Forage Factsheet – Alfalfa

**Species Name:** Alfalfa - *Medicago sativa*

Alfalfa can have creeping or tap root systems. *Medicago falcata* is a yellow flowered tap rooted alfalfa with superior hardiness, but lower yield potential.

Tap-root type alfalfas have a narrow crown and a deep tap root with limited branching roots.

Creeping-root type alfalfas have a tap root and thick, spreading horizontal roots. Generally, the crown is wider and set deeper into the ground than tap root type alfalfas.

**Origin:** Europe, Middle East, Siberia

**Longevity:** 3-20 years. Creeping rooted alfalfa generally survives for long periods of time, but management has a significant impact on longevity. Cultivars have varying levels of winter hardiness and disease resistance, which is a major factor determining longevity.

**Uses:** hay, pasture, stockpiling

**Optimal time of use:** Cut alfalfa at 10% bloom to obtain the best compromise between yield and nutritional value. After cutting, alfalfa may be stockpiled to provide a source of fall grazing after the first killing frost. Grazing can begin at the bud stage. Do not graze to less than four inches (10 cm) tall.

**Recovery after use:** Alfalfa should be allowed to regrow to the bud stage before recutting or grazing. Avoid use for six weeks prior to killing frost to reduce winter injury.

**Yield:** On average, creeping-root type alfalfa tends to yield less than tap-root type alfalfa in wet areas and more in drier areas. Creeping-root type alfalfa yields approximately 3230 lbs/acre (3670 kg/ha) in the Brown soil zone, 6760 lbs/acre (7681 kg/ha) in the Dark Brown soil zone, and 5590 lbs/acre (6352 kg/ha) in the Black and Grey soil zones. Tap-root type alfalfa yields approximately 3130 lbs/acre (3556 kg/ha) in the Brown soil zone, 6249 lbs/acre (7101 kg/ha) in the Dark Brown soil zone, and 5590 lbs/acre (6352 kg/ha) in the Black and Grey soil zones.

Recommended initial stocking rates are 1.2 AUM/acre (3 AUM/ha) in the Brown soil zone, and 1.8 AUM/acre (4.0 AUM/ha) in the Dark Brown, Black and Grey soil zones.

**Palatability/Nutritional Value:** Alfalfa is highly palatable and can have crude protein levels as high as 21% and digestible dry matter levels of approximately 71%. Alfalfa causes bloat in livestock with the risk greatest during rapid plant growth.

**Competitiveness:** Alfalfa is competitive. Stand thinning due to winter injury or disease can lead to an increase in weeds. Creeping-root alfalfa can spread by developing new shoots from creeping rootstocks.

**Winter Hardiness:** Winter hardiness in alfalfa is highly variable, depending on the cultivar. Alfalfa can range from non-dormant (no winter hardiness) to very winter hardy. Generally, creeping rooted types are more winter hardy and stress tolerant than tap rooted types. Select the appropriate cultivar for the objectives of the stand. Management can have a large impact on winter hardiness.

**Drought Tolerance:** Alfalfa has a deep root system allowing it to access subsoil moisture more effectively than other forage species.

**Erosion Control:** Alfalfa has fair erosion control potential.

**Ease of Establishment:** Alfalfa establishes readily.

**Suggested Mixtures:** Crested wheatgrass, meadow bromegrass, timothy, intermediate wheatgrass, smooth bromegrass.

**Salinity Tolerance:** Alfalfa has fair salinity tolerance.

**Flooding Tolerance:** Alfalfa can withstand one to two weeks of spring flooding or waterlogged soils prior to spring growth.

**Soil Texture:** Alfalfa prefers well drained sandy, loamy or clay soils in all soil zones.

**Acidity Tolerance:** Alfalfa tolerates soil pH as low as 6.2.

Dryland Forage Species Adaptation CD.
Management Considerations: Alfalfa responds well to fertilization with phosphorous, sulfur and possibly micronutrients. Avoid use (grazing or cutting) during the fall critical period (six weeks prior to frost). Select a cultivar adapted to the area and intended use of the stand. Inoculate alfalfa seed prior to seeding.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Alkali Saltgrass

Species Name: Salt Grass, Alkali Salt Grass – *Distichlis stricta*

Origin: Saline wetlands and lowlands

Longevity: Long-lived

Uses: Reclamation, pasture

Optimal time of use: Salt grass is used primarily in the reclamation of wet saline areas. Graze salt grass in the fall to avoid hoof damage to the sod.

