Axonopus parodii and *Paspalum* spp. racemes production and seeds health quality

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Abstract. Brazil has been developing research for selection of native species of *Paspalum notatum, P. lepton* and *Axonopus parodii* for use as ornamental lawns. These species can be propagated sexually (seeds) or vegetatively (stolons and rhizomes). However, they may have low percentage of viable seeds. This study aims to evaluate the production of inflorescences and seed quality in *P. notatum* accessions and *A. parodii* with potential for use as utility lawns in the condition of Rain Forest Zone - Pernambuco, Brazil. The experimental design was completely randomized block with four replicates and eight accessions - *Axonopus parodii* Vall, ined. (BRA 002658); *Paspalum notatum* (BRA 019178, BRA 023558, BRA 023566, BRA 023728, BRA 012254 and BRA 006301) and *P. lepton* (BRA 023591). After stabilization of the lawn, the number of racemes per square meter was recorded fortnightly. The racemes were collected to make the analysis of seed quality. Means were compared by Tukey test at 5% probability, via Sisvar statistical program. It was observed that the higher number of racemes per square meter was produced 93 days after planting (DAP), with a reduction of production after 121 DAP. The seed quality was variable between accessions, indicating that this is an aspect to be observed for the selection of these accessions as lawns.

Keyword: Grass, Green cover, fungi, *Axonopus*, *Paspalum* sp.

INTRODUCTION

Lawns are basic and fundamental components in many landscapes, not only for their aesthetic value but even more for their benefit of the preservation of the environment (Murdoch et al., 1998), acting in erosion control, soil stabilization, infiltration and protection of groundwater, flood control, carbon sequestration, heat dissipation and reduced visual pollution problems (Beard and Green, 1994). In Brazil, *Paspalum notatum* has been widely used in lawns in urban areas because of their resistance to trampling, drought and poor soils (Lorenzi, 2013). Their high production of roots and rhizomes (Espindola et al., 1998) results in a good ground cover.

Most genus *Paspalum* species are apomictic polyploid, mainly tetraploid (Quarín and Normann, 1990). For landscaping, the seed production may be interesting for the cultivation of lawns. However, it was observed that the species of the genus *Paspalum* have low capacity to produce viable seeds. This effect is due to several factors, such as not passing from the vegetative stage to the reproductive (Humphreys, 1979), low caryopses formation rate in inflorescence and absence of seed germination by dormancy (Maeda and Pereira, 1997; Batista and Godoy, 1998).

Another important and understudied factor that can affect seed germination is the health quality. Pathogenic microorganisms negatively influence the physiological seed quality. Its presence may result in reduced germination potential, and later in the growth in the field (Pedroso, 2009). Furthermore, the infected seeds can spread pathogenic agents from one region to another and often introduce them into free areas (Lazarotto et al., 2012).

This study aims to evaluate the production of inflorescences and seed quality in *Axonopus parodii* and *Paspalum* spp. accessions with potential for use as utility lawns in the condition of Rain Forest Zone - Pernambuco, Brazil.

MATERIALS AND METHODS

The trial was installed at Camaragibe, Pernambuco - Brazil (7°56'33"S and 35°01'50" W, 100m elevation), a rain forest zone, during the period of October, 2013 to April, 2014. Eight accessions, from the *Paspalum* Germplasm Embrapa Bank (Brazilian Agricultural Research Corporation) localized in São Carlos-SP, Southeast Brazilian region, were tested as utility lawns: *A. parodii* Vall, ined. (BRA 002658); *P. notatum* (BRA 019178, BRA 023558, BRA 023566, BRA 023728, BRA 012254 and BRA 006301) and *P. lepton* (BRA 023591).

Soil texture contained 49% sand grain, 17% fine sand, 6% silt and 28% clay (grain size). Were applied 0.5 t ha^{-1} of calcite and a fertilization of 180 kg P_2O_5, 80 kg K_2O and 60 kg N ha^{-1}, before and after plantation.

Experimental total area was 138 m², minimally managed without mowing, weeds remove or irrigation. The seedlings were manually planted at 100 plants m^{-2} in spacing of 0.10 m x 0.10 m, total 1m². The study was arranged as a randomized complete-block, with four replications (represented by 1m²). After stabilization of the lawn (79 days after the planting-DAP), the cumulative number of racemes per square meter was recorded fortnightly. The collected materials were stored at 6.5°C and relative humidity of 81% for further analysis. The experimental design was completely random and the means compared with Tukey's test at the 5% probability level.

