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Sixth Annual Report of the Botanist

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Charles E. Bessey was Professor of Botany at the
University of Nebraska, beginning in 1884.



Charles Edwin Bessey (1845-1915)

SIXTH ANNUAL REPORT OF THE BOTANIST.

BY CHARLES E. BESSEY, PH. D., BOTANIST FOR THE BOARD.

Gentlemen of the State Board of Agriculture: I have the honor to present herewith my sixth annual report, as your official botanist, for the year 1891:

GRASSES AT THE STATE FAIR.

There were fifteen collections of grasses at the State Fair in September, 1891, but not all were entered for the premiums which you offered for "the best and largest collection of native grasses from any part of the state." These were distributed as follows:

NORTHEASTERN COUNTIES—

Boyd.....	12 kinds of grasses.
Cuming.....	57 kinds of grasses, and 3 clovers.
Holt.....	36 kinds of grasses, and 3 clovers.
Keya Paha	28 kinds of grasses.

NORTHWESTERN COUNTIES—

Cherry	107 kinds of grasses.
Sheridan.....	38 kinds of grasses, and 2 clovers.

SOUTHWESTERN COUNTIES—

Chase.....	71 kinds of grasses.
Dundy	60 kinds of grasses, and 2 clovers.
Hayes.....	31 kinds of grasses, and 3 clovers.
Red Willow.....	17 kinds of grasses.

CENTRAL COUNTIES—

Buffalo.....	24 kinds of grasses, and 2 clovers.
Greeley.....	12 kinds of grasses, and 1 clover.
Kearney.....	48 kinds of grasses, and 4 clovers.
Merrick	25 kinds of grasses, and 1 clover.
Sherman.....	13 kinds of grasses.

Some of these collections were most excellently prepared, the bunches being neatly tied, and arranged upon the walls with great skill. It is evident that the small expenditure involved in the payment of this premium on grasses adds greatly to the attractiveness of Agricultural Hall. It has also become of a good deal of educational value. I find that each year there is shown a greater amount of exact knowledge as to our native grasses by those who bring collections, and those who visit the Fair.

THE WEEDS OF NEBRASKA.

Although Nebraska is still a new state, many weeds have already shown themselves upon our rich soil, and the farmers and gardeners are compelled to wage a bitter and unceasing warfare upon these unwelcome plants. An examination of the flora of the state shows that there are fully one hundred plants in Nebraska which are properly called weeds, and whose presence in meadows and cultivated fields is harmful. Selecting those which are the worst, the following list of the first twelve is submitted. I shall be glad to receive criticisms upon this list, and suggestions of additions or changes:

1. Sand-bur (*Cenchrus tribuloides* L.). A great pest, especially in the eastern portion of the state.
2. Milkweed (*Asclepias syriaca* L.). Troublesome in fields in eastern Nebraska.
3. Buffalo-bur (*Solanum rostratum* Dunal). A rapidly spreading weed in the southern half of the state.
4. Sunflower (*Helianthus annuus* L.). One of the most abundant of Nebraska weeds.
5. Horseweed (*Erigeron canadense* L.). In grain fields and pastures late in the season; in eastern Nebraska.
6. Big Ragweed (*Ambrosia trifida* L.). In fields and by roadsides in eastern Nebraska.
7. Bitterweed (*Ambrosia artemisiifolia* L.). In fields and by roadsides in eastern Nebraska.
8. Squirrel-tail Grass (*Hordeum jubatum* L.). A widely distributed weed of the early part of the season.
9. Cockle-bur (*Xanthium canadense* Mill.). Too well known in eastern Nebraska.
10. Porcupine Grass (*Stipa spartea* Trin.). A pest in prairie pastures in the greater part of the state, but most abundant eastward. In the west it is largely replaced by the more slender Needle Grass (*Stipa comata* Tr. & Rpr.).
11. Purslane (*Portulaca oleracea* L.). A native of the old world, now abundant throughout the state.
12. Heartsease (*Polygonum terrestre* (Willd.) B. S. P.) A troublesome weed in corn fields, widely distributed.

In some localities in the eastern counties the Creeping Thistle (*Cnicus arvensis* (L.) Hoff.), commonly called the "Canada Thistle," is coming in. Prompt measures should be taken to eradicate this vile weed wherever it makes its appearance. Our rich soil is likely to produce such a rank growth of the underground stems as to make it unusually difficult to destroy it when once well started.

The Ox-Eye Daisy, or Whiteweed (*Chrysanthemum leucanthemum* L.), has made its appearance in the eastern counties. Between Lincoln and Omaha there are several fields which, last year, were white with the pretty, but undesirable, flowers. It must be promptly dealt with, or Nebraska farmers will soon have to wage a perennial warfare upon it, just as their fathers have in the eastern states. It will be much wiser not to allow it to get a foothold.

Within a few years we have heard a great deal about a weed which is spreading in the northern counties, and to which the name "Russian Thistle" has been given. I have taken pains to investigate the plant and find that it is not a thistle at all, but

a near relative of the common Lamb's Quarters. Its scientific name is *Salsola kali* L., and its proper English name is Prickly Saltwort. In order that it may be readily recognized I copy Bentham's description, as follows:

"Prickly Saltwort (*Salsola kali* L.). A procumbent, glabrous annual, with a hard, much-branched stem, six inches to near a foot long. Leaves all ending in stout prickles, the lowest semi-cylindrical, linear, slightly enlarged at the base; the uppermost shorter and broader, nearly triangular. Flowers sessile in the upper axils. The appendage of the perianth spreads horizontally over the fruit, but is usually shorter than the surrounding floral leaves or bracts."

I desire to invite correspondence upon the subject of weeds. Any plant which is weedy in its habits should be watched. Send a specimen of the plant, in flower or fruit, wrapped securely in a newspaper. The postage on such packages is one cent for each ounce. Address me at the State University, Lincoln, Nebraska.

A PRELIMINARY LIST OF THE GRASSES OF NEBRASKA.

