Variation in Pinehill Bluestem, a Southern Ecotype of the *Andropogon scoparius* Complex

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Highlight: *Pinehill bluestem is the most common variant of the little bluestem (*Andropogon scoparius*) complex in pine forests of north and central Louisiana and east Texas. It is also frequent in adjacent portions of Oklahoma and Arkansas. It differs from other inland forms of little bluestem primarily in its unreduced pedicellate spikelets, which are equal in size to the sessile spikelets. Because of vegetative similarity between pinehill bluestem and associated forms of* A. scoparius, *separation of varieties for purposes of forage management is not recommended.*

Pinehill bluestem (*Andropogon scoparius* var. *divergens* Anderss. ex Hack.), also called "eastern little bluestem" (Gould, 1969), is one of the most common grasses on pine forest range of east Texas and Louisiana. It has been reported also in Arkansas and Mississippi (Hitchcock, 1951). The grass appeared under the name *Andropogon divergens* (Hack.) Anderss. ex Hitchc. in Hitchcock's (1951) manual, and that name is still widely used. Gould (1967), in a revision of the genus *Andropogon*, assigned the name *Schizachyrium scoparius* var. *divergens* (Hack.) Gould. In their recent Texas plant manual, Correll and Johnston (1970) followed Gould's revision.

On longleaf-slash pine forest range in Louisiana, where total herbage yield may exceed a ton/acre, pinehill bluestem often accounts for over 50% of the herbage weight (Grelen and Enghardt, 1973). Its forage value is similar to that of other forms of little bluestem (*A. scoparius* Michx.), averaging up to 10% crude protein in young spring leaves but less than 5% in mature summer foliage (Campbell et al., 1954).

The primary distinguishing feature of pinehill bluestem is the presence of pedicellate spikelets about ¼ inch (6-8 mm) long, equal in size to the seed-producing sessile spikelets (Hackel, 1889; Hitchcock, 1951). Pedicellate spikelets in pinehill bluestem may be staminate or sterile but are always unreduced; other forms of little bluestem, except *A. scoparius* var. *virilis* Shinners which is discussed below, have only a sterile rudiment (Fig. 1). The type description for var. *divergens* indicated that leaf sheaths and basal portions of blades were silky-pilose (Hackel, 1889). Considerable variation in foliage pubescence, as well as in growth form and color, is found among bluestem plants in Louisiana. This paper reports investigations made to determine the extent of this variation and to learn if more than one discrete form of *A. scoparius* is represented within the principal range of variety *divergens*.

Methods

During 1966 and 1967, more than 200 plants representing various forms of *A. scoparius* throughout east Texas, southeast Oklahoma, south Arkansas, Louisiana, and south Mississippi were systematically collected and transplanted to an observational nursery on the Palustris Experimental Forest near Alexandria, La. Most were collected on pine sites, but some were from prairie and hardwood sites west of the pine belt in Texas and Oklahoma. Soils and associated vegetation were recorded at each collection point.

Heights were measured weekly, and dates of stalk elongation and flowering were recorded during the 1967 and 1968 growing seasons. In October 1968, two growing seasons after transplanting, morphological descriptions were made of each plant. Measurements included mature height, foliage color (green or glaucous), degree of foliage pubescence, and size of pedicellate spikelet.

Results

Of the 200 plants collected, 62% fitted the description of pinehill bluestem in Hitchcock's (1951) manual, having unreduced pedicellate spikelets and villous leaf sheaths. Another 8%, with villous sheaths but with both unreduced and rudimentary pedicellate spikelets on the same plant, could also be included. Such plants had at least one culm with each type

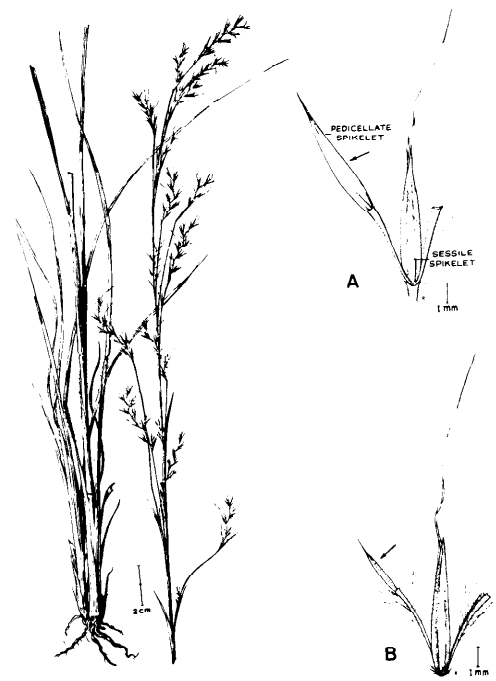

Fig. 1. Andropogon scoparius *plant with details of paired spikelets showing pedicellate spikelet: (A) unreduced as in var.* divergens, *and (B) rudimentary as in other varieties.*

