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Density, tillering and yield of three *Tripsacum dactyloides* (L.) L. genotypes during the crop establishment period

The genus *Tripsacum* consists of perennial grasses that are widespread in the Western Hemisphere from Massachusetts, United States to Paraguay, South America (de Wet *et al*., Am. J. Bot. 70:1139-1146, 1983). *T. dactyloides (*Eastern gamagrass) is a relative of field corn *(Zea mays)* characterized as a high productive and palatable warm-season, perennial forage grass. Some authors have reported good performance of eastern gamagrass used as a forage crop for grazing (Burns *et al*., J. Anim. Sci. 70:1251-1261, 1993; Aiken, J. Anim. Sci. 75:803-808, 1997), hay (Burns *et al*., Postharvest Biol. Tec. 7:261-269, 1996), and silage (Eun *et al*., J. Anim. Sci. 82:170-178, 2004). Recently, eastern gamagrass has also gained attention as a grass for growing vegetative hedges to control erosion or filter strips to reduce water pollution from agricultural runoff (Rankins *et al*., Weed Technol. 19:73–77, 2005; Kaspar *et al*., J. Environ. Qual. 36:1503–1511, 2007), and a crop to ameliorate marginal (Gilker *et al*., Soil Sci. Soc. Am. J. 66:931–938, 2002) or contaminated soils (Euliss, Bioresource Technol. 99: 1961–1971, 2008). Eastern gamagrass is especially useful due to its tolerance to adverse subsoil conditions, such as extreme acidity and compaction (Ritchie *et al*., Field Crop. Res. 97:176–181, 2006; Foy *et al*., J. Plant Nutr. 22(10):1551-1566, 1999; Clark *et al*., Plant Soil 200:33-45, 1998), winter hardiness and high dry matter production (Faix *et al*., J. Range Manage. 33(5):388-390, 1980). Nevertheless, stand establishment can be difficult because of seed dormancy and slow seedling growth. Extended cold stratification of hydrated seeds was reported to overcome dormancy (Ahring and Frank, J. Range Manage. 21:27–30, 1968; Anderson, Bot. Gaz. 46:353–364, 1985), but planting dry seed in the fall has been more successful (Gibson *et al*., Crop Sci. 45:494–502, 2005, among others).

The aim of this study was to compare emergence percentage, tiller number dynamics and dry matter (DM) production of three genotypes of *T. dactyloides* unfertilized or with the addition of nitrogen and nitrogen plus phosphorus, during the crop establishment period. Genotypes used in this study were the diploid cultivars Iuka and Pete, kindly supplied by Dr. Maria Haytt (Iowa State University) and a tetraploid genotype (GT) from CIMMYT (Mexico). The research site was located at the Instituto Fitotécnico de Santa Catalina, Facultad de Ciencias Agrarias y Forestales, Universidad Nacional de La Plata, Llavallol, Buenos Aires (34 º 48' S, 48 º 31' W). Planting was made on June 14th 2007 (to fulfill the period of low temperatures required to alleviate caryopsis dormancy), Field trials were established on a Typic Argiudoll soil which showed, to 20 cm depth, 32 g kg^{-1} organic matter and pH = 6. Seeds were planted approximately 3-4 cm deep in rows 0.7 m apart, spaced 0.2 m in the row. Weeds were controlled preemergence with glyphosate [N-(phosphomethyl)glycine] applied at 2 L ha^{-1} and mechanically during the postemergence period. From emergence (September 20th 2007) to harvest (March 3rd 2008) accumulated precipitation was 545.3 mm and mean air temperature was 20.75°C. Trials were conducted in a randomized complete block design with a factorial arrangement of treatments in three replicates. Factors included genotypes (3 levels) and fertilization treatments (3 levels). Fertilization treatments were control (without fertilization), NH_4NO_3 (92 kg ha^{-1}) and $(NH_4)_2PO_4H$ (143 kg ha^{-1}). The last two treatments provided equal doses of nitrogen each. Genotype was the main plot treatment (plot size: 6.3 by 8 m), and fertilization was the subplot treatment (plot size: 2.1 by 8 m). The data were subjected to analysis of variance, and significant differences among the means and treatments were compared by Tuckey test at 5% level using the Statistix software package (Analytical software, 2003). Seedling emergence percentages (Mean ± SEM) of Pete (49.3% ± 4.6), Iuka (46.6% ± 4.8) and GT (46.6% ± 2.4), recorded on October 4th 2007, were similar between genotypes ($P = 0.87$). The number of plants per hectare was 70476 for cv. Pete and cv. Iuka and 66667 for GT. The number of tillers per plant did not differ between genotypes ($P = 0.78$). The interaction between number of tillers X fertilization was not significant ($P = 0.73$). Plants were harvested on March 3rd 2008. The GT genotype produced higher dry mass (DM) per area than Pete and Iuka cultivars ($P = 0.002$). Plots fertilized with $(NH_4)_2PO_4H$ showed a higher DM per area than the control ($P = 0.042$). Genotype X fertilization interaction was significant ($P = 0.031$) (Figure 1). The GT genotype fertilized with $(NH_4)_2PO_4H$ showed the highest DM production (2911.6 kg ha^{-1}). In a parallel study in the same environment, the same material without fertilization, in its first year of production, showed a yield of 13731.5 kg ha^{-1} DM. These results show the potential of this species, mainly the GT genotype, and the need to assess different agronomic variables aimed to increase establishment and crop yield efficiency.

Figure 1. Total *Tripsacum dactyloides* dry matter production at the end of crop establishment period. Fertilization treatments were: control (without fertilization), NH_4NO_3 (92 kg ha^{-1}) and $(NH_4)_2PO_4H$ (143 kg ha^{-1}). Vertical bars represent SEM. Different letters indicate significant differences between treatments.