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Biology-Genetics

Morphoagronomic characterization of *Landraces* of *Zea mays* L. in an agroecological production system

Caracterização morfoagronômica de raças locais de *Zea mays* L. em sistema agroecológico de produção

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ABSTRACT

The objective of this study was to verify if Landrace maize compared to conventional hybrid corn differ in cycle and morphoagronomic traits when grown in agroecological system. The experiment was conducted at the Center for Agricultural Research at the Passo Fundo University, in a randomized block design with five replications, three *Landraces* of Creole maize ("Cabo roxo", "Aztequinha" and "Franco-Brazileiro") and hybrid maize. conventional (22s18 - Sementes Sempre). The fertilizer inputs were made with organic compost and Efficient Microorganisms (MS). Spontaneous species population, phenological cycle, stem diameter, ear and grain characteristics and yield per hectare were evaluated. The treatments did not differ significantly in the evaluation of the cycle in days presenting statistical difference only in plant height at the end of the cycle, where the Landrace "Cabo roxo" presented height of 209,9 cm. Regarding plant and ear characterization, the treatments differed significantly only in the evaluation of grain weight per ear, where the conventional hybrid reached 170,4 g. Thus, it was found that there is little significant difference between the local breeds and the conventional hybrid in the agroecological production system using mulch mass.
Keywords: Corn; Organic farming; Mulch

RESUMO

O objetivo do estudo foi verificar se raças locais de milho comparadas com milho híbrido convencional diferem no ciclo e nos caracteres morfoagronômicos quando cultivados em sistema agroecológico. O experimento foi conduzido no Centro de Pesquisas Agronômicas da Universidade de Passo Fundo (Cepagro), em delineamento de blocos ao acaso com cinco repetições, três raças locais de milho crioulo ("Cabo roxo", "Aztequinha" e "Franco-brasileiro") e milho híbrido convencional (22s18 – Sementes Sempre). Os aportes de adubação foram feitos com composto orgânico e Microrganismos Eficientes (EM). Foram avaliados a população de espécies espontâneas, ciclo fenológico, diâmetro do colmo, características das espigas, dos grãos e rendimento por hectare. Os tratamentos não diferiram significativamente na avaliação do ciclo em dias apresentando diferença estatística apenas em altura de

planta ao final do ciclo, onde a raça local de milho “Cabo roxo” apresentou altura de 209,9 cm. Quanto à caracterização de planta e de espiga, os tratamentos diferiram significativamente entre si apenas na avaliação do peso de grãos por espiga, onde o híbrido convencional alcançou 170,4 g. Assim, verificou-se que existe pouca diferença significativa entre as raças locais e o híbrido convencional no sistema agroecológico de produção com uso de massa de cobertura morta.
Palavras-chave: Milho; Produção orgânica; Cobertura morta (mulch)

1 INTRODUCTION

The conservation of plant genetic resources and the concept of gene erosion, emerged in the twentieth century, and authors warned about the reduced genetic variability in crops, due to loss of traditional breeds. Cultivated by old populations, they adapt to local conditions and farmers' agronomic practices, as they are characterized by high diversity, valuable potential for cultural treatment and irreplaceable germplasm banks (PALUMBO *et al*., 2017).

The conventional maize production demands large quantities of pesticides and soluble mineral fertilizers, however, the sustainability of this system is in question. The use of exogenous genetics, with the use of hybrids synthetic and transgenic events, restrict organic farming and agroecology, widely practiced in small rural communities (BATEY, 2009; HEMP, 2011).

Also known as *landraces*, local maize breeds are selected by farmers regionally and they have great adaptation to various conditions of climate, soil, rusticity, resistance to disease and pests. This is checked by open pollination of the strains, making it possible to “save” seeds, that is, to store them for the following crops. The *landraces* have invaluable to traditional populations and are natural components of agrobiodiversity (CARPENTIERI-PÍPOLO *et al*., 2010; CATÃO *et al*. 2010a; ARAÚJO JÚNIOR *et al*., 2015; MACEDO *et al*. 2016).