Recovery after use: Salt grass withstands light grazing once per year.

Yield: Salt grass has low forage yields as it only grows two to six inches tall. Graze salt grass as the secondary species in the stand.

Palatability/Nutritional Value: Salt grass has low palatability and fair nutritional value.

Competitiveness: Salt grass forms a thick sod.

Winter Hardiness: Salt grass has very good winter hardness.

Drought Tolerance: Salt grass has poor drought tolerance.

Erosion Control: In moist saline areas, salt grass sod is useful in the prevention of water erosion.

Ease of Establishment: Salt grass seed is not commonly available so little is known about its establishment characteristics. Salt grass propagates and spreads well from grass roots or sod.

Suggested Mixtures: Alkali cord grass, saline tolerant grasses.

Salinity Tolerance: Salt grass has excellent salinity tolerance.

Flooding Tolerance: Salt grass will withstand approximately 3 weeks of spring flooding and requires very moist or wet soils season long.

Soil Texture: Salt grass will only grow on moist saline soils. It is adapted to all soil zones.

Acidity Tolerance: Salt grass is not tolerant of acidic soils.

Management Considerations: Graze late in the season to maintain plant vigor and reduce hoof damage.
Forage Factsheet – Alsike Clover

**Species Name:** Alsike Clover - *Trifolium hybridum*

**Origin:** Sweden

**Longevity:** 1-5 years (grows mainly as a biennial in Saskatchewan). Alsike clover will reseed itself.

**Uses:** Hay, reclamation, pasture

**Optimal time of use:** Hay alsike clover once per year during full bloom. May cause bloat and photosensitization in livestock. Alsike clover provides good early fall grazing after the first killing frost.

**Recovery after use:** Alsike clover regrows well after haying or grazing. For fall pasture, utilize regrowth after killing frost.

**Yield:** Alsike clover yields approximately 3100 lbs/acre (3522 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Alsike clover is palatable to livestock. In the vegetative state, crude protein is approximately 22% and digestibility is 65%. It may cause bloat and photosensitization if grazed during the growing season.

**Competitiveness:** Alsike clover is competitive once established.

**Winter Hardiness:** Alsike clover has good winter hardiness.

**Drought Tolerance:** Alsike clover does not tolerate drought.

**Erosion Control:** Alsike clover has limited use for erosion control. Alsike clover can be used as a plow down crop (green manure) to add organic matter to the soil.

**Ease of Establishment:** Alsike clover establishes readily, but does not compete well with cover crops.

**Suggested Mixtures:** Timothy or reed canary grass for hay production, or as a component of a pasture or reclamation mix on acidic or poor quality soils.

**Salinity Tolerance:** Alsike clover is not recommended for saline areas.

**Flooding Tolerance:** Alsike clover can withstand at least five weeks of spring flooding and waterlogged soils.

**Soil Texture:** Alsike clover is suited to cool, wet, and slightly acidic loamy to clay soils. Alsike clover is adapted to the Black and Grey soil zones.

**Acidity Tolerance:** Alsike clover tolerates soil pH as low as 6.0.

**Management Considerations:** Fertilize according to soil test results. In acidic soils, root nodulation and nitrogen fixation can be impaired. Condition the crop when cutting for hay to speed drying.

Forage Factsheet – Altai Wildrye

**Species Name:** Altai Wildrye Grass - *Elymus angustus*

**Origin:** Siberia and Mongolia

**Longevity:** Long-lived.

**Uses:** Pasture, stockpiling

**Optimal time of use:** Altai wildrye can be used for summer grazing, but is superior for fall pasture. Livestock typically avoid grazing altai wildrye during summer, but after fall frost animals prefer altai wildrye over many other grasses. Altai wildrye stockpiles well because its long basal upright leaves cure well and are fairly easy for animals to graze after snowfall.

**Recovery after use:** Altai wildrye recovers well after grazing. At least 60 days of regrowth (or until after the first killing frost) should occur before regrazing.

