

# DICHANTHELIUM (POACEAE) IN THE UNITED STATES AND CANADA<sup>1</sup>

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## ABSTRACT

This is a taxonomic revision of the grass genus *Dichanthelium* as represented in the United States and Canada. Keys and descriptions are provided for the 45 taxa (26 species and 19 varieties) of the United States and Canada recognized by the writers. A total of 26 new combinations and changes of status are proposed. Many species of the genus *Dichanthelium* (*Panicum* subgenus *Dichanthelium* Hitchc. & Chase) are widespread through the eastern half of the United States and the center of diversity appears to be in southeastern North America. At least some species are present almost throughout the cool, subtropical and tropical regions of North America and the Caribbean, and a few species range throughout much of South America. The genus also is represented in the Hawaiian Islands. This publication represents the first major revision of the *Dichanthelium* grass group since the monograph of *Panicum* by Hitchcock and Chase in 1910.

Linnaeus (1753), in *Species Plantarum*, described the first three species that are included in the *Dichanthelium* group, *Panicum dichotomum*, *P. clandestinum*, and *P. latifolium*. *Panicum dichotomum* L. was designated as the type species of *Panicum* subgenus *Dichanthelium* by Hitchcock & Chase (1910) and is herein accepted as the type of the genus *Dichanthelium*. Lamarck in 1798 described *Panicum scoparium*, *P. laxiflorum*, *P. nitidum*, and *P. nodiflorum*; the last two species are now submerged in synonymy under *Dichanthelium dichotomum*. Most of the subsequent naming of dichanthelia taxa was done by the following workers: Elliott 8, Vasey 14, Scribner 22, Ashe 48, Nash 44, and Hitchcock 15. Among the other early botanists who contributed names were Swartz, Pursh, Poiret, Schultes, Sprengel, Michaux, Kunth, Nees, Desvaux, A. Gray, Chapman, Trinius, Torrey, Steudel, Grisebach, and Fournier.

In 1885, in a catalogue of the grasses of the United States, George Vasey listed 12 species of rosette-forming panicums. Four years later, in the first monograph of *Panicum*, Vasey (1889) recognized 20 species and 18 varieties in this group. In *Grasses of North America*, Beal (1896), recognized only 13 species and 6 varieties. During the period 1893–1900, G. V. Nash and W. W. Ashe collected extensively throughout the Carolinas and Florida and named a total of 92 new rosette-forming panicums. In 1901 Scribner and Merrill prepared an annotated list of the New England species of *Panicum*, and in this list most of the species of Nash and Ashe were put in synonymy or retained as varieties.

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In the same year, Scribner (1901), in a comprehensive treatment of American grasses, recognized 43 species of *dichanthelia*.

In 1910 A. S. Hitchcock and Agnes Chase published their monumental treatment of the North American species of *Panicum*. Included were keys to the subgenera and the "groups" of subgenus *Dichanthelium*, species writeups with complete citation of synonyms and rejected species, morphological descriptions and numerous excellent spikelet illustrations, brief statements of habitat and distribution, small U.S. map inserts showing distributions, and lists of representative collections by state. A total of 197 species were treated, 109 of these in the subgenus *Dichanthelium* Hitchcock & Chase, which was named and described in this treatment.

Hitchcock and Chase made a valiant effort to restrict the recognized species to recognizable taxonomic units. Two hundred and thirty-three previous names were absorbed in synonymy. Forty-seven of the 92 species named by Nash and Ashe were rejected. In the 45 years following the Hitchcock and Chase monograph, many state and regional treatments have been presented. Noteworthy are those of Deam (1929), Weatherby & Griscom (1934), Fernald (1921, 1929, 1934, 1950), Silveus (1942), Shinnars (1944), Pohl (1947), Blomquist (1948), and Steyermark (1963). *Dichanthelium* was elevated to generic status by Gould (1974).

Attempts to reduce the number of *Dichanthelium* taxa are seen in the treatments of Radford et al. (1964) in the *Manual of the Vascular Flora of the Carolinas*, and Correll & Johnston (1970) in the *Manual of the Vascular Plants of Texas*. Radford et al. relegated significant numbers of names to synonymy and recognized 40 species in the Carolinas. Correll and Johnston reduced the number of Texas species to 26, from a total of 53 recognized by Hitchcock and Chase. Still further reduction in the number of species in Texas is seen in the treatment of Texas grasses by Gould (1975), who listed only 16.

Selected groups of the *dichanthelia* have been the subject of one M.S. thesis (J. D. Bacon, 1970), and four Ph.D. dissertations (M. G. Lelong, 1965, R. W. Freckmann, 1967, R. W. Spellenberg, 1968, and C. A. Clark, 1977). Spellenberg (1975) has reported on synthetic hybridization of western North American segregates of *Dichanthelium acuminatum* (as *Dichanthelium lanuginosum*).

The following treatment is based on the study of plant materials collected by the writers throughout the midwestern, eastern, and southcentral portions of the United States and on the specimens of numerous herbaria including MO, NY, TAES, TEX, and US.

In the basic treatment, specific reference to synonyms is restricted to author and date of publication, except for names published after 1962 where a complete citation is given. Except for the few recently proposed names, a relatively complete listing of North American taxa is included in the *Index to Grass Species* (Chase & Niles, 1962), the 1951 revision of Hitchcock's *Manual of the Grasses of the United States*, and the 1910 monograph of *Panicum* by Hitchcock and Chase. Type material examined by the writers is indicated by reference to the herbarium. Species (and variety) distributions are shown in Figs. 1-3. The numbers correspond with the listed numbers of the taxa.

TAXONOMIC RELATIONSHIPS OF *DICHANTHELIUM* AND *PANICUM*<sup>3</sup>

*Dichanthelium* typically has a growth pattern that distinguishes it from all other North American grasses, including *Panicum*. In all but two species, a basal rosette of short, broad-bladed leaves is produced during autumn and winter, and primary inflorescences are developed on elongated shoots early in the spring. Late spring, summer, and autumn growth in most species produces fascicles of short, branched and rebranched lateral shoots with greatly reduced leaves and lateral inflorescences. *Panicum* species do not normally produce a basal rosette of short, broad leaves nor do they usually have two distinct flowering periods with profuse secondary branching of the culms. *Dichanthelium* begins flowering early in the spring, in February and March in the southern United States, with the species of *Panicum* of the area flowering from a few weeks to as much as five or six months later. All species of *Dichanthelium* are perennial, as are many species of *Panicum*. The type species of *Panicum* (*P. miliaceum* L.), however, is an annual.

*Dichanthelium* differs from all other North American genera of grasses except *Melica* (Boyle, 1945) in the low incidence of polyploidy. All but three of the United States species are diploid ( $2n = 18$ ), and the exceptional species, *Dichanthelium boscii*, *D. xanthophysum*, and *D. clandestinum*, are tetraploid ( $2n = 36$ ). In contrast, *Panicum* and most other genera of grasses are only 20–30% diploid and 70–80% polyploid.

Brown et al. (1957) determined that the shoot apex of *Panicum* has a single layer of tunica cells, whereas in *Dichanthelium* there is a double layer of cells at the shoot apex. Recent investigations (Brown & Smith, 1972; Smith & Brown, 1973) have shown *Dichanthelium* to differ from *Panicum* and most genera of the subfamily Panicoideae in the intermediate products of photosynthesis. In *Dichanthelium* the initial fixation of carbon is in 3-carbon phosphoglyceric acid, whereas in *Panicum* the initial fixation is in 4-carbon acids (oxaloacetic, malic, aspartic), which, via the Calvin-Benson cycle, are then converted into 3-carbon molecules (Smith & Brown, 1973). The two carbon-fixation pathways are referred to as  $C_3$  and  $C_4$ , with the  $C_4$  pathway being associated with high specialization in the structure and function of the vascular bundle sheath cells (in the leaf) and high  $^{13}C/^{12}C$  ratios. The  $C_4$  pathway, bundle sheath cell specialization, and high  $^{13}C/^{12}C$  ratios are characters of the Kranz syndrome (Smith & Brown, 1973). All *Dichanthelium* species examined for leaf anatomy were  $C_3$  and non-Kranz, while all panicums examined except *P. hians* were  $C_4$  and Kranz. *Panicum hians* Ell., a doubtful *Panicum*, was intermediate. The  $^{13}C/^{12}C$  ratios of all species of *Dichanthelium* tested by Brown & Smith (1975) and by the authors were low negative ratios in the range of  $-22^\circ/_{\infty}$  to  $-38^\circ/_{\infty}$ . Most *Panicum* species reportedly have  $\delta^{13}C$  numbers ( $^{13}C/^{12}C$  ratios) between  $-9$  and  $-18^\circ/_{\infty}$  (Smith & Brown, 1973). The data show a gap of about  $9^\circ/_{\infty}$  ( $-15$  to  $-24^\circ/_{\infty}$ ) between the two genera, making them appear completely distinct in respect to carbon-fixation pathways. The assumption that Kranz and

<sup>3</sup> This discussion is essentially as presented in the Ph.D. dissertation of the second author (Clark, 1977).

non-Kranz conditions are conservative and major contrasting taxonomic characters was mainly responsible for reclassification of subfamilies and tribes of the grass family by Avdulov (1931) and by Stebbins & Crampton (1961). Brown & Smith (1975: 11–12) suggest that:

... the assumption that the Kranz and non-Kranz conditions specify distinctive evolutionary lines of high taxonomic priority, even at the subgeneric level in *Panicum*, could require that the genus be divided on these characters either into two genera or subgenera or into a large number of genera. The type species of *Panicum*, *P. miliaceum* L., is a Kranz species. Therefore, any non-Kranz subgeneric taxa might be removed from the genus into newly-erected genera. Since *Dichanthelium* has long been recognized as having the status of a subgenus based upon distinctive morphological characters and is now known to differ from the type by being a non-Kranz taxon, its elevation to generic status seems justified.

Consistent epidermal differences have been reported in the palea of the upper (perfect) floret of *Dichanthelium* and *Panicum* (Clark & Gould, 1975). The surfaces of *Dichanthelium* palea tips uniformly have simple, rounded papillae, spaced in regular rows, whereas the palea tips of *Panicum miliaceum* and other *Panicum* species studied have irregularly arranged, compound or aggregated papillae. This is a character that has proven to be consistent throughout the Hawaiian and South American species of *Dichanthelium* as well as the North American taxa.

Table 1 presents a comparison of 24 characteristics of *Dichanthelium* and *Panicum*.

#### TAXONOMY

***Dichanthelium*** (Hitche. & Chase) Gould, Brittonia 26: 59. 1974. Based on *Panicum* L. subgenus *Dichanthelium* Hitche. & Chase, Contr. U.S. Natl. Herb. 15: 142. 1910. TYPE SPECIES: *Panicum dichotomum* L.

Perennials, typically tufted and usually forming in late summer or early autumn a basal rosette of shorter, broader blades than those of the culms. Culms stiffly erect or decumbent-erect, glabrous or hairy, 15–70 cm tall, infrequently to 150 cm or more tall. Sheaths of the main culms rounded on the back, often shorter than the culm internodes, glabrous or variously hairy. Ligule usually a ring of hairs, infrequently a short membrane or absent. Culm blades narrow or broad, usually flat, the reduced blades of secondary branches involute in some species. Secondary branching after the first culm growth and elongation often resulting in densely clustered fascicles of often much-reduced leaves and inflorescences. Inflorescence typically a small panicle with spreading or occasionally contracted branches, the spikelets short- or long-pedicelled. Spikelets ovate, elliptical or obovate, awnless, 0.8–4.5 mm long. Disarticulation below the glumes. Glumes both present, but the lower one often greatly reduced. First glume with nerves or nerveless, mostly  $\frac{1}{4}$ – $\frac{1}{3}$  as long as the spikelet but minute in a few species and  $\frac{3}{4}$  the length of the spikelet in others. Lower floret usually neuter but staminate in a few species. Upper floret perfect, with a shiny, glabrous, coriaceous lemma and palea, the lemma tightly inrolled over the palea. Palea apex rounded, with minute, symmetrical papillae in longitudinal rows, and an apical ridge with 7–12 large stomata in one or more rows.

TABLE 1. Comparison of taxonomic characters of *Dichantherium* and *Panicum*.

| Characters              | <i>Dichantherium</i>   | <i>Panicum</i>  |
|-------------------------|--|---|
| Basic Chromosome Number | $x = 9$ . All diploid ( $2n = 18$ ) except <i>D. boscii</i> , <i>D. xanthophysum</i> and <i>D. clandestinum</i> , which are tetraploid ( $2n = 36$ ).        | $x = 9, 10$ . Reported $2n = 18, 20, 21, 25, 30, 32, 36, 36 + Bs, 40, 42, 44, 45, 48, 49+, 54$ , and $72$ (Carnahan & Hill, 1961).                              |
| Chromosome Size         | Small and short, uniform.  | Small to medium-sized (Brown, 1948).  |
| Apospory                | Not reported.  | Reported in <i>P. deustum</i> , <i>P. maximum</i> , <i>P. obtusum</i> , and <i>P. virgatum</i> (Brown & Emery, 1958).   |
| Embryo Sac Development  | Species examined are of the <i>Polygonum</i> type.   | Usually of the <i>Polygonum</i> type, occasionally the <i>Adoxa</i> type (Waller, 1976).  |
| Embryo Size             | Relatively small in relation to total seed size.   | Relatively large in relation to total seed size.  |
| Annuals or Perennials   | Perennials only.   | Both annuals and perennials, with the type, <i>P. miliaceum</i> L., being annual.   |
| Growth Form             | Usually a basal rosette of short, broad blades formed in late summer and through winter. Lateral branching often profuse and conspicuous.                    | Usually no basal rosette of short, broad blades formed. Not sufficient lateral branching to alter overall appearance.   |
| Flowering               | Most species begin flowering early in spring and then continue to produce reduced, secondary inflorescences until winter frosts.                             | Most species begin flowering in late spring or summer and usually do not produce reduced, secondary inflorescences.   |
| Inflorescence           | An open panicle on terminal shoots and reduced, contracted panicles on branches.   | An open or contracted panicle.  |
| General Morphology      | Morphologically homogenous.  | Morphologically heterogeneous (Brown, 1948).  |
| Spikelet Morphology     | Uniform in structure and appearance.   | Variable in structure and appearance.   |
| Palea Morphology        | Uniform in shape, indurate, with margins inrolled. Paleas of perfect florets with simple, rounded papillae arranged in more or less linear rows at the apex. | Palea morphology variable. Paleas of perfect florets usually with compound or multiple papillae irregularly arranged at the apex (Clark & Gould, 1975).         |
| Ligule                  | A short, fringed or glabrous membrane, a fringe of hairs, or absent.   | A fringed or glabrous membrane, a fringe of hairs, or absent.   |
| Habitat                 | Moist, humid, most commonly shaded habitats in temperate and subtropical to tropical regions of the Americas; also in bogs and swamps of Hawaii.             | Variable habitats, in wet or dry sites, with world-wide distribution in temperate and subtropical to tropical regions.  |
| Culm Anatomy            | Cells of assimilatory tissues of random size and arrangement. No layer of well-developed parenchyma separating assimilatory tissue and sclerenchyma fibers.  | Assimilatory tissue often of radial chlorenchyma. Usually a layer of well-developed parenchyma separating the assimilatory tissue from the sclerenchyma fibers. |

TABLE 1. Continued.

| Characters  | <i>Dichantheium</i>   | <i>Panicum</i>   |
|---|---|--|
| Tunica of Shoot   | Shoot apex with 2 layers of tunica cells.   | Shoot apex with one layer of tunica cells in species examined (Brown et al., 1957).  |
| Kranz Syndrome<br>Photosynthesis                        | C <sub>3</sub> photosynthesis (non-Kranz).  | C <sub>4</sub> photosynthesis (Brown & Smith, 1972; Smith & Brown, 1973) (Kranz).  |
| Vascular<br>Bundles<br>of Leaf                          | Outer sheath with no chloroplasts (non-Kranz).  | Outer sheath with large, specialized chloroplasts (Kranz).   |
| Chloren-<br>chymatous<br>Cells of<br>Blade<br>Mesophyll | Usually randomly arranged and continuous between vascular bundles, with numerous air spaces (non-Kranz) but occasionally slightly radially arranged. Five or more chlorenchymatous cells intervening between adjacent vascular bundles (non-Kranz). | Often radially arranged around vascular bundles and usually tightly packed and with few air spaces; often interrupted by a region of colorless cells between the vascular bundles. Usually 2–4 chlorenchymatous cells intervening between adjacent vascular bundles (Kranz) (Hattersley & Watson, 1975). |
| Blades  | Only occasionally with pronounced ribs and furrows on both surfaces.  | Pronounced ribs and furrows on both surfaces.  |
| Mestome sheath  | Always present and continuous around the vascular bundle.   | Frequently present, but occasionally absent. When present, often interrupted on one side by fibers.  |
| Stomata   | Triangular-shaped or dome-shaped subsidiary cells.  | Triangular- or tall, dome-shaped subsidiary cells.   |
| Leaf Epidermis<br>Bicellular<br>micro-hairs             | Present, broadest near the mid-portion and tapering towards both ends, with the cells approximately the same length, the distal cell slightly longer.   | Present, clavate or tapered, with the distal cell about 1½ times as long as the basal cell.  |
| Silica cells  | Cross-, saddle-, or occasionally dumbbell-shaped.   | Cross-, saddle-, or dumbbell-shaped.   |

Key to the Species

- 1. Basal leaves long, narrow and linear, bright green or bluish-green, mostly 8–20 cm long and seldom more than 5 mm broad (see also *D. aciculare*).
- 2. Spikelets (2.9–)3.1–4.5 mm long, with the upper floret shorter than the somewhat beaked second glume and lemma of the lower floret ..... 1. *D. depauperatum*
- 2'. Spikelets 2.2–3(–3.2) mm long, the upper floret as long as the beakless second glume and lemma of the lower floret ..... 2. *D. linearifolium*
- 1'. Basal leaves long or short, not narrow and linear, more than 5 mm broad when as much as 8 cm long.
- 3. Leaves at base of the plant numerous, relatively long and soft, similar to and only slightly, if at all, shorter than the soft, yellowish green lower culm blades; plants branching only at the base, the slender culms remaining simple; blades mostly 4–10 mm broad.
- 4. Sheaths retrorsely pilose; uppermost culm blade 4–7 cm long, at least ¾ as long as those of the basal tuft; blade margins glabrous or finely ciliate .... 3. *D. laxiflorum*
- 4'. Sheaths glabrous or ascending-pilose; uppermost culm blade 1.5–6 cm long, less than ¾ as long as the blades of the basal tuft; blade margins coarsely papillose-ciliate ..... 4. *D. leucoblepharis*