In order to enable those who are studying our grasses to know what has already been accomplished, I have prepared the following preliminary list of the species which grow wild, or which have escaped from cultivation and maintain themselves without our care. I have followed Hackel's arrangement, as given in his recent work on grasses, and have revised the English names mainly in accordance with Professor F. L. Scribner's Index to Grass Names, in the Proceedings of the Society for the Promotion of Agricultural Science, for 1890. It is hoped that these English names will be used as here given, in order that there may be less confusion in popular discussions where English and not scientific names are used.

As will be seen, the list contains one hundred and fifty-four numbers, representing one hundred and forty-two different species and twelve varieties. These, moreover, belong to fifty-one genera, which are distributed through ten of the thirteen tribes into which Hackel subdivides the grasses of the whole world. Of the one hundred and fifty-four grasses here enumerated, one hundred and thirty-six appear to be indigenous, while eighteen have been introduced. The latter are distinguished in the list by being printed in SMALL CAPITALS.

Tribe I--Maydeæ.

1. Gama Grass (*Tripsacum dactyloides* L.). A large corn-like grass five to six feet high, growing in wet lands in Cass and Nemaha counties.

Tribe II--Andropogoneæ.

2. Turkey-foot (*Andropogon hallii* Hack.). A large grass with a white hairy top, growing in bunches in the western half of the state.
3. Bushy Blue Stem (*Andropogon nutans* L.). A very common large grass; throughout the state.
4. Big Blue Stem (*Andropogon provincialis* Lam.). The tallest of our blue stem grasses; throughout the state.
5. Little Blue Stem (*Andropogon scoparius* Michx.). From two to two and a half feet high and usually reddish in color; throughout the state.
6. Johnson Grass (*Andropogon sorghum* Brot., var. *HALAPENSIS* Hack.). A tall cultivated grass, which is grown for forage in counties in the south half of the state.

Tribe V—Paniceæ.

7. Bead Grass (*Paspalum setaceum* Michx.). A low grass with bead-like grains widely distributed.
8. Red-Top Panic (*Panicum agrostoides* Muhl.). A bushy grass of little value; not common.
9. Old Witch Grass (*Panicum capillare* L.). A low weedy grass which is too common throughout the state.
10. Old Witch Grass (*Panicum capillare* L., var. *macrospermum* Vasey). Resembling the preceding, but with larger grains; western Nebraska.
11. Barn-yard Grass (*Panicum crus-galli* L.). A well known weedy grass; throughout the state. (Introduced?)
12. Bristly Barn-yard Grass (*Panicum crus-galli* L., var. *hispidum* (Muhl.) Torr.). Like the preceding, but bristly; throughout the state. (Introduced?)
13. Panic Grass (*Panicum depauperatum* Muhl.). A low prairie grass; central Nebraska.
14. Panic Grass (*Panicum dichotomum* L.). A low prairie grass; widely distributed.
15. Panic Grass (*Panicum dichotomum* L., var. *barbulatum* (Michx.) Gr.) Much like the preceding; central Nebraska.
16. Slender Crab-Grass (*Panicum filiforme* L.). A slender grass said to occur in the state (Gray's Manual).
17. Sprouting Crab-Grass (*Panicum proliferum* Lam.). A spreading, branching, weedy grass of eastern Nebraska.
18. Crab Grass (*Panicum SANGUINALE* L.). An introduced weedy grass, troublesome in lawns and fields in the eastern half of the state.
19. Small Panic Grass (*Panicum scoparium* Lam.). A low prairie grass, widely distributed.
20. Switch Grass (*Panicum virgatum* L.). A tall grass with a bushy reddish top; throughout the state.
21. Switch Grass (*Panicum virgatum* L., var. *glaucum* Vasey). Like the preceding, but glaucous and smaller; central Nebraska.
22. Switch Grass (*Panicum virgatum* L., var. *confertum* Vasey). A variety found in Banner county.
23. Wilcox's Panic Grass (*Panicum wilcoxianum* Vasey). A very small prairie grass found at Fort Niobrara.
24. Yellow Foxtail (*Setaria GLAUCA* (L.) Beauv.). A well known introduced weedy grass; widely distributed.
25. Green Foxtail (*Setaria VIRIDIS* (L.) Beauv.). Much like the preceding, but greener in color; widely distributed.
26. Millet, or Hungarian Grass (*Setaria ITALICA* (L.) Kunth.). Widely cultivated, and often escaped.
27. Sand-bur (*Cenchrus tribuloides* L.). Too well known in nearly all parts of the state.

Tribe VI—Oryzeæ.

28. Indian Rice (*Zizania aquatica* L.). A tall grass growing in ponds in many parts of the state.
29. Rice Cut-Grass (*Homalocenchrus oryzoides* (L.) Poll.). A rough-leaved grass; in wet places in many parts of the state.

30. Virginia Cut-Grass (*Homalocenchrus virginica* (Willd.) Britt.). Resembling the preceding, but with a more southerly distribution.

Tribe VII—Phalarideæ.

31. Wild Ribbon Grass (*Phalaris arundinacea* L.). A stout grass of wet grounds, widely distributed.
 32. Canary grass (*Phalaris CANARIENSIS* L.). Escaped in many parts of the state.

Tribe VIII—Agrostideæ.