**Yield:** Altai wildrye yields approximately 2260 lbs/acre (2568 kg/ha) in the Brown soil zone, 4590 lbs/acre (5215 kg/ha) in the Dark Brown soil zone, and 4045 lbs/acre (4596 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates for established pastures are 0.5 AUM/acre (1.25 AUM/ha) in the Brown soil zone, 1.1 AUM/acre (2.75 AUM/ha) in the Dark Brown soil zone, and 0.8 AUM/acre (2.0 AUM/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Altai wildrye's palatability increases as it matures. Altai wildrye has approximately 65% dry matter digestibility and 10% crude protein at maturity in the fall.

**Competitiveness:** Altai wildrye is competitive once established.

**Winter Hardiness:** Altai wildrye has very good winter hardiness.

**Drought Tolerance:** Altai wildrye has very good drought tolerance. Deep roots (up to 10 feet deep) can take advantage of deep soil moisture and high water tables.

**Erosion Control:** Altai wildrye has limited use for erosion control.

**Ease of Establishment:** Altai wildrye seedlings are slow growing and poor competitors with weeds, companion crops or other forage seedlings.

**Suggested Mixtures:** Altai wildrye is best used with alfalfa or cicer milkvetch. Animals will select the legume unless it is intensively grazed. Mixtures should be seeded at 90 degree angles to the altai wildrye rows to decrease interspecies competition.

**Salinity Tolerance:** Altai wildrye has excellent salinity tolerance.

**Flooding Tolerance:** Altai wildrye can withstand approximately one to two weeks of spring flooding.

**Soil Texture:** Altai wildrye establishes best on loam and clay soils, but will grow on all soil textures. Altai wildrye requires approximately 13.5 inches or 350 mm of annual precipitation, but will have excellent production in dry areas with high water tables.

**Acidity Tolerance:** Altai wildrye tolerates soil pH as low as 5.9.

**Management Considerations:** Care during establishment will result in adequate plant populations for optimal production. Altai wildrye remains most productive if it is grazed in the fall.

Forage Factsheet – Awned Wheatgrass

Species Name: Awned Wheatgrass – *Agropyron subsecundum*

Origin: Moist sites in the prairie parkland.

Longevity: Long-lived.

Uses: Reclamation, pasture

Optimal time of use: Awned wheatgrass should be grazed prior to seed head development.

Recovery after use: Graze awned wheatgrass once per year. At least four inches (100mm) of stubble should be left after grazing to maintain vigor.

Yield: Awned wheatgrass yields are comparable to slender wheatgrass. In rangeland, awned wheatgrass is a decreaser species.

Palatability/Nutritional Value: Awned wheatgrass is palatable until heading. Awn development and coarse stems at maturity reduce palatability. Digestibility ranges from 55% in June to 35% in October and crude protein ranges from 14% in June to 4% in October.

Competitiveness: Little is known about its competitiveness in pure stands or simple mixes.

Winter Hardiness: Awned wheatgrass has good winter hardiness.

Drought Tolerance: Awned wheatgrass has moderate drought tolerance.

Erosion Control: Awned wheatgrass is a useful component of reclamation mixes.

Ease of Establishment: Awned wheatgrass is relatively easy to establish.

Suggested Mixtures: Green needle grass, northern wheatgrass and western wheatgrass, plains rough fescue, purple prairie clover.

Salinity Tolerance: Awned wheatgrass has poor salinity tolerance.

Flooding Tolerance: Awned wheatgrass can withstand approximately one to two weeks of spring flooding.

Soil Texture: Awned wheatgrass is best suited to moist, well drained loamy textured soils in sheltered areas of the Brown, Dark Brown, and Black soil zones. Awned wheatgrass is found in moist shady areas such as coulees, on the edges of brush or tree bluffs, or in wet areas around treed sloughs.

Acidity Tolerance: NA

Management Considerations: NA

Forage Factsheet – Big Bluestem

Species Name: Big Bluestem – *Andropogon gerardii*

Origin: Tall Grass Prairie

Longevity: Long-lived.

Uses: Reclamation, pasture.

Optimal time of use: Big bluestem should be grazed late in the season (or dormant) to maintain stand longevity and production. At least four inches (100 mm) of standing stubble should remain after grazing.

Recovery after use: In Saskatchewan, big bluestem regrowth is dependent on moisture, the previous year’s production level, intensity of defoliation and root energy reserves. Fifteen or more inches (380 mm) of new growth should be present before a second defoliation.

