

PLANT MATERIALS TECHNICAL NOTE

VEGETATIVE GUIDE FOR IDENTIFYING FOUR NATIVE WHEATGRASSES IN MONTANA AND WYOMING

Bluebunch wheatgrass, *Pseudoroegneria spicata* (Pursh) Å. Löve
Slender wheatgrass, *Elymus trachycaulus* (Link) Gould ex Shinners
Thickspike wheatgrass, *Elymus lanceolatus* (Scribn. & J.G. Sm) Gould
Western wheatgrass, *Pascopyrum smithii* (Rydb.) Å. Löve

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Figure 1. Thickspike wheatgrass (All images USDA-NRCS unless noted).

INTRODUCTION

Wheatgrasses are cool-season grasses and key components of many rangeland plant communities (Figure 1). Given the approximately 15 different species of native and introduced wheatgrasses found in Montana and Wyoming, as well as their morphological and anatomical similarities, identification of some species is difficult. This Technical Note describes the distinguishing vegetative features of each of four common native wheatgrass species.

The distinguishing vegetative characteristics for bluebunch wheatgrass (*Pseudoroegneria spicata*), slender wheatgrass (*Elymus trachycaulus*), thickspike wheatgrass (*Elymus lanceolatus*), and western wheatgrass (*Pascopyrum smithii*) are depicted in Figures 3 through 8. The distinct features of mature plants include auricles, ligules, seedheads (inflorescences), spikelets, and florets.

Please note that distinguishing vegetative features may or may not be present or evident due to numerous environmental factors such as climatic conditions (intervals of cool and wet versus hot and dry), soil type, and herbivory, to name a few. When identifying wheatgrass species, examine and assess multiple features and plant specimens if possible. Always consider the collection location and verify that the prevailing ecological conditions support the species in question.

The basic anatomy of a grass plant is shown in Figure 2, depicting important vegetative features of grasses, and their relative position on the plant. These include the inflorescence, spikelet, awn, lemma, glume, blade, ligule, auricle, sheath, node, and tiller (Mangold et al., 2014).

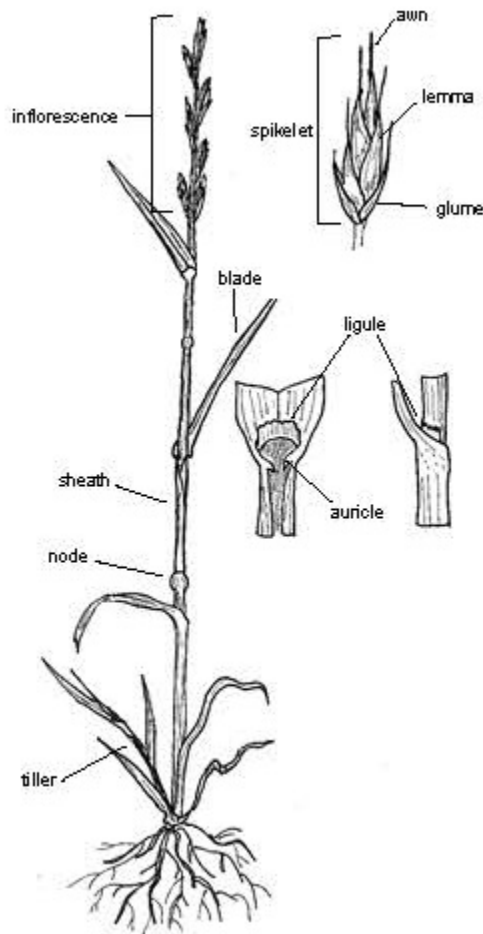


Figure 2. Vegetative parts of a grass plant. Used with permission, H. Parkinson, Montana State University.

GENERAL DESCRIPTION

A. Mature Plant

Bluebunch wheatgrass is a bunchgrass preferring open droughty sites with coarse soils and southern exposures (Figure 3a). It thrives in annual precipitation zones ranging from 20 to 51

centimeters per year. In higher precipitation areas, bluebunch can grow up to approximately 92 centimeters tall (USDA-NRCS, 2016a). It has blue-green leaves that are flat to slightly rolled, each with a blade 2 to 3 millimeters wide and 18 centimeters long. The upper leaf surface is deeply grooved, with white margins that are weakly barbed (Table 1; Majerus, 2009).

