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## IOWA SPECIES OF AGROPYRON

D. W. AUGUSTINE

The species of *Agropyron* constitute a highly variable group. Especially is this true of forms occurring in the western part of the United States. The ones found in Iowa, although fewer in number and often clear cut in character, frequently present difficulties in classification. It is the purpose of this paper to clarify some of these difficulties and to point out the more constant characters. The more common variations observed by the author are also described. Distribution maps were also made, based upon material in the herbaria at Iowa State College, Grinnell College and the University of Iowa. Further distribution was recorded by personal observation and collection. Although not entirely complete, the material available does indicate the general distribution in the state.

To clarify any confusion of names a brief synonymy is given. Both the synonymy and nomenclature in this paper are taken from A. S. Hitchcock's "Manual of the Grasses of the United States." Because herbarium specimens and material sent in for identification are often incomplete, quite often lacking the root system or the underground stems, a key has been made based principally upon spikelet characters. However, vegetative characters are important and are often useful in quick identification of the species. Another key presented which may be helpful is one based on vegetative characters. It is hoped that this may prove useful in classifying fragments of *Agropyron* which are sometimes sent in for identification.

The *Hordeae* tribe of the *Gramineae* may be simply characterized as having spikelets which are one to several flowered and are placed on opposite sides of a jointed or continuous rachis forming a symmetrical spike. The genus *Agropyron* contains grasses having the following characters<sup>1</sup>: spikelets several-flowered, solitary (rarely in pairs), sessile, placed flatwise at each joint of a continuous (rarely disarticulating) rachis, the rachilla disarticulating above the glumes and between the florets; glumes equal, firm, several-nerved, rarely 2- or 1-nerved or nerveless, usually shorter than the first lemma, acute or awned, rarely obtuse or notched;

<sup>1</sup> A. S. Hitchcock "Manual of the Grasses of the United States," p. 229.

lemmas convex on the back, rather firm, 5 to 7-nerved, acute or awned from the apex; palea about as long as the lemma.

The species described in this paper are all perennial plants.

Key to Iowa species of *Agropyron* based principally on spikelet characters.

1. Glumes much shorter than the spikelets; internodes of the rachilla scaberulous or scabrous-pubescent.
  - (a) Glumes acute or abruptly awn-pointed, strongly nerved, blades flat, spikelets 4- to 6-flowered.....*A. repens*
  - (b) Glumes gradually tapering to a short awn, usually faintly nerved, blades involute in drying, spikelets 6- to 12-flowered.....*A. Smithii*
2. Glumes broad and nearly as long as the spikelets; internodes of the rachilla villous or villous-pubescent.
  - (a) Spikelets awnless or nearly so; spike 10 to 25 cm. long  
— *A. pauciflorum*
  - (b) Spikelets long awned; spike 6 to 15 cm. long.....*A. subsecundum*

Key to Iowa species of *Agropyron* based upon vegetative characters.

- (1) Plants with creeping rhizomes; culms few or solitary.
  - (a) Blades usually over 5 mm. broad, flat, bright green, not strongly nerved, sheaths of the innovations often pubescent; rhizome yellowish .....*A. repens*
  - (b) Blades usually less than 5 mm. broad, bluish green, strongly nerved, involute in drying, sheaths glabrous; rhizomes lighter colored .....*A. Smithii*
- (2) Plants without creeping rhizomes; culms tufted.
  - (a) Blades 2 to 4 mm. wide, mostly flat, usually strongly nerved and scabrous, ligules less than 5 mm. long; culms mostly 50 to 100 cm. tall.....*A. pauciflorum*
  - (b) Blades 3 to 8 mm. wide, usually flat or involute, strongly nerved, scabrous, ligules about 5 mm. long, culms mostly taller .....*A. subsecundum*

The following descriptions are, with slight variations, the same as are found in A. S. Hitchcock's "Manual of the Grasses of the United States." Additional comments are those of the author or as otherwise designated.

1. AGROPYRON REPENS (L.) Beauv.

Couch, Quitch, Quick or Quack Grass.

Green or glaucous; culms curved at the base or erect, 50 to 100 cm. tall, sometimes taller, with creeping yellowish rhizomes; sheaths of the innovations often pubescent; blades relatively thin, flat, usually sparsely pilose on the upper surface, mostly 6 to 10 mm. wide; spike 5 to 15 cm. long, the rachis scabrous on the angles; spikelets mostly 4- to 6-flowered, 1 to 1.5 cm. long, the rachilla glabrous or scaberulous; glumes 3- to 7-nerved, awn-pointed; lemmas mostly 8 to 10 mm. long, the awn from less than 1 mm.

long to as long as the lemma; palea obtuse, nearly as long as the lemma, scabrous on the keels.