- 3'. Leaves at base of the plant typically forming a basal rosette of short, relatively broad, firm or thin blades, these usually conspicuously shorter than the culm blades; blades 3–25 mm or more broad.
5. Spikelets 3.3–5.2 mm long ..... A
- 5'. Spikelets 0.8–3.2 mm long ..... AA
- A. (Spikelets 3.3–5.2 mm long)
6. Blades of culm leaves, at least some, 13–35 mm broad.
7. First glume usually  $\frac{1}{4}$ – $\frac{1}{3}$  as long as the spikelet; panicle branches and leaf blades spreading.
8. Spikelets broadly elliptic to obovate, turgid, usually with broad, heavy nerves ..... 11. *D. oligosanthos*
- 8'. Spikelets narrowly elliptic to obovate, not turgid or strongly-nerved.
9. Culm nodes, at least the lowermost, bearded; spikelets 3.8–5.2 mm long.
10. Ligules 1.5 mm or less long; blades glabrous or puberulent; spikelets 4–5.2 mm long ..... 5. *D. boscii*
- 10'. Ligules 2.5–4 mm long; blades commonly puberulent-tomentose on one or both surfaces but occasionally nearly glabrous; spikelets 3.8–4.2 mm long ..... 14. *D. ravenelii*
- 9'. Culm nodes glabrous or slightly pubescent; spikelets 3.3–3.8 mm long.
11. Sheaths glabrous or softly villous; blades mostly 8–12(–18) cm long ..... 6. *D. latifolium*
- 11'. Sheaths, at least the lower ones, papillose-hispid with spreading hairs; blades 10–28 cm long ..... 7. *D. clandestinum*
- 7'. First glume of at least some spikelets  $\frac{1}{2}$  or more as long as the spikelet; panicle branches and leaf blades stiffly erect or only slightly spreading.
12. Blades papillose-hispid on one or both surfaces ..... 12. *D. leibergii*
- 12'. Blades glabrous on both surfaces ..... 13. *D. xanthophyllum*
- 6'. Blades of culm leaves 12 mm or less broad.
13. Spikelets broadly elliptic or slightly obovate, rounded at the apex; first glume  $\frac{1}{4}$ – $\frac{1}{3}$  as long as the spikelet ..... 11. *D. oligosanthos*
- 13'. Spikelets narrowly ovate, elliptic, obovate, or obpyriform, rounded or pointed at the apex; first glume short or long.
14. First glume of at least some spikelets commonly  $\frac{1}{2}$ – $\frac{2}{3}$  as long as the spikelet; blades of culm leaves typically (7–)8–12 mm broad; spikelets finely pubescent to coarsely hairy; plants of northern and north-central United States and adjacent Canada.
15. Blades papillate-hispid on one or both surfaces; spikelets hairy with usually papillate hairs ..... 12. *D. leibergii*
- 15'. Blades glabrous on both surfaces, glabrous or ciliate on the margins; spikelets with nonpapillate hairs ..... 13. *D. xanthophyllum*
- 14'. First glume rarely as much as  $\frac{1}{2}$  as long as spikelet except in *D. pedicellatum* of Texas; blades of culm leaves 2–7(–9) mm broad; spikelets hairy or glabrous.
16. Spikelets narrowly obpyriform, 3.5–4.3 mm long; first glume appearing distant from the second glume due to the narrow, attenuate base of the second glume; blades characteristically firm, short, and abruptly pointed, usually ciliate on the margins to well above middle; Texas ..... 18. *D. nodatum*
- 16'. Spikelets narrowly ovate, elliptic, obovate or obpyriform, 3.2–3.9 mm long; first glume not appearing distant from the second glume; blades firm or thin, short or long, usually ciliate on the margins only near the base.
17. Midculm blades firm and stiff, long-acuminate at the apex, seldom over 2.5 mm broad on plants with spikelets 3.3 mm or more long; lower culm internodes glabrous or hairy but not puberulent, spikelets 3.3–3.6 mm long; widespread on Atlantic Coastal Plain and occasional westward ..... 23. *D. aciculare*
- 17'. Midculm blades thin or firm, 3–8(–12) mm broad, not long acuminate at the apex; lower culm internodes various; spikelets 3.3–3.9 mm long.

18. Lower culm internodes glabrous or hairy but not puberulent; spikelets usually pubescent or short-hispid with papillate hairs, 3.3–3.9 mm long; Texas and northern Mexico ..... 19. *D. pedicellatum*  
 18'. Lower culm internodes minutely puberulent; spikelets 3.3–3.6 mm long, puberulent to glabrous; mainly on Atlantic Coastal Plain, a few records from midwestern United States ..... 20. *D. sabulorum*

## AA. (Spikelets 0.8–3.2 mm long)

19. Spikelets 2.1–3.2 mm long ..... B  
 19'. Spikelets 0.8–2 mm long ..... BB

## B. (Spikelets 2.1–3.2 mm long)

20. Blades of primary culms, at least some, 13–25 mm broad ..... C  
 20'. Blades of primary culms 12 mm or less broad ..... CC

## C. (Blades 13–25 mm broad)

21. Culm nodes glabrous or slightly hairy, the internodes typically glabrous; glabrous-glandular band not developed below the culm nodes.  
 22. Blades long or short, the lower ones cordate at the base; ligule absent or a ring of hairs; spikelets 2.1–2.9 mm long.  
 23. Spikelets (2.1–)2.4–3.2 mm long, narrowly ovate or elliptic.  
 24. Sheaths, at least the lower ones, papillose-hispid with stiff, spreading hairs; blades, at least some, 12–20 cm or more long ..... 7. *D. clandestinum*  
 24'. Sheaths glabrous or finely pubescent; blades usually less than 10 cm long ..... 8. *D. commutatum*  
 23'. Spikelets 2.1–2.2 mm long, broadly elliptic to suborbicular ..... 9. *D. sphaerocarpon*  
 22'. Blades, at least some, 12–25 cm long, not cordate at the base; ligule a fringed or glabrous membrane; spikelets 2.2–2.9 mm long ..... 17. *D. scabriusculum*  
 21'. Culm nodes, at least the lower ones, bearded, the lower internodes with long, spreading hairs; glabrous-glandular band present just below the culm nodes ..... 16. *D. scoparium*

## CC. (Blades 12 mm or less broad)

25. Blades, at least the lower ones, cordate or subcordate at the base, mostly 6–12 mm broad.  
 26. Spikelets narrowly elliptic, 2.1–3.2 mm long.  
 27. Larger culm blades broadest near the base, spreading from the culms, usually asymmetrical, when broad then strongly cordate at the base ..... 8. *D. commutatum*  
 27'. Larger culm blades broadest at or just below the middle, erect or erect-spreading, narrow below to a moderately cordate-subcordate base ..... 25. *D. boreale*  
 26'. Spikelets broadly elliptic or broadly obovoid to subspherical, 2.1–2.2 mm long ..... 9. *D. sphaerocarpon*  
 25'. Blades not cordate or subcordate at the base, narrow or broad.  
 28. Hairs of ligule or pseudoligule, at least some, 2–5 mm long.  
 29. Sheaths with hairs 2–4 mm long; nerves of the upper glume and lemma of the lower floret narrow, distinct or indistinct.  
 30. Ligule with a dense ring of short hairs in front of a thin line of long hairs ..... 21. *D. ovale*  
 30'. Ligule without a dense ring of short hairs in front of the line or ring of long hairs ..... 26. *D. acuminatum*  
 29'. Sheaths glabrous, pubescent, or with stiff hairs not over 1.5 mm long; nerves of the upper glume and lemma of the lower floret broad, distinct ..... 11a. *D. oliganthes* var. *oliganthes*

- 28'. Hairs of ligule or pseudoligule less than 2 mm long, or if this long, then culms with a broad, glabrous-glandular band just below the nodes.
31. Culm nodes, at least the lower ones, bearded.
32. Culms tall and stout, with a broad, glabrous-glandular band below the nodes; blades of the lower leaves typically villous or velvety-pubescent ..... 16. *D. scoparium*
- 32'. Culms tall or short, without a glabrous-glandular band below the nodes.
33. Culm internodes glabrous or the lower ones slightly pilose; culm nodes bearded with long, spreading hairs; blade surfaces glabrous or those of the lower leaves sparsely pilose ..... 24. *D. dichotomum*
- 33'. Culm internodes, at least the lower ones, strigose or villous; culm nodes bearded with spreading or appressed hairs; blade surfaces glabrous or variously hairy.
34. Culm nodes bearded with long, reflexed or spreading hairs; culm internodes typically with spreading or reflexed, pustulate-based hairs; primary culm blades soft and broad, pilose or villous on both surfaces, 8–12 mm broad ..... 15. *D. malacophyllum*
- 34'. Culm nodes bearded with erect or less frequently spreading hairs; culm internodes typically with appressed or erect, non-pustulate hairs; primary culm blades firm, mostly 4–8 mm broad.
35. Blades pubescent or strigose on the abaxial surface, glabrous on the adaxial surface or with a few long hairs near the base ..... 21. *D. ovale*
- 35'. Blades, at least those at the lower nodes, villous or strongly pilose on both surfaces ..... 22. *D. consanguineum*
- 31'. Culm nodes not bearded, the lowermost nodes sometimes sparsely hairy or puberulent.
36. Plants typically 75–150 cm tall but occasionally much shorter; ligule membranous; first glume less than  $\frac{1}{3}$  as long as the spikelet, broad and truncate or rounded ..... 17. *D. scabriusculum*
- 36'. Plants mostly 35–75 cm tall; ligule a ring of hairs or absent; first glume to  $\frac{1}{3}$  as long as the spikelet.
37. Blades of midculm leaves typically long and stiff, linear or linear-lanceolate and acuminate, when less than 8 cm long then only 2–5 mm broad ..... 23. *D. aciculare*
- 37'. Blades of midculm leaves lanceolate, thin or firm but not stiff, mostly 3–12 mm broad, when as much as 8 cm long, then usually 7 mm or more broad.
38. Spikelets 2.5–3.2 mm long, broadly elliptic, rounded at the apex; second glume and lemma of the lower floret with broad, rounded nerves ..... 11. *D. oligosanthos*
- 38'. Spikelets 2.1–3.2 mm long, elliptic or obovate, rounded or pointed at the apex; second glume and lemma of the lower floret with narrow, faint or distinct nerves.
39. Culm internodes and sheaths, at least the lower ones, puberulent or pubescent; plants mostly of the Atlantic Coastal Plain ..... 20. *D. sabulorum*
- 39'. Culm internodes and sheaths glabrous or sparsely pilose.
40. Culms tending to be stiffly erect; blades erect or erect-spreading, broad, usually but not always, tapering from just below the middle to both ends, often yellowish green; plants not or sparingly branched in age, not developing leafy fascicles of reduced leaves and inflorescences; plants of the northeastern United States and southern Canada ..... 25. *D. boreale*
- 40'. Culms not stiffly erect; blades usually spreading, broad or narrow, bright green; plants often branching freely in age, becoming top-heavy with a mass of fascicled, reduced leaves and inflorescences;

plants widespread in the eastern, central, and southern United States ..... 24. *D. dichotomum*

BB. (Spikelets 0.8–2 mm long)

- 41. Hairs of ligule or pseudoligule 2–5 mm long, at least on some ligules.
- 42. Ligule with a distinct ring of short hairs in front of the long hairs ..... 21. *D. ovale*
- 42'. Ligule without a distinct ring of short hairs in front of the long hairs ..... 26. *D. acuminatum*
- 41'. Hairs of ligule or pseudoligule absent or short, not over 1.5 mm long.
- 43. Lower culm internodes and sheaths puberulent, pubescent, strigose or villous.
- 44. Blades of midculm leaves long, narrow, and stiff, acuminate, often becoming involute, mostly 2–5 mm broad even when long ..... 23. *D. aciculare*
- 44'. Blades of midculm leaves lanceolate, usually soft, when 8 cm or more long often more than 5 mm broad.
- 45. Lower culm internodes cinereous-puberulent to short-pubescent; leaves lacking long hairs except for a fringe on the upper sheath margins and often long cilia on blade margins; lower culm nodes sometimes puberulous but not bearded; spikelets 1.3–2 mm long ..... 20. *D. sabulorum*
- 45'. Lower culm internodes variously pubescent, strigose, or villous; leaves with the sheaths usually strigose or villous; the blades often with long hairs on the abaxial surface and occasionally on the adaxial surface; lower culm nodes usually bearded; spikelets 1.5–2 mm long ..... 21. *D. ovale*
- 43'. Lower culm internodes, and usually the sheaths, glabrous.
- 46. Blades typically thick and glabrous or with a few papillate-hairs on the lower margins.
- 47. Blades of the lower culm leaves linear or linear-lanceolate, acuminate, 6 mm or less broad, relatively narrow at the base ..... 23. *D. aciculare*
- 47'. Blades of the lower culm leaves lanceolate, mostly 7–30 mm broad; blades broad and subcordate at the base.
- 48. Spikelets 1.4–2 mm long.
- 49. Spikelets broadly elliptic or obovoid to subspherical ..... 9. *D. sphaerocarpon*
- 49'. Spikelets narrowly elliptic ..... 8. *D. commutatum*
- 48'. Spikelets 1–1.1 mm long ..... 10. *D. erectifolium*
- 46'. Blades thin and glabrous or essentially so, broad or narrow, usually not cordate or subcordate but occasionally so in *D. boreale*.
- 49. Blades broad, erect or spreading-erect, often yellowish green, tapering from slightly below the middle to both ends, sometimes subcordate at the broad base; plants sparingly branched in age, without fascicled, reduced leafy branches and inflorescences; spikelets 2 mm or more long; plants mostly of northeastern United States and southern Canada ..... 25. *D. boreale*
- 49'. Blades broad or narrow, erect or spreading, bright green; plants freely branching in age, becoming top-heavy with a mass of fascicled, reduced leafy branches and inflorescences; spikelets 1.2–2 mm long; plants widespread in eastern and southern United States ..... 24. *D. dichotomum*

1. *D. depauperatum* (Muhl.) Gould, Brittonia 26: 59. 1974. TYPE: "... Penns. Carolina."

BASIONYM: *Panicum depauperatum* Muhlenberg, Descr. Gram. 112. 1817.

SYNONYMS: *Panicum strictum* Pursh, 1814, not R. Br., 1810. Fragment and photo of holotype, US.

*P. rectum* Roemer & Schultes, 1817.

*P. involutum* Torrey, 1823. Fragment and photo of holotype, US.

*P. muhlenbergii* Sprengel, 1825.

*P. junceum* Trinius, 1826.

*P. sprengelii* Kunth, 1829.

- P. depauperatum* var. *involutum* Wood, 1861.  
*P. depauperatum* var. *laxum* Vasey, 1889.  
*P. depauperatum* var. *psilophyllum* Fernald, 1921.  
*P. strictum* var. *psilophyllum* (Fernald) Farwell, 1941.

*Culms* densely tufted, mostly 20–60 cm tall, glabrous or the lowermost nodes and internodes hispid or puberulent. *Plants* in age often becoming bushy-branched and developing small, contracted panicles in the axils of narrow, flat or involute, reduced leaves. *Leaves* pilose or hispid with long hairs to nearly glabrous, the sheaths commonly thinly pilose. *Ligule* a fringe of hairs 0.3–1 mm long. *Blades* linear or some of the lower ones lanceolate, 8–20 cm or more long, 1–5(–6) mm broad, gradually tapering to a long, slender tip, often involute on drying. *Panicles* of the primary culms 4–8(–10) cm long, relatively few-flowered, with short, spreading or erect-spreading branches. *Spikelets* (2.9–)3.1–4.5 mm long, usually glabrous but occasionally sparsely pilose, ovate or elliptic, with the upper floret conspicuously shorter than the narrowly or broadly pointed and somewhat beaked second glume and lemma of the lower floret. *First glume* about  $\frac{1}{3}$  as long as the spikelet, irregularly lobed, rounded or broadly pointed. *Second glume* strongly 7–9-nerved. *Lemma* of the upper floret broadly rounded and often minutely umbonate at the apex.

**HABITAT AND DISTRIBUTION.** On open or semiopen grassland sites, often on the disturbed soils of roadsides and ditches. Southeastern Canada (Quebec and Ontario), northeastern and central United States (Newfoundland to Minnesota), south to Georgia and Texas.

2. ***D. linearifolium*** (Scribner) Gould, *Brittonia* 26: 60. 1974. TYPE: "Dry soil, especially hillsides, New York and New Jersey to Missouri," Vasey in 1882. Holotype, US.

**BASIONYM:** *Panicum linearifolium* Scribner, in Britton & Brown, *Illust. Fl.* 3: 500 fig. 268a. 1898.

**SYNONYMS:** *Panicum wernerii* Scribner, 1898. Holotype, US.

*P. perlongum* Nash, 1899. Holotype, NY; isotype, US; fragment and photo of holotype, US.

*P. pammeli* Ashe, 1900.

*P. linearifolium* var. *wernerii* (Scribner) Fernald, 1921.

*P. strictum* var. *perlongum* (Nash) Farwell, 1928.

*P. strictum* var. *linearifolium* Farwell, 1928.

*P. strictum* var. *linearifolium* subvar. *wernerii* (Scribner) Farwell, 1928.

*Dichanthelium perlongum* (Nash) Freckmann, *Phytologia* 39: 269. 1978.

Similar to and perhaps intergrading with *D. depauperatum* but the sheaths characteristically densely pilose, the spikelets shorter (2.3–3, occasionally –3.2, mm long), and the upper floret typically rounded or broadly pointed and as long as the second glume and lemma of the lower floret.