The purity and health analyses were realized in December 2014. Only the BRA 023728, BRA 019178 and BRA 023591 accessions, harvest 93 DAP, present enough seeds for the blotter test. Four repetitions of 100 seeds were distributed on three sheets of sterilized filter paper, moistened with sterilized distilled water and placed in plastic boxes ('gerbox'), previously disinfected with 1% sodium hypochlorite (Brasil, 2009). The seeds were incubated for seven days under a 12 hour black light/12 hour no light photoperiod at a temperature of 24 ± 1 °C. Fungal structures were observed under a stereoscopic and optical microscope and identified with the help of an identification key (Barnett and Hunter, 1972). The experimental design was completely random and the means compared with Tukey's test at the 5% probability level.

RESULTS AND DISCUSSION

The higher values of cumulative number of racemes per square meter was observed 93 DAP with a reduction of production after 121 DAP (Figure 1). At 93 DAP, more than 79 racemes per square meter were observed in BRA 023591 (393), BRA 023728 (282), BRA 023558 (106), BRA 019178 (101) and BRA 012254 (79) (Figure 1). The BRA 023591 accession (Figure 2) stood out with higher racemes productions during evaluations 93, 108 and 121 DAP and the specie *A. parodii* (BRA 002658) doesn't raceme produce.

Only the BRA 023728, BRA 019178 and BRA 023591 present enough seeds for the health analysis. The following fungi were identified in seeds of *Paspalum* spp.:

Penicillium spp., *Curvularia* spp., *Alternaria* spp., *Cladosporuim herbarium*, *Rhizopus* spp. and *Stemphyllium* spp. (Figure 3). Many of these genera have been reported in the literature present in the microflora (Brosnan and Deputy, 2008; Aguiar, 2014).

In BRA 023728 access we detected the highest number of fungal species, differing from the others. The genus *Curvularia* had a higher incidence above 56% for the three accessions (Figure 4). Similar results were obtained by Aguiar (2014) who detected high frequency of *Curvularia* spp. in seeds of *P. notatum*. Symptoms are characterized by reddish-brown or black spots. In some cases the spots are confined to the top or bottom of the glumes and have a clearer center (Prabhu et al., 1999).

Additional work is also needed to determine the racemes production of *Paspalum notatum, P.lepton* and *Axonopus parodii*, the potential of the seed in transmitted disease, how long the pathogen survives in seed and whether fungicide seed treatments have an effect on transmission.