Iowa:<sup>2</sup> Dubuque, June 22, 1918, *Pammel*; Chickasaw Co., 1925, *Spiker*; Winneshiek Co., near Calmar, Sept. 5, 1934, *Tolstead*; Decatur Co., July 13, 1903, *Anderson*; Creston, July 6, 1892, *F. C. Stewart*; Bloomfield, July 10, 1918, *Warner*; Goldfield, July 12, 1919, *Cratty*; Winterset, June, 1926, *County Auditor*; Grundy Center, June 22, 1901, *Paddock 3205*; Mtfl Ayr, June 23, 1922, *Bliss*; Emmet Co., July 1, 1922, *Wolden 474*; Rockwell City, July 20, 1920, *Scott*; Emmet Co., 1909, *Paige*; Armstrong, Emmet Co., 1927, *Helgason*; Ft. Dodge, *Paige*; Dickinson Co., Aug., 1921, *Cratty*; Ames, 1891, *Rolfs*; Vinton, July, 1925, *Will*; Jamaica, Dallas Co., July, 1918, *Thompson*; Algona, Aug. 30, 1928, *Cratty*; Eldora, June, 1925, *Pammel*; Clinton, June 13, 1913, *Pammel 11*; Alden, July 10, 1895, *Stevens 1133*; Decorah, July 14, 1914, *Cratty*. (See Fig. 1.)

There are several variations of *Agropyron repens* found in Iowa. All of them are more or less intergrading. There are however, striking forms which occasionally are found. Fernald lists one variety and several forms.<sup>3</sup> Variety *subulatum* is listed as occurring in Iowa. It is characterized as having lanceolate inrolled glumes which gradually taper from the middle toward the apex. Two forms which sometimes appear to be distinct are *Agropyron repens* forma *trichorrhachis* and *Agropyron repens* forma *pilosum*. The form *trichorrhachis* has broad acute glumes with scarious margins. The rachis is pilose or hirsute. The form *pilosum* also has the broad glumes with scarious margins and the villous or hirsute rachis but differs in having definite awns.

Some of these variations of *Agropyron repens* were observed in the material studied. However in the Iowa material these variations seemed to intergrade, so they are not recognized as true forms in this paper. Only one of these forms is listed by Fernald as occurring in Iowa.

*Agropyron repens* is usually considered to be a troublesome weed especially in cultivated fields. It is of value however in checking erosion, and it also has some forage value. It is commonly found in waste ground, meadows, pastures, roadsides and similar places.

## 2. AGROPYRON SMITHII Rydb.

*A. spicatum* (Pursh) Scribner & Smith, U. S. Dept. Agr. Div. of Agrost. Bull. 4: 33. 1897, in the sense of Scribner & Smith but not of Pursh.

*A. occidentale* Scribn., U. S. Dept. Agr. Div. Agrost. Circ. 27: 9. 1900. Blue Joint or Bluestem or Western Wheat Grass.

Usually glaucous and blue-green; culms erect, 30 to 60 cm. tall, sometimes taller, with creeping rhizomes; sheaths glabrous; blades firm, stiff, strongly

<sup>2</sup> All the specimens cited in this paper are in the herbarium of Iowa State College.

<sup>3</sup> Rhodora 35:182. 1937.

nerved, scabrous or sometimes sparsely villous on the upper surface, mostly 2 to 4 mm. wide, tapering to a sharp point; spike erect, mostly 7 to 15 cm. long, the rachis scabrous on the angles; spikelets rather closely imbricate, occasionally two at a node, 6- to 10-flowered, 1 to 2 cm. long, the rachilla scabrous or scabrous-pubescent; glumes rigid, tapering to a short awn, rather faintly nerved, 10 to 12 mm. long; lemmas about 1 cm. long, firm, glabrous, often pubescent near the base, obscurely nerved, acuminate, mucronate, sometimes short-awned; palea scabrous-pubescent on the keels.