33. Beard Grass (*Aristida basiramea* Engelm.). A low grass on the prairies, especially north and west.
 34. Prairie Triple-awn (*Aristida oligantha* Michx.). Cherry county.
 35. Purple Beard Grass (*Aristida purpurea* Nutt.). A much bearded prairie grass, which is common throughout the state.
 36. Purple Beard Grass (*Aristida purpurea* Nutt., var. *hookeri* Tr.). A variety of the preceding; in western Nebraska.
 37. Long-awned Poverty Grass (*Aristida tuberculosa* Nutt.). Central Nebraska.
 38. Needle Grass (*Stipa comata* Trin. & Rupr.) A well known prairie grass in the western half of the state.
 39. Porcupine Grass (*Stipa spartea* Trin.). Stoutier than the preceding; most abundant in eastern Nebraska.
 40. Feather Bunch-Grass (*Stipa viridula* Trin.). A slender grass with shorter awns; in western Nebraska.
 41. Indian Millet (*Oryzopsis cuspidata* (Nutt.) Benth.). A very pretty prairie grass; in the western and northwestern counties.
 42. Indian Millet (*Oryzopsis micrantha* (Trin. & Rupr.) Thurb.). Resembling the foregoing; central and western Nebraska.
 43. Hairy Muhlenbergia (*Muhlenbergia comata* (Thurb.) Benth.). Said to occur in Nebraska (Coulter's Manual).
 44. Nimble Will (*Muhlenbergia diffusa* Schreb.). A prairie grass of Eastern Nebraska.
 45. Wood Grass (*Muhlenbergia mexicana* (L.) Trin.). In shaded places in many parts of the state.
 46. Wood Grass (*Muhlenbergia mexicana* (L.) Trin., var. *filiformis* Vasey). Eastern Nebraska.
 47. Blow-out Grass (*Muhlenbergia pungens* Thurb.). Sandy places in western half of the state.
 48. Muhlenberg's Grass (*Muhlenbergia racemosa* (Michx.) B. S. P.) A common grass which is very promising as a hay plant; throughout the state.
 49. Muhlenberg's Grass (*Muhlenbergia racemosa* (Michx.) B. S. P., var. *ramosa* Vasey). This much more branched and leafy variety is found westward in the state.
 50. Muhlenberg's Grass (*Muhlenbergia sylvatica* T. & Gr.). Reported from Holt county by Mr. Bates.
 51. Brachyelytrum (*Brachyelytrum aristosum* (Michx.) B. S. P.). Observed only in Cass county.

52. Timothy (*Phleum PRATENSE* L.). A well known meadow grass, which has escaped in many places throughout the state.
53. Mountain Foxtail (*Alopecurus alpinus* Sm.). Prairies, northwest Nebraska.
54. Wild Water-Foxtail (*Alopecurus aristulatus* Michx.). In water or wet places; widely distributed, especially northward.
55. Water Foxtail (*Alopecurus geniculatus* L.). Wet places; eastern Nebraska.
56. Meadow Foxtail (*Alopecurus PRATENSIS* L.). Sparingly escaped from cultivation in eastern Nebraska.
57. Alkali Grass (*Sporobolus airoides* (Steud.) Torr.). On alkali prairies in western Nebraska.
58. Prairie Grass (*Sporobolus asper* (Michx.) Beauv.). Common on prairies in different parts of the state.
59. Prairie Grass (*Sporobolus asperifolius* (N. & M.) Thurb.). Dry prairies, widely distributed.
60. Prairie Grass (*Sporobolus cuspidatus* Torr.). Widely distributed.
61. Prairie Grass (*Sporobolus cryptandrus* (Trin.) Gr.). Common throughout the state.
62. Prairie Grass (*Sporobolus depuperatus* Torr.). Northwestern Nebraska.
63. Wire Grass (*Sporobolus heterolepis* Gray). Apparently not common, though found in the eastern and northern parts of the state.
64. Late Dropseed Grass (*Sporobolus serotinus* (Torr.) Gr.). Western Nebraska.
65. Southern Poverty Grass (*Sporobolus vaginæflorus* (Torr.) Vasey). Roadsides and waste places in eastern Nebraska.
66. Slender Reed-Grass (*Cinna pendula* Trin.). Eastern and northern Nebraska.
67. Herd's Grass (*Agrostis alba* L.). Apparently indigenous from central to western and northwestern Nebraska.
68. Red Top (*Agrostis alba* L., var. *VULGARIS* (With.) Thurb.). Escaped from cultivation in the eastern half of the state.
69. Northern Red Top (*Agrostis cæarata* Trin.). Wet places in northwest Nebraska.
70. Thin Grass (*Agrostis perennans* (Walt.) Tuck.). In eastern Nebraska.
71. Tickle Grass (*Agrostis hiemalis* (Walt.) B. S. P.). A well-known weedy grass of early summer; throughout the state.
72. Blue-Joint Grass (*Calamagrostis canadensis* (Michx.) Beauv.). A stout prairie grass of the western half of the state.
73. Sand Grass (*Calamagrostis confinis* Nutt.). Platte river, in central Nebraska.
74. Yellow Top (*Calamagrostis stricta* Trin.). Common in the western half of the state.
75. Sand Grass (*Calamovilfa longifolia* (Hook.) Scribner). On sandy soil throughout the western half of the state.

Tribe IX—Aveneæ.

76. Purple Wild Oat-Grass (*Avena striata* Michx.). In northwestern Nebraska.
77. Tall Oat-Grass (*Arrhenatherum AVENACEUM* Beauv.). Escaped from cultivation at Lincoln.

Tribe X—Chlorideæ.

78. Cord Grass (*Spartina cynosuroides* (L.) Willd.). A tall grass with long tough leaves, growing in moist lands throughout the state.
79. Little Cord-Grass (*Spartina gracilis* Trin.). A very pretty grass of western Nebraska.
80. Texas Crab-Grass (*Schedonnardus texanus* Steud.). A low weedy grass; throughout the state.
81. Black Grama (*Bouteloua hirsuta* Lag.). Throughout the state, but more abundant westward.
82. Blue Grama (*Bouteloua oligostachya* Torr.). The common Grama throughout the state.
83. Tall Grama (*Bouteloua racemosa* Lag.). Throughout the state.
84. Slough Grass (*Beckmannia eruceiformis* Host.). A rare grass growing in wet places in central and northern Nebraska.
85. Buffalo Grass (*Buchloe dactyloides* Engelm.). This well-known grass was once common throughout the state. It is now rare in eastern Nebraska, but is still abundant in the western counties.

Tribe XI—Festuceæ.