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Figures

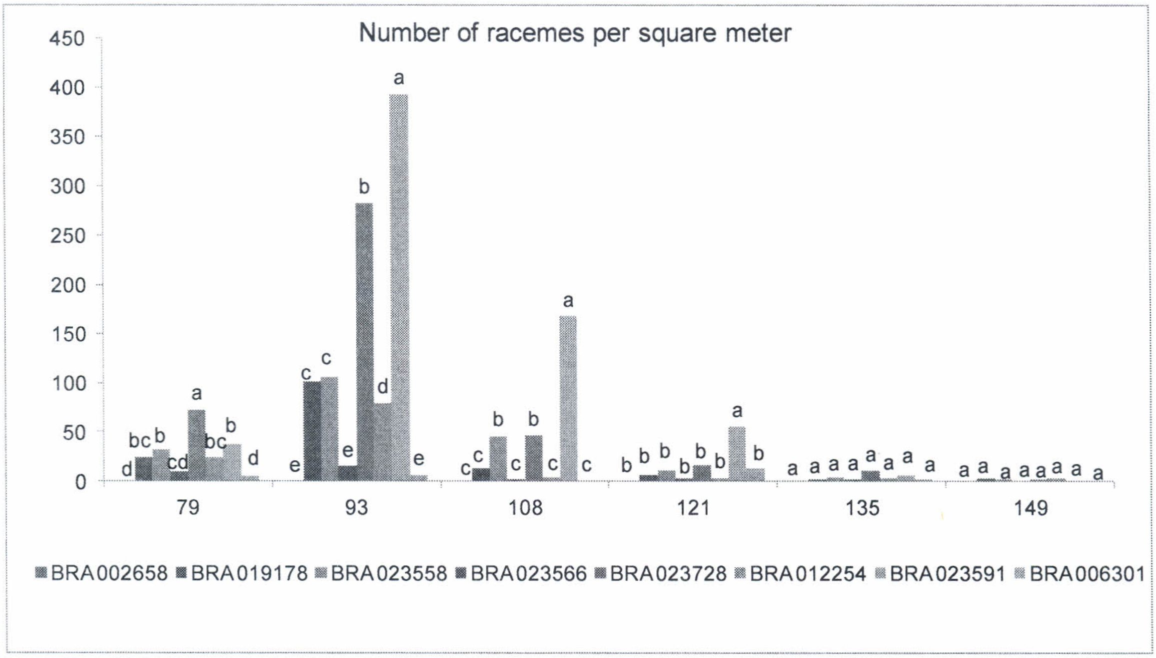

Fig 1. Racemes production at 79 to 149 DAP (days after planting) of accessions; BRA 002658; BRA 019178; BRA 023558; BRA 023566; BRA 023728; BRA 012254; BRA 023591 and BRA 006301. Camaragibe, Pernambuco - Brazil, 2014.

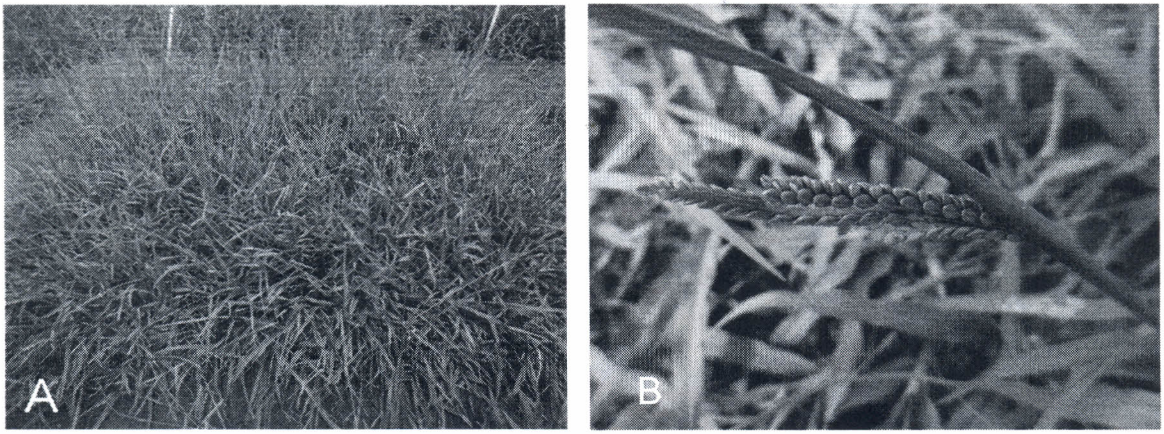

Fig 2. Racemes production of *Paspalum lepton* (BRA 023591): racemes per square meter (A) and panicle per racemes (B), Camaragibe, Pernambuco - Brazil, 2014.