Organic farming is an alternative for maintaining soil fertility and reducing environmental impacts caused by conventional agriculture, as it consists of ecological production systems that promote the biodiversity grown and soil biological activity, being based on the minimum use of external inputs, pesticides and fertilizers soluble minerals. Only the use of organic compounds for plant nutrition is released (FAVARATO *et al*., 2013; GOLD, 2007; VINCENT-CABOUD *et al*., 2017).

With the using of the no-tillage, the soil surface is turned from three to five centimeters deep in the sowing line, maintaining the mulch mass in the soil to preserve its quality and suppress spontaneous plants. The conventional no-tillage is a conservationist technique that presupposes the use of herbicides in the interruption vegetation, as annual as perene. In this scenario, an implement called roller crimper appears as an alternative, eliminating the use of pesticides and facilitating the implementation of direct seeding and organic production that is fundamental in organic farming and agroecology (DELATE, 2010; MIRSKY *et al*., 2011; VINCENT-CABOUD *et al*., 2017).

Thus, it becomes relevant to know how no-tillage can influence the phenological response and the morphoagronomics characterization of *landraces* in the agroecological production system. This study aimed to verify if the maize local breeds differ in cycle and in morphoagronomic characters from a conventional hybrid grown under agroecological technology and conservationist no-till techniques.

2 MATERIAL AND METHODS

Three *landraces* and a conventional hybrid (22s18 – sementes Sempre) used as a control, were evaluated in an experiment implemented in the Experimental Area of the Center of agricultural research (Cepagro), Passo Fundo University –UPF, in the agricultural yer 2018, situated in the geographic coordinates 28º 23’ S of latitude and in longitude 52º 38’ O, with the altitude of 687m, at the Passo Fundo, Rio Grande do Sul. The experimental area has been free of pesticides since 2012.

The *landraces* come from the process of rescue and multiplication of creole maize seeds carried out by family farmers that practice family agriculture in the cities of Canguçu and Ibarama, Rio Grande do Sul.

To the Morphagronomic characterization of the varieties, a randomized block was design with five reaplications . The experimental units were consisted of five lines with 4 m long, spacing of the 0.45m between rows and 0.3 m between plants. The sowing was performed manually, with an interval of ten days between the treatments, starting with the conventional hybrid corn and followed by the accessions "*landraces*" "Cabo roxo", "Aztequinha" e "Franco-brasileiro". After thinning, four plants remained per linear meter, totaling a density of 88,888 plants ha-1.

Each experimental unit consisted of 8m2 with a useful area of 4,05m2, with an intern distance border being considered 0,5m of the perimeter of each experimental unit. The experimental area was previously prepared with cultures of winter, from the seeding of 400 seeds/m² of *Avena strigosa* Shreb. and *Vicia sativa* in a proportion of 50% each. The cover crop was interrupted at full anthesis with the 2,4 m long straight bar roller crimper with 0,6 m in diameter and rods of 0,12 m, ballasted with water to provide mass of approximately 650 kg. The cover crop mass mulch was estimated at 4,8 t.ha-1 using a 0,25 m² iron frame.

The experiment was conducted under the conditions of agroecological production system, that is, with biological only phytosanitary control, 3 applications of *Bacilus turingensis* performed with costal sprayer, with syrup volume 400 L.ha-1 and 100 ml dose. The fertilization input was performed only with the use of 1500 Kg.ha-1 of organic compost and 2 spray of solution with efficient microorganisms (100 ml at 400 L.ha-1 volume of syrup).