Slender wheatgrass is also a bunchgrass adapted to a wide range of soils ranging from fine to coarse in texture (Figure 3b). It grows in annual precipitation zones ranging from 20 to 61 centimeters per year and can grow up to 1.2 meters in height (USDA-NRCS, 2016b). It can have short rhizomes. Leaves are green and can be flat or folded, up to 3 to 8 millimeters wide and 10 to 20 centimeters long, with a rough and coarsely veined upper surface (Majerus, 2009).

Thickspike wheatgrass, also known as streambank wheatgrass, is a moderately rhizomatous grass found growing on a wide range of soils but preferring sandy loams to clayey soils in precipitation zones between 15 to 20 centimeters per year (Figure 3c). It grows to a height of 91 centimeters tall (USDA-NRCS, 2016c). Leaves are green-blue, flat or involute, slightly rough, up to 5 millimeters wide and up to 30 centimeters long, with coarse venation (Majerus, 2009).

Western wheatgrass is strongly rhizomatous, and is found growing on a wide range of soils but prefers clay soils and areas that retain or receive additional moisture (Figure 3d). It grows up to 61 centimeters tall (USDA-NRCS, 2016d). Leaves are blue-green, attached at a 45 degree angle, and are stiff and flat, up to 5 millimeters wide and 15 centimeters long. Leaves are strongly ribbed and rough on upper surface (Majerus, 2009).

It should be noted that thickspike wheatgrass and western wheatgrass may demonstrate only subtle vegetative differences, depending on a variety of factors. In some cases, the location, (i.e. likelihood of a species growing in certain soils, precipitation, climate, etc.) should be considered when identifying the species. Additionally, the foliage of actively growing thickspike wheatgrass tends to be more supple than western wheatgrass.

Table 1. Common and unique characteristics of the four wheatgrasses.

Species	Roots	Blades	Auricles	Ligule	Spike Length	Spikelet	Lemma	Awn
Bluebunch wheatgrass	fibrous	blue-green 2 – 3 mm wide 18 cm long	clasping 0.9 mm	1 mm	≤ 15 cm	4 - 8 flowered	8 - 10 mm hairy margins	turn outward 10 - 20 mm
Slender wheatgrass	fibrous, short rhizomes	green 3 - 8 mm wide ≤ 20 cm long	clasping or none 0 – 2 mm	1 mm truncate jagged	≤ 30 cm	3 – 6 flowered	8 - 12 mm	tipped 0 – 5 mm
Thickspike wheatgrass	rhizome	green-blue 2 - 5 mm wide ≤ 30 cm long	clasping ≤ 3 mm	≤ 1 mm scalloped	≤ 20 cm	3 – 8 flowered	7 - 9 mm pubescent	tipped 0 – 1 mm
Western wheatgrass	rhizome	blue-green 2 - 5 mm wide ≤ 15 cm long	clasping or none 0 – 0.7 mm	3 - 5 mm rounded	≤ 25 cm	6 – 10 flowered	6 – 10 mm	tipped or tapering to point