86. False Buffalo Grass (*Munroa squarrosa* Torr.). A low grass of western Nebraska, much like Buffalo Grass, but apparently worthless.
87. Reed Grass (*Phragmites vulgaris* (Lam.) B. S. P.). The tallest of our grasses (eight to twelve feet), growing in ponds throughout the state. On the Platte river lands the stems often extend along the ground for from forty to fifty or more feet, striking root and sending up leafy shoots at each joint.
88. Tall Red Top (*Triodia seslerioides* (Michx.) Benth.). In southeastern Nebraska.
89. Purple Sand-Grass (*Triodia purpurea* (Walt.) Hack.). Cherry county.
90. Blow-out Grass (*Redfieldia flexuosa* Vasey). On sandy land in or about blow-outs; central Nebraska.
91. Spike Grass (*Diplachne fascicularis* (Lam.) Beauv.). Central Nebraska.
92. Hair Grass (*Eragrostis capillaris* (L.) Nees.). Eastern Nebraska.
93. Stink Grass (*Eragrostis* MAJOR Host.). An introduced weed, now widely distributed.
94. Comb Grass (*Eragrostis pectinacea* (Michx.) Gray). A pretty weed of a reddish color; widely distributed.
95. Southern Spear-Grass (*Eragrostis purshii* Schrad.). A widely distributed weed.
96. Creeping Meadow-Grass (*Eragrostis reptans* (Michx.) Nees). A low grass of wet places; common in eastern Nebraska.
97. Blow-out Grass (*Eragrostis tenuis* (Ell.) Gray). A pretty grass of sandy lands in central and northern Nebraska.
98. Early Bunch-Grass (*Eatonia obtusata* (Michx.) Gray). An early grass of the prairies; apparently throughout the state.
99. Early Bunch-Grass (*Eatonia obtusata* (Michx.) Gray, var. *robusta* Vasey). Central and western counties.
100. Eaton's Grass (*Eatonia pennsylvanica* (Spreng.) Gray). Western Nebraska.
101. Wild June-Grass (*Koeleria cristata* Pers.). A common early prairie grass throughout the state.

102. Water Grass (*Catabrosa aquatica* (L.) Beauv.). An aquatic grass of the central and western counties.
103. Porter's Melic-Grass (*Melic porteri* Scribner). Eastern Nebraska.
104. Twin Grass (*Diarrhena americana* Beauv.). Eastern Nebraska.
105. Salt Grass (*Distichlis spicata* (L.) Greene, var. *stricta* Thurber). Common on alkaline soils throughout the state.
106. Orchard Grass (*Dactylis GLOMERATA* L.). Escaped from cultivation in eastern Nebraska.
107. Mountain Spear-Grass (*Poa alpina* L.). Western counties.
108. Wood Spear-Grass (*Poa alsodes* Gr.). Northwestern Nebraska.
109. Bunch Spear-Grass (*Poa andina* Nutt.). Apparently throughout the state.
110. Low Spear-Grass (*Poa ANNUA* L.). Introduced in eastern Nebraska.
111. Spear Grass (*Poa cæsia* Smith). Western counties.
112. Creeping Spear-Grass (*Poa compressa* L.). Eastern and northern counties.
113. Spear Grass (*Poa nemoralis* L.). Northwestern Nebraska.
114. Nevada Spear-Grass (*Poa nevadensis* Vasey). Western counties.
115. Kentucky Blue-Grass (*Poa PRATENSIS* L.). Escaped from cultivation in many parts of the state.
116. False Red-Top (*Poa serotina* Ehrh.). Central to northern counties.
117. Spear Grass (*Poa sylvestris* Gray). Northwestern Nebraska.
118. Oregon Blue-Grass (*Poa tenuifolia* Nutt.). Central to western Nebraska.
119. Reed Meadow-Grass (*Glyceria arundinacea* Kunth.). A tall aquatic grass of central and northern Nebraska. (*G. grandis* Wats.)
121. Fowl Meadow-Grass (*Glyceria nervata* (Willd.) Trin.). An aquatic grass, widely distributed.
122. Pale Manna-Grass (*Glyceria pallida* (Eddy) Trin.). Northwestern Nebraska.
123. Water Grass (*Atropis distans* (L.) Griseb.). Northwestern and western counties. (*Glyceria* and *Puccinellia*.)
124. Wild Fescue (*Festuca confinis* Vasey). Northwestern Nebraska.
125. Tall Fescue (*Festuca ELATIOR* L.). Escaped from cultivation at Lincoln.
126. Nodding Fescue (*Festuca nutans* Spreng.). Widely distributed.
127. Sheep's Fescue (*Festuca ovina* L.). A small, hard grass, widely distributed and certainly indigenous.
128. Buffalo Bunch-Grass (*Festuca scabrella* Torr.). Central and eastern Nebraska.
129. Slender Fescue (*Festuca tenella* Willd.). Central and western Nebraska.
130. Brome Grass (*Bromus breviaristatus* Thurb.). Northwestern Nebraska.
131. Swamp Chess (*Bromus ciliatus* L.). Throughout the state.
132. Swamp Chess (*Bromus ciliatus* L., var. *purgans* Gr.). Northwestern Nebraska.
133. Wild Chess (*Bromus kalmii* Gray). Central and northwest Nebraska.
134. Wild Chess (*Bromus kalmii* Gray, var. *porteri* Coulter). Northwest Nebraska.
135. Smooth Brome-Grass (*Bromus RACEMOSUS* L.). Introduced at Lincoln.
136. Chess or Cheat (*Bromus SECALINUS* L.). A well-known weed in eastern, central, and northern Nebraska.

Tribe XII—Hordeæ.

137. Perennial Rye-Grass (*Lolium PERENNE* L.). Escaped at Lincoln.
138. Hairy Wheat-Grass (*Agropyrum dasystachyum* (Gr.) Vasey). Northwestern Nebraska.