Yield: Recommended stocking rates are approximately 0.5 AUM/acre (1.25 AUM/ha). High precipitation levels greatly increase yield.

Palatability/Nutritional Value: Big bluestem is highly palatable. It is preferred in native stands to other grasses. Big bluestem crude protein levels are 7-12% during summer, however forage quality drops late in the growing season.

Competitiveness: Big bluestem is a poor competitor during establishment or when grazed. It is a decreaser species in native grasslands.

Winter Hardiness: Big bluestem’s winter hardiness is generally good. Intense defoliation compromises big bluestem's winter hardiness.

Drought Tolerance: Big bluestem has poor drought tolerance

Erosion Control: Big bluestem can be used in a reclamation mix in moist areas in southeast Saskatchewan.

Ease of Establishment: Big bluestem has fair seedling vigor.

Suggested Mixtures: Other native warm and cool season species.

Salinity Tolerance: Big bluestem has fair to poor salinity tolerance.

Flooding Tolerance: Big bluestem can withstand saturated soils for approximately one to two weeks in the spring.

Soil Texture: Big bluestem is suited to moist, well drained, fertile loam soils. Warm growing conditions are critical for big bluestem growth. In Saskatchewan, big bluestem is best adapted to the southeast where it is found in moist low lands, in coulees and on lower slopes between hills.

Acidity Tolerance: Big bluestem tolerates soil pH as low as 6.0.

Management Considerations: Burning stimulates new growth and increases productivity of big bluestem in its primary area of adaptation. Nitrogen is crucial for the productivity of big bluestem through legumes in a mix (nitrogen fixation) or nitrogen fertilization.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Birdsfoot Trefoil

Species Name: Birdsfoot Trefoil – *Lotus corniculatus*

Origin: Sweden

Longevity: 2-4 years.

Uses: Hay, pasture

Optimal time of use: Hay birdsfoot trefoil once per year during full bloom.

Recovery after use: Birdsfoot trefoil pasture requires four to six weeks of rest between grazing events.

Yield: Birdsfoot trefoil yields approximately 3825 lbs/acre (4336 kg/ha) in the Black and Grey soil zones.

Palatability/Nutritional Value: Birdsfoot trefoil is palatable and does not cause bloat in ruminants. Birdsfoot trefoil crude protein content at full bloom is approximately 9%.

Competitiveness: Birdsfoot trefoil is moderately competitive.

Winter Hardiness: Birdsfoot trefoil has poor winter hardiness. Winter survival is improved by deep snow cover and adequate rest prior to frost.

Drought Tolerance: Birdsfoot trefoil has fair drought tolerance.

Erosion Control: Birdsfoot trefoil is of limited use for controlling soil erosion, but is adapted to growing on poor soils.

Ease of Establishment: Birdsfoot trefoil is slow to establish. Seedlings have small weak roots and are sensitive to shade. Seed birdsfoot trefoil at 1/4” (2.6 mm) due to its small seed size.

Suggested Mixtures: Birdsfoot trefoil is best seeded alone, or with timothy, without a cover crop.

Salinity Tolerance: Birdsfoot trefoil has moderate salinity tolerance.

Flooding Tolerance: Birdsfoot trefoil is tolerant of up to four weeks of flooding. It is tolerant of wet soils throughout the year.

Soil Texture: Birdsfoot trefoil is adapted to moist sandy loam to clay soils in the Black and Grey soil zones. It tolerates soils that are wet or waterlogged, or soils low in fertility.

Acidity Tolerance: Birdsfoot trefoil can tolerate soil pH as low as 5.5.

Management Considerations: Inoculate birdsfoot trefoil seed to enhance nitrogen production. To improve establishment and stand longevity do not defoliate prior to full bloom in the first production year. Leave at least 3 inches (7.5 cm) of stubble following haying or grazing. Do not cut for 6 weeks prior to killing frost.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Blue Grama

Species Name: Blue Grama – *Bouteloua gracilis*

Origin: Dry mixed grass prairie.

Longevity: Long-lived.

Uses: Reclamation, pasture.

