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RESEARCH ARTICLE

GERMINATION OF BRACHIARIA SEEDS MULATO II IN DIFFERENT SUBSTRATES

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ABSTRACT

The use of quality seeds is fundamental to the success of any crop. In Brazil, it has been growing significantly the implementation of pastures areas, mainly of brachiaria. However, there are many difficulties to determination of quality of seeds from this genus of forages. With this, the aim with this work was to relate the characteristics of different substrates and the physiological potential of seeds of brachiariaMulato II. Was evaluated the germination of bared and treated seeds of brachiaria in the following substrates: germitest paper (described at RegrasparaAnálise de Sementes), sand and perlite in two gradations (small and large). According the results, was possible to conclude that the utilization of substrate small perlite, when used bared seeds, is more promising to evaluate the germination of brachiaria seeds cultivar Mulato II. For seeds treated, all substrates used are efficient to evaluate the germination of brachiaria seeds cultivar Mulato II. The substrate 100% small perlite achieved the desired index of germination of brachiaria described by the normative instruction 45 from 17 September 2013 (MAPA).

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INTRODUCTION

Nowadays, in Brazil currently around 48% of the national territory is destined to the cultivation of pastures, what means, almost the half of the national territory is destined to the feeding of ovine, goats and bovines mainly. Being this, the brachiaria it presents as the forage of higher dissemination used in this activity, that today gives to Brazil the second place in the bovine meat production (9, 9 millions of tons), staying behind only of the United States (11 millions of tons) and ahead of potentials like European Union (7,8 millions of tons) and China (5,8 millions of tons) (BEEFPOINT, 2014). The animal breeding, of pastures and also the prepare of soil has fundamental importance to the increase of production. Two of these aspects will be discussed in this work: the pastures breeding and the soil conditions (substrate). The grass Mulato II is a hybrid brachiaria that was introduced in Brazil in 2003 and commercialized since 2004. This grass has high capacity of production and resistance to some leafhoppers species (Argel, Miles, Guirot et al., 2007). The seeds germination is influenced directly by the properties of substrate where it was sown.

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Characteristics like aeration, moisture retention level and the presence of pathogens can retard or intensify the germination as the percentage, speed and uniformity. However, the adequate choice of substrate results in higher vigor of seedlings and reduction of costs (BRASIL 1992, FIGLIOLIA et al. 1993, CARVALHO e NAKAGAWA, 2000). In brachiaria seeds, it has been observed a serious problem related to germination. According the normative instruction nº 45 from 17 September 2013, the minimum germination established is of 60%, value not achieved to the most part of lots currently commercialized in Brazil, invalidating their sale as seed. It is important to highlight that many laboratories are having difficulties to realize the germination test following the RegrasparaAnálise de Sementes and these relates the low germination to the substrate used in the test. With this, the aim with this work was to relate the characteristics referred to different substrates on the potential of germination of grass seeds Mulato II.

MATERIALS AND METHODS

The research was conducted at Central Laboratory of Seeds, in the Department of Agricultural of Universidade Federal de Lavras (UFLA), in Lavras-MG.

Were used two lots of brachiaria seeds cultivar Mulato I, being one compound by bared seeds and another compound by treated seeds, which were donated by the Dow AgroSciences company. The water content of seeds was determined by the oven method at 105°C by 24 hours (BRASIL, 2009), using two replications of 50 seeds of each treatment. After this period, seeds were taken to desiccators until the cooling of samples and following was performed the dry mass of seeds. The results were expressed in percentage. The germination test was conducted with eight replications of 25 seeds, with the sown in germitest paper moistened with distilled water and also with other substrates (Table 1). Seeds were kept in BOD, regulated at alternate temperature of 35ºC during the day and 20ºC during the night. The evaluation of normal seedlings were realized in three counts. The first one on the seventh day, the second count on fourteenth day and the last one on twentieth day after sowing. The results were expressed in medium percentage of normal seedlings from the eight replications.