139. Wheat Grass (*Agropyrum glaucum* R. & S.). Very common throughout the state, though more abundant westward, where it is one of the most highly prized native grasses.
140. Couch Grass (*Agropyrum repens* (L.) Beauv.). Much like the preceding, but greener and with more underground stems. Widely distributed.
141. Slender Wheat-Grass (*Agropyrum tenerum* Vasey). Western counties.
142. Purple Wheat-Grass (*Agropyrum violaceum* (Hornem.) Lange). Cherry county.
143. Wheat Grass (*Agropyrum unilaterale* Vasey & Scribner). Central and northern Nebraska.
144. Squirrel-tail Grass (*Hordeum jubatum* L.). A weed which is widely distributed throughout the state.
145. Barley Grass (*Hordeum nodosum* L.). A weed almost as widely distributed as the preceding species.
146. Wild Rye (*Elymus canadensis* L.). A well-known stout grass, common throughout the state.
147. Wild Rye (*Elymus canadensis* L., var. *glaucofolius* (Muhl.) Gr.). This white variety is occasionally found in eastern Nebraska.
148. Giant Rye-Grass (*Elymus condensatus* Presl.). Central Nebraska.
149. Wild Rye (*Elymus elymoides* (Raf.) Swezey). Western Nebraska.
150. Siberian Lyme-Grass (*Elymus sibericus* L.). Cherry county.
151. Dennett Grass (*Elymus striatus* Willd.). Central and northern counties.
152. Hairy Dennett-Grass (*Elymus striatus* Willd., var. *villosus* Gr.). Cherry county.
153. Lyme Grass (*Elymus virginicus* L.). Eastern and northern counties.
154. Bottle Brush (*Asprella hystrix* (L.) Willd.). Saunders county.

THE GRASSES OF NORTHWESTERN NEBRASKA.

BY J. M. BATES.

Northwestern Nebraska may well be considered the native home of wild grasses, since of 154 species and varieties found in Nebraska, which is pre-eminently a grass region, 113 are found in the range of my observations along the line of the Fremont & Elkhorn Valley road, from Neligh, Antelope county, on the east to Harrison, Sioux county, on the west. This region is naturally divided into moist hay lands; dry, firm, table or rolling lands; sand hills; and wooded slopes and canyons. Each of these divisions affords peculiar conditions of soil, light, and moisture for the production of certain species that will not flourish under other conditions; and as there is constantly taking place, in the history of the geologic ages, and the history which man is making by the progress of civilization, the extermination of plants and animals not fitted to their environment, and the survival of the fittest, so we may find, in the habitat of these grasses, nature's plain hint as to what is best fitted to the present conditions of climate and soil in our region. In treating briefly of these native grasses from an agricultural standpoint, I shall, therefore, make use of these four natural divisions.

1. Moist Hay Lands.

The most prominent grasses are Wild Rye (*Elymus canadensis* L.), excellent for pasture and hay. In favorable soil it grows fully six feet; is very leafy and nutritious. Common Wheat Grass (*Agropyrum glaucum* R. & S.), with a head resem-

bling unbearded wheat, and stiff, flat leaves, covered with a bluish white or glaucous bloom; height about twelve to eighteen inches. While not found in *wet* ground, it grows in almost all the firm, good soils in this part of the state, from valley to dry table land. Too much importance can hardly be given to this grass on account of its persistent and pushing nature, and the excellence of the hay derived from it. In some even of the low grounds, it forms already the bulk of the bottom, and is pushing itself in everywhere by means of the tough underground stems. It is regarded by some feeders as valuable for winter forage without grain, as slough grass is with grain. It should be cut when passing out of bloom. The Couch Grass (*Agropyrum repens* (L.) Beauv.), which is very much like it, lacks the bluish look, is paler green, taller, and has a narrower and usually longer head. It has, I think, a similar value, but is much less common.

Switch Grass, often called Western Red Top (*Panicum virgatum* L.), is second to none in this region. It may be distinguished by its ample reddish panicle of seeds nearly as large as and resembling broom corn; plant from one to six feet high, very leafy all the way up, growing singly in tufts, or in round masses ten feet in diameter. Cut before frost. The leafy stems are full of nutriment and highly relished. The weight of hay made from it is of no small importance in estimating its agricultural value. Growing with it in most places we find Big Blue Stem (*Andropogon provincialis* Lam.) of very different appearance, but similar value. This grass is, however, of much less wide range, choosing only the soils we are considering in this first division, while the Switch Grass is found in all four of these divisions almost equally at home. This Blue Stem, or Blue Joint, as it is variously called, has an upright, purplish head, very narrow, branching into short divisions, height from one to five feet. The lower leaves are reddish all the fall and winter. With it is found a beautiful grass called Bushy Blue Stem (*Andropogon nutans* L.), of the same grade and habit. The head in its perfection has the color of "old gold." With these tall grasses is found one of very modest form but great value, called Bunch Spear-Grass (*Poa andina* Nutt.), a true sister of Kentucky Blue-Grass. It forms the same mat when closely fed, and is relished equally well. Unfortunately, we cannot get much of it into our hay, its height being from six to eighteen inches, and the stem very slight. This, too, is found in almost all situations and soils, but grows largest in the moist haylands.

In the eastern part of our range, as far west as Rock county, one of the numerous "drop-seed grasses" is very abundant, viz., *Sporobolus heterolepis* Gray. It forms an important part of the bulk of hay in Holt and Rock counties, but no one speaks well of its quality. It is wiry even when young, as are nearly all the species of this genus. In wet ground another species, *Sporobolus asper* Kunth., is very common. In my opinion it is much better fodder. It may be distinguished in winter by the white sheath still enclosing the panicle. In the sloughs and beside streams a Blue-Joint Grass (*Calamagrostis canadensis* (Michx.) Beauv.), and the Yellow Top (*C. stricta* Trin.) make up a considerable portion of the bulk. Both are good grasses—very leafy, sometimes four feet high. Cord Grass (*Spartina cynosuroides* (L.) Willd.) is also one of the bulkiest occupants of the sloughs, though not fine in any sense. Still, when cut in bloom, it is well relished by cattle. It affords a mass of leaves without stems, involute, rolled together, three feet high, with only here and there a fruiting stalk, which sometimes, as last year,