**HABITAT AND DISTRIBUTION.** Frequently present in open woodlands in the eastern part of the range. With the same general range and habitat preference as *D. depauperatum* but present westward to North Dakota, Colorado, and New Mexico.

In 1967, Freckmann recognized only one species, *Panicum depauperatum*, in the *strictum-perlongum-linearifolium* complex and treated *P. perlongum* and

*P. linearifolium* as varieties. In 1978 he transferred the *perlongum* entity to *Dichanthelium* at the species level (*D. perlongum* [Nash] Freckmann).

3. **D. laxiflorum** (Lamarck) Gould, Brittonia 26: 60. 1974. TYPE: "Amerique Septentrionale." Fragment and photo of holotype in US.

BASIONYM: *Panicum laxiflorum* Lamarck, Encycl. 4: 748. 1798.

SYNONYMS: *Panicum xalapense* H.B.K., 1816.

*P. pumilum* Bosc ex Nees, 1829, not Lamarck, 1798.

*P. rariflorum* Ruprecht, 1842, not Lamarck, 1798.

*P. ruprechtii* Fournier, 1886, not Fenzl, 1854.

*P. dichotomum* var. *laxiflorum* (Lamarck) Beal, 1896.

*P. caricifolium* Scribner, 1898.

*P. pyriforme* Nash, 1899. Isotypes, MO, NY, US.

*P. aureum* Muhlenberg ex Scribner & Merrill, 1900.

*P. xalapense* var. *strictirameum* Hitchcock & Chase, 1910.

*P. laxiflorum* var. *strictirameum* (Hitchcock & Chase) Fernald, 1934.

*Plants* mostly 15–60 cm tall, with rather long, soft basal blades. *Culms* not branching above the base; *internodes* below the panicle glabrous, the nodes bearded with soft, spreading hairs. *Sheaths* rather uniformly pilose with spreading usually reflexed hairs 2–3 mm long. *Ligule* a glabrous or minutely fringed rim less than 0.5 mm or absent. *Blades* soft, yellowish green mostly 7–16(–20) cm long, 3–10 mm broad, lanceolate or less frequently gradually tapering to an acuminate apex, glabrous or pilose, often ciliate on the margins to well above the middle. *Panicles* open, mostly 4–12 cm long, usually elevated on a long peduncle but occasionally remaining in a basal tuft of leaves; *main panicle axis and branches* usually hirsute with long, soft hairs, the spikelets on short or long pedicels. *Spikelets* pubescent with short spreading hairs, 1.7–2.3 mm long, narrowly ovate or oblong, obtuse or broadly rounded at the apex. *First glume* rounded or broadly pointed at the apex, ca.  $\frac{1}{3}$  as long as spikelet. *Second glume* and lemma of the lower floret with 7–9 narrow but strong nerves.

**HABITAT AND DISTRIBUTION.** Usually in shaded, moist habitats. Along the Coastal Plain, Maryland to Georgia and Florida, and westward to Indiana, Missouri, Arkansas, Oklahoma, and Texas; also in Mexico, Guatemala and the Dominican Republic.

The collection *Gould 12521* from near College Station, Brazos County, Texas, appears to be a hybrid. These specimens (at least on the US sheet) have the retrorsely pilose sheaths, and blades with glabrous surfaces and coarsely ciliate margins of *D. laxiflorum*, but have a much-branched habit and relatively short, dark green blades.

4. **D. leucoblepharis** (Trinius) Gould & Clark, comb. nov. TYPE: Hitchcock & Chase (1910) state "A specimen in the Trinius Herbarium is labeled: 'ab. Enslino in Am. bor. 1. dt. cl. Trattinick.' This is typical *P. ciliatum* Ell. . . . the Enslin specimen has been chosen as the type."

BASIONYM: *Panicum leucoblepharis* Trinius, Clav. Agrost. 234. 1822. *Panicum ciliatum* Elliott, 1816, not Maercklin, 1792.

*Plants* densely tufted, with the leaves mostly in a basal tuft. *Culms* 5–35 cm

tall, not branching above the base and thus not developing fascicles of reduced floriferous secondary branches above the base. *Sheaths* glabrous or pilose, most frequently hairy on the margins. *Ligule* a minute fringe of hairs, much less than 1 mm long. *Blades* typically short and broad, mostly 3–6 cm long and 3–8 mm broad, usually coarsely ciliate with stiff, papilla-based hairs to well above the middle, the *uppermost leaf blade* usually much shorter than those below. *Panicles* open, few-flowered, mostly 3–5 cm long, scarcely elevated above the basal tuft of leaves or well-exserted on long peduncles; *panicle axis* usually pilose with spreading hairs. *Spikelets* 1.1–2.1 mm long, glabrous to pubescent or puberulent, elliptic or slightly obovate, broadly pointed or rounded at the apex. *First glume* broadly pointed or rounded at apex,  $\frac{1}{3}$ – $\frac{1}{2}$  as long as the spikelet. *Second glume* and lemma of the lower floret usually 7-nerved, the nerves weakly or strongly developed.

Key to the varieties

- a. Spikelets puberulent or pubescent, 1.5–2.1 mm long; blade surfaces glabrous .....  
..... 4A. *D. leucoblepharis* var. *leucoblepharis*
- aa. Spikelets glabrous, 1.1–1.8 mm long.
  - b. Blade surfaces glabrous; spikelets 1.2–1.8 mm long .....  
..... 4B. *D. leucoblepharis* var. *glabrescens*
  - bb. Blade surfaces pilose or hispid; spikelets 1.1–1.5 mm long .....  
..... 4C. *D. leucoblepharis* var. *pubescens*

4A. *D. leucoblepharis* (Trinius) Gould & Clark. var. *leucoblepharis*.

SYNONYMS: *Panicum ciliatum* Elliott, 1816, not *P. ciliatum* Maercklin, 1792.  
*P. ciliatifolium* Kunth, 1829.  
*P. ciliatifolium* Desvaux, 1831.

As Veldkamp (1976) has recently noted, the name *Panicum ciliatum* Elliott (Bot. S.C. and Ga. 1: 126. 1816) cannot be considered the basionym for this species as the combination *Panicum ciliatum* was first published by F. Maercklin (Schrift. Regensb. Bot. Ges. 1: 332–334. Regensburg) as a species *Digitaria*.

HABITAT AND DISTRIBUTION. In shaded to somewhat open areas of pine forest, mostly in sandy, acidic soils. Along the Coastal Plain from North Carolina to Florida, Mississippi, and Texas.

4B. *D. leucoblepharis* (Trinius) Gould & Clark var. *glabrescens* (Grisebach) Gould & Clark, comb. nov. TYPE: Jamaica, *Purdie*. Holotype, K, examined by Hitchcock.

BASIONYM: *Panicum dichotomum* L. var. *glabrescens* Grisebach, Fl. Brit. W. Indies 553. 1864.  
SYNONYM: *Panicum polycaulon* Nash, 1897. Holotype, NY; fragment and photo of holotype, US.

Culms slender, 15–45 cm tall; blades of culm leaves short, to 6 mm broad, coarsely ciliate on the margins.

HABITAT AND DISTRIBUTION. Usually in open woodlands in low, sandy, acidic soil. Southern Georgia, Alabama, Mississippi, Louisiana, and Florida, also in the Antilles.

- 4C. *D. leucoblepharis* (Trinius) Gould & Clark var. *pubescens* (Vasey) Gould & Clark, comb. nov. TYPE: *Curtiss*, North American Plants No. H. Lectotype, US, selected by Hitchcock.

BASIONYM: *Panicum laxiflorum* Lam. var. *pubescens* Vasey, Contr. U.S. Natl. Herb. 3: 30. 1892.

SYNONYMS: *Panicum strigosum* Muhlenberg, 1816. Holotype, NY; fragment and photo of holotype, US.

*P. longipedunculatum* Scribner, 1894.

Autumnal plants forming dense mats with the inflorescences not or only slightly overtopping the leaves.

HABITAT AND DISTRIBUTION. In the United States, along the Coastal Plain from southeastern Virginia to Florida and Texas, and also reported from Tennessee; also in eastern Mexico, the Antilles, Central America, and northern South America.

5. *D. boscii* (Poiret) Gould & Clark, comb. nov. TYPE: "Recueillie a Caroline par M. Bosc." Fragment and photo of lectotype, US.

BASIONYM: *Panicum boscii* Poiret in Lamarck, Encycl. Suppl. 4: 278. 1816.

SYNONYMS: *Panicum waltheri* Poiret, 1816, not Pursh, 1814.

*P. latifolium* L. var. *australe* Vasey, 1889.

*P. latifolium* var. *molle* (Vasey) Hitchcock & Chase, 1889. Holotype, US.

*P. waltheri* var. *molle* (Vasey) Porter, 1893.

*P. porterianum* Nash, 1895.

*P. pubifolium* Nash, 1899. Syntypes, NY.

*P. boscii* var. *molle* (Vasey) Hitchcock & Chase, 1908.

*Culms* stout, few to several in small clumps, 40–70 cm tall, in age branching above and often becoming "top-heavy" and reclining; the internodes glabrous, puberulent or papillose, the nodes retrorsely bearded. *Sheaths* glabrous, puberulent, or papillose-pilose. *Ligule* a fringe of hairs ca. 1 mm long. *Blades* glabrous to pubescent or villous on one or both surfaces, 7–12 cm long, 15–30 mm broad, often asymmetrical, sparsely ciliate at the usually broadly cordate base. *Panicles* 4–10 cm long, to 8 cm broad, with stiffly erect-spreading, usually puberulent branches. *Spikelets* papillose-pubescent, narrowly ellipsoid to obovate, (3.7–) 4–5.2 mm long. *First glume*  $\frac{1}{3}$ – $\frac{2}{5}$  the length of the spikelet. *Lower floret* often staminate.

HABITAT AND DISTRIBUTION. Usually in shaded, well-drained forest sites. Connecticut and Massachusetts to northern Florida and westward to Illinois, Missouri, Oklahoma, and eastern Texas.

6. *D. latifolium* (L.) Gould & Clark, comb. nov. TYPE: "Habitat in America." Fragment and photo of holotype, US.

BASIONYM: *Panicum latifolium* L., Sp. Pl. 58. 1753.

SYNONYMS: *Milium latifolium* (L.) Moench, 1794.

*Panicum macrocarpon* LeConte ex Torrey, 1818. Holotype, NY; fragment and photo of holotype, US.

*P. schneckii* Ashe, 1900.

*Culms* 45–80(–100) cm tall, glabrous or sparsely pubescent, the lower nodes

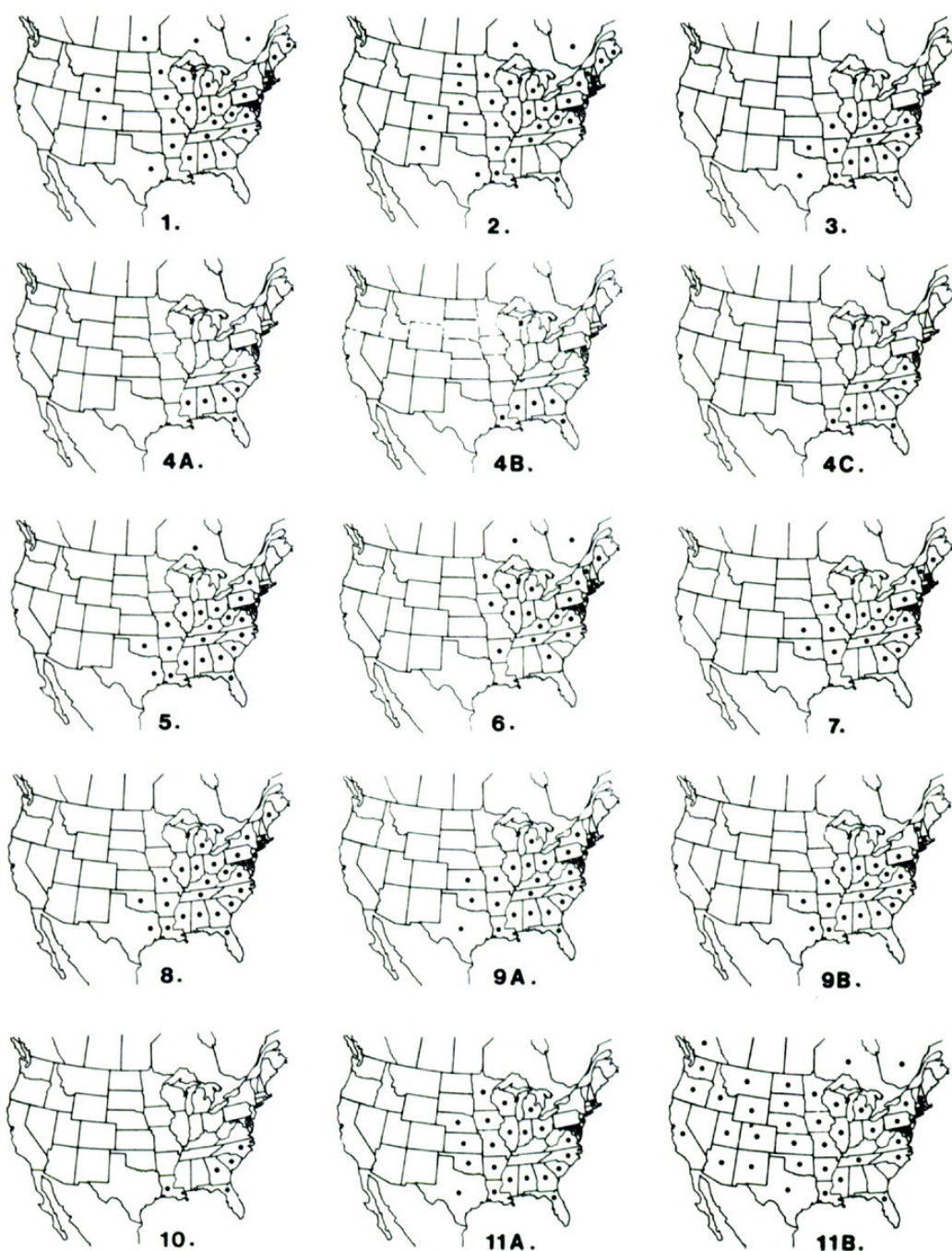


FIGURE 1. 1. *D. depauperatum*. 2. *D. linearifolium*. 3. *D. laxiflorum*. 4A. *D. leucoblepharis* var. *leucoblepharis*. 4B. *D. leucoblepharis* var. *glabrenscens*. 4C. *D. leucoblepharis* var. *pubescens*. 5. *D. boscii*. 6. *D. latifolium*. 7. *D. clandestinum*. 8. *D. commutatum*. 9A. *D. sphaerocarpon* var. *sphaerocarpon*. 9B. *D. sphaerocarpon* var. *isophyllum*. 10. *D. erectifolium*. 11A. *D. oligosanthos* var. *oligosanthos*. 11B. *D. oligosanthos* var. *scribnerianum*.

and sheath bases occasionally inconspicuously hairy. *Sheaths* shorter than the internodes, frequently ciliate with soft hairs on the margins, glabrous or sparsely pilose on the back, usually soft-hairy on the collar. *Ligule* a minute fringed membrane, rarely as much as 1 mm long. *Blades* thin, glabrous on both surfaces,

broadly cordate at the base, mostly 8–12(–18) cm long and 13–35 mm broad, usually not or only slightly asymmetrical. *Panicles* with spreading or erect-spreading branches, 6–15(–20) cm long, relatively few-flowered, the branches glabrous or scabrous. *Spikelets* narrowly ellipsoid, broadly pointed, puberulent to nearly glabrous, 3.3–3.8 mm long. *First glume*  $\frac{1}{3}$ – $\frac{1}{2}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In well-drained, shady forest sites. Maine to northern Georgia and westward to Wisconsin, Illinois, Tennessee, and Mississippi.

*Dichanthelium latifolium* appears closely related to *D. clandestinum* and to *D. commutatum*.

7. ***D. clandestinum*** (L.) Gould, Brittonia 26: 59. 1974. TYPE: "Habitat in Jamaica, Pennsylvania, *Kalm*." The reference to Jamaica by Linnaeus must be in error.

**BASIONYM:** *Panicum clandestinum* L., Sp. Pl. 58. 1753.

**SYNONYMS:** *Milium clandestinum* (L.) Moench, 1794.

*Panicum latifolium* var. *clandestinum* (L.) Pursh, 1814.

*P. pedunculatum* Torrey, 1823. Fragment and photo of holotype, US.

*P. clandestinum* L. var. *pedunculatum* (Torrey) Torrey, 1841.

*P. decoloratum* Nash, 1899. Holotype, NY; isotype, US.

*Chasea clandestina* (L.) Nieuwland, 1911.

*Culms* rather stout, 40–80(–125) cm tall, often from stout rhizomes 5–10 cm long, usually in large clumps; *internodes* glabrous to scabrous or papillose-hispid, the nodes glabrous or slightly hairy. *Sheaths*, at least the lower ones, papillose-hispid with stiff hairs, usually with soft hairs on the collar. *Ligule* a minute, fringed membrane, never over 1 mm long. *Blades* glabrous or scabrous, 10–20 (–28) cm long and mostly 12–30 cm broad, cordate at the base. *Panicles* usually open, 8–15 cm long and 6–9 cm broad, with spreading or erect-spreading branches; *axis and branches* glabrous or scabrous. *Spikelets* narrowly ovate to elliptic, puberulent, more or less pointed at the apex, (2.3–)2.7–3.5(–4) mm long. *First glume* usually  $\frac{1}{3}$ – $\frac{2}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In moist, often sandy soil of shaded or slightly open sites in and along woodlands, often in ditches and low areas. Southeastern Canada and the eastern half of the United States from Maine to northern Florida and westward to Iowa, Kansas, and Texas.

The stiff, coarse hairs of the sheath are often bristly and reportedly irritating to the skin. *Dichanthelium clandestinum* appears closely related to *D. latifolium*, differing mainly in the bristly sheaths and the usually longer leaf blades.

8. ***D. commutatum*** (Schultes) Gould, Brittonia 26: 59. 1974. TYPE: No specimen or definite locality indicated.