Table 1. Types of substrate and quantities of water used to moisten the substrate

Substrate	Water
Paper	2,5 ml.g-1 de paper
SmallPerlite	70% fieldcapacity
LargerPerlite	70% fieldcapacity
Sand	70% fieldcapacity

Research source: Regras para análise de sementes, 2009

For determination of germination speed index, were realized daily evaluations from the beginning of seedlings germination, computing the number of emerged seedlings until the stabilization of stand. Was computed the percentage of normal seedlings at 21 days. To the calculation of germination speed index, according Edmond and Drapala (1958), were realized daily lectures of the number of seedlings with leaves above the substrate.

$$GSI = G_{1/N1}+G_{2/N2}+G_{3/N3}+...+G_{n\ /Nn}$$

Where:

GSI = germination speed index
G1, G2 andGn = number of normal seedlings computed in the first count, in the second count and the last count,
N1, N2 andNn = number of days from the sowing until the first, the second and the last count.

After a number of days of sowing were collected samples of vegetal tissue from 10 plants/treatment to the evaluation of fresh mass of shoot. Following, this content was weighted in balance of precision at laboratory of seeds. For the determination of dry mass, were used the same samples evaluated in fresh mass. These were collected in oven with temperature of 65 degrees, relative humidity of 0%, during 72 hours and after were weighted in balance of precision. The experimental design was the completely randomized in a factorial scheme of 2x4 with 2 conditions of seeds (bare and treated) and 4 types of substrate (paper, sand, small perlite and large perlite) with 8 replications of 25 seeds. The interpretation of the data was realized through the analysis of variance and the means were compared by the Scott Knott test at 5%.

The statistical analyzes were realized with aid of SISVAR® statistical program (FERREIRA, 2011). Were determined the coefficient of simple linear correlation (r) of Pearson, between the values obtained in the tests used to evaluate the physiological quality of seeds.

RESULTS AND DISCUSSION

The medium water content of seeds in the moment of tests was of 8,3% with maximum variation of 1%. It is important to highlight the importance of have a water content between the materials with the less variation as possible. In the case of no control of this variation in the water content, the process of deterioration can be accelerated and also there are formation of products that causes immediate damages like the formation of free radicals, masking the final result, according described by Marcos Filho (2005). For datas referred to germination of bared seeds at seven days, was possible to observe that the higher results of germination was identified in substrate compound by 100% or small perlite, cause this was the unique treatment that was different from the others. The same was observed to treated seeds, where one more time the germination presented higher value in substrate compound by 100% of small perlite (Table 2).

Table 2. Percentage of germination on seventh day of bared and treated seeds of brachiaria in different substrates

Substrate	Germination 7 days (%)	
	BaredSeeds	TreatedSeeds
Paper	31b	13b
Sand	33b	11b
Small Perlite	53a	25a
Large Perlite	37b	12b
Cv. (%)	29,95	

Means followed by the same letter in the column do not differ at 5% probability by Scott Knott test

In the first count of germination of grass seeds Mulato II the percentage of germinated seeds was elevated, agreeing with the results of Oliveira et al. (2008), that in the count of germination of *Brachiariabrizantha* seeds after seven days from sowing there was also significant difference of germinated seeds, as well as seeds that passed by the process of breaking dormancy with KNO3 and H2SO4 as well as the control. After 14 days of germination (Table 3), the substrate small perlite also presented higher value of germination when using bared seeds. However, when we evaluate seeds treated we realize that there is no significant difference.

Table 3. Percentage of germination on fourteenth day of bared and treated seeds of brachiaria in different substrates

Substrate	Germination 14 days (%)	
	BaredSeeds	TreatedSeeds
Paper	40b	23a
Sand	42b	21a
Small Perlite	60a	30a
Large Perlite	48b	17a
Cv. (%)	29,07	

Means followed by the same letter in the column do not differ at 5% probability by Scott Knott test

At 14 days from sowing, it was noted that the most part of seeds already have been germinated and the count was stabilized when this occurred. In other works, like Usberti (1981) also working with B. brizantha, was observed that 95% of germinated seeds with 21 days already have been germinated on the fourteenth day of installation of test. In the work realized by Dias and Alves (2001), it was conclued that the germination test realized with B. brizantha can be finalized with 10 days after sowing, without commitment of the results With 21 days after sowing (Table 4), repetead for bared seeds the higher values of germination in substrate small perlite (100%). And again there was no diference between the treatments for treated seeds.