reaches the height of eight feet four inches in Brown county. Comb Grass, or "False Red Top," (*Eragrostis pectinacea* (Michx.) Gray), is not a bulky element of low hay, but is excellent as far as it goes. It grows also in the firmer ground among the sand hills. Early Bunch-Grass (*Eatonia obtusata* (Michx.) Gray), is fine and leafy, but often thick enough to add a valuable contribution. But much of the fodder of the sloughs and considerable of the growth of all soils is not made up of true grasses, but consists of various species of the genus *Carex*, with a few species of *Cyperus*, both of which are true sedges. Some species of *Juncus*, the Rush, are also among most grasses, especially in moist soils. These are sometimes called "Sour Grass." They have not the same nourishing qualities as the better grasses, but, undoubtedly, serve the purpose of appetizers, giving a wholesome change of diet, which is just as necessary for beast as for man. With a very little showing they may be distinguished by their small, brown or pale green heads, which are much more compact than the panicles of grasses. There is no soil that does not contain some of these species, the best known being probably the one that produces the black matted roots called "nigger-heads," that lie around in plowed ground for years without falling in pieces.

2. The Dry Table Lands.

The characteristic grasses are the Wheat Grass and Switch Grass, mentioned before, together with Wild June Grass (*Koeleria cristata* Pers.), which forms good early pasture and fair hay, if cut soon enough; Needle Grass (*Stipa comata* Trin. & Rupr.), which very few need any further introduction to, is called excellent hay if cut just after the needles have dropped. It makes good pasture when kept down in the spring. Purple Beard-Grass (*Aristida purpurea* Nutt.) grows in low tufts less than a foot high, with three awns sticking out at about right angles at the top of each seed, purplish in color, dry and poor in texture. It is generally left by cattle. Little Blue Stem or Red Stem (*Andropogon scoparius* Michx.), sometimes called Broom Grass also, is not much better. It makes very sorry hay unless cut as soon as it blooms. When fed early in spring, in short pastures, it is all eaten, but is worthless for winter pasture. But these dry lands are largely covered by two very small grasses which are unequaled for pasture summer and winter, viz., Buffalo Grass (*Buchloe dactyloides* Engelm.) and Blue Grama (*Bouteloua oligostachya* Torr.). Buffalo Grass may be told always by its runners, which are sent out like those of the strawberry, often rooting at the joints. A solid bed of curling, fine leaves is thus produced, which cattle and horses delight to gnaw at when it seems as if there were nothing worth their attention. The flower stalk is seldom over four inches high in the male plant; in the female one inch. Grama closely resembles it, but has no runners and grows from six to thirty inches high—usually eight to ten on old sod. The Buffalo Grass is usually killed out by cultivation, but I have seen a field of Grama on fallow land that would cut three, fourths of a ton to the acre. And no sweeter hay could be found.

3. The Sand Hills.

Of the grasses already mentioned Broom Grass is very common, Switch Grass and Blue Grama also. Black Grama or Bristly Mesquite (*Bouteloua hirsuta* Lag.) here has its home and seems to have a value much like the Blue. They grow together here only. Turkey-foot Grass (*Andropogon hallii* Hack.) is the sand hills

Blue Stem. It is coarser than its low-ground relative, but excellent if cut or fed off in good season. The two run together at the foot of the hills. Three blow-out grasses are abundant: *Redfieldia flexuosa* Vasey, *Muhlenbergia pungens* Thurb., and *Eragrostis tenuis* (Ell.) Gray. The first two are very wiry; the last is tender and succulent up to fading from bloom. I am told it is eagerly sought by cattle in early spring. It is a lightly rooted perennial, in close tufts. Sand Grass (*Calamovilfa longifolia* (Hook.) Scrib.) is very prominent, but chiefly valuable for holding the soil together and preparing it for better species. The sand hills are sometimes spoken of with contempt. When ranchmen first came in and undertook to fence pastures, on account of the farmers, they left out the sand hills as not worth fencing in. They have learned since that the cattle tire of the low grass and will feed half the time where there seems very little to eat and do much better than when confined to the heavier grasses. With the diminution of prairie fires the sand hills are becoming thickly covered with nourishing grasses where six or eight years ago a prairie schooner could not bait its team.

4. The Wooded Slopes and Creek Canyons.

Many of the aforementioned grasses are common here. The characteristic species are Dennet Grass (*Elymus striatus* (Willd.), also var. *villosus* Gray), at Long Pine, and Lyme Grass (*Elymus virginicus* L.); *Agropyrum tenerum* Vasey, a tall slender wheat grass; Brome grass of two species; in the eastern part, *Bromus ciliatus* L.; in the western, *B. breviaristatus* Thurb.; Nodding Fescue Grass (*Festuca nutans* Spreng.); Fowl Meadow-Grass (*Glyceria nervata* (Willd.) Trin.); and Reed Meadow-Grass (*G. arundinacea* Kth.); Spear Grass (*Poa nemoralis* L.) in the east, and *Poa serotina* Ehrh., with *P. tenuifolia* Nutt. in the west; Water Grass (*Catabrosa aquatica* (L.) Beauv.) growing on the edge of Pine creek and White river and prostrate in the water—I found it eaten closely when cattle could get at it; Eaton's Grass (*Eatonia pennsylvanica* (Spreng.) Gray); Reed Grass (*Phragmites vulgaris* (Lam.) B. S. P.), thirteen feet high, is not much fed on but affords shelter for thousands of cattle in storms; *Cinna pendula* Trin., Slender Reed Grass, five feet high, with broad leaves and graceful, pendulous head, looking very inviting.