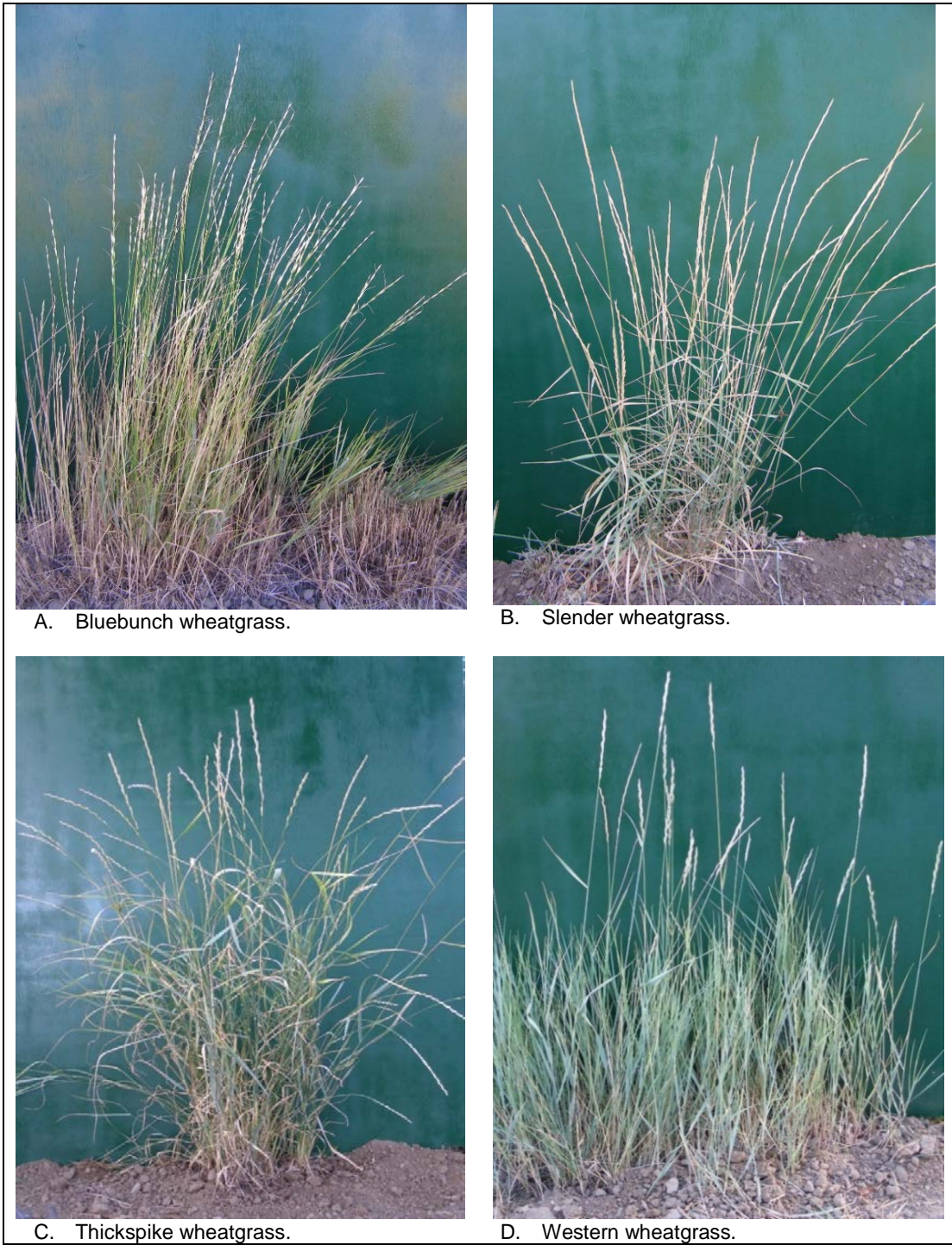


Figure 3. Comparison of the vegetative growth habits of the four wheatgrass species.

B. Auricles

Auricles, if present, grow out from the sheath, and are located at the collar which is the intersection of the sheath and leaf blade (Figure 4 and Table 1). Bluebunch wheatgrass auricles

are up to 0.9 millimeters long, and appear to clasp the stem. Slender wheatgrass auricles are rudimentary and up to 2 millimeter long or absent. Thickspike wheatgrass auricles are clasping and up to 3 millimeters long. Western wheatgrass auricles can be rudimentary or clasping, up to 0.7 millimeter long, and sometimes purple at the base (Majerus, 2009).