**BASIONYM:** *Panicum commutatum* Schultes, Mant. 2: 242. 1824.

**SYNONYMS:** *Panicum nervosum* Muhlenberg ex Elliott, 1816, not Lamarck, 1797.

*P. umbrosum* LeConte ex Torrey, 1818, not Retzius, 1786. Lectotype, NY; fragment and photo of lectotype, US.

*P. enslini* Trinius, 1826. Fragment and photo of holotype and isotype, US.

*P. polyneuron* Steudel, 1854.

- P. leiophyllum* Fournier, 1886, not Nees, 1829.  
*P. jorii* Vasey, 1889. Holotype, US; isotype, MO.  
*P. commutatum* var. *minus* Vasey, 1889.  
*P. commutatum* var. *latifolium* Scribner, 1893.  
*P. manatense* Nash, 1897. Fragment and photo of holotype, US.  
*P. commelinaefolium* Ashe, 1898. Holotype, NY.  
*P. ashei* Pearson ex Ashe, 1898. Isolectotype, MO, NY, US.  
*P. equilaterale* Scribner, 1898. Lectotype, US; isotype, US.  
*P. currani* Ashe, 1899.  
*P. epilifolium* Nash, 1899. Holotype, NY; fragment and photo of holotype, US.  
*P. subsimplex* Ashe, 1900. Isotypes, MO, NY.  
*P. mutabile* Scribner & Smith ex Nash, 1903. Holotype, NY; isotype, US.  
*P. commutatum* var. *ashei* (Pearson ex Ashe) Fernald, 1934.

*Culms* tufted, usually slender and wiry, 15–75 cm tall, usually glabrous but the lower nodes and internodes occasionally pubescent but not puberulent. *Sheaths* usually shorter than the internodes, ciliate on the margins, glabrous or less frequently puberulent on the back, often pubescent on the sides of the collar and occasionally across the collar. *Ligule* absent or a fringe of hairs less than 1 mm long. *Blades* exceedingly variable in size, moderately thick or firm, the lower ones broadest below the middle, typically asymmetrical and strongly to moderately cordate at the base, mostly 4–9(–12) cm long and 8–25 mm broad, usually glabrous on the surfaces and papillate-ciliate on the lower margins. *Panicles* open, those of the main culm 5–10(–14) cm long about  $\frac{1}{2}$  as broad as long, with spreading or spreading-erect branches. *Spikelets* on short or rather long pedicels, narrowly elliptic, glabrous or puberulent (2–)2.4–3.2 mm long. *First glume*  $\frac{1}{3}$ – $\frac{1}{2}$  as long as the spikelet, rounded or broadly pointed. *Lemma* of the upper floret often minutely apiculate.

**HABITAT AND DISTRIBUTION.** Mostly in low shaded, moist sites in and along woodlands. Throughout the eastern coastal states, Maine, and Massachusetts to Florida, and westward to Michigan, Missouri, Oklahoma, and Texas; also in Mexico.

9. ***D. sphaerocarpon*** (Elliott) Gould, Brittonia 26: 60. 1974. TYPE: Georgia. BASIONYM: *Panicum sphaerocarpon* Elliott, Bot. S.C. & Ga. 1: 125. 1816.

*Plants* developing a winter rosette of conspicuous, broad, short, thick basal blades, these often with a narrow white border. *Culms* 20–80 cm tall, in age branching at the middle and upper nodes to produce fascicles of reduced leaves and inflorescences, the leaf blades short and flat, the nodes glabrous or appressed-pubescent. *Ligule* absent or a fringe of hairs to 1 mm long. *Culm blades* broad, moderately thick, glabrous on the surfaces, ciliate with papillate hairs on the lower margins, cordate-clasping at the base. *Panicles* open, 5–15(–18) cm long, with spreading lower branches to 8 cm long; axis and branches glabrous. *Spikelets* puberulent to glabrous, broadly elliptic or broadly obovoid to sub-spherical, 1.4–2.2 mm long. *First glume* acute or broadly rounded at the apex, mostly  $\frac{1}{3}$ – $\frac{1}{4}$  as long as the spikelet.

Key to the varieties

- a. Mid-culm blades 6–11(–14) mm broad, the uppermost blade usually 3–9 cm long  
 ----- 9A. *D. sphaerocarpon* var. *sphaerocarpon*

- aa. Mid-culm blades, at least some, 15–30 mm broad, the uppermost blade usually 10–15 cm or more long ..... 9B. *D. sphaerocarpon* var. *isophyllum*

9A. *D. sphaerocarpon* (Elliott) Gould var. *sphaerocarpon*.

SYNONYMS: *Panicum kalmii* Swartz ex Wikstrom, 1829.

*P. heterophyllum* Swartz ex Wikstrom, 1829, not Sprengel, 1822, nor Bosc ex Nees, 1829.

*P. dichotomum* L. var. *sphaerocarpon* (Elliott) Wood, 1861.

*P. nitidum* Lamarck var. *crassifolium* A. Gray, 1877.

*P. microcarpon* Muhlenberg var. *sphaerocarpon* (Elliott) Vasey, 1883.

*P. vicarium* Fournier, 1886.

*P. inflatum* Scribner & Smith, 1899. Holotype, US; isotype, MO.

*P. mississippiense* Ashe, 1900.

*P. sphaerocarpon* var. *inflatum* (Scribner & Smith) Hitchcock & Chase, 1910.

HABITAT AND DISTRIBUTION. Throughout eastern United States, west to Michigan, Kansas, Oklahoma, and Texas, and south through Mexico, in woodlands, brushy areas, and old fields.

Plants with ligules 0.3–1 mm long and leaf blades with more or less parallel margins were recognized by Hitchcock & Chase (1910) as *P. sphaerocarpon* var. *inflatum*. Wolff 3964 from Milam Co., Texas, has a ligule of dense hairs ca. 3 mm long and hispid-pubescent sheaths. This could be a *D. sphaerocarpon*–*D. acuminatum* hybrid.

9B. *D. sphaerocarpon* (Elliott) Gould var. *isophyllum* (Scribner) Gould & Clark, comb. nov. TYPE: Tennessee, Blount Co., Alleghany Springs, E. E. Gayle, August 1890.

BASIONYM: *Panicum microcarpon* Muhlenberg var. *isophyllum* Scribner, Bull. Agric. Exp. Sta. Univ. Tennessee 7: 51. fig. 54. 1894. *Panicum microcarpon* Muhlenberg (1817) is a later homonym of *P. microcarpon* Muhlenberg ex Elliott, 1816. The name *isophyllum* Scribner is the earliest varietal name to be applied to this taxon and must be retained even though the species basionym, *microcarpon*, is illegitimate.

SYNONYMS: *Panicum multiflorum* Elliott, 1816, not Poiret, 1816. Fragment and photo of holotype, US.

*P. microcarpon* Muhlenberg, 1817, not Muhlenberg ex Elliott, 1816. Fragment and photo of holotype, US.

*P. polyanthes* Schultes, 1824.

*P. firmandum* Steudel, 1855.

*Dichanthelium sphaerocarpon* var. *polyanthes* (Schultes) Gould, Brittonia 26: 60. 1974.

HABITAT AND DISTRIBUTION. Mostly in well-drained shaded, woodland areas. Vermont to Georgia and westward to southern Illinois, Missouri, Oklahoma, and eastern Texas.

In *D. sphaerocarpon* var. *isophyllum* the upper culm leaves are conspicuously enlarged and sometimes the uppermost culm leaf is the largest, measuring as much as 25 cm long and 3 cm broad. The inflorescences of var. *isophyllum* tend to be larger than those of var. *sphaerocarpon*, occasionally reaching 18 cm or more in length and 8 cm in width.

10. *D. erectifolium* (Nash) Gould & Clark, comb. nov. TYPE: "Florida."

BASIONYM: *Panicum erectifolium* Nash, Bull. Torrey Bot. Club 23: 148. 1896. Based on *P. sphaerocarpon* Elliott var. *floridanum* Vasey, 1889. Isotype, MO.

SYNONYM: *Panicum floridanum* Chapman, 1897, not Trinius, 1834.

*Plants* rather stout, 30–70 cm tall, with culms stiffly erect, in small to large clumps. *Culms* typically 4–7-noded. *Herbage* essentially glabrous, the blade margins usually ciliate. *Sheaths* shorter than the internodes. *Blades* of culm leaves firm, erect or erect-spreading, short, usually 4–8 cm long but occasionally longer, 6–9(–14) mm broad. *Panicles* 5–10 cm long, characteristically loosely contracted and densely flowered with very small spikelets; *axis and branches* glabrous. *Spikelets* broadly elliptic to suborbicular, puberulent to nearly glabrous, 1–1.2 mm long. *First glume* mostly  $\frac{1}{4}$  or less as long as the spikelet.

**HABITAT AND DISTRIBUTION.** Mostly in moist or wet soil of marshy, low pine forest. Along the Coastal Plain, North Carolina to Florida and westward to Louisiana.

This species is rather common in the low, moist pine barrens of Florida and occasional at other southeastern localities in moist habitats. Its affinities obviously are with *Dichanthelium sphaerocarpon*.

11. ***D. oligosanthos*** (Schultes) Gould, Brittonia 26: 60. 1974. TYPE: Georgia.

**BASIONYM:** *Panicum oligosanthos* Schultes, Mant. 2: 256. 1824. Based on *Panicum pauciflorum* Elliott, 1816, not R. Brown, 1810.

*Culms* loosely to densely tufted, rather wiry, 15–85 cm long, branching in age to produce fascicles of reduced leaves and small, secondary panicles. *Sheaths* glabrous to densely papillate-hispid, the margins usually ciliate. *Ligule* a dense fringe of hairs 0.1–4.2 mm long. *Primary culm blades* firm, 3–14 cm long, 3–12(–15) mm broad, broad at the base but not cordate. *Panicles* 4–13 cm long, broad or narrow. *Secondary panicles* 2–5 cm long, little if at all exerted, usually with only 1–9 spikelets. *Spikelets* glabrous to pilose or papillose-pilose, broadly elliptic or ovate, blunt or broadly pointed at the apex, 2.5–4 mm long, 1.2–2.2 mm broad. *First glume* broadly pointed, mostly  $\frac{1}{4}$ – $\frac{1}{3}$  as long as the spikelet.

Key to the varieties

- a. Ligule usually 1.6 mm or more long; abaxial leaf surface usually tomentose, occasionally puberulent ..... 11A. *D. oligosanthos* var. *oligosanthos*
- aa. Ligule usually less than 1.6 mm long; abaxial leaf surface puberulent or hirsute to glabrous, never tomentose.
  - b. Culms mostly 25–60 cm tall, in small or large clumps; blades of the lower culm leaves mostly 7 mm or more broad, glabrous or puberulent, spreading or somewhat erect spreading; primary panicles usually well exerted on long peduncles, about as broad as long; spikelets mostly 3–4 mm long ..... 11B. *D. oligosanthos* var. *scribnerianum*
  - bb. Culms mostly 10–25 cm tall, densely tufted; blades 3–6 mm broad, very firm, erect or erect-spreading, long-hirsute on both surfaces; panicles only slightly, if at all, exerted above the leaves; spikelets 2.7–3.4 mm long ..... 11C. *D. oligosanthos* var. *wilcoxianum*

11A. ***D. oligosanthos*** (Schultes) Gould var. *oligosanthos*.

**SYNONYMS:** *Panicum pauciflorum* Elliott, 1816. Fragment and photo of holotype, US.  
*P. scoparium* Lamarck var. *angustifolium* Vasey, 1889. Lectotype, US.  
*P. scoparium* var. *pauciflorum* Scribner, 1894.

*Culms* usually puberulent to villous. *Blades* narrowly acuminate, mostly 5–8

mm broad, broad at the base but not cordate. *Lowermost internode of panicle axis* usually villous or tomentose. *Spikelets* mostly 3.3–4 mm long.

**HABITAT AND DISTRIBUTION.** Eastern United States from Massachusetts to Florida and west to Minnesota, Nebraska, and Texas; no records seen from New York, Pennsylvania, W. Virginia, Kentucky and Tennessee but probably also present in these states.

- 11B. ***D. oligosanthos*** (Schultes) Gould var. ***scribnerianum*** (Nash) Gould, Brittonia 26: 60. 1974. TYPE: Massachusetts, near Deerfield, Cooley. Fragment of holotype, US; isotype, MO.

**BASIONYM:** *Panicum scribnerianum* Nash, Bull. Torrey Bot. Club 22: 421. 1895. Based on *Panicum macrocarpon* Torrey, 1823, not LeConte, 1819.

**SYNONYMS:** *Panicum scoparium* S. Watson ex Nash, 1895, not Lamarck, 1798.

*P. helleri* Nash, 1899. Holotype, NY; isotype, US.

*P. pernervosum* Nash, 1899. Holotype, NY; fragment and photo of holotype, US; isotype, MO.

*P. oligosanthos* var. *scribnerianum* (Nash) Fernald, 1934.

*P. oligosanthos* var. *helleri* (Nash) Fernald, 1934.

*Blades* glabrous to puberulous. *Lowermost internodes of panicle axis* glabrous, scabrous or puberulous. *Spikelets* mostly 2.7–3.3 mm long but varying from 2.5–4 mm, glabrous to pilose or papillate-pilose.

**HABITAT AND DISTRIBUTION.** Usually growing in exposed loamy or loamy-clay sites, often in brushy areas. Ontario to British Columbia and throughout the United States but infrequent in the southeastern and western states; also present in northern Mexico.

Relatively glabrous plants with small spikelets were referred by Hitchcock & Chase (1910) and Hitchcock (1935, 1951), to *Panicum helleri* Nash.

- 11C. ***D. oligosanthos*** var. ***wilcoxianum*** (Vasey) Gould & Clark, comb. et stat. nov. TYPE: Nebraska, Fort Niobrara, Wilcox in 1888. Holotype, US; isotype, NY.

**BASIONYM:** *Panicum wilcoxianum* Vasey, U.S.D.A. Div. Bot. Bull. 8: 32. 1889.

**SYNONYMS:** *Milium wilcoxianum* (Vasey) Lunell, 1915.

*Dichanthelium wilcoxianum* (Vasey) Freckmann, Phytologia 39: 269. 1978.

*Plants* short and relatively stout; culms rarely over 25 cm tall, in small or large clumps or tufts. *Culms*, *sheaths* and *blades* papillose-hirsute. *Blades* firm, usually stiffly erect, mostly 5–8 cm long and 3–6 mm broad. *Panicles* small, few-flowered, mostly 2–5 cm long. *Spikelets* mostly 2.5–3.4 mm long.

**HABITAT AND DISTRIBUTION.** On open, well-drained, grassland sites. Manitoba, Saskatchewan, Alberta, Minnesota and North Dakota, south to Illinois, Kansas, Colorado, and New Mexico.

12. ***D. leibergii*** (Vasey) Freckmann, Phytologia 39: 271. 1978. TYPE: Iowa, Plymouth Co., J. Leiberg 34. Holotype, US.

**BASIONYM:** *Panicum scoparium* Lamarck var. *leibergii* Vasey, U.S.D.A. Div. Bot. Bull. 8: 32. 1889.

SYNONYMS: *Panicum scribnerianum* Nash var. *leibergii* (Vasey) Scribner, 1897.  
*P. leibergii* (Vasey) Scribner, 1898.  
*Milium leibergii* (Vasey) Lunell, 1915.  
*Panicum leibergii* var. *baldwinii* Lepage, 1959. Isotype, US.

*Culms* 25–75 cm tall, usually puberulent or pubescent at least on the lower internodes. *Sheaths* papillose-hispid with spreading hairs. *Ligule* a minute fringed or glabrous membrane not over 0.5 mm long including the hairs. *Blades* papillose-hispid on one or both surfaces, papillose-ciliate on the margins, mostly 6–15 cm long and (6–)7–15 mm broad, tending to be erect on the culm, the uppermost blade usually short and reduced. *Panicles* narrow or open, mostly 6–15 cm long. *Spikelets* oblong-obovate, papillose-hispid with spreading hairs, (3.1–)3.3–4 mm long. *First glume* variable in development, often  $\frac{1}{2}$  and occasionally  $\frac{3}{4}$  as long as the spikelet.

HABITAT AND DISTRIBUTION. In open woodlands and well-drained prairies. Ontario, Manitoba, and Saskatchewan, to Pennsylvania, Michigan, and North Dakota, and south to southern Ohio, Indiana, Missouri, and Kansas.

The collection *Bush 419*, from McDonald Co., Missouri, probably is a hybrid.

13. **D. xanthophysum** (A. Gray) Freckmann, *Phytologia* 39: 271. 1978. TYPE: New York, Oneida Co., near Oneida Lake. Lectotype, US; isolectotypes, MO, US.

BASIONYM: *Panicum xanthophysum* A. Gray, *N. Amer. Gram. & Cyp.* 1: no. 28. 1834. Fragment of lectotype, US; isolectotype, US.

SYNONYMS: *Panicum xanthophysum* f. *amplifolium* Scribner, 1900. Holotype, US.

*Culms* 25–60 cm tall, glabrous or the lower internodes minutely puberulent. *Sheaths* papillose-pilose and ciliate at least near the apex, often nearly glabrous. *Blades* thin, glabrous except for the ciliate margins, mostly 8–15 cm long and (6–)8–20 mm broad, the uppermost culm blade not or only slightly reduced in size, sometimes longer than those below. *Panicles* 5–12 cm long, typically narrow, contracted and few-flowered, the stiff branches erect or nearly so. *Spikelets* broad or narrow, usually elliptic-obovate, (3.2–)3.5–4 mm long, pubescent. *First glume* variable in development,  $\frac{1}{3}$ – $\frac{2}{3}$  as long as the second glume and lower lemma.

HABITAT AND DISTRIBUTION. In well-drained prairies. Quebec to Ontario, south to Pennsylvania, Michigan, Wisconsin, Minnesota, and Iowa.

14. **D. ravenelii** (Scribner & Merrill) Gould, *Brittonia* 26: 60. 1974. TYPE: South Carolina. Fragment and photo of holotype, US.