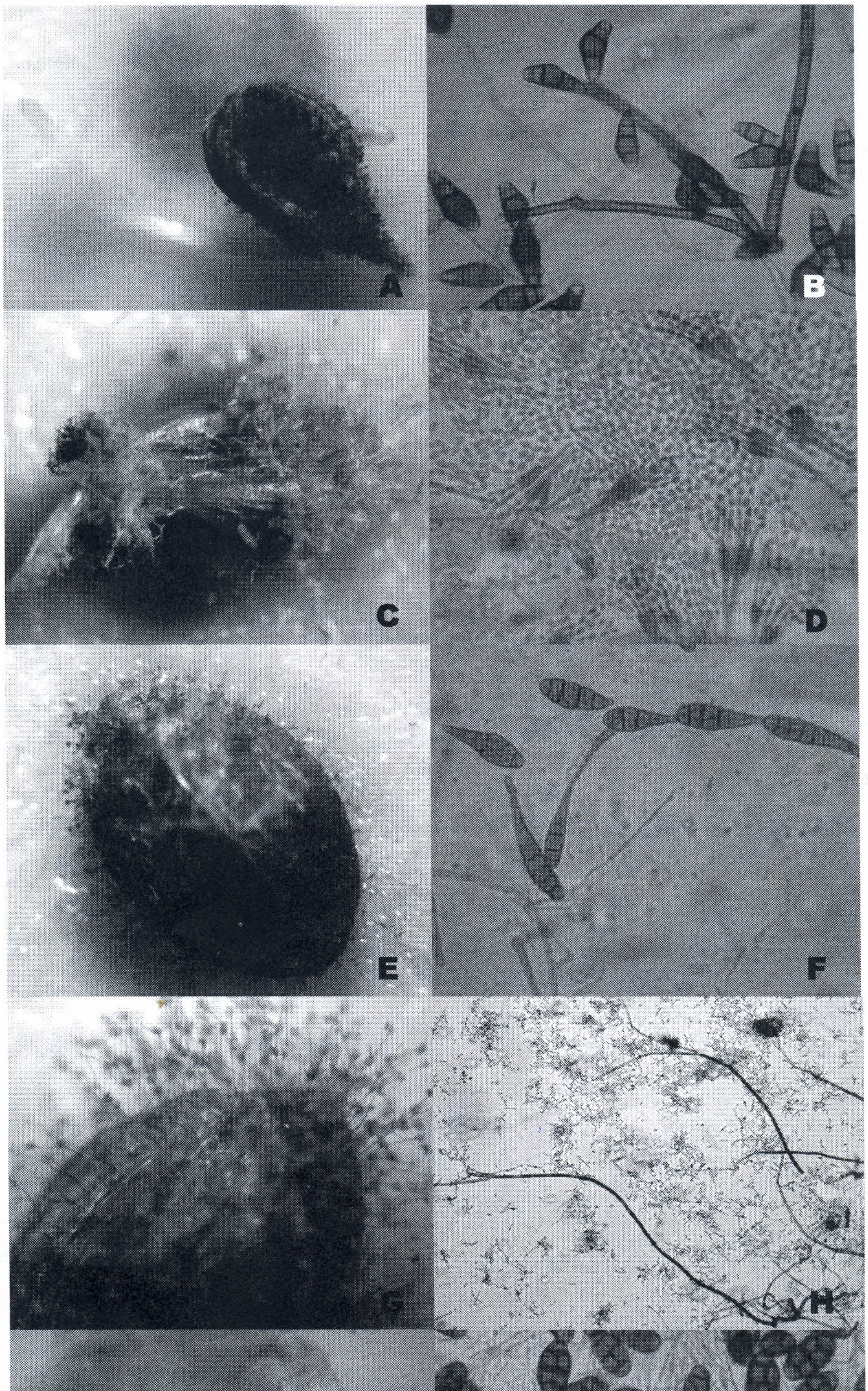

Fig 3. Fungi detected in seeds of *Paspalum* spp.: *Curvularia* spp. (A; B), *Penicillium spp.*(C; D), *Alternaria* spp.(E; F), *Cladosporuim herbarium*(G; H) and *Stemphyllium* spp.(I; J)

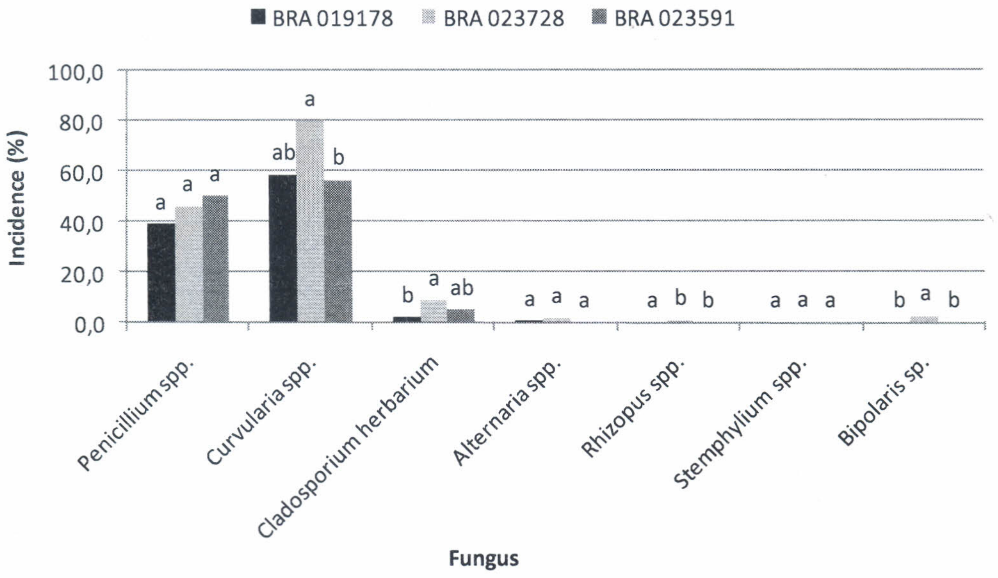

Fig 4. Incidence of different fungi on seeds of three accessions of *Paspalum* spp. (BRA 023728, BRA019178 and BRA 023591). Camaragibe, Pernambuco - Brazil, 2014.