
EMERGENCY BRACHIARIA DECUMBENS A FUNCTION OF DEPTH OF SEEDS IN SOIL PROFILE

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SUMMARY: The grass *B. decumbens* is the most cultivated pasture establishment in Brazil pastures and on areas used for other crops is amongst the more undesired weeds, due to hard control and rusticity. Therefore, the aim of this study was to determine the effects of sowing depths on *B. decumbens* emergence. The tests were performed on green house using the following sowing depths (0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0 e 10.0 cm). From 7.0 cm deep occurred significant emergence speed index (SEI) and seedlings emergence percentage (%ESI) reduction. In assessing the ability of germination of *B. decumbens* occurred suppression effect of germination in greater depth evaluated, while the other depths were tested emergency plan, with lower occurrence between 5 and 7 cm and topsoil. Layers between 0.5 and 2.5 cm larger plants des emergency occurred.

Keywords: Soil Seed Ban. Vigor. Weed.

EMERGÊNCIA DE *BRACHIARIA DECUMBENS* EM FUNÇÃO DA PROFUNDIDADE DE SEMENTES NO PERFIL DO SOLO

RESUMO: A gramínea *B. decumbens* é a mais cultivada em formação de pastagens no Brasil, em áreas onde são utilizadas para outros cultivos torna-se uma das plantas daninhas mais indesejadas, devido o seu difícil controle e rusticidade. Assim, o objetivo deste estudo foi determinar a emergência das plântulas de *B. decumbens* em profundidades de semeadura. Os ensaios foram realizados em casa de vegetação com as seguintes profundidades de semeadura (0,0; 0,5; 1,0; 1,5; 2,0; 2,5; 3,0; 4,0; 5,0; 6,0; 7,0; 8,0; 9,0 e 10,0 cm). A partir de 7,0 cm de profundidade ocorreu redução significativa no índice de velocidade de emergência (IVE) e na porcentagem de emergência das plântulas (%ESI) de *B. decumbens*. Na avaliação da habilidade de germinação da *B. decumbens* ocorreu efeito de supressão da germinação na maior profundidade avaliada, enquanto que, as demais profundidades testadas ocorreram emergência da planta, com menor ocorrência entre 5 e 7 cm e na camada superficial do solo. Nas camadas entre 0,5 e 2,5 cm ocorreu maior emergência des plantas.

Palavras – chave: Banco de sementes em solo. Vigor. Planta daninha.

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INTRODUÇÃO

Signal grass [*Brachiaria decumbens* cv. Brasilisk (Stapt)] is an erect tussock grass, from Africa and belongs to Poaceae family. Is amongst the main forages on Brazilian livestock, but on the Midwest and Southeast regions is the most cultivated grass for pastures establishment due to high leaf biomass production with good quality, high resistance to heavy grazing and trampling (MOREIRA; BRAGANÇA, 2010), however this species may become one of the most undesired plants, due to aggressiveness, rusticity and hard control, causing negative interaction as native species extinction (VELMAN; PUTZ, 2011).

Considering this species importance, basic studies on its biology are necessary, however there are few studies in Brazil which clarify the involved mechanisms on weed emergence, as maximum depth which the seeds can emerge (LABONIA *et al.*, 2009). Thereby, the soil seed bank is considered as a seed and vegetative propagules reservoir which constitutes the plants life cycle origin (SOUZA *et al.*, 2009), and also contains many information about environmental conditions and previous cropping practices, which makes it an important factor for evaluation of weeds infestation potential on the present and future (CARNONA; BÔAS, 2001).

The vertical distribution of weeds seeds displays strict correlation to soil preparation. Mostly of positive photoblastic species as *Conyza sp.* (VIDAL *et al.*, 2007), *Erythrina velutina* (CARDOSO *et al.*, 2008) and *Ipomoea sp.* (LABONIA *et al.*, 2009) demand a certain amount of light to start the germination process (RADOSEVICH *et al.*, 2007). Whether any of these seeds is located on higher depths, their germination is compromised, differently from negative photoblastic species which doesn't need light stimulus, as *Sida cordifolia* (KLEIN; FELIPPE, 1991), *Euphorbia hederifolia* and *Brachiaria plantaginea* (SALVADOR, 2007) and *Commelina benghalensis* (DIAS *et al.*, 2009).