BASIONYM: *Panicum ravenelii* Scribner & Merrill, U.S.D.A. Div. Agrost. Bull. 24: 36. 1901. Fragment and photo of holotype, US.

SYNONYM: *Panicum scoparium* Lamarck var. *majus* Vasey, 1889. Holotype, US.

*Culms* rather stout, to 75 cm tall, the internodes glabrous or pubescent with erect or spreading hairs, the nodes retrorsely bearded; when internodes hairy, then culms often with a broad glabrous band below the bearded nodal area. *Sheaths* coarsely hairy, the hairs often long and papillate. *Ligule* a fringe of

hairs usually 2.5–4 mm long. *Blades* 8–15 cm long, 10–25 mm broad, typically puberulent-tomentose on the abaxial surface and glabrous on the adaxial surface but occasionally glabrous or puberulent on both surfaces. *Panicles* open, few-flowered, mostly 9–12 cm long, the panicle axis usually hairy, with either or both short and long hairs. *Spikelets* pubescent, broadly oblong to obovate, rounded at the apex, 3.7–5 mm long. *First glume* ca.  $\frac{1}{3}$  or slightly more as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In sandy woodlands. Delaware and Virginia south to Florida and west to Iowa, Missouri, eastern Oklahoma, and eastern Texas.

15. ***D. malacophyllum*** (Nash) Gould, Brittonia 26: 60. 1974. TYPE: Oklahoma, "Indian Territory," Sapulpa, 1895, *Bush* 1228. Holotype, NY; isotypes, MO.

**BASIONYM:** *Panicum malacophyllum* Nash, Bull. Torrey Bot. Club 24: 198. 1897. Fragment and photo of holotype, US; isotypes, MO.

**SYNONYM:** *Panicum scoparium* Lamarck var. *minus* Scribner, 1894. Lectotype, US.

*Culms* 30–70 cm tall, the internodes pilose or papillose-pilose with spreading hairs, at least below, the nodes retrorsely bearded. *Plants* in age developing dense fascicles of short branches and short, flat leaves. *Herbage* pubescent to villous throughout, often with long and short hairs intermingled, the blades velvety-pilose on both surfaces. *Sheaths* loose, shorter than the internodes, usually less strongly pilose than the culms. *Ligules* 1–1.5 mm long. *Blades* mostly 6–10 cm long, 5–12 mm broad, narrowing to the base, ciliate on the lower margins. *Panicles* 3–7 cm long, usually densely pubescent, the branches first erect and then spreading, the lower main branches often with short, spikelet-bearing branches in their axils. *Spikelets* elliptic, papillate-pilose, mostly 2.9–3 mm long. *First glume* about  $\frac{1}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In sandy woodlands. Missouri and Kansas south to Tennessee, Arkansas, Oklahoma, and Texas.

16. ***D. scoparium*** (Lamarck) Gould, Brittonia 26: 60. 1974. TYPE: "Caroline," Michaux. Fragment and photo of holotype, US.

**BASIONYM:** *Panicum scoparium* Lamarck, Encycl. 4: 744. 1798. Fragment and photo of holotype, US.

**SYNONYMS:** *Panicum pubescens* Lamarck, 1798.

*P. viscidum* Elliott, 1816. Fragment and photo of holotype, US.

*P. pauciflorum* Michaux, 1825.

*P. nitidum* Lamarck var. *velutinum* Doell, 1877.

*P. scoparium* Lamarck var. *genuinum* Scribner, 1894.

*P. laxiflorum* var. *pubescens* (Lamarck) Chapman, 1897.

*Chasea pubescens* (Lamarck) Nieuwland, 1911.

*Culms* coarse and thick, to 150 cm tall, in age usually becoming much-branched and developing dense fascicles of reduced leaves and inflorescences. *Lower culm internodes*, *sheaths*, and *blades* velvety-pubescent or velvety-pilose, the upper culms and leaves often moderately pubescent to essentially glabrous.

*Culms* with a broad, glabrous, glandular-blotched band or zone just below the nodes. *Ligule* a dense ring of hairs 1–2 mm long. *Blades* of main culm mostly 10–25 cm long and 10–20 mm broad, the blades of the fascicled branches short, broad and flat. *Primary panicles* large and open at maturity, mostly 10–18 cm long and 8–14 cm broad. *Spikelets* finely pubescent or occasionally glabrous, ovate or oblong, 2.2–2.8 mm long, rounded or broadly pointed at the apex. *First glume* small, poorly developed, often vestigial.

**HABITAT AND DISTRIBUTION.** In sandy soils of woodlands and low moist ditches and swales. Massachusetts and New Jersey south along the Coastal Plain to Florida and west to Michigan, Missouri, Oklahoma, and Texas; also in Mexico and the Antilles.

*Dichanthelium scoparium* most frequently grows in open or partially open ditches and presents a coarse, weedy aspect. When growing in association with other dichantheliums it tends to flower later than all other species.

17. **D. scabriusculum** (Elliott) Gould & Clark, comb. nov. TYPE: Georgia, Baldwin. Fragment and photo of holotype, US.

**BAISIONYM:** *Panicum scabriusculum* Elliott, Bot. S.C. & Ga. 1: 121. 1816.

**SYNONYMS:** *Panicum lanuginosum* Bosc ex Sprengel, 1825, not Elliott, 1816.

*P. eriophorum* Schultes, 1827.

*P. nealleyi* Vasey, 1886. Holotype, US.

*P. dichotomum* L. var. *elatum* Vasey, 1889. Lectotype, US.

*P. viscidum* Elliott var. *scabriusculum* (Elliott) Beal, 1896.

*P. cryptanthum* Ashe, 1900.

*P. aculeatum* Hitchcock & Chase, 1906. Holotype, US; isotype, NY.

*P. recognitum* Fernald, 1938. Holotype, US; isotype, US.

*Culms* mostly 90–150 cm tall, glabrous, hispid or the internodes puberulent below, often with a light-colored or mottled band or zone of glandular tissue below each node, in age becoming much-branched and developing fascicles of reduced leaves and inflorescences. *Sheaths* shorter than the internodes, glabrous or hispid, often mottled or white-spotted. *Ligule* a minute membrane, usually with a ring of short hairs immediately above. *Blades* elongate, mostly 15–25 cm long and 9–13(–15) mm broad, with parallel margins for most of the length, often more or less pubescent on the abaxial surface but otherwise glabrous or scabrous. *Primary panicles* open, 10–18(–20) cm long, as much as 15 cm broad. *Spikelets* broadly ovate, abruptly narrowing to a point, 2.2–2.9 mm long. *First glume* variable, often greatly reduced or vestigial, occasionally as much as  $\frac{1}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** Moist, low, usually shaded sites, often along ditches, streams, and swales. On the Coastal Plain, New York, New Jersey and Maryland to Georgia and Florida, and westward to Arkansas, Louisiana, and eastern Texas.

18. **D. nodatum** (Hitchcock & Chase) Gould, Brittonia 26: 60. 1974. TYPE: Texas, Kenedy Co., Sarita, Hitchcock 3865. Holotype US; isotypes MO, US.

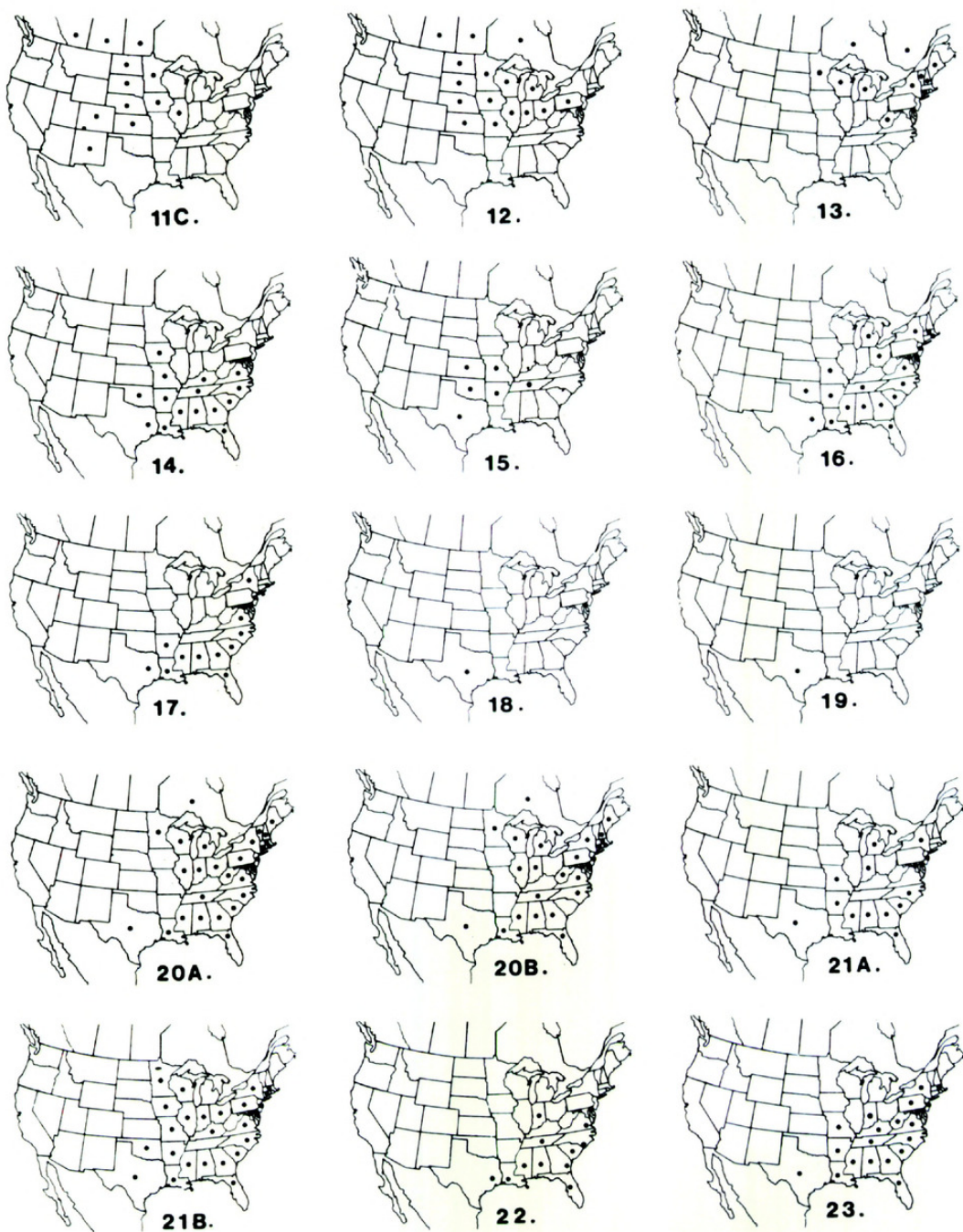


FIGURE 2. 11C. *P. oligosanthes* var. *wilcoxianum*. 12. *D. leibergii*. 13. *D. xanthophysum*. 14. *D. ravenelli*. 15. *D. malacophyllum*. 16. *D. scoparium*. 17. *D. scabriusculum*. 18. *D. nodatum*. 19. *D. pedicellatum*. 20A. *D. sabulorum* var. *patulum*. 20B. *D. sabulorum* var. *thinium*. 21A. *D. ovale* var. *ovale*. 21B. *D. ovale* var. *addisonii*. 22. *D. consanguineum*. 23. *D. aciculare*.

BASIONYM: *Panicum nodatum* Hitchcock & Chase, Contr. U.S. Natl. Herb. 15: 293. 1910.

*Culms* 20–50(–65) cm tall, subrhizomatous at the base, and often with numerous nodes and short internodes, the internodes scabrous or puberulent to short-hispid, the lower nodes usually inconspicuously hairy. *Sheaths*, at least

the lower ones, short-pubescent with spreading hairs. *Ligule* a dense tuft of hairs 1–2 mm long. *Blades* typically thick, firm, short and broad, minutely puberulent on both surfaces, usually 3–9 cm long, 4–7(–9) mm broad, usually papillose-ciliate on the margins to well above the middle. *Panicles* few-flowered, 4–9 cm long, most frequently narrow and with ascending branches and appressed branchlets. *Spikelets* puberulent, narrowly obpyriform, tapering from above the middle to the base, 3.5–4.3 mm long. *First glume* acute, mostly about  $\frac{1}{3}$  as long as the spikelet but usually some glumes longer, appearing distant from the second glume due to the narrow, attenuate base of the second glume. *Lemma* of upper floret often minutely puberulent at the tip.

**HABITAT AND DISTRIBUTION.** Open woods, oak motts, and brushy coastal grasslands, usually in sandy soils. Sandy grasslands and oak motts of southern Texas, Robertson, Bastrop, Edwards counties south to the southern tip of the state and northern Mexico.

19. ***D. pedicellatum*** (Vasey) Gould, *Brittonia* 26: 60. 1974. TYPE: Texas, Kimble Co., *Reverchon 1620*. Holotype, US; isotypes, NY, TAES.

**BASIONYM:** *Panicum pedicellatum* Vasey, U.S.D.A. Div. Bot. Bull. 8: 28. 1889.

*Culms* 20–70 cm tall from a knotty base, puberulent or hirsute, at least below. *Sheaths* glabrous, pubescent, or papillate-strigose. *Ligule* a minute, fringed membrane or a ring of hairs 0.3–1 mm long, occasionally with a few longer hairs. *Blades* flat, glabrous or sparsely appressed pilose or puberulent, usually ciliate with a few long papilla-based hairs near the base, 4–12 cm long, 3–7(–8) mm broad, narrow at the base and acuminate at the apex. *Panicles* narrow or open, 3–10 cm long, with erect or spreading branches and appressed branchlets and pedicels. *Pedicels* of lateral spikelets usually shorter than the spikelets. *Spikelets* narrowly obovate, 3.3–3.9 mm long, usually pubescent or short-hispid with papillate hairs but occasionally glabrous. *First glume* acute, commonly about  $\frac{1}{2}$  length of the spikelet.

**HABITAT AND DISTRIBUTION.** Usually growing in limey soil on well-drained, partially shaded or open rocky sites. Edwards Plateau of Texas, Bosque, to Bexar, Uvalde, and Val Verde counties; also in northeastern Mexico.

20. ***D. sabulorum*** (Lamarck) Gould & Clark, comb. nov. TYPE: Uruguay, Montevideo, *Commerson*.

**BASIONYM:** *Panicum sabulorum* Lamarck, *Encycl.* 4: 744. 1798.

*Culms* erect or trailing at the base, often much-branched, 15–60 cm tall, usually with numerous nodes and short internodes, at least the lowermost minutely puberulent to short-pubescent, rarely glabrous. *Leaves* typically glabrous on the surfaces and glabrous or pubescent on the upper sheath margins, often coarsely ciliate on the blade margins at and occasionally above the base. *Ligule* a ring of hairs 0.2–1(–1.5) mm long. *Blades* thin, lanceolate, glabrous or puberulent, never with long hairs except for the marginal cilia, mostly 3–9 cm long and 3–8(–12) mm broad. *Panicles* 3–9 cm long, typically open in age and

occasionally with reflexed branches. *Spikelets* puberulent to glabrous, 1.8–3.6 mm long, elliptic or slightly obovate, broadly rounded at the apex. *First glume* broad or narrow, pointed, usually  $\frac{1}{3}$  or less as long as the spikelet.

#### Key to the varieties

- a. Spikelets 1.8–3.6 mm long; primary panicles often more than 6 cm long; midculm blades often 7 cm or more long ..... 20A. *D. sabulorum* var. *patulum*
- aa. Spikelets 1.3–1.7 mm long; primary panicles mostly 2.5–4 cm long; midculm blades 2–5(–6) cm long ..... 20B. *D. sabulorum* var. *thinium*

20A. ***D. sabulorum*** (Lamarck) Gould & Clark var. ***patulum*** (Scribner & Merrill) Gould & Clark, comb. nov. TYPE: Florida, Mantee Co., Braidenton, *Combs* 1296. Holotype, US.

BASIONYM: *Panicum nashianum* Scribner var. *patulum* Scribner & Merrill, U.S.D.A. Dept. Agrost. Circ. 27: 9. 1900.

SYNONYMS: *Panicum lancearium* Trinius, 1826. Fragment of holotype, US.

*P. webberianum* Nash, 1896. Holotype, NY; isotypes, MO, NY.

*P. nashianum* Scribner, 1897. Isotype, MO.

*P. tsugetorum* Nash, 1898. Holotype, NY; fragment and photo of holotype, US.

*P. patentifolium* Nash, 1899. Holotype, NY; isotypes, MO, NY, US.

*P. onslowense* Ashe, 1900. Isotype, US.

*P. lanuginosum* var. *siccanum* Hitchcock & Chase, 1906. Holotype, US.

*P. patulum* (Scribner & Merrill) Hitchcock, 1906.

*P. lancearium* var. *patulum* (Scribner & Merrill) Fernald, 1934.

*P. euchlamydeum* Shinnars, 1944.

*P. commonsianum* Ashe var. *euchlamydeum* (Shinner) Pohl, 1947.

*Blades* tending to be aggregated towards the base of the plant, the upper blades often much-reduced; in plants referred to *Panicum webberianum* Nash, the lower blades rather thick, broad (8–12 mm) and abruptly acute, usually with a few long cilia at the base. *Spikelets* 1.8–3.6 mm long, usually puberulent but occasionally glabrous.

HABITAT AND DISTRIBUTION. Growing mostly in moist sand of low woodland borders. On the Coastal Plain, Massachusetts to Georgia, Florida, Mississippi, and Louisiana, a few scattered records from Michigan, Wisconsin, and Tennessee. One record from northeastern Mexico.

20B. ***D. sabulorum*** (Lamarck) Gould & Clark var. ***thinium*** (Hitchcock & Chase) Gould & Clark, comb. nov. TYPE: New Jersey, Tom's River, A. Chase 3577. Holotype, US.

BASIONYM: *Panicum unciphyllum* Trinius var. *thinium* Hitchcock & Chase, *Rhodora* 8: 209. 1906. Holotype, US.

SYNONYMS: *Panicum portoricense* Desvaux ex Hamilton, 1825.