All the following grasses afford fine forage: Northern Red Top (*Agrostis exarata* Trin.); *A. hiemalis* (Walt.) B. S. P.; Muhlenberg's Grass in three species: *Muhlenbergia racemosa* (Michx.) B. S. P.; *M. mexicana* (L.) Trin.; *M. sylvatica* Torr. & Gray; the last at Ewing only, are very important for the amount of excellent late pasture they afford—all leafy grasses with slender though somewhat wiry stems. Indian Millet (*Oryzopsis micrantha* (Trin. & Rupr.) Thurb.) grows where the ground is so shaded that scarcely any other is found; *Stipa viridula* Trin., one of the Needle grasses, but a harmless form, is good. Water Foxtail (*Alopecurus geniculatus* L., var. *aristulatus* Torr.), is soft and succulent, resembling weak timothy, but growing in water. Rice Cut-Grass (*Homalocenchrus oryzoides* Poll.) and *H. virginica* (Willd.) Britt., are closely fed. Indian Rice (*Zizania aquatica* L.) is a general favorite and from its size and abundance is important. *Cenchrus tribuloides* L., the despised Sand-bur, has no rival as a pasture grass; even after the burs were ripe, but the plants still succulent, I have seen it cropped close by horses and cows; it is not an unmitigated evil as some suppose. Barn-yard Grass (*Panicum crus-galli* L., which lines so many of our streams, is excellent, and, if not a native, it is evidently quite at home. *P. dichotomum* L., its congener, is one of the best

and commonest growths in the brush. Many more might have brief mention, but this is sufficient to show that the stock of northwest Nebraska is not likely to suffer for lack of food, summer or winter, in appetizing variety.

SOME GRASSES OF BOX BUTTE AND SCOTT'S BLUFF COUNTIES.

Dr. W. A. Thomas reports that on the Snake creek bottoms (in the southern part of Box Butte county) great quantities of wild hay are annually made, consisting of a mixture of several species. The bulk of this appears from specimens brought to me to be Prairie Grass (*Sporobolus asper*), with some Black Grama (*Bouteloua oligostachya*), Salt Grass (*Distichlis*), and Sedges of several species. The very pretty Little Cord Grass (*Spartina gracilis*) occurs, also, as a constituent of the hay in some places. On the higher banks Wheat Grasses (*Agropyrum glaucum*), and Wild Rye (*Elymus canadensis*) are found in some abundance.

On the Platte bottoms in Scott's Bluff county Wheat Grass (*Agropyrum glaucum*) grows abundantly, and is especially fine along the line of the irrigating ditches. On the high prairies the scattered bunches of Black Grama (*Bouteloua oligostachya*) are often very fine, attaining a height of from fifteen to twenty inches. With this there are also scattered bunches of Bushy Blue Stem (*Andropogon nutans*) and Little Blue Stem (*A. scoparius*). The first is said to be running out, and by some people is not considered to be of much value.

In some localities certain large Sedges furnish an abundance of coarse forage which, though not very nutritious, is freely eaten by cattle. A little grass-like sedge called "Nigger Wool" (probably a species of *Carex*) is eagerly fed upon by grazing animals. It has a great many fine leaves from two to four inches in length. These have a blackish color at base, on which account the name is given.

As late as October the grasses, though dry and brown in the high western lands of Box Butte and Scott's Bluff counties, furnished much valuable pasturage, and on these the cattle feed and do well all winter long, except when covered too deep with snow.

In the sand hills of western Nebraska the herds of cattle find excellent feed in the wild grasses, which, although short, are very nutritious. The presence of good water in the sand hill ponds adds not a little to the value of these hills for the feeding of herds of cattle.

SOME GRASSES OF SOUTHWESTERN NEBRASKA.

Many valuable observations on the grasses of the counties lying immediately south of the Platte river, from Kearney county to Perkins, were made in the summer of 1891 by Mr. P. A. Rydberg, whom I requested to give particular attention to the forage plants of that region. His daily notes are transcribed herewith, but little changed.

Near Minden perhaps the most important grass was a *Poa* which I regard as a variety of Bunch Grass (*Poa tenuifolia*). Although the foliage is far from being as luxuriant as that of Kentucky Blue Grass (*Poa pratensis*), this Bunch Grass is more easily made into hay, and possibly may be improved by proper cultivation. On certain soils I think it would be more profitable than Kentucky Blue Grass. I found it on low land (and sometimes on alkaline soil) throughout western Nebraska, from Kearney county to Phelps, Deuel, and Cheyenne. Among other species in Kearney

county may be mentioned Wild June Grass (*Koeleria cristata*) and Early Bunch Grass (*Eatonia obtusata*). But perhaps the most important wild grass, especially for hay making, is Wheat Grass (*Agropyrum glaucum*) which has received a variety of names, viz.: "Slough Grass," "Pond Grass," "Wild Wheat," "Blue Stem," "Blue Grass," "Colorado Blue Grass," "Grama Grass," and even "Buffalo Grass." Oddly I did not hear any place the name "Quack Grass" for it, although it so much resembles that eastern grass. In Kearney county many people think that it has come in since the country has been settled, but others say that it was found in sloughs and near ponds, from which it has spread over the prairies. The names "Pond Grass" and "Slough Grass" refer to this belief.

In the northern part of Kearney county, along the Platte river, there are extensive natural hay lands. Although too early in the season for many species, I may mention the following, viz.: Wheat Grass (*Agropyrum glaucum*), Bunch Grass (*Poa tenuifolia*), Ribbon Grass (*Phalaris arundinacea*), Blue-Joint Grasses (*Calamagrostis canadensis* and *C. confinis*), Switch Grass (*Panicum virgatum*), Herd's Grass (*Agrostis alba*), Reed Grass (*Phragmites communis*), and a number of others of less importance.

In the narrow sand-hill belt near the north side of the county the following grasses were noticed: Blow-out Grass (*Muhlenbergia pungens*), Needle Grass (*Stipa comata*), Feather Grass (*Stipa viridula*), Big Blue Stem (*Andropogon provincialis*), Slender Fescue (*Festuca tenella*), and Prairie Grass (*Sporobolus cryptandrus*). These offered pasturage to herds of cattle and sheep.

An examination of the grasses of Phelps county shows that they are much like those of Kearney county. In the northern part of the county there is a similar narrow sand-hill belt which extends part way across the county from east to west. On the Platte bottoms the grass was shorter, and here and there were patches of Salt Grass (*Distichlis spicata*, var. *stricta*).

Some time was spent in Gosper county, in which Buffalo Grass (*Buchloe dactyloides*) is much more abundant than in the counties eastward.