Control of spontaneous plants was carried out by cover crops dead mulch. To the characterization of the varieties under study, as proposed by Teixeira; Costa (2010), The main descriptors evaluated were emergence, male flowering, female flowering, plant height during the cycle (measured from the soil to the last leaf sheath), population, the height first ear of corn, stem base diameter and number of leaves above the ears. After collection, were gauged ear length, ear diameter, number of grain rows, number of grains per row, number of grains per ear, row arrangement, ear diameter, mass of grains per ear, cob diameter and color of the grains of the ear. It was also recorded the phenology of *landraces* in days after sowing in order to identify their cycle. The population of the treatments was evaluated during the vegetative and reproductive cycles. The yield was calculated considering the grains mass per ear, the number of ears per plant and the population. The spontaneous plants that emerged through the mulch mass were listed after 3 randomized collections with the 0,25m² frame within the experimental area. Quantitative soil analyzes were performed from a sampling conducted in June 2018 and another in May 2019, after data collection in the experimental area (Table 1). The obtained data were submitted to analysis of variance and their averages compared by Tukey test at 5% probability level.

Table 1 – Soil analyzes of the experimental área intended for the creole maize and conventional hybrid experiment compared before (control) and after management of the agroecological system in the 2018/2019 agricultural yer, Passo Fundo University – UPF, in Passo Fundo – RS

System[1]	pH	SMP	P mg/dm³	K mg/dm³	MO%	Al cmolc/dm³	Ca cmoc/dm³	V%
Control	5,1	5,2	10,8	154	3,4	0,6	4,97	39
Agroecological	5,8	5,9	9,5	173	4,6	0	7,54	67

[1]Situation of the area subject of roller crimper agroecological management system, before winter (cover crop intercropping) and summer (creole maize and conventional hybrid).

Since 2012 conducted without the use of soluble and chemical fertilizers, the soil of the experimental area after the brief intervention of agroecological management has continued to present toxic aluminum and hydrogen potential in contents that are not considered high. The system increased some benefits, for example, Potassium, Organic Matter, Calcium and Base saturation that already had good levels and had their indexes increased. The Phosphorus probably reduced by being immobilized in the stubble.

Table 2 – Weather Information Summer 2018/2019, Passo Fundo, RS

Year	Climatic factors	Oct	Nov	Dec	Jan	Feb	Mar	Apr
2018/19	A.T.[1](°C)	17.8	20.9	21.8	23.3	20.7	19.6	19.2
	RH[2] %	75.3	65.4	67.1	79.4	76.9	74.2	77.3
	Precip. (mm)	319.5	211.6	123.3	153.2	204.5	124.3	107.1
Normal	A.T.[1]°C)	17.6	19.6	21.4	22.1	22	20.5	17.6
	RH[2] %	69	67	67	71	74	75	74
	Precip. (mm)	152.9	131.7	173.2	149.7	165.8	134.9	99.7

[1]Avereage temperature; [2]Relative humidity
Source: Embrapa - Weather Information, 2019

It was noted that the average temperature and rainfall were higher than normal during almost the entire period in which the experiment was implemented in the experimental area. Only in February and March, with temperature averages of 20,7° and 19,6° C, respectively, the values were below the normal average. In the case of rainfall, only the months of December and March, where the respective values recorded were 123,3 and 124,3 mm, the averages were lower than normal. This situation, although be beneficial to the productivity of C4 metabolism crops, may increase the incidence of disease.

Table 3 - Genealogy of Creole maize and conventional hybrid compared in agroecological system in the 2018/2019 agricultural year, Passo Fundo University - UPF, in Passo Fundo –RS

Acess	Source
Cabo roxo	Rio Grande do Sul - Brasil
Aztequinha	Paraná - Brasil
Franco-brasileiro	Poitou- França
Híbrido 22s18	Sempre sementes

3 RESULTS AND DISCUSSION

3.1 Spontaneous plants

Despite the management of an agroecological production system using the intercropping mulch mass in the control of spontaneous plants, their presence was verified in the maize experiment, which lasted in the area until the end of the crop cycle (Table 4).

