rev. Fac. Zoot. Vet. Agro. 2006;13(2):39-57. English.

16~~22~~. Kuva MA, Pitelli RA, Alves PLCA, Salgado TP, Pavani MCDM. Weed seed bank and its correlation with established flora in the sugarcane agroecosystem. Plant. Dan. 2008;26(4):735-744. English.

17~~23~~. Soares DG, Andreazza AC, Salvador, M. Sequestering ability of butylated hydroxytoluene, propyl gallate, resveratrol, and vitamins C and E against ABTS, DPPH, and hydroxyl free radicals in chemical and biological systems. Jour. Agric. Foo. Chem. 2003;51(4):1077-1080. English.

18~~24~~. Pereira FAR, Velini ED. Systems of non-cerrado and dynamic weed populations. Plant. Dan. 2003;21(3):355-363. English.

19~~25~~. Blanco HG, Arévalo RA, Blanco FMG. Monthly distribution of the emergence of six weeds in soils with and without crops. Plant. Dan. 1994;12(2):78-83. English.

20~~6~~. Roberts HA, Feast PM. Emergence and longevity of seeds of annual weeds in cultivated and undisturbed soil. J. Appl. Ecol. 1972;12(4):316-324. English.

21~~7~~. Araújo EL, Martins FR, Santos AM. Establishment and death of two dry tropical forest woody species in dry and rainy seasons in northeastern brazil. In: Nogueira RJMC, editors. Environmental stresses: damage and benefits in plants. Recife: Universidade Federal Rural de Pernambuco; 2005. English.

22~~8~~. Cunha JLXL, Freitas FCL, Coelho MEH, Silva MGO, Silva KS, Nascimento PGML. Phytosociology of weeds in sweet pepper crop in no-tillage and conventional systems. Rev. Agro. 2014;8(1):119-126. English.

23~~9~~. Nascimento PGML, Silva MGO, Fontes LO, Rodrigues APMS, Medeiros MA, Freitas FCL. Phytosociological survey of weed communities in different maize planting systems in Mossoró – RN. Agro. Sci. Sem. 2011;7(3):01-09. English.

24~~30~~. Marques LJP, Silva MRM, Araújo MS, Lopes GS, Corrêa MJP, Freitas ACR, Muniz FH. Floristic composition of weeds in cowpea in the crushed capoeira system. Plant. Dan. 2010;28(1):953-961. English.

25~~31~~. Pinotti EB, Bicudo SJ, Curcelli F, Dourado WS. Floristic survey of weeds in cassava in the municipality of Pompéia – SP. Rev. Rai. Ami. Trop. 2010;6(1):120-125. English.

26~~32~~. Borchartt L, Jakelaitis A, Valadão FCA, Venturoso LAC, Santos CL. Weed interference periods in common bean crop (*Phaseolus vulgaris L.*). Rev. Sci. Agro. 2011;42(3):725-734. English.

27~~33~~. Lima LKS, Silva JS, Santos JPS, Araújo AE. Phytosociological survey of spontaneous plants in the yam crop under organic production. Agro. Cient. Sem. 2014;10(2):72-76. English.

28~~34~~. Inoue MH, Silva BE, Pereira KM, Santana DC, Conciani PA, Sztoltz CL. Phytosociological survey on pasture. Plant. Dan. 2012;30(1):55-63. English.

29~~35~~. Duarte AP, Silva AC, Deuber R. Weed plants in maize crops, under different management, the average Paranapanema. Plant. Dan. 2007;25(2):285-291. English.

30~~6~~. Barroso AAM, Alves PLCA, Yamauti MS, Nepomuceno MP. Community weed and its interference in common bean planting under no-tillage, in the spring harvest. Plant. Dan. 2012;30(2):279-286. English.

31~~7~~. Utomo M, Susanto H. Effect of long-term conservation tillage on soil properties and weed dynamics in Sumatra. In.: Proccendings 16 th Asian-Pacific Weed Science Society Conference. Kuala Lumpur: APWSS; 1997. English.