Amongst the factors which determinate the passage of phenological stages from seeds to seedlings, the diaspore depth on soil profile is one of the most important and, undoubtedly, its evaluation is essential to develop population growth models and, with practical ends, to evaluate mechanic methods and chemical methods, isolated or associated, on weed control (CANOSSA *et al.*, 2007; SOUZA *et al.*, 2009).

Studies about diaspores population dynamics (RADOSEVICH *et al.*, 2007) corroborate management strategies and help the understanding of seed banks formation dynamics in agricultural soils. Thus, the aim of this study was to determine the ability of emergency seed of *B. decumbens* at various depths in the soil profile.

MATERIAL AND METHODS

The two experiments were conducted in the green house used arable layer of a red dystrophic latossol (380 g.kg⁻¹ granulometry, with 50 g.kg⁻¹ of clay and silt and 570 g.kg⁻¹ of sand). It was dry on shade with 25-30 °C, followed by sieving on 5.0 mm mesh before being transferred to plastic boxes (EMBRAPa, 2006), with 2.5 L, black colored to avoid light to interfere on results. The moisture was kept at 40% of soil field capacity, determined by the gravimetric method (RICHARDS, 1965).

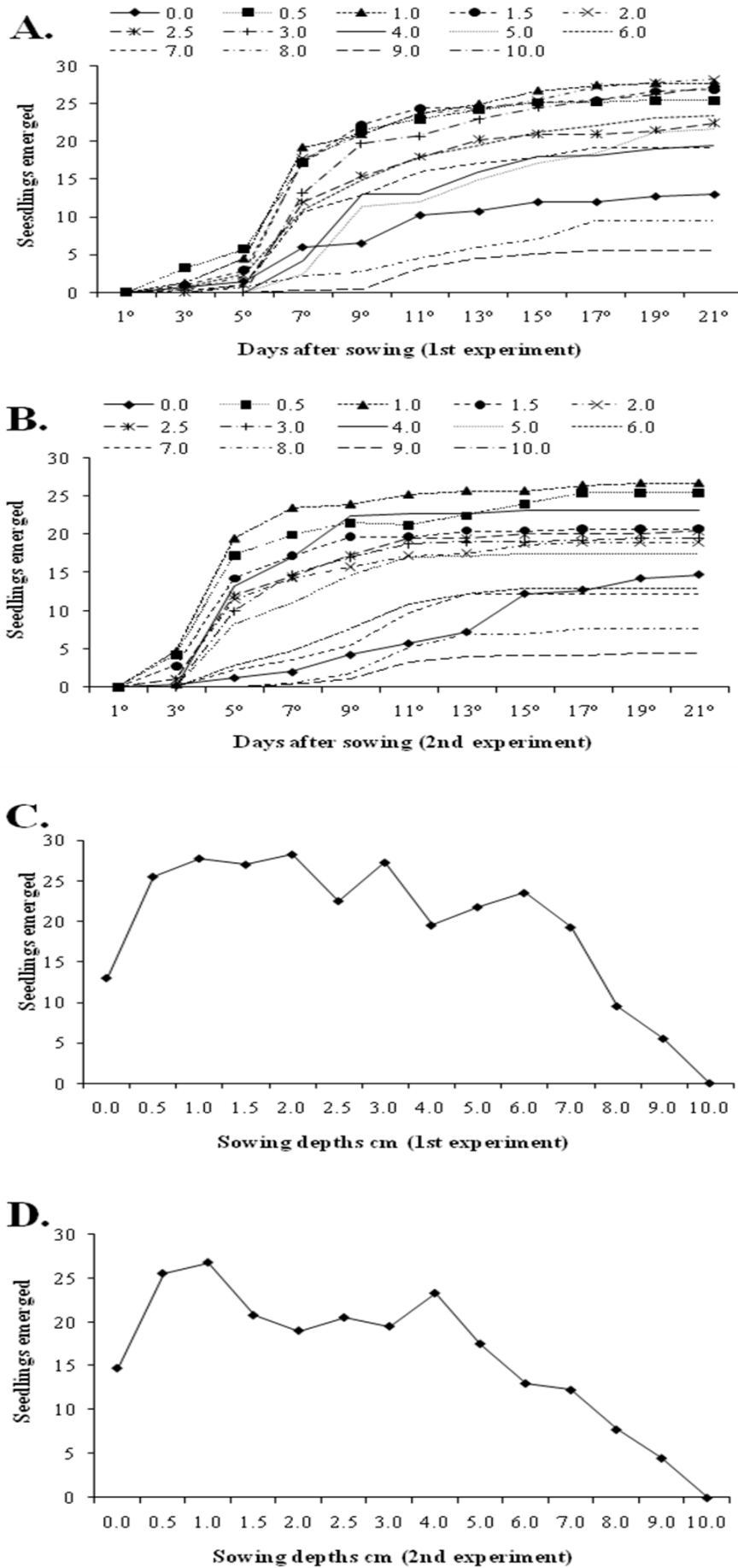
The experiments were conducted for 21 days, according Souza-Filho *et al.* (2001), recommended that monitoring of plant emergence of grasses for 15 days after sowing (DAS), in randomized blocks design (RBD) with 14 treatments and four repetitions. The sowing depths were 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0 and 10.0 cm. The depth of 10 cm was used as a depth limit because it is more common to the formation of seed banks weeds. Each box was considered an experimental unit and 50 seeds were sowed in each box, width 15 cm and height of 10.5 cm.