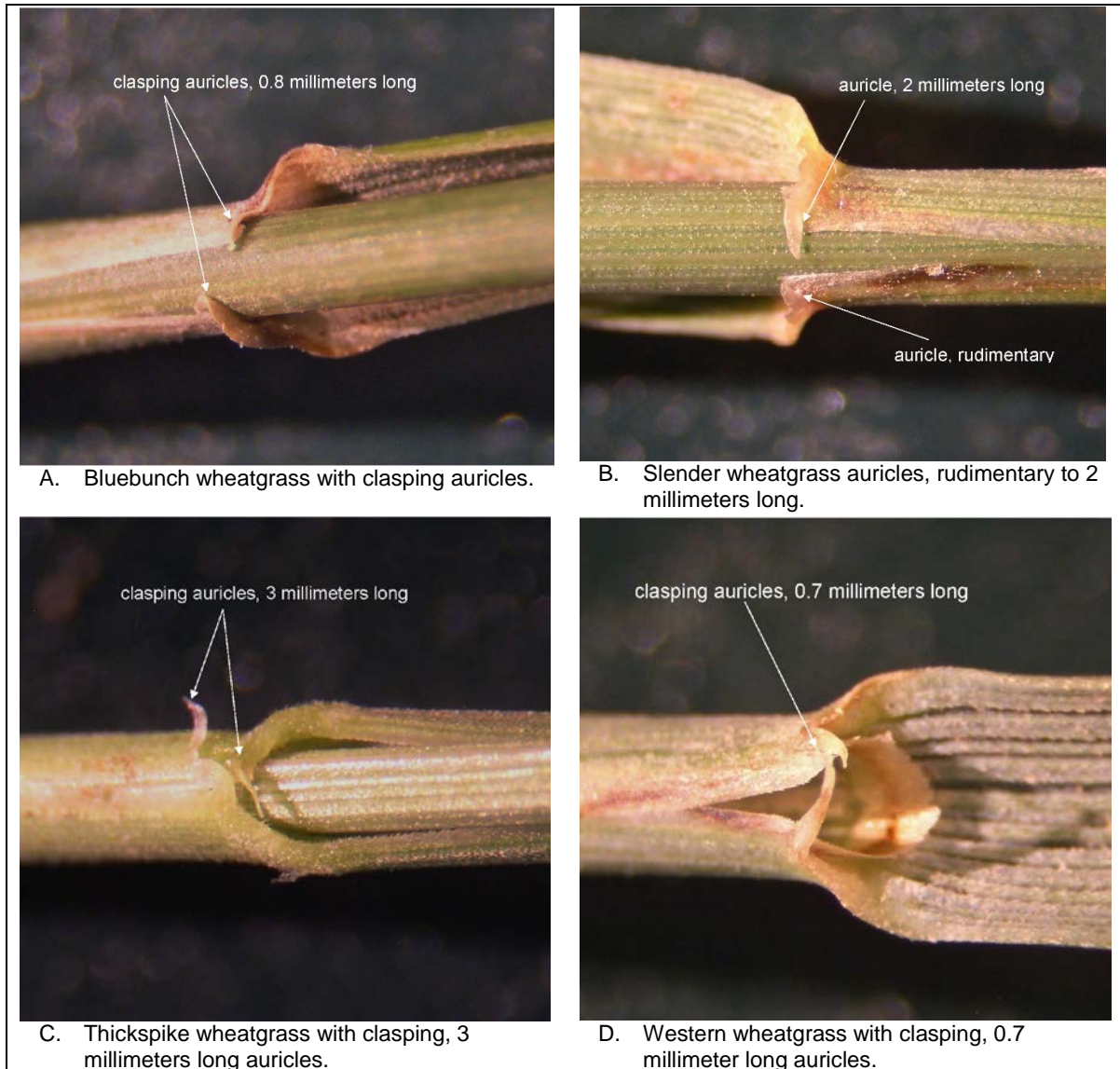


Figure 4. Comparison of the four wheatgrass species auricles.

C. Ligules

Ligules are growths protruding from the sheath and, if present, are found at the top of the collar inside the leaf blade (Figure 5). All four wheatgrasses have a membranous ligule. A bluebunch wheatgrass ligule is 1 millimeter in length and rounded. The slender wheatgrass ligule is 1 millimeter long and truncate with jagged edge. Thickspike wheatgrass ligule is inconspicuous (up to 1 millimeters long) scalloped or toothed. Western wheatgrass ligule is 3 to 5 millimeters in length with hairs on the fringe (Majerus, 2009).