*P. heterophyllum* Bosc ex Nees, 1829, not Sprengel, 1822.

*P. columbianum* Scribner, 1897. Isotype, NY.

*P. psammophilum* Nash, 1899. Holotype, NY; isotype, US.

*P. pauciciliatum* Ashe, 1900. Lectotype and isolectotype, US; photo of lectotype, US.

*P. oricola* Hitchcock & Chase, 1906. Isotypes, MO, NY.

*P. columbianum* var. *thinium* Hitchcock & Chase, 1908.

*P. heterophyllum* var. *thinium* (Hitchcock & Chase) Hubbard, 1912.

*P. columbianum* var. *oricola* (Hitchcock & Chase) Fernald, 1934.

*Dichanthelium columbianum* (Scribner) Freckmann, *Phytologia* 39: 270. 1978.

*Culms* 15–50 cm tall, usually crisp-puberulent below but occasionally short-

pilose, much-branched in age and with fascicled floriferous secondary branches, these with short, flat (not aciculate) blades. *Sheaths*, at least the lower ones, puberulent or short-pilose. *Ligules* a thin or dense ring of hairs 0.2–1(–1.5) mm long. *Blades* of culm leaves lax or firm, lanceolate, most commonly glabrous on the adaxial surface and puberulent on the abaxial surface but occasionally glabrous or puberulent on both surfaces, mostly 2.5–5(–6) cm long and 3–6 mm broad, usually ciliate on the margins. *Panicles* mostly 2.5–4 cm long. *Spikelets* 1.3–1.7 mm long, usually puberulent. *First glume* rarely more than  $\frac{1}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In low, moist woodlands and cutover forestland. Coastal Plain, Maine to Florida, Louisiana, and also in scattered localities in New York, Michigan, Wisconsin, Indiana, Illinois, and Texas.

Plants of both var. *patulum* and var. *thinium* of *D. sabulorum* occasionally have slightly longer hairs than typical on the culms and sheaths. These probably represent an intermediate stage or transition to *D. ovale* which typically has strigose or villous sheaths and bearded culm nodes. There also seems to be an associated trend towards narrower and firmer blades leading to *D. aciculare*, possibly through *D. ovale* at least in part.

21. ***D. ovale*** (Elliott) Gould & Clark, comb. nov. TYPE: Georgia, St. Mary's, Baldwin. Fragment and photo of holotype, US.

**BASIONYM:** *Panicum ovale* Elliott, Bot. S.C. & Ga. 1: 123. 1816.

Plants tufted, leafy at the base. *Culms* 20–50 cm tall, the lower nodes and internodes strigose, less commonly villous or pilose, the upper nodes often glabrous or nearly so, the culms frequently branched and rebranched at the upper nodes, the branchlets with short, flat blades but the branches rarely appearing congested or fasciated. *Lower sheaths* strigose or pilose on the back with long hairs or intermixed long and short hairs, the upper sheaths sparsely pilose. *Ligule* a dense ring of hairs 0.5–1.5 mm long, often with a thin line of hairs (pseudoligule) 2–3 mm long immediately above. *Blades* of culm leaves firm, ascending, often ciliate on the lower margins, lanceolate to lanceolate-acuminate, 6–10 cm long, 5–10 mm broad, acuminate at the apex, the adaxial surface glabrous or sparsely hispid with long, stiff hairs, the abaxial surface glabrous or pubescent with short hairs. *Panicles* open, 5–9 mm long and nearly as broad as long. *Spikelets* pubescent to nearly glabrous, narrowly oblong-elliptic. *First glume*  $\frac{1}{3}$  to nearly  $\frac{1}{2}$  as long as the second glume and lemma of the lower floret.

Many populations of *D. ovale* closely approach the highly variable *D. acuminatum* in morphological characteristics. In the southern portion of the range of *D. ovale*, the presence of a double ring of hairs in the ligular area sometimes is difficult to determine and the separation of both varieties of *D. ovale* from *D. acuminatum* var. *villosum* is not always satisfactory.

#### Key to the varieties

- |     |                           |  |
|-----|---------------------------|--|
| a.  | Spikelets 2.6–3.1 mm long | 21A. <i>D. ovale</i> var. <i>ovale</i>     |
| aa. | Spikelets 1.5–2.5 mm long | 21B. <i>D. ovale</i> var. <i>addisonii</i> |

21A. *D. ovale* (Elliott) Gould & Clark var. *ovale*.

SYNONYMS: *Panicum ciliferum* Nash, 1897. Holotype NY; isotypes, MO, US; fragment and photo of holotype, US.

*P. malacon* Nash, 1897. Holotype, NY; isotypes, MO, NY, US.

*P. strictifolium* Nash, 1899. Holotype, NY; isotypes, NY, US.

*P. erythrocarpon* Ashe, 1900.

HABITAT AND DISTRIBUTION. In sandy, well-drained forestland and along woods borders. New York and New Jersey to Michigan and Wisconsin, and south to Florida, and eastern Texas. Rather infrequent over most of its range but common throughout Florida.

21B. *D. ovale* (Elliott) Gould & Clark var. *addisonii* (Nash) Gould & Clark, comb. nov. TYPE: New Jersey, Wildwood, *Bicknell* in 1897. Holotype, NY.

BASIONYM: *Panicum addisonii* Nash, 1898. Holotype, NY; fragment and photo of holotype, US.

SYNONYMS: *Panicum commonsianum* Ashe, 1898. Isotype, NY.

*P. wilmingtense* Ashe, 1900.

*P. alabamense* Ashe, 1900, not Trinius, 1854. Isotypes, NY, US.

*P. owenae* Bicknell, 1908. Holotype, NY; isotypes, NY, US.

*P. commonsianum* subsp. *addisonii* (Nash) Stone, 1911.

*P. commonsianum* var. *addisonii* (Nash) Fernald, 1935.

*P. mundum* Fernald, 1936. Isotypes, MO, NY, US.

*P. commonsianum* var. *addisonii* (Nash) Pohl, 1947.

*P. columbianus* Scribn. var. *commonsianum* (Ashe) McNeill & Dore, *Naturaliste Canad.* 103: 562. 1976.

*Dichanthelium commonsianum* (Ashe) Freckmann, *Phytologia* 39: 271. 1978.

*Culms* tending to be much-branched with short, narrow, rather stiff, lanceolate or acuminate blades. *Culms and sheaths* strigose-pubescent, occasionally with a few short hairs intermixed. *Blades* of culm leaves usually glabrous on both surfaces, infrequently with a few soft hairs or a few long stiff hairs. *Spikelets* pubescent, elliptic or obovate, broadly rounded at the apex, 1.5–2.5 mm long.

HABITAT AND DISTRIBUTION. Most frequent on the Atlantic Coastal Plain, Connecticut and New York to Georgia and northern Florida but occasional at widely scattered localities throughout the eastern and midwestern states, ranging westward to Minnesota, Iowa, Oklahoma, and Texas and northern Mexico.

22. *D. consanguineum* (Kunth) Gould & Clark, comb. nov. TYPE: Florida, no specific locality indicated.

BASIONYM: *Panicum consanguineum* Kunth, *Rév. Gram.* 1: 36. 1829. Based on *P. villosum* Elliott, *Bot. S.C. & Ga.* 1: 124. 1816.

SYNONYMS: *Panicum villosum* Elliott, not Lamarck, 1791. Fragment and photo of holotype, US.

*P. commutatum* Schultes var. *consanguineum* (Kunth) Beal, 1896.

*P. georgianum* Ashe, 1898. Holotype, US.

*P. deamii* Hitchcock & Chase, 1929. Holotype, US.

*Culms* 20–60 cm tall, with bearded nodes and densely ascending-villous internodes. *Sheaths* villous. *Ligules* absent or short, not over 1 mm long. *Blades of midculm leaves* 7–11 cm long, 5–8 mm broad, villous on both surfaces, usually

involute at the narrow apex, tapering slightly to the base. *Blades of secondary branches* short, flat and narrow. *Panicles* 4–8 cm long, often contracted and appearing “compact.” *Spikelets* puberulent, 2.5–2.8 mm long, narrowly elliptic-obovate, rounded at the apex. *First glume* about  $\frac{1}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In dry or moist sandy soils of open or cut-over woodlands. Occasional, Virginia, North Carolina, Indiana, Tennessee, Georgia, Florida, Louisiana, and Texas.

This species appears closely related to the two varieties of *D. ovale* and all have bearded nodes and appressed-strigose or appressed-villous internodes and sheaths.

23. **D. aciculare** (Desvaux ex Poirét) Gould & Clark, comb. nov. TYPE: “Habitat in india orientale.” Holotype in P (not seen); fragment and photo of holotype, US. Hitchcock & Chase (1910) stated that the type collection “is without doubt from the southeastern United States.”

**BAISIONYM:** *Panicum aciculare* Desvaux ex Poirét in Lamarck, Encycl. Suppl. 4: 274. (July) 1816. Fragment and photo of holotype, US.

**SYNONYMS:** *Panicum angustifolium* Elliott, (Dec.) 1816. Holotype, US.

*P. setaceum* Muhlenberg, 1817.

*P. subuniflorum* Bosc ex Sprengel, 1825.

*P. nitidum* Lamarck var. *angustifolium* (Elliott) A. Gray, 1835.

*P. redivivum* Trinius ex Steudel, 1841.

*P. curtisii* Steudel, 1854.

*P. neuranthum* Grisebach, 1866. Holotype, NY.

*P. neuranthum* Grisebach var. *ramosum* Grisebach, 1866. Isotypes, MO, NY.

*P. nemopanthum* Ashe, 1898. Isolectotype, US.

*P. arenicolum* Ashe, 1898. Lectotype, US; isolectotypes, NY.

*P. ovinum* Scribner & Smith, 1899. Holotype, US.

*P. delawareense* Ashe, 1900. Isotype, US.

*P. pungens* Muhlenberg ex Scribner & Merrill, 1900, not Poirét, 1816.

*P. filirameum* Ashe, 1900. Isotype, US.

*P. arenicoloides* Ashe, 1900. Fragment and photo of holotype, US.

*P. orthophyllum* Ashe, 1900. Fragment and photo of isotype (?), US.

*Panicum fusiforme* Hitchcock, 1909.

*Chasea angustifolia* (Elliott) Nieuwland, 1911.

*P. bennettense* W. V. Brown, 1942.

*P. pinetorum* Swallen, 1942. Holotype, US.

*Dichantherium angustifolium* (Elliott) Gould, Brittonia 26: 59. 1974.

*Plants* with a basal rosette of thick, broad, short blades. *Culms* usually stiffly erect, 25–75 cm tall, glabrous or moderately pubescent or pilose but the nodes not truly bearded, in age often branching freely above, producing fascicles of reduced leaves and panicles, the leaves narrow, often involute. *Sheaths* glabrous, pubescent or pilose, occasionally with long, papillate hairs. *Ligule* usually a fringe of hairs 1 mm or less long. *Blades of midculm leaves* firm or stiff, narrowly lanceolate, usually acuminate, glabrous or hairy, mostly 6–15(–20) cm long and 2–6(–8) mm broad, sometimes becoming tightly involute. *Panicles* open or tightly contracted, mostly 4–9 cm long. *Spikelets* elliptic-ovate to obpyriform or fusiform, glabrous or puberulent, 1.9–3.6 mm long. *First glume* usually  $\frac{1}{4}$ – $\frac{1}{3}$  (– $\frac{1}{2}$ ) as long as the spikelet.

**HABITAT AND DISTRIBUTION.** Frequent on dry sandy soil of open woods and

cut-over forestlands. Atlantic Coastal Plain from Massachusetts and New York to Florida and central Texas, occasional eastward to Indiana, Missouri, and Arkansas; also south through the Antilles, Mexico and Central America to northern South America.

A statistical analysis of morphological variation patterns in populations herein referred to *D. consanguineum*, *D. ovale*, *D. sabulorum*, and *D. aciculare* (Allred & Gould, 1978) shows that within geographic regions these taxa comprise rather well defined groups. When variation patterns from several regions are superimposed, however, the boundaries between groups break down and a continuum of attribute variation is approached. The recognition of only four species and six varieties in this complex to which almost 50 species names have been applied admittedly is somewhat arbitrary and certainly not entirely satisfactory. This treatment, however, is believed to be the best disposition of the populations involved on the basis of available data.

24. ***D. dichotomum*** (L.) Gould, Brittonia 26: 59. 1974. TYPE: "Habitat in Virginia," Clayton 458. Fragment and photo of holotype, US.

BASIONYM: *Panicum dichotomum* L., Sp. Pl. 58. 1753.

*Culms* slender, 15–80(–100) cm tall, becoming much-branched and "bushy" in age (autumnal phase), the internodes glabrous (the lowermost rarely puberulent), the nodes glabrous or bearded with long spreading hairs. *Sheaths* glabrous on the back, ciliate or pubescent with soft hairs on the margins. *Ligules* absent or a ring of short hairs not over 1 mm long. *Panicles* mostly 2–8(–10) cm long, the late-formed, lateral panicles much-reduced and few-flowered; *axis and branches* glabrous. *Spikelets* oblong or obovate, puberulent or glabrous, 1.2–2.9 mm long, those of the primary panicles usually on long pedicels.

#### Key to the varieties

- a. Blades of the lower culm leaves short or long, usually more than 4 mm broad when as much as 7 cm long.
  - b. Ligules 1–1.8 mm long; spikelets 1.3–1.5 mm long; sheaths and lower blades, at least some, sparsely pilose with spreading hairs; lower culm blades 1–3 cm long ..... See 26D. *D. acuminatum* var. *implicatum*
  - bb. Ligules 0.5 mm or less long; spikelets 1.1–2.9 mm long; sheaths and lower culm blades glabrous or rarely pilose with spreading hairs; lower culm blades short or long.
    - c. Lower culm blades commonly more than 5 cm long or more than 4.5 mm broad; spikelets 1.5–2.4 mm long; plants widespread in eastern United States, in well-drained woodland sites .... 24A. *D. dichotomum* var. *dichotomum*
    - cc. Lower culm blades usually not more than 5 cm long and 4.5 (rarely 6) mm broad (but leaves of the basal rosette often much longer); spikelets 1.1–1.6 mm long; plants of moist seeps and acid bogs.
      - d. Margins of blades thin, green; spikelets glabrous or sparsely puberulent ..... 24B. *D. dichotomum* var. *ensifolium*
      - dd. Margins of blades with a cartilaginous, usually whitish border; spikelets puberulent ..... 24C. *D. dichotomum* var. *tenue*
- aa. Blades of the lower culm leaves, at least some, 6–15 cm long but only 2–4 mm broad.
  - e. Spikelets puberulent, 1.9–2 mm long; blades often 12–15 cm long ..... See 23. *D. aciculare*
  - ee. Spikelets glabrous or pubescent, 1.2–1.5 mm long; blades to 6, occasionally to 8, cm long.

- f. Spikelets glabrous, 1.2–1.5 mm long; blades glabrous ..... 24D. *D. dichotomum* var. *glabrifolium*  
 ff. Spikelets pubescent, (1.2–)1.3–1.4 mm long; blades with a few long, stiff hairs on the margins towards the base ..... 24E. *D. dichotomum* var. *breve*

24A. *D. dichotomum* (L.) Gould var. *dichotomum*.

SYNONYMS: *Panicum nitidum* Lamarck, 1791.

*P. heterophyllum* Muhlenberg, 1793.

*P. nodiflorum* Lamarck, 1798. Fragment and photo of holotype, US.

*P. barbulatum* Michaux, 1803. Fragment of lectotype, US.

*P. microcarpon* Muhlenberg ex Elliott, 1816.

*P. angustifolium* LeConte ex Torrey, 1818, not Elliott, 1816.

*P. tremulum* Sprengel, 1821. Fragment and photo of lectotype, US.

*P. nitidum* var. *barbatum* Torrey, 1824.

*P. nitidum* var. *ramulosum* Torrey, 1824.

*P. dumus* Desvaux, 1831.

*P. dichotomum* var. *nitidum* (Lamarck) Wood, 1861.

*P. dichotomum* var. *barbulatum* (Michaux) Wood, 1861.

*P. dichotomum* var. *nodiflorum* (Lamarck) Grisebach, 1866.

*P. nudicaule* Vasey, 1889. Lectotype, US; isotype, NY, TAES.

*P. dichotomum* var. *divaricatum* Vasey, 1889. Lectotype, US.

*P. dichotomum* var. *viride* Vasey, 1889. Lectotype, US.

*P. nitidum* var. *pauciflorum* Britton, 1889. Holotype, US.

*P. nitidum* var. *viride* (Vasey) Britton, 1889.

*P. pubescens* Lamarck var. *barbulatum* (Michaux) Britton, 1889.

*P. dichotomum* var. *commune* S. Watson & Coulter, 1890.

*P. ramulosum* Michaux ex Nash var. *viride* (Vasey) Porter, 1893.

*P. sphagnicola* Nash, 1895. Holotype, NY; isotypes, MO, NY, TAES, US.

*P. nitidum* var. *barbulatum* (Michaux) Chapman, 1897.

*P. annulum* Ashe, 1898, not A. Rich., 1851. Lectotype, US.

*P. lucidum* Ashe, 1898. Lectotype, US; isotype, NY.

*P. maculatum* Ashe, 1898, not Aublet, 1775.

*P. mattamuskeetense* Ashe, 1898. Isolectotypes, NY, US.

*P. roanokense* Ashe, 1898.

*P. clutei* Nash, 1899. Isotypes, NY, US.

*P. curtivaginum* Ashe, 1900.

*P. taxodiorum* Ashe, 1900. Holotype, NY; isotype, MO.

*P. flexuosum* Muhlenberg ex Scribner & Merrill, 1900, not Retzius, 1791. Holotype, US.

*P. multirameum* Scribner, 1900. Isotype, MO.

*P. bogueanum* Ashe, 1900.

*P. yadkinense* Ashe, 1900. Isolectotype, US.

*P. subbarbulatum* Scribner & Merrill, 1901.

*P. gravius* Hitchcock & Chase, 1906. Holotype, US.

*P. caerulescens* Hackel ex Hitchcock, 1909. Isotype, NY.

*Chasea dichotoma* (L.) Nieuwland, 1911.