In Frontier and Lincoln counties Buffalo Grass, and other highland grasses, are more common. Of the taller grasses, Big Blue Stem and Needle Grass are very common. Similar conditions prevail in Perkins county, whose grass flora is much like that of Frontier and Lincoln.

The most common grasses of southern Deuel county are Buffalo Grass (*Buchloe dactyloides*), Blue Grama (*Bouteloua oligostachya*), and the "Nigger-head" (*Carex*), called also Bunch Grass and Willow Grass by the settlers. The Blue Grama seems to be the most important grass of the table lands of western Nebraska. It is regarded as the best pasture grass, and is preferred over any other by animals. Our horses always selected it and grew fat upon it, although we sometimes drove twenty to twenty-five miles a day over the prairies and never gave them as much as a handful of oats, corn, or any other feed. Wherever it grows a little taller it produces an excellent hay. It never grows on really wet ground, but on land which has plenty of rain and good drainage, it attains a height of over two feet. Under irrigation, where the amount of moisture can be regulated, I think it will make a most excellent hay-grass.

The Buffalo Grass is of less value, partly because it is not as common and partly because it is so short that it is even of little value as pasture grass.

"Nigger-head" (*Carex*) is regarded as a valuable pasture grass, and it plays an especially important part in the "winter pasture" in this country. In the dry

autumn this, and the two preceding species, become self-cured, and it is regarded as constituting very good pasture throughout the winter. The sedges are generally regarded as worthless, but this species is without doubt one of the exceptions to the general rule. Many herders do not give their cattle any hay throughout the winter, except on stormy days and during weather in which the snow is too deep. A sheep rancher in Deuel county drives a big snow plow over the prairies, and thus allows his sheep to graze upon the uncovered grasses.

Here it may be proper to remark upon the badly mixed condition of the common names of the grasses as used by the settlers. The three foregoing grasses are all called Buffalo Grass by different persons. I have heard this name applied also to no less than nine other grasses, even including the tall Turkey-foot Grass (*Andropogon hallii*). Here, then, are an even dozen different things to which the name Buffalo Grass is given, and, no doubt, each man thinks that he is right in his use of the name when, as a matter of fact, only one of these is entitled to the name. It is nearly impossible to tell what grass is referred to when a settler speaks of Buffalo Grass.

In the Platte valley, near the mouth of Rush creek in Deuel county, the grasses afford much pasturage, although at the time of my visit (July) the grasses were closely eaten down by the herds of cattle. I noticed Blue Grama (*Bouteloua oligostachya*), Early Bunch-Grass (*Eatonia obtusata*), Fine Top (*Sporobolus airoides*), Indian Millet (*Oryzopsis cuspidata*), False Buffalo-Grass (*Munroa squarrosa*), Wild Rye (*Elymus sitanion*), Big Blue Stem (*Andropogon provincialis*), Little Blue Stem (*Andropogon scoparius*), Wheat Grass (*Agropyrum glaucum*), and a species of Muhlenberg's Grass (*Muhlenbergia*).

For some distance up the Platte bottoms in Cheyenne county the grasses are much the same as in Deuel county. There are broad stretches of excellent highlands, often miles in extent.

In Banner county, in the valleys, the Salt Grass (*Distichlis spicata*, var. *stricta*) is quite common. Turkey-foot Grass (*Andropogon hallii*) and Bushy Blue-Stem (*A. nutans*) also occur with other common grasses. The fact that there are almost numberless herds of cattle in these hills and valleys is proof of the abundance of the forage plants.

In Scott's Bluff county Sand Grass (*Calamagrostis longifolia*), Cord Grass (*Spartina cynosuroides*), Wild Rye (*Elymus canadensis*), and two kinds of Wheat Grass (*Agropyrum glaucum* and *A. tenerum*) occur among the tall grasses; near the northwest corner of the county there are extensive meadows upon which good hay is made, as is shown by the big stacks which may be seen in great numbers. The grass averages two feet in height, and includes the following species: Switch Grass (*Panicum virgatum*), Fine Top (*Sporobolus airoides*), Herd's Grass (*Agrostis alba*), Wheat Grass (*Agropyrum glaucum*), Blue Grama (*Bouteloua oligostachya*), Wild Rye (*Elymus canadensis* and *E. sitanion*), Sand Grass (*Calamagrostis longifolia*), Cord Grass (*Spartina cynosuroides*), and Reed Grass (*Phragmites vulgaris*). Of these, Switch Grass, Wheat Grass, and Blue Grama are regarded as the best for hay. I asked a man how he regarded Herd's Grass for hay and he answered that the ranchmen considered it as nearly worthless. He did not know that it was a variety of Red Top.

Upon the divide between Lawrence Fork and the Lodge Pole creek, in Kimball county, on the rich soil the "Nigger-head" Grass is very common and is highly regarded. Good crops are grown on this divide every season. Black Grama (*Bouteloua*

hirsuta), Wire Grass (*Schedonnardus texanus*), and some others were noticed. In the valley of the Lodge Pole creek much good grass is found. Between Sidney and Lodge Pole I passed through one pasture after another, and saw the largest herds of horses I have ever seen. The valley is used here exclusively for pastures and hay lands. In the pastures it had been well eaten down, and in the hay lands it had recently been cut (August). I saw big stacks all over the valley.

In summing up the results of his observations Mr. Rydberg says: "Two grasses and one sedge, Grama, Buffalo Grass, and Nigger-head constitute the larger part of the grass flora of the upland prairie. How many millions of cattle, horses, and sheep have been sustained both summer and winter upon these low grasses? The bottom lands, especially near Platte river and Lodge Pole creek, are covered mostly by grass, and used extensively for pasture and hay lands. The most valued grasses for hay making are Wheat Grass (*Agropyrum glaucum*), Switch Grass (*Panicum virgatum*), Little Blue-Stem (*Andropogon scoparius*), Blue Grama (*Bouteloua oligostachya*), Wild Rye (*Elymus canadensis*), Muhlenberg's Grass (*Muhlenbergia racemosa*), and a Blue Grass (*Poa* sp.)."