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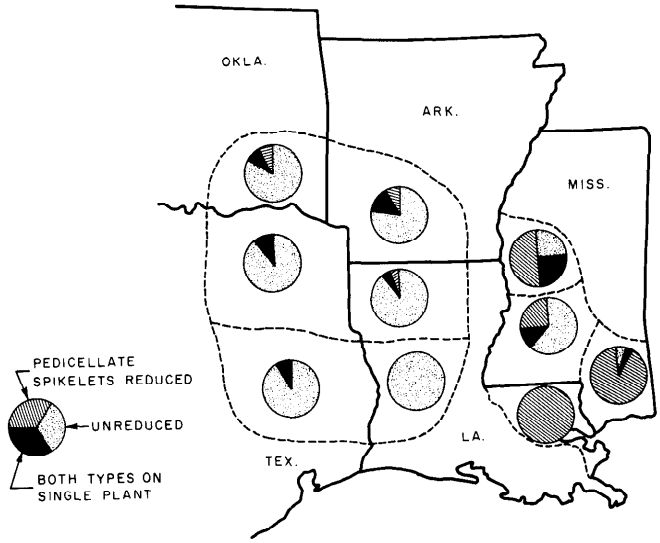

Fig. 2. *Proportions of pinehill bluestem plants within the* A. scoparius *population of the 5-state collection area, as indicated by transplants at Alexandria, La. Both stippled and black areas represent plants that can be called pinehill bluestem.*

of spikelet; occasional branches or individual spikelets of another type were ignored. With foliar pubescence disregarded and unreduced pedicellate spikelets as the only criterion, 83% of the transplants could be called pinehill bluestem.

Only in east Texas and southwest Louisiana did all plants collected have unreduced pedicellate spikelets, although over 10% of the Texas plants had both unreduced and rudimentary spikelets (Fig. 2). Across the Mississippi River in southeast Louisiana all collected plants had rudimentary spikelets; only 10% of the plants from southeast Mississippi had unreduced spikelets and half of these also had reduced spikelets. In southeast Oklahoma and south Arkansas, about 90% of the plants had unreduced spikelets.

Pinehill blustem had not been reported previously from Oklahoma, although Shinners (1954) found a form of *A. scoparius* with unreduced pedicellate spikelets and sparse foliage pubescence extending from northeast Texas into Oklahoma and Arkansas. He named the grass *A. scoparius* var. *virilis*, although it apparently is not separable from the variable pinehill bluestem population. At the time Shinners named the grass, pinehill bluestem was thought to be restricted to southeast Texas.

Although Hitchcock describes the sheaths of pinehill bluestem as villous, considerable variation in foliar pubescence was found among transplants otherwise fitting the description of pinehill bluestem. More than half of the plants had villous sheaths but 43% were glabrous or only slightly pilose. Moreover, foliage of 12% was chalky, or glaucous, in color. Hairiness was somewhat correlated with geographic location of collection site. Fewer than 5% of the transplants from southwest Louisiana had glabrous foliage, while over 40% of those from northeast Texas were glabrous. Thus, a higher percentage of glabrous plants came from sites closer to the range of the glabrous western form of little bluestem, *A. scoparius* var. *neomexicanus* (Nash) Hitchc. This observation agrees with the overall pattern of variation and intergradation within the *A. scoparius* complex described by McMillan (1964).

Hitchcock (1951) reports a maximum height of 47 inches (120 cm) for pinehill bluestem. Transplants, relatively free from competition, grew from 40 inches (102 cm) to over 7 feet (213 cm). Mature height, like hairiness, showed geographic relationships. Plants from south Mississippi and southeast Louisiana averaged 72 inches (183 cm), while Arkansas plants averaged 58 inches (147 cm). Although plants were more robust in the nursery, height differences were probably relative. If so, the taller southern plants may reflect the longer growing seasons and day length of the Gulf Coastal region. Larsen (1947) found that southern bluestem plants grew taller than local plants in a transplant garden at Chicago.

Discussion and Conclusions

The concentration of *A. scoparius* plants with unreduced pedicellate spikelets and variable foliar pubescence in Louisiana and adjoining portions of other states is apparently part of the overall ecotypic variation within the species (McMillan, 1964). Such plants, sometimes separated into varieties *divergens* and *virilis*, might best be considered part of the same variable population. The *divergens* epithet, however, has priority because of earlier publication.

Unreduced, and particularly staminate, pedicellate spikelets are rare in *A. scoparius* outside the range of var. *divergens*. The geographic concentration of var. *divergens* coincides with no presently expressed land form, climatic region, or vegetation type. The principal range is within the portion of the Coastal Plain west of the Mississippi River, at the western limit of the southern pine belt.

If *A. scoparius* plants with unreduced spikelets are assigned to var. *divergens*, plants of the pine forest types with rudimentary spikelets should be assigned to another variety. Both forms vary in foliage pubescence and cannot be distinguished without inflorescences. McMillan (1964) indicated that the variously pubescent southeastern forms with rudimentary pedicellate spikelets approach *A. scoparius* var. *frequens* Hubb. Hubbard (1917), however, described var. *frequens* as glabrous.

Morphological variation of the kind and extent reported here is by no means rare in the *A. scoparius* complex, in which more than a dozen taxa have been described. Because of intergradations between and variation within forms, however, separation below the species is not recommended in southern range management.

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