Optimal time of use: Blue grama is primarily used for reclamation purposes. Blue grama is a “warm season (C4) grass” and grows primarily during mid to late summer. A pure stand of blue grama should be grazed during the summer or fall. When blue grama is seeded in a mix, grazing should be timed for other species in the mix.

Recovery after use: Blue grama takes approximately fourteen months to fully recover from grazing.

Yield: Blue grama is short growing, with one to four inch long leaves. Blue grama yields approximately 125 lbs/acre (142 kg/ha) on the Canadian prairies.

Palatability/Nutritional Value: Blue grama has a peak digestibility of 50% in July and lows of 40% in October. Crude protein levels range from 5-9%.

Competitiveness: Once established, blue grama forms a thick sod that is not easily invaded by other plants. Increases in overgrazed pastures.

Winter Hardiness: Blue grama is winter hardy.

Drought Tolerance: Blue grama is very drought tolerant.

Erosion Control: Blue grama is best used in mixes with other native grasses for erosion control. It stabilizes soil by forming a thick, root-bound sod.

Ease of Establishment: Blue grama is slow to establish.

Suggested Mixtures: Blue grama may be mixed with native species such as green needle grass, western wheatgrass, northern wheatgrass, needle and thread, and western porcupine grass in a pasture or reclamation mix. It is one of the few warm season grasses with broad adaptation in Saskatchewan.

Salinity Tolerance: Blue grama has low salinity tolerance.

Flooding Tolerance: Blue grama tolerates approximately one week of saturated soils in the spring.

Soil Texture: Blue grama is suited to well drained sandy to clay soils in the Brown and Dark Brown soil zones. Blue grama is found in native pastures on well drained and dry soils on hillsides and hill tops and south facing slopes.

Acidity Tolerance: Blue grama tolerates soil pH as low as 6.6.

Management Considerations: Allow for adequate rest following defoliation.

Forage Factsheet – Canada Wildrye

**Species Name:** Canada Wildrye/Nodding Wildrye - *Elymus canadensis*

**Origin:** Mixed grass prairie.

**Longevity:** Up to 5 years. Long term stands of Canada wildrye persist through establishment of new seedlings.

**Uses:** Reclamation, pasture, hay.

**Optimal time of use:** Canada wildrye should be cut for hay before seed heads are present. Canada wildrye grows rapidly in the spring. If grazing, utilize in the spring or early summer.

**Recovery after use:** Canada wildrye regrows slowly after haying or grazing. It should be rested for a full growing season following use.

**Yield:** NA

**Palatability/Nutritional Value:** Canada wildrye is moderately palatable when vegetative. Palatability drops drastically at the heading stage.

**Competitiveness:** Canada wildrye competes poorly with weeds. Canada wildrye is one of the first species to establish on a disturbed site but is replaced by other species within a few years.

**Winter Hardiness:** Canada wildrye has good winter hardiness.

**Drought Tolerance:** Canada wildrye has moderate drought tolerance but is best adapted to moist, disturbed areas.

**Erosion Control:** Canada wildrye is an excellent grass for erosion control. It is one of the first species to establish in a disturbed site or along waterways and wetlands.

**Ease of Establishment:** Canada wildrye seedlings are vigorous and easy to establish. Canada wildrye responds well to dormant seeding (i.e., end of October).

**Suggested Mixtures:** Other native species for reclamation purposes.

**Salinity Tolerance:** Canada wildrye has poor salinity tolerance.

**Flooding Tolerance:** NA

**Soil Texture:** Canada wildrye is adapted to sandy through clay soils, but is most productive on coarse textured soils. It thrives in areas with greater than 20 inches (500 mm) of annual precipitation or in moist low-lying areas along sloughs, rivers, creeks and in depressions.

**Acidity Tolerance:** Canada wildrye tolerates soil pH as low as 5.0.

**Management Considerations:** Canada wildrye will persist if allowed to go to seed and establish new plants.

Dryland Forage Species Adaptation CD.
Species Name: Cicer Milkvetch – *Astragalus cicer*

Origin: Eastern Europe

Longevity: 5-20 years

Uses: pasture

Optimal time of use: Cicer milkvetch begins growth approximately three weeks after alfalfa in the spring. Because of cicer milkvetch’s prostrate growth habit, it is not recommended as a hay crop. Cicer milkvetch pastures may be grazed anytime during the early summer to fall.