Table 4. Percentage of germination on twenty-first day of bared and treated seeds of brachiaria in different substrates

Substrate	Germination 21 days (%)	
	BaredSeeds	TreatedSeeds
Paper	44b	25a
Sand	44b	22a
Small Perlite	60a	31a
Large Perlite	48b	18a
Cv. (%)	29,08	

Means followed by the same letter in the column do not differ at 5% probability by Scott Knott test

How already related, the count was stabilized 14 days from sowing for the germination test, with difference less significant between the two last counts, proving that the germination test for Mulato II grass seeds, as well as to other forage seeds, in the case o *B. brizantha* (DIAS and ALVES, 2001) can be finalized before the described by the Regras de Análises de Sementes. For fresh mass, the less values were observed in seeds germinated in germitest paper, for seeds bared and treated. While to the others treatments there was no significant difference (Table 5).

Table 5. Fresh mass of brachiaria seedlings germinated in different substrates after twenty-one days

Substrate	Freshmass (mg)	
	BaredSeeds	TreatedSeeds
Paper	100,0b	100,0b
Sand	153,3a	125,9a
Small Perlite	145,4a	131,1a
Large Perlite	149,4a	144,2a
Cv. (%)	11,95	

Means followed by the same letter in the column do not differ at 5% probability by Scott Knott test

This difference can be justified by the depth in which the seeds were placed on substrates, with this, the roots presented higher capacity of to develop in sand than in germitest paper, where the roots did not develop satisfactorily, generating with this, a seedling shorter in relation to others treatments. Gomes et al. (2008)working with lettuce seeds using fertilizing alternative substrates, like carbonized rice chaff and earthworm compost with different doses of SulPoMag®, observed that are significant differences in the content of fresh mass between some of the treatments while for others, the difference was not significant. In relation to fresh mass, there was a significant difference for substrate sand, that presents the higher values when were evaluated the bared seeds. For treated seeds there was no significant difference in different treatments (Table 6).

Table 6. Dry mass of brachiaria seedlings germinated in different substrates after twenty-one days

Substrate	Drymass (mg)	
	BaredSeeds	TreatedSeeds
Paper	95,0b	95,0a
Sand	155,5a	105,0a
Small Perlite	95,0b	95,0a
Large Perlite	95,0b	95,0a
Cv. (%)	8,95	

Means followed by the same letter in the column do not differ at 5% probability by Scott Knott test

About the dry mass, Gomes et al. (2008) also showed significant differences between the most part f their treatment, following the tendency of fresh mass. In Table 7, there are the data's referred to the germination speed index of brachiaria seeds in different substrates. Was possible to observe that the seeds in sand substrate presented higher values when compared to the others treatments. This result can be explained by the better availability of water in this substrate.

Table 7. Germination Speed Index (GSI) of brachiaria seeds germinated in different substrates during twenty-one days

Substrate	GSI	
	BaredSeeds	TreatedSeeds
Paper	11,5a	12,4a
Sand	9,3b	9,8b
Small Perlite	9,5b	9,2b
Large Perlite	9,1b	9,6b
Cv. (%)	1,75	

Means followed by the same letter in the column do not differ at 5% probability by Scott Knott test

The vigor of seedling suffer influence direct from the substrate where it was sown, cause these substrates differs in many aspects like aeration, moisture retention level, presence of pathogens, between others (BRASIL 1992, FIGLIOLIA et al. 1993, CARVALHO e NAKAGAWA, 2000), and as smaller the vigor of seeds, smaller will be the performance of seedlings, this was also reported in studies from Edje and Burris (1971) with soybean, Khah et al. (1989) with wheat and Schuch et al. (1999) with black oat, what explains the difference in the production of dry mass.

Conclusions

The utilization of substrate perlite, when using bare seeds, is more promising to evaluate the germination of brachiaria seeds, cultivar Mulato II. For seeds treated, all the substrates used were efficient to evaluate the germination of brachiaria seeds cultivar Mulato II. The substrate 100% Perlite achieved the desired index of germination of brachiaria described by the normative instruction 45 from 17 September 2013 (MAPA).

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