Table 4 - Spontaneous plants in the creole maize and hybrid experiment submitted to the management of the agroecological system in the northern region of Rio Grande do Sul, 2018/2019. Passo Fundo University-UPF, passo Fundo –RS

Common name	Scientific name	Population
Broom stick	*Bidens pilosa*	2,3/m²
White broom	*Vernonanthura discolor*	4,3/m²
Glossy nightshade	*Solanum americanum*	2,3/m²
Papuan	*Urochloa plantaginea*	5,3/m²
Brizantha grass	*Urochloa brizantha*	7,7/m²
Trapoeraba	*Commelina bengalensis*	2,3/m²
Potato weed	*Galinsoga parviflora*	3,3/m²
Finger-grass	*Digitaria horizontalis*	2,3/m²
Broad-leaved dock	*Rumex obtusifolius*	1/m²
Dandelion	*Taraxacum oficinalle*	1,3/m²
Horseweed	*Conyza bonariensis*	4,3/m²
Nut grass	*Cyperus rottundus*	4,3/m²

Using mulch mass to control spontaneous plants in maize Martins *et al*. (2016) verified in the experimental area the presence of *Bidens pilosa* L. (broom stick), *Amaranthus hybridus* L. (green amaranth), *Raphanus raphanistrum* L. (wild radish), *Ipomoea grandifolia* (Dammer) O´don. (morning glory), *Portulaca oleracea* L. (verdolaga), *Commelina bengalensis* L. (trapoeraba) and *Digitaria horizontalis* Wild. (finger-grass). The mulch mass on the soil surface is fundamental due to the physical effect that limits light passage, making seed germination and seedling initial growth difficult. In addition, the allelopathic effects of phytomass decomposition and root exudation release substances that will have an inhibitory effect on seeds, preventing germination, or on plants, interfering with their developmental processes. Thus growth is retarded or paralyzed spontaneous plant death occurs (ALVARENGA *et al*., 2001). However, despite the benefits of mulch mass, some mulches can often induce seed germination of some species through chemical, physical and biological soil improvement, and the possible availability of allelopathic substances, which could contribute to seed dormancy break in response to an adaptive advantage (CORREIA *et al*., 2006), which may have occurred at work, given the presence of spontaneous plants in the experimental area.

The efficiency of mulch mass control depends on factors related to soil, cropping system, species used and spontaneous species (TREZZI; VIDAL, 2004). Martins *et al*. (2016) observed that the mulch mass of the black oat and wild radish provided lower plant density and B. *pilosa* dry matter accumulation, regardless of the type of spontaneous plant management. In another study, Roman (2002) also found that the black oat mulch mass provided high potential in suppressing the emergence of B. *pilosa*.

The literature mentions that A. *sativa* presents a high suppressive capacity of spontaneous plants, both for physical attributes as well as the release of allelochemicals that reduce seed germination and the development of spontaneous plants caused by mulch mass decomposition (CAMPIGLIA *et al*., 2010; ZERNER; GILL; VANDELEUR, 2008). The plants of *Avena* spp. have the ability to exude phenolic acids and scopoletin, a secondary product of the coumarin class and that has an inhibitory effect on plant root growth (DUCCA; ZONETTI, 2008; JACOBI; FLECK, 2000).

In a research conducted with cover crops in maize production, it was evaluated that the species: *Urochloa ruziziensis* and Sudan grass maintained soil coverage above 68% until flowering, providing lower mass and lower density of spontaneous plants at the time of cutting / harvesting cover crops, proving to be a good option for integrated management of spontaneous plants (BORGES *et al*., 2013).

3.2 Phenological cycle

Considering the evaluation of the phenological cycle of the hybrid and the three *landraces* only at stage R2, there was a significant difference by the analysis of variance, showing that the *landraces* of Creole maize do not differ in precocity from the conventional hybrid (Table 5). In R2, the formation of three statistically distinct groups occurred, and the conventional hybrid and the landrace "Aztequinha" were in group a, with the two latter being until the pasty grain period and the "cabo roxo" variety less days, remaining in group c and showing higher precocity.