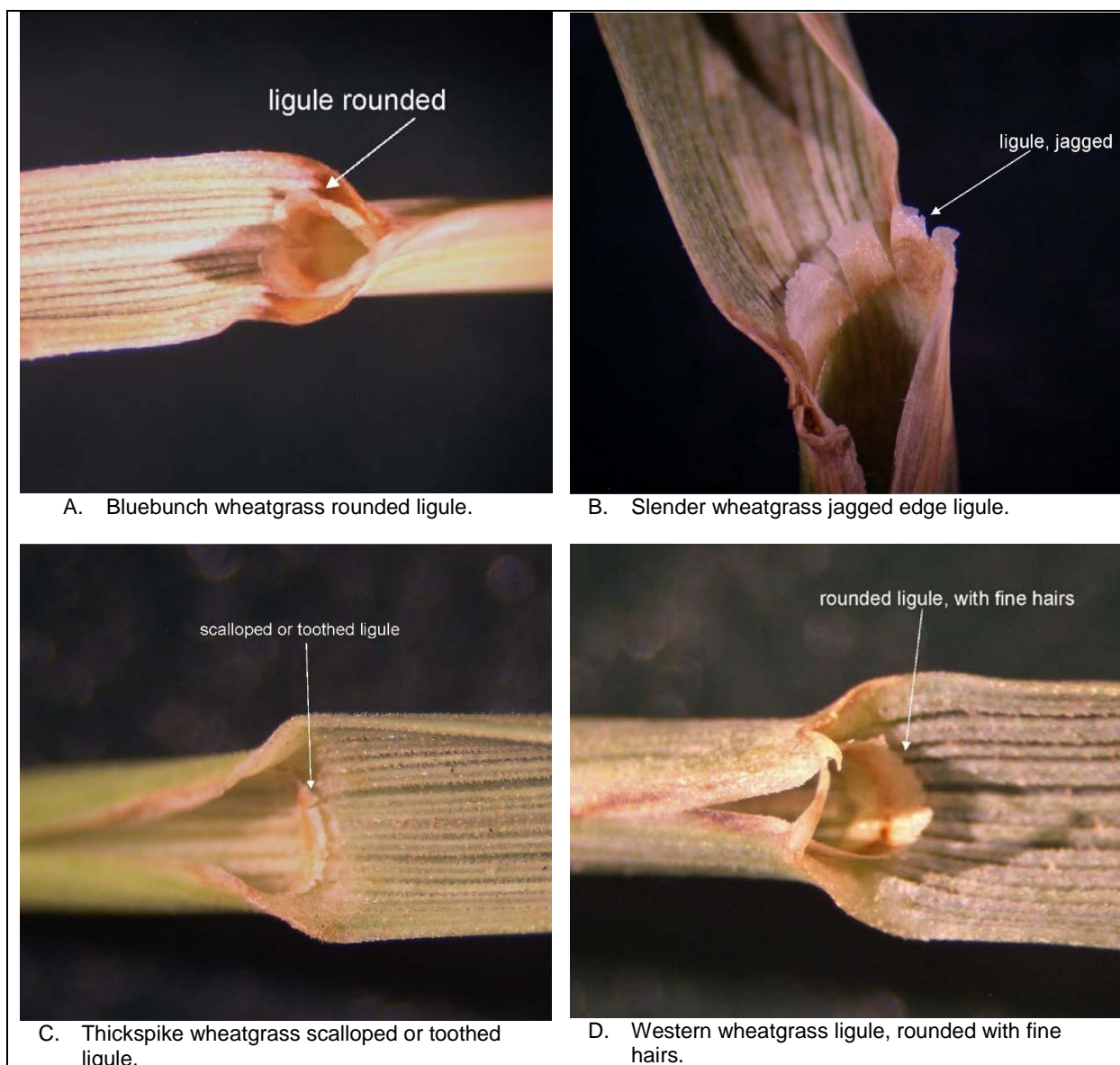


Figure 5. Ligule comparison for four wheatgrass species.