*Iowa*: Goldfield, July 12, 1919, *Cratty*; Iowa Falls, Oct. 3, 1923, *Shepherd*; Mason City, June 23, 1918, *Pammel*; Paton, July 7, 1925, *Wilson*; West Bend, July 10, 1919, *Cratty*; Northboro, July 11, 1927, *Boylard*; Oak View State Park, north of Hawarden, July 13, 1934, *Fulfs 2735*; Ellsworth, Emmet Co., July, 1922, *Wolden 514*; Ft. Dodge, *Paige*; Odebolt, June 29, 1922, *J. D. McCorkindale*; Sand mounds south of Muscatine, Summer, 1935, *Estle and Brown*; Clarion, *Richards*; Pilot Mount, August 10, 1901, *King & A. MacCorkindale 3056*, Marathon, July 21, 1908, *Pammel 31*; Lake Mills, July 29, 1918, *Pammel*; 3 miles s.w. of Ft. Dodge, Sept. 5, 1934, *Fulfs 2840*; Lee Co., *Fulfs 1271*; Jewell Junction, July 4, 1895, *Carver*. (See Fig. 2.)

The species, *A. Smithii*, is usually the most quickly recognizable by its 6 to 12-flowered spikelets, rigid tapering glumes, its rhizomes, and the blades, which are usually involute in drying. Plants in the field or recently collected specimens of this species quite often have a bluish-green color.

*Agropyron Smithii* is found most often in moist, usually alkaline soil and forms thick mats of vegetation. It is a valuable forage grass and also a soil binder. Its growth as a forage grass is encouraged by stockmen.

### 3. AGROPYRON PAUCIFLORUM (Schwein.) Hitchc., Am. Jour. Bot. 21: 132. 1934.

*Agropyron tenerum* Vasey, Bot. Gaz. 10: 258. 1885.

Slender Wheat Grass.

Resembling *A. subsecundum*; sheaths glabrous or rarely pubescent; blades mostly 2 to 4 mm. wide; spike usually more slender, 10 to 25 cm. long, sometimes unilateral; spikelets from rather remote to closely imbricate; glumes and lemmas awnless or nearly so.

*Iowa*: Decorah, July 28, 1934, *L. H. and Lois Pammel*; Belmont, July 13, 1930, *Pammel & McNutt*; Coon Rapids, July 26, 1921, *Pammel*; Ellsworth, Emmet Co., July 1, 1922, *Wolden 513*; Lime Creek, Forest City, July 28, 1918, *Pammel*; Ft. Dodge, *Paige*; N. E. Iowa, July 17, 1899, *God-dard*; Rockwell City, July 4, 1928, *County Agent*; Storm Lake, July 14, 1934, *Fulfs 2756*; Humbolt, July 28, 1926, *Pammel 200*; Ceylin, July 11, 1901, *Pammel*; Ames, July 9, 1892, *Stewart*; Armstrong, July 3, 1903, *Pammel*; West Bend, July 10, 1919, *Cratty*; Ames, June 27, 1893, *Stewart*; Armstrong, July 3, 1902, *Pammel*; Armstrong, July 19, 1891, *Cratty*; Ames, 1895, *Carver 1117*; Traer, July 28, 1919, *Zohne*; Storm Lake, June 6, 1923, *Pammel*; Buena Vista Co., Aug. 2, 1926, *Hayden*; Emmetsburg, July 5,

1921, *Pammel*; 3 mi. s.e. of Ft. Dodge, Sept. 5, 1934, *Fulfs* 2839; Chickasaw Co., July 18, 1926, *Spiker*. (See Fig. 3.)

This species is most easily recognized by the few-flowered spikelets, the pubescent to villous (rarely scabrous) rachilla and the broad glumes which are usually about as long as the spikelet. Rhizomes were noted by the author on a few specimens but their occurrence is rare. Several varieties have been recognized by other investigators.

*A. pauciflorum* is found usually in moist, often rather sandy soils in Iowa. However, it does not always occur where moist soil conditions exist. Especially is this true of sections of the western United States where it often forms a prominent part of the bunch-grass prairie. *A. pauciflorum* is a valuable forage grass and its seed is sometimes sold under the trade name of Slender Wheat Grass.

3a. The following specimens have rhizomes or appear to be rhizomatous because of decumbent culms and could possibly be referred to as *Agropyron pseudorepens* Scribn., & Smith.

Iowa: Dolliver, July 6, 1926, *Pammel* 1233; Dickens, Sept. 10, 1934, *Fulfs* 2908; Mason City, August 12, 1922, *Pammel*; Armstrong, Emmet Co., June 22, 1898, *Cratty*.