Table 5-Phenological cycle of Creole maize and conventional hybrid submitted to management of the agroecological system in the northern region of Rio Grande do Sul, 2018/2019 crop. Passo Fundo University -UPF, Passo Fundo-RS

Access	V2 DAS[1]	V4 DAS[1]	V8 DAS[1]	VTDAS[2]	R2 DAS[3]	R6 DAS[4]
Hybrid	31,4a	52a	79a	83,8a	133,4 a	164,8a
Cabo roxo	30a	43a	77a	81,8a	124 c	156a
Aztequinha	31a	54,4a	77,1a	88,8a	132,5 a	159,9a
Franco-bra	34,5a	57a	81,5a	81,8a	125,9 b	155,8a
(CV%)	10,71	16,78	7,34	6,35	3,93	5,06

[1]Beginning of the phenological stages V2, V4 and V8 in days after sowing. [2]Beginning of the Phenological stage, VT- tearing in days after sowing. [3]R2 Beginning of the pasty stage in days after sowing. [4]R6. Hard grain stage in days after sowing

Knowledge of the phenological cycle is fundamental to characterize the needs of the crop, establish relationships with environmental conditions, determine the critical periods of the crop and classify genotypes according to precocity. The information about the moment of occurrence of the stages helps in the best use of natural resources, aiming at good yields and also avoiding losses in corn production (FORSTHOFER *et al*., 2006; BERGAMASCHI; MATZENAUER, 2014).

3.3 Morphoagronomic aspects

In terms of plant height, at stage V8, the landrace "Cabo roxo" stood out, with a height of 113,1 cm and differing significantly from other treatments (Tabela 6).

Table 6-Plant height during the phenological cycle of Creole maize and conventional hybrid submitted to management of the agroecological system in the northern region of Rio Grande do Sul, 2018/2019 crop. Passo Fundo University -UPF, Passo Fundo-RS

Access	V2 (cm)[1]	V4 (cm)[1]	V8 (cm)[1]	VT (cm)[2]	R2 (cm)[3]
Hybrid	27a	76,8a	99,7 b	133,9 c	193,6 b
Cabo roxo	27,7a	56,5a	113,1 a	139,2 a	209,9 a
Aztequinha	30,9a	52,5a	75,4 d	99,7 d	158,5 d
Franco-bra	28,1a	75,9a	95,3 c	137,4 b	183,8 c
(CV%)	20,72	29,91	19,31	13,89	8,58

[1]Plant height in cm at the beginning of the phenological stages V2, V4 and V6. 2Plant height at the beginning of the transitional phenological stage (vegetative / reproductive cycle). 3Plant height at the pasty grain phenological stage.

In a study conducted in Araras-SP in 2015, Arantes *et al*. (2018) found the height of 107 cm organic cultivation of corn without inoculating *Azospirillum* in measuring the V8 leaf stage. During the reproductive cycle, once again the landrace "cabo roxo" differed statistically from other treatments, reaching 209,9 cm, showing larger size. In the São Paulo study, the plant height found was 212 cm at stage R2. Silveira *et al*. (2015), characterized 8 varieties of Creole maize in RS, obtaining an average of 214 cm for plant height, with a range of 180 to 261 cm.

Bianchetto *et al*. (2017) found no statistical differences in relation to plant height, comparing the hybrid cultivar with *landraces*.

Landraces are generally larger than hybrid cultivars. This is due to the fact that the obtaining of smaller maize plants may come from genetic improvement, due to a better suitability for mechanized harvesting. In addition, *landraces* maintained their large, spike-like characteristics as an adaptive tendency to favor competition for solar energy, as they were older, they were not developed within the stand-off management systems used today (MACHADO *et al*., 2001).

In the vegetative population evaluation, the contional hybrid presented a larger population, while the *landraces*, had lower indices, and "Franco-Brasileiro" presented a smaller population in the vegetative cycle with 15,3. In the reproductive population index "Franco-Brasileiro" also had the lowest index. One possible explanation for the poor population performance is that this landrace should have been sown earlier, or in mid-September when the soil temperature is milder. Regarding the beginning of male and female flowering, and the insertion height of the first ear, there was no significant difference between treatments (Tabela 7).