D. Seedheads

In grasses, the seedhead or inflorescence is one of three types: panicle, spike, or raceme. A wheatgrass inflorescence is a spike. The spike is an unbranched stem or rachis to which spikelets (containing multiple florets) or individual florets are directly attached (Figure 2).

Bluebunch wheatgrass spikes are up to 15 centimeters long with individual florets arranged alternately with 4 to 8 florets per spike (Figure 6). Florets are up to 2.5 centimeters long, with or without a divergent awn. Slender wheatgrass spikes are up to 30 centimeters long with spikelets alternately arranged and tightly appressed to rachis. Spikelets are slightly overlapping.

Thickspike wheatgrass spikes can be up to 20 centimeters long, with spikelets that are alternate and varying from separate at the base to overlapping at the top. Western wheatgrass spikes can

be up to 25 centimeters long, with 1 (occasionally 2) spikelet per rachis node and the 6 to 10 florets each measuring up to 2 centimeters long and are partially overlapping (Majerus, 2009).



Figure 6. Length and characteristics of wheatgrass species spikes.

E. Spikelets and Florets

Individual spikelets are the floral units consisting of the glume, lemma, palea, and caryopsis. The four species are collectively depicted in Figure 7 and illustrated individually in Figure 8.

Bluebunch wheatgrass spikelets are 4 to 8 flowered. With bluebunch wheatgrass florets, the glumes are 3 to 5 nerved and narrow, and either acute or awn-tipped. The lemma has a widely divergent awn up to 10 to 20 millimeters long. Palea and lemma length are equal, the lemma with hairy margins (Figure 8a; Majerus, 2009).

Slender wheatgrass has 3 to 6 flowered spikelets, up to 2 centimeters long with glumes that are 3 to 7 nerved with an acute or 0 to 5 millimeter long awn-tip. Lemmas are 8 to 12 millimeters long. The palea is shorter than the lemma with fine-toothed margins (Figure 8b; Majerus, 2009).

Thickspike wheatgrass has 3 to 8 flowered spikelets, which are 2 centimeters long, and partially overlapping. The glumes are half the length of first floret and can be glabrous to pubescent, are 3 to 7 nerved, ranging from acute to acuminate or with an awn up to 1 millimeter in length. Lemmas are up to 9.5 millimeters long, 5-nerved, awn tipped with minute barbs, and the palea is sparsely pubescent (Figure 8c; Majerus, 2009).

With western wheatgrass florets, the glumes are 3 to 5 nerved, rigid and tapering to the awn tip, with the first glume shorter than the second (13 millimeters long). The lemma is 9.5 millimeters long, 5-nerved, tends to be glabrous to pubescent, and acute or with an awn up to 11 millimeters long. The palea is rough, with pubescence on the keel up to 3 millimeters long. Palea is shorter than lemma with fine-toothed margins (Figure 8d; Majerus, 2009).

