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Variation of soil and plant characteristics among old world bluestem species

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ABSTRACT

Old world bluestems (*Bothriochloa* spp.) have been successfully introduced as grasses for livestock forage in the semiarid Texas High Plains. Questions remain, however, on effects of these grasses on soil resources. We tested the hypothesis that differences in grass species produce differences in soil properties important to crop growth and useful in selecting the optimum species for the Southern High Plains of Texas. Three old world bluestem (*Bothriochloa*) species [C.E. Hubbard 'Caucasian', *B. caucasica* (Trin.); 'WW Spar', *B. ischaemum* (L.) Keng. var *ischaemum* (Hack.); and S.T. Blake 'WW-B Dahl', *B. bladhii* (Retz)] were grown in a randomized complete block design, with three replications, for nine years on a clay loam soil near Lubbock, Texas. Soil samples were collected in the ninth year to determine soil texture, wet aggregate stability, bulk density (BD), soil organic carbon (SOC), particulate organic carbon (POC), and soil strength as measured by the cone penetrometer. The grass species differed in their above-ground biomass and below-ground root production. In the ninth year of production, *Bothriochloa caucasica* and *B. bladhii* produced about twice the above-ground biomass with about 25% fewer roots than *B. ischaemum*. Soils where *B. caucasica* was grown had the highest BD (1.36 Mg m^{-3}) and *B. ischaemum* had the lowest (1.31 Mg m^{-3}). The soil in which *B. ischaemum* was growing had a lower BD, greatest root biomass, organic matter content, and aggregate stability suggesting superior soil quality for agricultural production. The species *B. bladhii*, however, often exhibited soil properties that were similar to both other species tested. Since *Bothriochloa bladhii* had superior or similar soil properties for plant growth among the species tested and has been shown to be higher in forage quality, animal performance, and carrying capacity than the other species, it appears to be the best choice among these three species to optimize both animal performance and desirable soil properties.

KEYWORDS

Old World Bluestem; Soil Quality; Grasses; Soil Organic Carbon

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