Table 7-Vegetative and reproductive population, days of sowing at flowering and stem diameter of Creole maize and conventional hybrid submitted to management of the agroecological system in the northern region of Rio Grande do Sul, 2018/2019 crop. Passo Fundo University -UPF, Passo Fundo-RS

Access	**Pop.Veg.(%)[1]**	**Pop.Rep.(%)[1]**	**FloDAS(♂)[2]**	**FloDAS(♀)[2]**	**Stem[3]**
Hybrid	44 a	39,8 a	86,2a	89,6a	1,94a
Cabo roxo	40 b	41,2 a	84a	87,6a	2,16a
Aztequinha	37,9 c	40 a	82,7a	86,9a	2,04a
Franco-bra	15,3 d	13,25 b	83,1a	86,4a	2,0a
(CV%)	35,43	39,08	5,49	6,1	29,71

[1]Population index at the end of the vegetative and reproductive cycles. [2]Male and female flowering begin on days after sowing. [3]Stem diameter in cm.

Silveira *et al*. (2015), observed significant difference between materials, in a study with *landraces* conducted in the city of Cruz Alta - RS. On this occasion, the average treatment ranged from 64 to 58 days (*landraces* “Ferro” and “Pixuara” respectively) in the evaluation of male flowering, 69 to 64 (“Cadeado” and “Pixuara”) in the evaluation of female flowering and 130 to 78 cm (“Brancão” and “Catarina”) in the evaluation of the insertion height of the 1st ear. In the evaluation of the stem diameter, there was no significant difference between the *landraces* and the conventional hybrid. The landrace “Cabo roxo” presented a slightly higher average than the other treatments (2,16 cm) and was again compared to the average recorded in the study by Arantes *et al*. (2018), surpassing this one, which was 1,94 cm. Muller *et al*. (2012) also found no significant differences for stem diameter working with creole maize. The fact that Creole maize varieties do not show significant difference for stem diameter may be due to the non-selection for this characteristic.

In the number of rows per ear variable, the landrace “Aztequinha” differed significantly from the other treatments, presenting a value of 13,7 (Table 8). In grain color, there was a predominance of yellow color. In the sanity of ears the conventional hybrid and the landrace “cabo roxo” presented good sanity. Already “Aztequinha” and “Franco-Brasileiro” had problems mainly regarding the *Fusarium moniliforme*, showing a low and medium sanity respectively. F. *moniliforme* is one of the most common pathogens found in maize seeds, causing stem and ear rot and causing a decrease in crop yield (SARTORI *et al*., 2004; JORGE *et al*., 2005). Catão *et al*. (2013b), also found in diversified mycobiotic Creole maize, having as main representative the fungus *Fusarium moniliforme*.

In the other evaluated characters, number of leaves above the second ear, insertion height of the first ear in cm and number of ears per plant there was no significant difference (Table 8). In the evaluation of leaf numbers above the second ear, the following values were observed: 6 leaves in the *landraces* “Cabo roxo” and “Franco-Brasileiro”, 5.5 leaves in the conventional hybrid and 5 leaves in the landrace “Aztequinha”. In the study by Silveira *et al*. (2015) observed values ranged from 9 to 6, in the *landraces* “Pixuara” and “Cadeado” respectively.

Table 8-Characteristics of the ear of Creole maize and conventional hybrid submitted to management of the agroecological system in the northern region of Rio Grande do Sul, 2018/2019 crop. Passo Fundo University -UPF, Passo Fundo-RS

Access	row/ear.[1]	Arrangement	Color	sanity	L.2ndear[2]	1stear[3]	Ear/pl[4]
Hybrid	12,3 ab	spiral	yellow	good	5,5	83	1,5
Cabo roxo	11,6 b	straight	red	good	6	100	1,57
Aztequinha	13,7 a	spiral	yellow	low	5	96,77	1,2
Franco-bra	10,6 b	straight	red	media	6	86,85	1,6
(CV%)	8,07					17,15	

[1]Number of rows per ear. [2]Number of leaves above the 2nd ear. [3]Insert height of 1st ear in cm. Number of ears per plant.