*Panicum mattamuskeetense* var. *clutei* (Nash) Fernald, 1937.

*P. lucidum* var. *opacum* Fernald, 1937. Syntypes, MO, NY, US.

*P. annulum* var. *glabrescens* Gleason, 1952. Holotype, US.

Culms slender, 20–80(–110) cm tall, with glabrous internodes and glabrous or bearded nodes. *Sheaths* glabrous on the back, infrequently the lowermost ones velvety-pilose. *Blades* of the main culm leaves 4–12(–15) cm long, 3–10 (–13) mm broad, thin, usually glabrous on both surfaces but occasionally pilose, often sparsely ciliate on the margins near the base. *Leaves* of fascicled secondary branches with narrow, flat or involute blades, commonly 3–7 cm long as in *P. dichotomum* var. *tenue*, the blades occasionally with thick whitish margins. *Panicles* well-exserted, open, with the branches, branchlets, and pedicels tending to be spreading, the spikelets never appearing secund on the branches; *late-*

formed panicles greatly reduced, few-flowered. *Spikelets* elliptic or obovate, 1.5–2.9 mm long, glabrous or occasionally puberulent. *First glume* ca.  $\frac{1}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In moist, sandy soil, usually in shaded, woodland habitats. Throughout eastern North America from Ontario, New Brunswick, Nova Scotia, Maine, and Michigan south to Florida, Missouri, Texas, and eastern Mexico.

24B. *D. dichotomum* (L.) Gould var. *ensifolium* (Baldwin) Gould & Clark, comb. nov. TYPE: Georgia, *Baldwin*. Fragment and photo of holotype, US.

**BASIONYM:** *Panicum ensifolium* Baldwin ex Elliott, Bot. S.C. & Ga. 1: 126. 1816.

**SYNONYMS:** *Panicum chamaelonche* Trinius, 1826. Fragment of holotype, US.

*P. nitidum* Lamarck var. *ensifolium* (Baldwin) Vasey, 1889.

*P. flavovirens* Nash, 1899. Isotype, NY.

*P. ramulosum* Michaux ex Nash, 1889. Fragment and photo of holotype, US.

*P. nitidum* var. *minus* Vasey, 1892. Holotype, US; isotype, MO.

*P. baldwinii* Nuttall ex Kearney, 1897. Holotype, US.

*P. brittoni* Nash, 1897. Syntypes, NY, US.

*P. cuthbertii* Ashe, 1898.

*P. glabrissimum* Ashe, 1898. Lectotype, US; isotypes, NY, US.

*P. shallotte* Ashe, 1900.

*P. parvipaniculatum* Ashe, 1900. Isolectotype, US.

*P. vernale* Hitchcock & Chase, 1910. Holotype, US.

*Dichanthelium ensifolium* (Baldwin) Gould, Brittonia 26: 59. 1974.

*Culms* slender and delicate, glabrous, 15–45 cm tall. *Sheaths* glabrous or minutely fringed on the margins. *Ligule* 0.5 mm or less long. *Blades* thin, short, spreading, often reflexed, glabrous or puberulent towards the tip. *Panicles* 2–6 cm long, the short, spreading branches with few spikelets. *Spikelets* broadly oblong or obovate, puberulent or glabrous, 1.1–1.5 mm long.

**HABITAT AND DISTRIBUTION.** In wet seeps, marshy areas and acid soils of bogs, usually in shade. Coastal Plain, New Jersey to Florida and Texas, also reported for Arkansas.

24C. *D. dichotomum* var. *tenue* (Muhl.) Gould & Clark, comb. et stat. nov. TYPE: No. 192 in the Muhlenberg Herb., PH. Fragment and photo of lectotype, US.

**BASIONYM:** *Panicum tenue* Muhlenberg, Descr. Gram. 118. 1817.

**SYNONYMS:** *Panicum deustum* Brickell & Enslin ex Muhlenberg, 1817, not Thunberg, 1794. Fragment and photo of holotype, US.

*P. liton* Schultes, 1824.

*P. unciphyllum* Trinius, 1826. Holotype, US.

*P. macrum* Kunth, 1829.

*P. albomarginatum* Nash, 1897. Holotype, NY; isotypes, MO, NY, US.

*P. trifolium* Nash, 1899. Holotype, NY; isotype, US.

*P. parvulum* Muhlenberg ex Scribner & Merrill, 1900, not Trinius, 1834.

*P. gracilicaule* Nash, 1903, not Rendle, 1899. Fragment and photo of holotype, US.

*P. concinnius* Hitchcock & Chase, 1910.

*Culms* typically delicate, 15–45 cm tall, glabrous or appressed-pubescent or pilose. *Ligules* minute, not over 0.5 mm long. *Blades* ascending or spreading, 2–5 cm long, 2–4 mm broad, usually rather thick, with thickened, whitish borders in “albomarginatum” types. *Spikelets* puberulent, elliptic, 1.3–1.6 mm long.

**HABITAT AND DISTRIBUTION.** In acid soils of bogs, wet seep and marshy area. Coastal Plain, Maryland to Georgia and Florida, and west to Texas; also in Mexico.

Although most plants with the general characteristics of *D. dichotomum* var. *tenue* conform to the characterization of the species as presented above, occasionally the basal blades and lower culm leaves are unusually large, sometimes as much as 10 cm long and 10 mm broad.

- 24D. ***D. dichotomum*** (L.) Gould var. ***glabrifolium*** (Nash) Gould & Clark, comb. et stat. nov. TYPE: Florida, in "flatwoods" at Tampa, *Nash 2415a*. Holotype, NY.

**BASIONYM:** *Panicum glabrifolium* Nash, Bull. Torrey Bot. Club 24: 196. 1897. Fragment and photo of holotype, US.

*Plants* tufted, 15–50 cm tall. *Blades* firm, 4–12 cm long, 2–4 mm broad. *Panicles* open, 4–9 cm long. *Spikelets* 1.2–1.4 mm long, broadly obovate, glabrous, 1.2–1.4 mm long.

**HABITAT AND DISTRIBUTION.** Infrequent in low, moist, sandy woods. Southern Florida (Polk and Hillsborough counties and south).

- 24E. ***D. dichotomum*** (L.) Gould var. ***breve*** (Hitchcock & Chase) Gould & Clark, comb. et stat. nov. TYPE: Florida, Jensen, *Hitchcock 734*. Holotype, US.

**BASIONYM:** *Panicum breve* Hitchcock & Chase, Contr. U.S. Natl. Herb. 15: 27. 1910.

*Plants* low, tufted, 5–20 cm tall. *Culms* wiry, glabrous or appressed-pubescent below. *Sheaths* ciliate on the margins, glabrous on the back. *Ligule* a ring of hairs ca. 0.3 mm long. *Blades* firm, 3–6(–8) cm long, ca. 1.5 mm broad, strongly involute and more or less falcate, with a few long, stiff hairs on the margins towards the base. *Panicles* short-exserted, 1.5–4 cm long, loosely flowered. *Spikelets* broadly obovate, puberulent, 1.3–1.4 mm long.

**HABITAT AND DISTRIBUTION.** In low, moist, pine and scrub hardwood woods. Southern Florida (Polk Co. and south).

25. ***D. boreale*** (Nash) Freckmann, Phytologia 39: 269. 1978. TYPE: New York, Green Co., Cairo, *G. V. Nash* in 1893. Holotype, NY; isotype, NY.

**BASIONYM:** *Panicum boreale* Nash, Bull. Torrey Bot. Club 22: 421. 1895.

**SYNONYMS:** *Panicum boreale* var. *michiganense* Farwell, 1940. Holotype, US.

*P. bicknellii* Nash, 1897. Isolectotype, US.

*P. calliphyllum* Ashe, 1898. Lectotype, US; isolectotype, NY.

*P. bushii* Nash, 1899.

*P. bicknellii* var. *bushii* (Nash) Farwell, 1921.

*Culms* slender, stiffly erect, glabrous or the lowermost nodes puberulent, mostly 25–60 cm tall but plants frequently flowering when only 10–15 cm tall, little-branched above the base, the secondary branches when present with relatively large leaves and broad blades. *Sheaths* glabrous or the lowermost finely

pilose, usually ciliate with soft hairs on the margins, and often with tufts of soft hair on either side just below the ligular region. *Ligule* absent or a ring of short hairs not over 1 mm long. *Blades* tending to be glabrous, thin, broad and erect, mostly 6–14 cm long and 6–13 mm broad, the lower blades when long usually broadest at the middle and narrowing to a cordate or subcordate base. *Blade base* typically ciliate with few, long papilla-based hairs, the hairs occasionally present to above the middle. *Panicles* open, few-flowered 5–8(–9) cm long, the main panicle axis and branches glabrous. *Spikelets* glabrous or pubescent, elliptic or slightly elliptic-obovate, 2.0–2.8 mm long, the tips of the second glume and lemma of the lower floret typically pointed. *First glume* broad,  $\frac{1}{4}$ – $\frac{1}{3}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In woodlands and on open grassy slopes, usually in moist soil. Newfoundland, Quebec, and Ontario, south to North Carolina, Indiana, Michigan, and Minnesota.

*Dichanthelium boreale* appears to be close to and possibly intergrading with *D. dichotomum* var. *dichotomum* and *D. commutatum*. Perhaps most typical of the species are plants with stiffly erect culms 30–45 cm tall and short, broad, stiffly erect blades. Included in the taxon, however, are relatively tall, slender plants with low internodes and long, broad, loosely erect-spreading blades that approach *D. dichotomum* var. *dichotomum* in general aspect but do not develop fascicles of reduced branchlets. These plants have for the most part been referred to *Panicum bicknellii* Nash and *P. calliphyllum* Ashe. *D. boreale* is little-branched at the upper nodes and does not develop fascicles of reduced leaves and inflorescences as in *D. dichotomum*.

26. ***D. acuminatum*** (Swartz) Gould & Clark, comb. nov. TYPE: Jamaica, Swartz. Fragment and photo of holotype, US.

**BASEONYM:** *Panicum acuminatum* Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

*Plants* with a well-developed rosette of broad, short basal leaves. *Culms* 15–70(–80) cm tall, usually becoming much-branched in age and commonly forming mats or pads of reduced branches and small, few-flowered panicles, the nodes and internodes glabrous or more commonly hairy. *Ligular hairs* well-developed, mostly 2–5 mm long but as short as 1 mm long in var. *implicatum*. *Leaves* glabrous to variously hairy. *Panicles* open or somewhat contracted, 2–12 cm long. *Spikelets* ovate, elliptic or slightly obovate, glabrous or more commonly pubescent, 0.8–2.7 mm long. *First glume* broad, rounded or abruptly pointed,  $\frac{1}{5}$ – $\frac{1}{3}$  as long as the spikelet.

In the following treatment, the populations referred to *D. acuminatum* are grouped into eight varieties. Listed as synonyms of the varietal names are a total of 46 names, many of which have been treated variously as species or varieties. It may be that the taxa retained as varieties do not adequately delimit the recognizable populations of this extremely widely distributed and morphologically variable species. The present treatment, however, provides a basis for

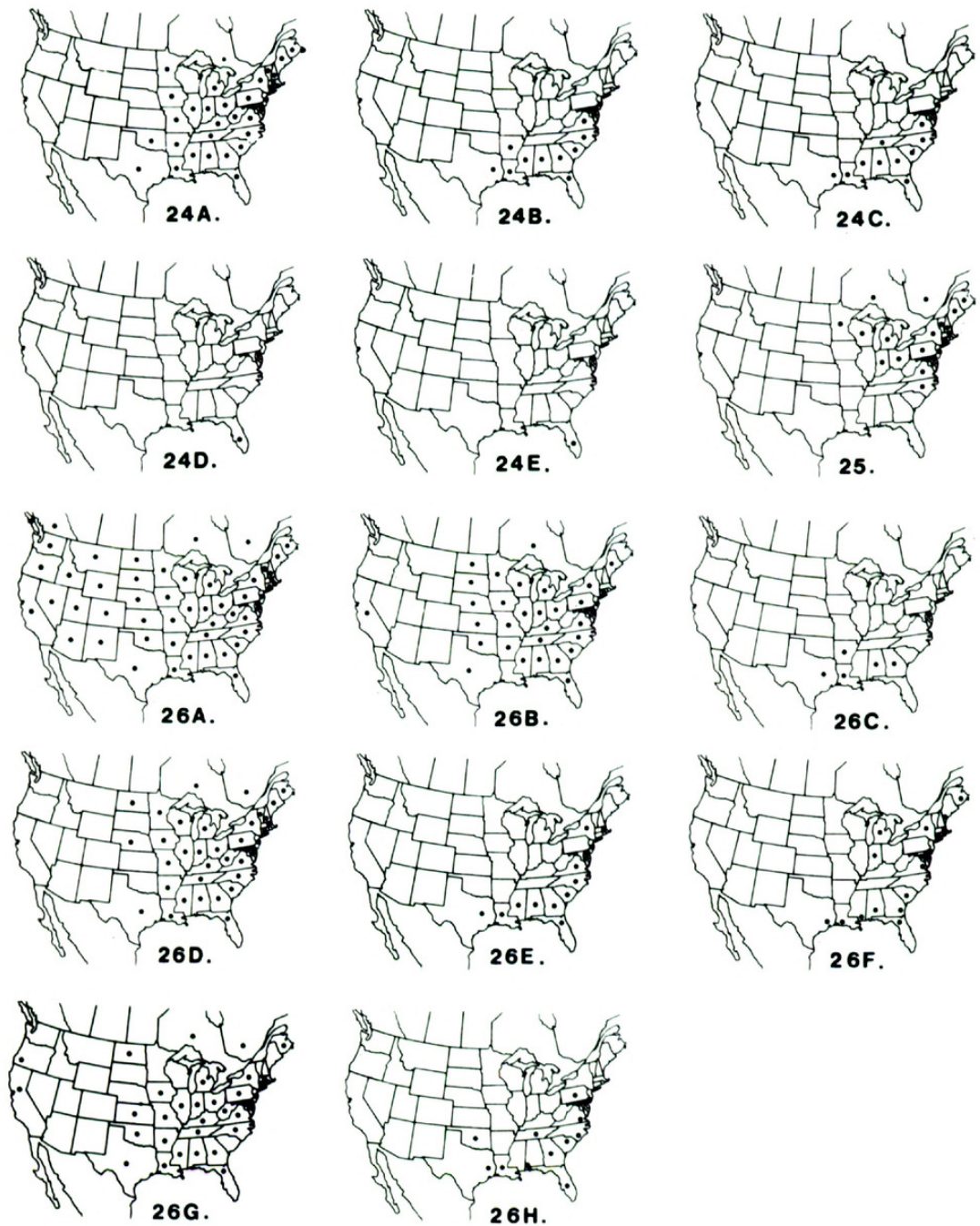


FIGURE 3. 24A. *D. dichotomum* var. *dichotomum*. 24B. *D. dichotomum* var. *ensifolium*. 24C. *D. dichotomum* var. *tenue*. 24D. *D. dichotomum* var. *glabrifolium*. 24E. *D. dichotomum* var. *breve*. 25. *D. boreale*. 26A. *D. acuminatum* var. *acuminatum*. 26B. *D. acuminatum* var. *villosum*. 26C. *D. acuminatum* var. *thurowii*. 26D. *D. acuminatum* var. *implicatum*. 26E. *D. acuminatum* var. *wrightianum*. 26F. *D. acuminatum* var. *densiflorum*. 26G. *D. acuminatum* var. *longiligulatum*. 26H. *D. acuminatum* var. *lindheimeri*.

comparative treatments of populations segregated mainly on the basis of spikelet size and type of indument.

Key to the varieties

- a. Culms pubescent or hairy; sheaths of culm leaves, at least the lower ones, puberulent, pubescent, hirsute or villous on the back.

- b. Sheaths with soft, spreading or reflexed hairs 2–5 mm long; spikelets 1.8–2.7 mm long ..... 26B. *D. acuminatum* var. *villosum*
- bb. Sheath hairs stiff or soft, ascending or erect-appressed, usually less than 2 mm long; spikelets 0.8–2.5 mm long.
- c. Spikelets 1.6–2.5 mm long.
  - d. Culms not robust, mostly 15–60 cm tall; panicles broad, open, rarely over 8 cm long ..... 26A. *D. acuminatum* var. *acuminatum*
  - dd. Culms robust, mostly 50–70 cm or more tall; panicle commonly narrow and somewhat contracted, 9–12 cm long ..... 26C. *D. acuminatum* var. *thurowii*
- cc. Spikelets 0.8–1.5 long.
  - e. Spikelets 1.2–1.5 mm long ..... 26D. *D. acuminatum* var. *implicatum*
  - ee. Spikelets 0.8–1.1 mm long ..... 26E. *D. acuminatum* var. *wrightianum*
- aa. Culms glabrous or the lower portions slightly hairy; sheaths glabrous or the lower-most sheaths sparsely pilose or puberulent on the back.
- f. Spikelets 1.4–1.8 mm long.
  - g. Panicle narrow,  $\frac{1}{4}$ – $\frac{1}{3}$  as broad as long, commonly 8–12 cm long ..... 26F. *D. acuminatum* var. *densiflorum*
  - gg. Panicle broad,  $\frac{2}{3}$  to nearly as broad as long, commonly 5–8 cm long ..... 26G. *D. acuminatum* var. *lindheimeri*
- ff. Spikelets 1.1–1.3 mm long ..... 26H. *D. acuminatum* var. *longiligulatum*

**26A. *D. acuminatum* (Swartz) Gould & Clark var. *acuminatum*.**

SYNONYMS: *Panicum lanuginosum* Elliott, 1816. Fragment and photo of holotype, US.

*P. nitidum* Lamarck var. *ciliatum* Torrey, 1824.

*P. dichotomum* (L.) var. *fasciculatum* Torrey, 1824.

*P. nitidum* var. *pilosum* Torrey, 1824.

*P. dichotomum* var. *pubescens* Munro ex Benthham, 1857.

*P. dichotomum* var. *lanuginosum* (Elliott) Wood, 1861.

*P. thermale* Bolander, 1862. Isotypes, MO.