B. decumbens emergence was evaluated each 48 hour and the emergence speed index (SEI) and the emergence percentage (ESI%) were calculated based on the counting, according to Maguire (1962). For ESI% calculation the data was transform by arc sen $\sqrt{x + 0.5}$. The data was submitted to variance analysis (ANOVA) and the means were compared by Tukey test at 5% level.

RESULTS AND DISCUSSION

At the first experiment, from the third DAS has occurred emergence at 0.0; 0.5; 1.0; 1.5; 2.0; 2.5; 3.0; 4.0; 5.0; 6.0 e 7.0 cm depths (Figure 1A). At 8.0 cm depth emergence has occurred from the seventh DAS and at 10.0 cm has occurred no seedlings emergence (Figure 1C).

Figure 1 - *B. decumbens* seedlings emergence at sowing depths.



On the second trial, from the third DAS has occurred emergence at 0.0, 0.5, 1.0, 1.5, 2.0 and 2.5 cm depths (Figure 1B). From the fifth DAS emergence occurred at 3.0, 4.0, 5.0, 6.0 and 7.0 cm depths. At 8.0 and 9.0 depths emergence occurred from the seventh DAS and at 10.0 cm has occurred no emergence of seedlings (Figure 1D).

The higher *B. decumbens* seedlings emergence percentage has occurred at 1.0 and 2.0 cm depths. These results were similar as those observed for *Oenocarpus minor* (SILVA E SILVA *et al.*, 2006), *Moringa oleifera* (SOUZA *et al.*, 2007), *Erythrina velutina* (CARDOSO *et al.*, 2008) and *Bidens pilosa* (SOUZA *et al.*, 2009).

The significant percentage reduction on this study occurred from 7.0 cm depth, with differ from *Panicum dichotomiflorum*, whereupon emergence was unfeasible at depths under 5.0 cm (FAUSEY; RENNER, 1997). *Brachiaria subquadriflora* emergence was unfeasible at depths under 7.0 cm (TEUTON *et al.*, 2004), *Alternanthera tenella* emergence was significantly reduced from 4.0 cm depth (CANOSSA *et al.*, 2007) and for *Ipomoea hederifolia* the emergence was unfeasible from 2.0 cm depth (LABONIA *et al.*, 2009).

The difference at cited emergence depth may has occurred due to seeds energetic reserve, since the bigger the seed (energetic reserve amount), the bigger is the chance of seedlings emergence from lower depths and they can survive longer on unfavorable environmental conditions (OLIVEIRA *et al.*, 2005; GOMES JÚNIOR; CHRISTOFFOLETI, 2008). Araldi *et al.* (2013), evaluated accumulated emergence at sowing depths and observed resemblances between three seed classification sizes (small, medium and big).