In the characterization of grains, of the six characteristics evaluated only weight of grains per ear differed statistically, and the conventional hybrid got the best average, 170,4 g (Table 9). Already the landrace “Franco-Brasileiro” obtained the lowest value, 70,7 g. In terms of number of grains per ear and number of grains per ear row, with averages ranging from 310,6 to 214,8, and between 24,4 and 19,3 respectively, the conventional hybrid and *landraces*, did not differ significantly. Macedo *et al*. (2016) measured to number of rows of ear 12,25, grain numbers per row 22,43 and number of kernels per ear 277,94 in accessions of “amarelão” creole maize treated with homeopathy in an experiment implemented in Bandeirantes - PR. In the control treatment evaluation, QPM BR 451 maize presented 12,28 rows per ear, 22,03 grains per row and 273,14 grains per ear.

Considering the grain weight per ear, the number of ears per plant and the population of the treatments, it is possible to extrapolate the yield of the conventional hybrid treatment that reached 9042,469 Kg.ha-1, using the agroecological production system. In Pennsylvania, United States of America, were observed productivities 9603.38 Kg.ha-1 in the case of organic corn sown cover crop mass composed of single vetch, was interrupted with the use of roller crimper (MISCHLER *et al*., 2010).

Table 9-Characteristics of creole maize and conventional hybrid grains submitted to the management of the agroecological system in the northern region of Rio Grande do Sul, 2018/2019 crop. Passo Fundo University -UPF, Passo Fundo-RS

Access	**Length[1]**	**Diameter[1]**	**N.Grain[2]**	**Grain/row[2]**	**Diam.Cob[1]**	**Wei/grain[3]**
Hybrid	13,6a	4,14a	310,6a	24,4a	2,36a	170,4 a
Cabo roxo	14,9a	4,24a	269,6a	22,9a	2,5a	102,3 b
Aztequinha	13,4a	4,1a	296,6a	20,6a	2,4a	100,7 b
Franco-bra	12,4a	3,8a	214,8a	19,3a	2,2a	70,7 c
(CV%)	13,57	9,83	24,26	24,89	8,58	11,26

[1]Length and diameter of ear, and diameter of cob in cm. [2]Number of total grains and grains per ear row. [3]Grain weight per ear in gr

Among the *landraces*, the “Cabo roxo” access yielded 5881,871 Kg.ha-1. This value surpassed the yield of all local breeds evaluated by Carpentieri-Pípolo *et al*. (2010) in a study conducted in two locations, Imbaú and Arapongas - PR. The values observed in that study ranged from 3443 to 1395 Kg.ha-1. These authors also found great amplitude in the productivity of the local breeds, which is corroborated by the low yield of 1332,288 Kg.ha-1 observed in the evaluation of the landrace “Franco-Brasileiro” and by the performance of the landrace “Aztequinha”. reached 4296,490 Kg.ha-1. In general, *landraces* are less productive than commercial cultivars.

Landraces have high production potential under low-tech farming conditions, and are important because they are sources of genetic variability that can be exploited in search of tolerant and/or biotic and abiotic resistant genes. Information on morphoagronomic characteristics of local maize breeds may be useful for preserving them from gene erosiona (ARAÚJO; NASS, 2002; LUCCHIN *et al*., 2003; CARPENTIERI-PÍPOLO *et al*., 2010).

4 CONCLUSION

It was evidenced that the no-tillage in agroecological production system matched the phenological cycle and the morphoagronomic characterization of the *landraces* to the conventional hybrid. In the use of intercropped black oat and vetch mulch mass submitted to roller crimper, the presence of twelve spontaneous plant species was observed. Conventional agricultural management employing massive use of herbicides precludes such a diverse agroecosystem as it selects pesticide-tolerant plants, greatly increasing the risk of infestation. In a next study, a reduction in plant spacing could be tested, or other cover crops possibilities to provide mulching mass. Another method of interrupting the roofing pool could also be tested compared to the roller crimper tipping.

In agroecological production systems, the use of roller crimper technology, as a function of soil cover crop, provided similarity in the response of Creole maize breeds to the conventional hybrid, highlighting sustainable and technological assumptions not generally employed in the field conventional no-till system.

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