4. AGROPYRON SUBSECUNDUM (Link) Hitchc., Am. Jour. Bot. 21: 131. 1934.

*A. Richardsonii* Schrad. *Linnaea* 12: 467. 1938.

*A. caninum* of many manuals.

Bearded Wheat Grass.

Green or glaucous, without creeping rhizomes; culms tufted, erect, 50 to 100 cm. tall; sheaths glabrous or rarely pubescent; blades flat, 3 to 8 mm. wide; spike erect or slightly nodding, 6 to 15 cm. long, sometimes unilateral from twisting of the spikelets to one side, the rachis scabrous or scabrous-ciliate on the angles, sometimes diarticulating; spikelets rather closely imbricate; few-flowered, the rachilla villous, the callus of the florets short-pilose; glumes broad, rather prominently 4 to 7-nerved, nearly as long as the spikelet, tapering into an awn; lemmas obscurely 5-nerved, the nerves becoming prominent toward the tip, the awn straight or nearly so, usually 1 to 3 cm. long.

Iowa: West Bend, July 10, 1919, *Cratty*; Dickinson Co., west of Miller's Bay, July 19, 1920, *Cratty*; Ames, June 22, 1897, *Combs & Ball* 769; Palo Alto Co., Highland Twp., Sec. 24, July 15, 1937, *Hayden* 7089; Armstrong, Emmet Co., July, 1893, *Cratty*; Estherville, Oak Hill, July 12, 1922, *Wolden* 533; Armstrong, Emmet Co., Aug., 1899, *Cratty*; Ames, June 22, 1897, *Ball & Combs* 38; South shore of Lake Okoboji, *Hitchcock*;  $\frac{1}{4}$  mi. w. Ruthven, Palo Alto Co., Sept. 8, 1934, *Fulfs* 2895; Osage, July 18, 1918, *Cratty*; Armstrong, July 1, 1901, *Pammel* 3264; Ames, July 8, 1890, *Simms*; Miller's Bay, July 23, 1913, *Cox & Pammel*; Cedar Falls, *Carver*. (See Fig. 4.)

DISTRIBUTION OF IOWA SPECIES OF AGROPYRON

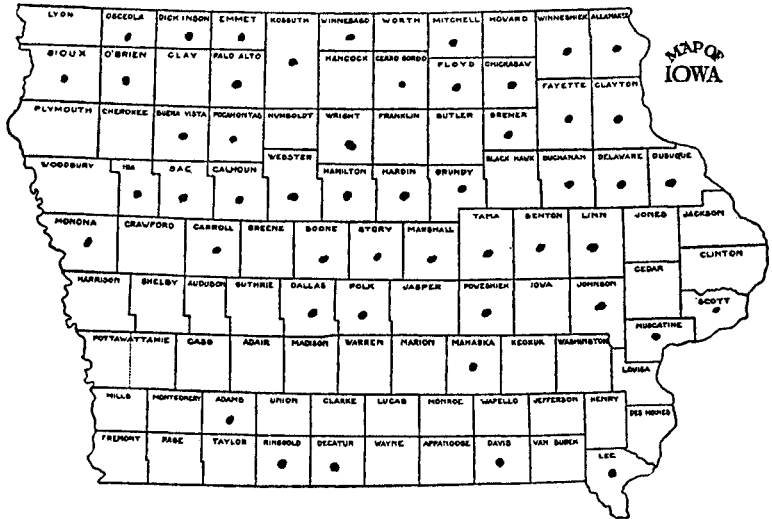


Fig. 1. *Agropyron repens* (L.) Beauv.

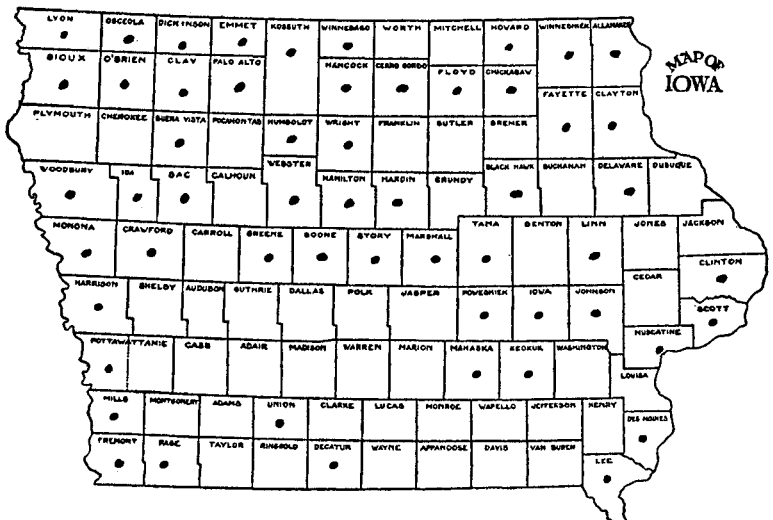


Fig. 2. *Agropyron Smithii* Rydb.