*P. tennesseense* Ashe, 1898. Fragment and photo of holotype, US.

*P. huachucae* Ashe, 1898. Lectotype, US.

*P. scoparioides* Ashe, 1898. Lectotype, US; isoelectotypes, NY.

*P. occidentale* Scribner, 1899. Isotype, MO.

*P. orangense* Ashe, 1899.

*P. ciliosum* Nash, 1899. Holotype, NY; isotype, US.

*P. subvillosum* Ashe, 1900. Fragment and photo of holotype, US.

*P. unciphyllum* Trinius f. *pilosum* Scribner & Merrill, 1901.

*P. unciphyllum* f. *prostratum* Scribner & Merrill, 1901, not *P. prostratum* Lamarck.

*P. shastense* Scribner & Merrill, 1901.

*P. chrysopsidifolium* Nash, 1903. Isotype, NY.

*P. comophyllum* Nash, 1903. Holotype, NY.

*P. lanuginosum* var. *huachucae* (Ashe) Hitchcock, 1906.

*P. huachucae* var. *silvicola* Hitchcock & Chase, 1908. Holotype, US.

*P. pacificum* Hitchcock & Chase, 1910. Isotype, NY.

*P. languidum* Hitchcock & Chase, 1910.

*P. huachucae* var. *fasciculatum* (Torrey) Hubbard, 1912.

*P. lindheimeri* Nash var. *fasciculatum* (Torrey) Fernald, 1921.

*P. lindheimeri* var. *septentrionale* Fernald, 1921.

*P. lindheimeri* var. *tennesseense* (Ashe) Farwell, 1928.

*P. lanuginosum* var. *septentrionale* (Fernald) Fernald, 1934.

*P. lanuginosum* var. *fasciculatum* (Torrey) Fernald, 1934.

*P. villosissimum* Nash var. *scoparioides* (Ashe) Fernald, 1934.

*P. brodiei* St. John, 1937.

*P. lassenianum* Schmoll, 1939.

*P. ferventicola* Schmoll, 1939. Isotype, NY.

*P. ferventicola* var. *papillosum* Schmoll, 1939. Isotype, NY.

*P. ferventicola* var. *sericeum* Schmoll, 1939. Isotype, NY.

*P. benneri* Fernald, 1944. Holotype(?), US.

*P. glutinoscabrum* Fernald, 1947.

- P. lanuginosum* var. *tennesseense* (Ashe) Gleason, 1952.  
*Dichanthelium lanuginosum* (Elliott) Gould, Brittonia 26: 60. 1974.  
*D. lanuginosum* var. *fasciculatum* (Torrey) Spellenberg, Madroño 23: 145. 1975.  
*D. lanuginosum* var. *sericeum* (Schmoll) Spellenberg, Madroño 23: 150. 1975.  
*D. lanuginosum* var. *thermale* (Bolander) Spellenberg, Madroño 23:151. 1975.

*Culms* usually in large clumps, 15–60 cm tall, usually densely villous below with long, soft hairs, these often minutely papillate. *Leaves* variously pubescent to nearly glabrous, the hairs soft or coarse, usually long. *Sheaths* shorter than the internodes, soft-villous or puberulent on the back, ciliate on the margins. *Ligules* well developed with hairs mostly 2–4 mm long. *Blades* thickened as in var. *implicatum* but not stiff, mostly 5–10 cm long and 5–10(–12) mm broad, the adaxial surface usually with long hairs or short and long soft hairs intermixed, the abaxial surface densely, velvety-pubescent to nearly glabrous. *Panicles* 5–8 cm long, loosely-flowered, commonly pubescent on the main axis and lower branches. *Spikelets* pubescent, elliptic-obovate, 1.6–2.5 mm long. *First glume* about as broad as long,  $\frac{1}{3}$  as long as the spikelet, broadly pointed to somewhat rounded at the apex.

**HABITAT AND DISTRIBUTION.** In a wide variety of habitats, mostly in moist, sandy soil of woodlands and woods borders. Widespread throughout North America from Quebec and British Columbia to Florida, California and eastern Mexico; also in Central America, the Antilles, and northern South America, and adventive in the Hawaiian Islands.

In the present interpretation, *D. acuminatum* var. *acuminatum* is arbitrarily separated from *D. acuminatum* var. *implicatum* on the basis of spikelet size (1.6–2.5 vs. 1.2–1.5). The culms and leaves of var. *implicatum* do tend to be smaller than those of var. *acuminatum* but no satisfactory separation can be made on this basis.

Lelong (1965) followed Chase in Hitchcock (1951) in recognizing *Panicum scoparioides* as a distinct species and treated *P. benneri*, *P. shastense*, and *P. villosissimum* var. *scoparioides* as synonyms. The characteristics upon which the *scoparioides* taxon is based do not appear sufficiently distinctive nor consistent to warrant taxonomic recognition. Lelong had doubts as to the validity of *P. scoparioides* as a species and stated (Lelong, 1965: 195),

... that this "rare species" is merely another resulting variant from sporadic hybridization between *P. scribnerianum* and western forms of *P. lanuginosum* (such as Heller 12452 identified as *P. pacificum*). Until it can be ascertained that *P. shastense* is indeed a rare hybrid, it should probably be regarded as a synonym of *P. scoparioides*. The surprisingly great similarity between western and eastern *Lanuginosa* has already been noted.

**26B. *D. acuminatum* (Swartz) Gould & Clark var. *villosum* (A. Gray) Gould & Clark, comb. nov. TYPE:** New York, Ontario Co., *Sartwell?*

**BASIONYM:** *Panicum nitidum* Lamarck var. *villosum* A. Gray, N. Amer. Gram. & Cyp. 2: 111. 1835.

**SYNONYMS:** *Panicum tectum* Willd. ex Sprengel, 1825.

*P. dichotomum* L. var. *villosum* (A. Gray) Vasey, 1889. Lectotype, US.

*P. nitidum* var. *pubescens* Scribner, 1893. Isotypes(?), NY.

*P. laxiflorum* Lamarck var. *pubescens* Chapman, 1893, not Vasey, 1892. Lectotype, US.

*P. villosissimum* Nash, 1896. Holotype, NY; isotypes, NY, US.

- P. atlanticum* Nash, 1897. Holotype, NY; isotype, US.  
*P. haemacarpum* Ashe, 1898. Lectotype, NY; isolectotype, US.  
*P. pseudopubescens* Nash, 1899. Holotype(?), NY.  
*P. cahoonianum* Ashe, 1899. Isotypes, NY.  
*P. xanthospermum* Scribner & Mohr, 1901. Holotype, US.  
*P. praecocius* Hitchcock & Chase, 1906. Holotype, US; isotype, NY.  
*P. olivaceum* Hitchcock & Chase, 1910.  
*P. villosissimum* var. *pseudopubescens* Fernald, 1934.  
*P. euchlamydeum* Shinnars, 1944. Isotype, US.  
*Dichanthelium lanuginosum* (Elliott) Gould var. *villosissimum* (Nash) Gould, Brittonia 26: 60. 1974.  
*Panicum lanuginosum* var. *praecocius* (Hitchcock & Chase) McNeill & Dore, Naturaliste Canad. 103. 1976.  
*Dichanthelium villosissimum* (Nash) Freckmann, Phytologia 39: 270. 1978.  
*D. villosissimum* (Nash) Freckmann var. *praecocius* (Hitchcock & Chase) Freckmann, Phytologia 39: 270. 1978.

Plants mostly 20–60 cm tall. *Culm nodes* bearded with long, soft, spreading hairs. *Sheath* villous with papilla-based hairs, 2–5 mm long, these spreading or reflexed on at least some sheaths. *Ligules* usually with hairs 3–5 mm long, occasionally some of the lateral hairs 1 mm or less long. *Blades* 6–10 cm long and 5–10 mm broad, usually pilose on both surfaces, the adaxial surface with hairs 2–4 mm long. *Spikelets* puberulent, elliptic, 1.8–2.7 mm long.

**HABITAT AND DISTRIBUTION.** Woods and woods borders, brushy or recently cleared pastures, usually in sandy soil. Throughout the eastern half of the United States, Connecticut and New York south to Florida and west to Minnesota, Nebraska, Kansas, Texas, and California; also eastern Mexico.

Plants in the northern part of the range with relatively small spikelets (1.8–2.4 mm long) and leaf surfaces tending to be papillate-strigose rather than villous have commonly been referred to *Panicum praecocius* Hitchcock & Chase.

Gray, in proposing the name *Panicum nitidum* var. *villosum*, listed in synonymy “*P. pubescens* Lam’k. Enc. Meth. IV. p. 748? Muhl. Gram. p. 116?” Hitchcock & Chase (1910) list *Panicum pubescens* Lamarck as a synonym of *P. scoparium* Lamarck.

- 26C. **D. acuminatum** (Swartz) Gould & Clark var. **thurowii** (Scribner & Smith) Gould & Clark, comb. et stat. nov. TYPE: Texas, Waller Co., F. W. Thurow 9. Holotype, US.

**BASIONYM:** *Panicum thurowii* Scribner & Smith, U.S.D.A. Div. Agrost. Circ. 16: 5. 1899. Holotype, US.

*Culms* stout, 40–70(–80) cm tall, with well-spaced nodes, the nodes bearded with spreading hairs, usually with a glabrous ring below. *Sheaths* densely to sparsely villous. *Ligule* a dense ring of hairs 3–4 mm long. *Blades* 7–12 cm long, 6–10 mm broad, velvety-villous on the abaxial surface, the adaxial surface more or less pilose. *Panicles* 9–11 cm long. *Spikelets* elliptic-obovate, pubescent, 1.8–2 mm long, rounded or broadly pointed at the apex. *First glume* very short and broad,  $\frac{1}{5}$ – $\frac{1}{4}$  as long as the spikelet.

**HABITAT AND DISTRIBUTION.** In dry woods, woods borders and brushy pastures. Occasional in Georgia, Alabama, Arkansas, Louisiana, and eastern Texas.

- 26D. **D. acuminatum** (Swartz) Gould & Clark var. **implicatum** (Scribner) Gould & Clark, comb. nov. TYPE: Maine, Cape Elizabeth, *F. Lamson-Scribner* in 1895. Holotype, US; isotype, NY.

BASIONYM: *Panicum implicatum* Scribner, U.S.D.A. Dept. Agr. Div. Agrost. Bull. 11: 43. 1898. Holotype, US; isotype, NY.

SYNONYMS: *Panicum velutinum* Bosc, 1825, not Meyer, 1818.

*P. leucothrix* Nash, 1897. Holotype, NY; isotypes, NY, TAES, US.

*P. parvispiculum* Nash, 1897. Holotype, NY, fragment and photo of holotype, US; isotypes, NY.

*P. microphyllum* Ashe, 1898. Isolectotypes, NY, US.

*P. meridionale* Ashe, 1898. Lectotype, US.

*P. filiculme* Ashe, 1898.

*P. curtifolium* Nash, 1899. Holotype, NY.

*P. earlei* Nash, 1899. Holotype, NY.

*P. albemarlense* Ashe, 1900. Lectotype, US.

*P. auburne* Ashe, 1900.

*P. austro-montanum* Ashe, 1900.

*P. unciphyllum* Trinius var. *implicatum* (Scribner) Scribner & Merrill, 1901.

*P. unciphyllum* var. *meridionale* (Ashe) Scribner & Merrill, 1901.

*P. lindheimeri* Nash var. *implicatum* subvar. *meridionale* (Ashe) Farwell, 1928.

*P. meridionale* var. *albermarlense* (Ashe) Fernald, 1934.

*P. lanuginosum* Elliott var. *implicatum* (Scribner) Fernald, 1934.

*P. lanuginosum* var. *implicatum* subvar. *meridionale* (Ashe) Farwell, 1941.

*Dichanthelium meridionale* (Ashe) Freckmann, Phytologia 39: 270. 1978.

*Culms* 10–60(–70) cm tall, pilose on the lower internodes, the nodes puberulent. *Sheaths*, at least the lower ones, puberulent or papillose-pilose. *Ligules* 1–5 mm long. *Blades* firm, strigose or puberulent to nearly glabrous on the surfaces, often with a few long hairs interspersed with the short ones, mostly 2–6 cm long and 2–5 mm broad. *Spikelets* puberulent, elliptic to subspherical, slightly pointed, 1.2–1.5 mm long. *First glume* broad, about  $\frac{1}{4}$  as long as the spikelet.

HABITAT AND DISTRIBUTION. In sandy woodlands and cleared woodland areas, occasionally in low, marshy, pine, cedar, and hemlock forest. Nova Scotia, New Brunswick, Quebec, Ontario, Maine, New York, Michigan, Wisconsin, Minnesota, North Dakota, Nebraska, and south to Florida and Texas; also in Cuba.

- 26E. **D. acuminatum** (Swartz) Gould & Clark var. **wrightianum** (Scribner) Gould & Clark, comb. et stat. nov. TYPE: Cuba, *C. Wright* 3463. Holotype, US; isotype, MO.

BASIONYM: *Panicum wrightianum* Scribner, U.S.D.A. Div. Agrost. Bull. 11: 44. fig. 4. 1898.

SYNONYMS: *Panicum strictum* Bosc ex Roemer & Schultes, 1817, not R. Br., 1810.

*P. minutulum* Desvaux, 1833, not Gaudin, 1826.

*P. deminutivum* Peck, 1907. Holotype, NY; isotypes, US.

*Culms* slender, weak, usually decumbent at the base, minutely puberulent at least on the lower internodes, 15–40(–50) cm tall. *Sheaths* shorter than the internodes, glabrous or puberulent on the back, ciliate on the margins and on the sides of the collar. *Blades* usually puberulent to pilose on both surfaces. *Panicles* open, 3–6 cm long, the minute spikelets long-pediceled. *Spikelets* puberulent, elliptic, pointed at the apex, ca. 1 mm long.

HABITAT AND DISTRIBUTION. In moist, sandy or muddy swamps, swales, and

boggy shorelines. Along the Coastal Plain, Massachusetts and New York to Florida and west to Louisiana and Texas.

- 26F. *D. acuminatum* (Swartz) Gould & Clark var. *densiflorum* (Rand & Redfield) Gould & Clark, comb. nov. TYPE: Maine. Mt. Desert shore of Ripples Pond, *Rand* in 1892.

BASIONYM: *Panicum nitidum* Lamarck var. *densiflorum* Rand & Redfield, Fl. Mt. Desert 174. 1894.

SYNONYMS: *Panicum spretum* Schultes, 1824.

*P. eatoni* Nash, 1898. Holotype, NY.

*P. octonodum* Smith, 1899. Isotypes, NY, US.

*P. paucipilum* Nash, 1899. Holotype, NY; isotypes, NY, US.

*P. nitidum* var. *octonodum* (Smith) Scribner & Merrill, 1901.

*Sheaths* glabrous on the back or the lower ones occasionally slightly puberulent, the margins usually ciliate above. *Ligules* usually 2–3 mm long. *Blades of culm leaves* 7–10 cm long, 4–8 mm broad, usually long-ciliate at the rounded base. *Panicle* 7–12 cm long,  $\frac{1}{4}$ – $\frac{1}{3}$  as broad as long, relatively many-flowered. *Spikelets* puberulent, elliptic, broadly pointed, 1.4–1.8 mm long. *First glume* very short.

HABITAT AND DISTRIBUTION. Usually in moist, sandy soil. Occasional on the Coastal Plain, Maine to northern Florida, Louisiana, and eastern Texas.

- 26G. *D. acuminatum* (Swartz) Gould & Clark var. *lindheimeri* (Nash) Gould & Clark, comb. nov. TYPE: Texas, Comal Co., New Braunfels, *Lindheimer* 565. Holotype, NY; isotypes, MO, NY.

BASIONYM: *Panicum lindheimeri* Nash, Bull. Torrey Bot. Club 24: 196. 1897.

SYNONYMS: *Panicum funstoni* Scribner & Merrill, 1901. Holotype, US.

*P. lindheimeri* var. *typicum* Fernald, 1921.

*P. lanuginosum* Elliott var. *lindheimeri* (Nash) Fernald, 1934.

*Dichanthelium lindheimeri* (Nash) Gould, Brittonia 26: 60. 1974.

*D. lanuginosum* var. *lindheimeri* (Nash) Freckmann, Phytologia 39: 270. 1978.

*Culms* slender, 30–70(–90) cm tall, glabrous or the internodes sparsely pilose, soon “bushy-branched” at the upper nodes to produce fascicles of small inflorescences. *Sheaths* glabrous on the back, glabrous or pilose on the margins. *Ligules* dense, 2–5 mm long. *Blades* bright green, glabrous or essentially so, 3–9(–15) cm long and 3–11 mm broad. *Panicles* open, 4–7(–10) cm long. *Spikelets* puberulent, elliptic or slightly obovate, 1–2 mm long.

HABITAT AND DISTRIBUTION. This grass usually is in woodlands and along woods borders, but also grows on open roadsides and in open pastures. Widespread throughout eastern and central North America, from southern New Brunswick, Ontario, and Manitoba southward, but absent or infrequent west of eastern Iowa, Kansas, and Oklahoma; a few records from Oregon, California and north-eastern Mexico. It is common throughout the eastern two-thirds of Texas.

- 26H. *D. acuminatum* (Swartz) Gould & Clark var. *longiligulatum* (Nash) Gould & Clark, comb. et stat. nov. TYPE: Florida, Apalachicola, *Vasey*, 1892. Holotype, NY.

BASIONYM: *Panicum longiligulatum* Nash, Bull. Torrey Bot. Club 26: 574. 1899.

*Culms* glabrous, usually stout, to 70 cm tall. *Sheaths* glabrous on the back, often ciliate on the margins. *Ligules* 2–3 mm long. *Blades* rather thick, glabrous on the adaxial surface, puberulent on the abaxial surface, 4–8 cm long, 4–8 mm broad. *Spikelets* puberulent, elliptic, 1.1–1.3 mm long, rounded or broadly pointed at the apex. *First glume* about  $\frac{1}{4}$  as long as the spikelet.

HABITAT AND DISTRIBUTION. Coastal Plain, Pennsylvania and New Jersey to Florida; also in Tennessee and eastern Texas.

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