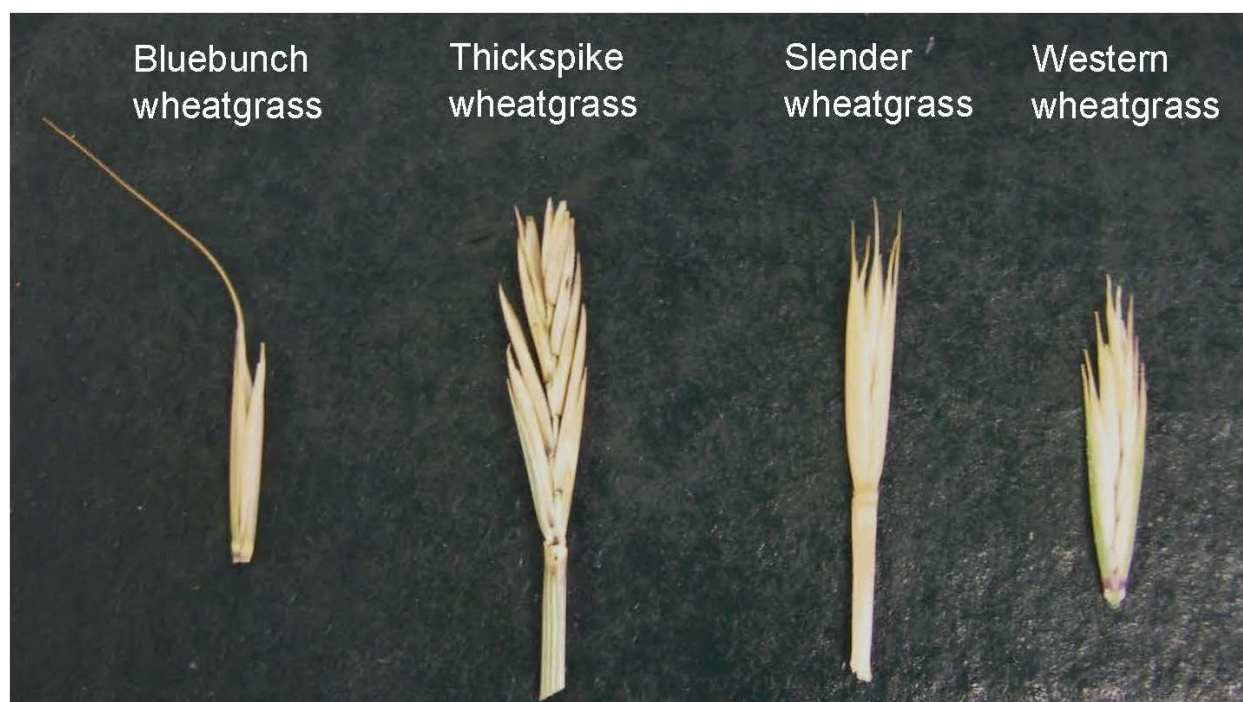


Figure 7. Floret of bluebunch wheatgrass and spikelets of thickspike, slender, and western wheatgrass.