On this study, emergence speed index (SEI) on both experiments was higher at 1.0 and 2.0 cm depth (Table 1), which corroborate with evaluation for *Bidens pilosa* (1.0 cm) (MUNIZ FILHO *et al.*, 2004; Souza *et al.*, 2009) and *Alternanthera tenella* (1.0 cm) (CANOSSA *et al.*, 2007).

Table 1 - Emergence Speed Index (SEI) and emergence percentage (%ESI) of *B. decumbens* seedlings. For %E, data was transformed in arc sen $\sqrt{x + 0.5}$. **(Continua)**

Depths (cm)	SEI		Emergence percentage	
	1st experiment	2nd experiment	1st experiment	2nd experiment
0.0	6.69 def	4.38 ef	26.00 bc	29.50 bcde
0.5	16.77 a	17.83 ab	51.00 a	51.00 ab
1.0	16.67 a	20.03 a	55.53 a	53.50 a
1.5	15.90 ab	15.10 abc	54.00 a	41.50 abc
2.0	15.62 ab	12.36 bcd	56.50 a	38.00 abc
2.5	11.67 abcd	13.22 bc	45.00 a	41.00 abc
3.0	13.56 abc	12.25 bcd	54.50 a	39.00 abc
4.0	8.67 cde	15.10 abc	39.00 ab	46.50 abc

Table 1 - Emergence Speed Index (SEI) and emergence percentage (%ESI) of *B. decumbens* seedlings. For %E, data was transformed in $\text{arc sen } \sqrt{x + 0.5}$. **(Conclusão)**

5.0	8.27 cdef	10.54 cde	43.50 ab	35.00 abcd
6.0	12.19 abcd	6.10 def	47.00 a	26.00 cde
7.0	10.26 bcd	5.34 ef	38.50 ab	24.50 cde
8.0	3.63 efg	2.52 f	19.00 c	15.50 def
9.0	1.94 fg	1.45 f	11.00 cd	9.00 ef
10.0	0.00 g	0.06 f	0.00 d	0.50 f
DMS	6.35	6.42	18.54	22.23
CV	24.83	26.11	19.03	27.37
F	19.36 **	25.28 **	23.84**	23.66**

** Significant at 5% probability by F test

Means followed by the same letter in columns do not differ significantly by Tukey test at 5% probability.

However, this study differs from SEI obtained for *Brachiaria brizantha* cv. Piatã, which the highest SEI were obtained on depths between 0.0 and 3.0 cm (IKEDA *et al.*, 2003). The low %ESI and SEI at lower depths may be attributed to survival strategy for weed seed bank formation.

B. decumbens emergence was affected by seeds location at the soil profile, therewith has occurred high intensity emergence reduction from 7.0 cm depth. Araldi *et al.* (2013) and Ikeda *et al.* (2013), also observed that sowing depth (*B. decumbens*) from 0.0 to 6.0 cm obtained the highest SEI.

This reproductive biology feature together with irregular germination guarantee the seed stock on soils and becomes a problem when develops at crop row from other crops, which may cause 30 to 80% reduction on maize production (PEREIRA; CAMPOS, 2001). On soybeans this may vary from 18 to 82% (FLECK, 1996) and on sugarcane the intense interference may cause up to 80% reduction on stalk production (KUVA *et al.*, 2001).

One of the main *B. decumbens* interference justification is the agricultural use in remnant pastures area (BIANCO *et al.*, 2000), such as the seed dispersion (anemochory) promotes fast invasion at parks and conservation units sited next to roads and prevent the species natural regenerative process, besides expand to neighbor areas, which represents risk to native species (ESPINDOLA *et al.*, 2005). On the other hand, management (conventional soil preparation) may help introducing seeds sited from more surfacing layers to more deep layers (lower than 7.0 cm, as seen in this study), which this seeds emergence is impaired, and also may bring deeper seeds to surfacing layers where herbicides may act on the germination of this seeds.

CONCLUSION

In assessing the ability of germination of *B. decumbens* occurred suppression effect of

germination in greater depth evaluated, while the other depths were tested emergency plan, with lower occurrence between 5 and 7 cm and topsoil. Layers between 0.5 and 2.5 cm larger plants des emergency occurred.

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