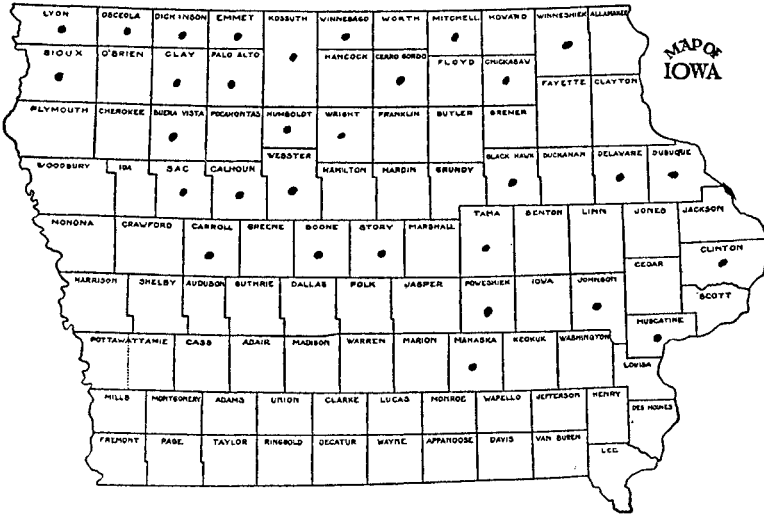


Fig. 3. *Agropyron pauciflorum* (Schwein.) Hitchc.

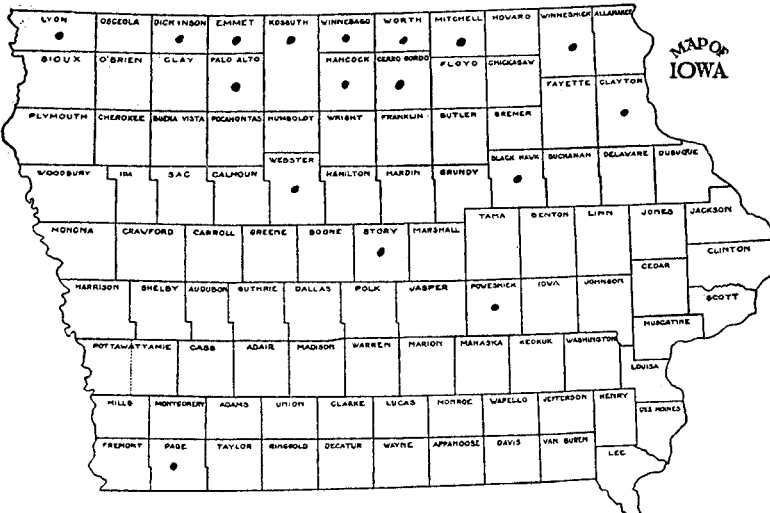


Fig. 4. *Agropyron subsecundum* (Link) Hitchc.



This species is most easily recognized by its long awns and broad glumes. The villosity of the rachilla may vary somewhat in different specimens. Occasionally rhizomatous specimens are found but this is rare.

*A. subsecundum* is also a valuable forage grass. It is usually found in moist soil of the prairie or in open woods. Like *A. pauciflorum*, it is a tufted grass. It forms an important part of the flora in sections of western United States but unfortunately appears to be only scattering in Iowa.

There are two other species of *Agropyron* that are likely to be adventive in the state. *Agropyron cristatum* (L.) Beauv. occurs in the Dakotas and in Kansas and Nebraska. It seems likely therefore that it might be found in northern and western Iowa. Similarly *Agropyron dasystachyum* (Hook.) Scribn. is found in Michigan, Illinois, Kansas and the Dakotas. Neither of these species were found in the material studied by the author. Their occurrence in territories adjacent to Iowa, however, would indicate that they could easily exist in the state.

#### ACKNOWLEDGMENTS

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DEPARTMENT OF BOTANY,  
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