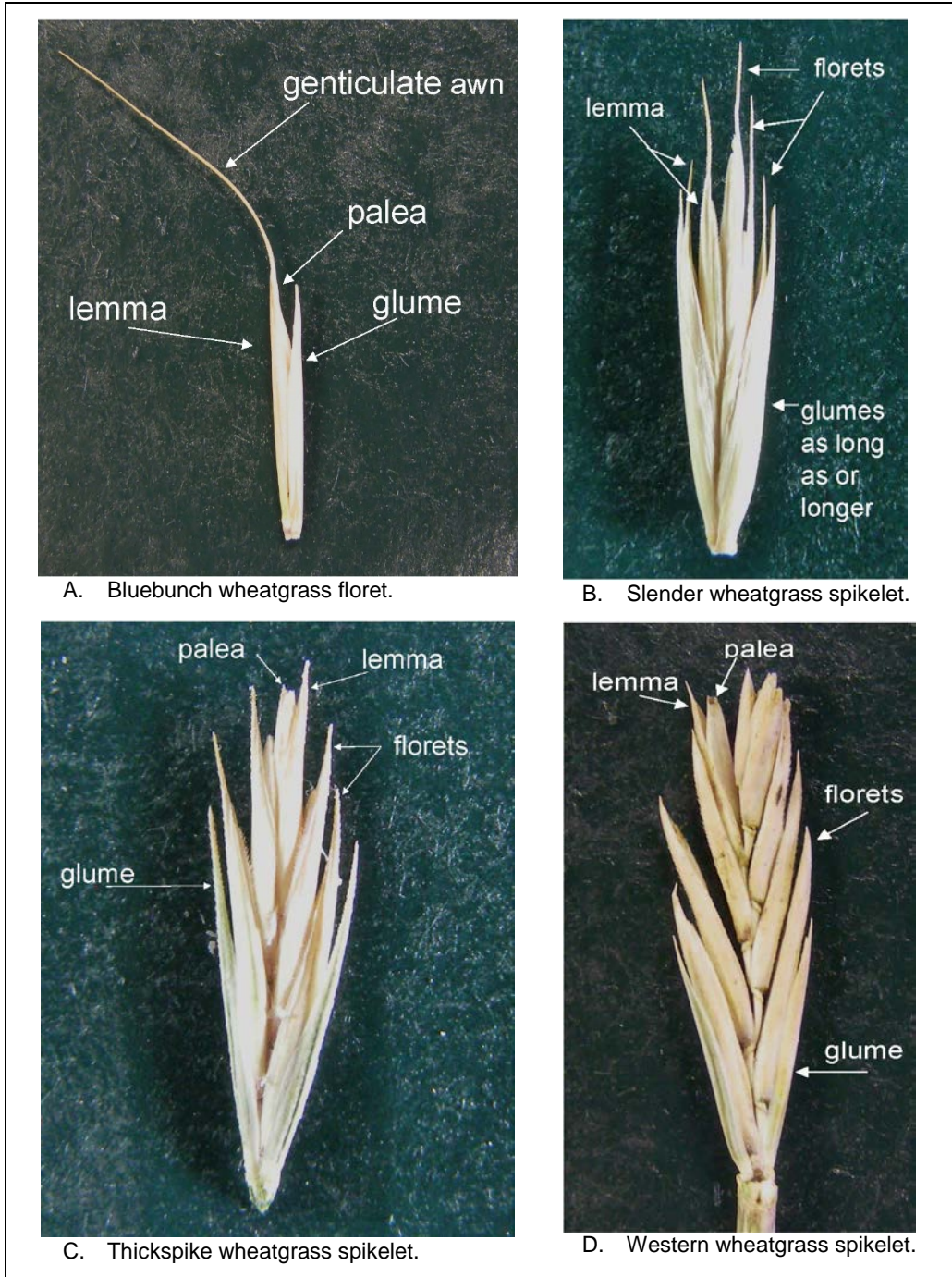


Figure 8. Spikelet comparison of the four wheatgrass species.

NRCS Application

This guide is designed to assist NRCS field staff, as well as landowners, in the identification of four native wheatgrasses. Native and introduced wheatgrasses represent an important group of plants for a variety of conservation practices and ecological applications. Since the aforementioned species fill different ecological niches and function differently in conservation

practices, proper identification is important. Proper identification is also important for range inventory, ecological site description, and other types of plant community monitoring.

Additional identification resources

- Foster, A. Field Guide: Identification of Common Range Plants of Northern Saskatchewan. Saskatchewan Agriculture, Food and Rural Revitalization.
- Lesica, P. 2012. Manual of Montana Vascular Plants. Brit Press, Fort Worth, TX.
- Majerus, M. E. 2009. Forage and Reclamation Grasses of the Northern Great Plains and Rocky Mountains. Valley Printers, Bridger, MT.
- Skinner, Q. D. 2010. A Field Guide to Wyoming Grasses. Education Resources Publishing, Cumming, GA.
- Taylor, J. E. and J. R. Lacey. 2004. Range Plants of Montana. Montana State University Extension Service Bulletin EB No. 122, Bozeman, MT.

References

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- Majerus, M.E. 2009. Forage and Reclamation Grasses of the Northern Great Plains and Rocky Mountains. Valley Printers, Bridger, MT.
- Mangold, J., H. Parkinson, and M. Lavin. 2014. Grass Identification Basics. MontGuide MT201402AG, Montana State University Extension. Bozeman, MT.
- USDA-NRCS. 2016a. The PLANTS Database (<http://plants.usda.gov>, 1 September 2016). Thickspike wheatgrass Plant Guide. National Plant Data Center, Baton Rouge, LA. 70874-4490 USA.
- USDA-NRCS. 2016b. The PLANTS Database (<http://plants.usda.gov>, 1 September 2016). Western wheatgrass Plant Guide. National Plant Data Center, Baton Rouge, LA. 70874-4490 USA.
- USDA-NRCS. 2016c. The PLANTS Database (<http://plants.usda.gov>, 1 September 2016). Slender wheatgrass Plant Guide. National Plant Data Center, Baton Rouge, LA. 70874-4490 USA.
- USDA-NRCS. 2016d. The PLANTS Database (<http://plants.usda.gov>, 1 September 2016). Bluebunch wheatgrass Plant Guide. National Plant Data Center, Baton Rouge, LA. 70874-4490 USA.

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