Recovery after use: Cicer milkvetch requires a full growing season to recover from grazing.

Yield: Cicer milkvetch yields approximately 1475 lbs/acre (1676 kg/ha) in the Brown soil zone, 3795 lbs/acre (4312 kg/ha) in the Dark Brown soil zone, and 4660 lbs/acre (5295 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates are 1.3 AUM/acre in the Dark Brown, Black and Grey soil zones.

Palatability/Nutritional Value: Cicer milkvetch has reported digestibility values of 61.5% and crude protein levels of approximately 14.6% throughout the grazing season. Cicer milkvetch produces good quality late season pasture. Cicer milkvetch does not cause bloat or accumulate selenium.

Competitiveness: Cicer milkvetch is competitive once established.

Winter Hardiness: Cicer milkvetch has good winter hardiness.

Drought Tolerance: Cicer milkvetch is moderately drought tolerant and goes dormant during periods of drought.

Erosion Control: Cicer milkvetch’s creeping rootstocks are effective at soil stabilization.

Ease of Establishment: Cicer milkvetch is difficult to establish. A high percentage of hard seeds and low seedling vigor results in extended establishment times. Cicer milkvetch seeds will continue to germinate for up to three years after they have been planted. Newer cultivars have greater seedling vigor. Do not use a cover crop when seeding cicer milkvetch. Scarify seed prior to planting.

Suggested Mixtures: Meadow bromegrass, bunchgrasses.

Salinity Tolerance: Cicer milkvetch has low salinity tolerance.

Flooding Tolerance: Cicer milkvetch withstands saturated soils for approximately one week in the spring. It does not tolerate flooding.

Soil Texture: Cicer milkvetch is adapted to all soil textures but produces best on coarse soils. It requires approximately 15.7 inches (400 mm) of annual precipitation. Cicer milkvetch produces well on sites with shallow water tables.

Acidity Tolerance: Cicer milkvetch tolerates soil pH as low as 6.0.

Management Considerations: Allow adequate time for establishment (1-2 growing seasons) before use.

Forage Factsheet – Creeping Foxtail

Species Name: Creeping Foxtail – Alopecurus arunidinaceus

Origin: Eastern Europe, Eurasia

Longevity: Long-lived

Uses: Hay, pasture, salinity reclamation

Optimal time of use: Creeping foxtail begins growth very early in the season. Hay creeping foxtail before flowering for the best yield and quality. Grazing can occur season-long.

Recovery after use: Creeping foxtail regrows quickly after use when moisture is available.

Yield: Creeping foxtail yields approximately 2650 lbs/acre (3011 kg/ha) in the Black soil zone.

Palatability/Nutritional Value: Creeping foxtail is very palatable for grazing or haying prior to seed head development. Creeping foxtail has an average total digestible nutrient (TDN) level of 65% and crude protein level of 14-15% in the vegetative state.

Competitiveness: Creeping foxtail is very competitive once established. Creeping foxtail displaces native wetland vegetation including reed canary grass.

Winter Hardiness: Creeping foxtail has good winter hardiness.

Drought Tolerance: Creeping foxtail is not drought tolerant.

Erosion Control: Creeping foxtail is effective for erosion control in high moisture areas such as streams and canals. Creeping foxtail is rhizomatous and will spread to hold soil in place.

Ease of Establishment: Creeping foxtail has very poor seedling vigor for the first 6 weeks after germination. Seeds are small and fluffy. Purchasing coated seed makes seed metering and distribution more consistent.

Suggested Mixtures: Creeping foxtail is competitive with other forages and is usually seeded as a monoculture.

Salinity Tolerance: Creeping foxtail has moderate salinity tolerance. It has the ability to displace foxtail barley growing in saline areas around permanent bodies of water.

Flooding Tolerance: Creeping foxtail withstands up to four weeks of spring flooding. It requires wet or waterlogged soils year round.

Soil Texture: Creeping foxtail is adapted to sandy, loamy, clay, peat or muskeg soils that remain moist or wet throughout the growing season.

Acidity Tolerance: Creeping foxtail tolerates soil pH as low as 5.1.

Management Considerations: Creeping foxtail becomes sod bound as the stand ages. Creeping foxtail responds well to nitrogen fertilization.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Creeping Red Fescue

Species Name: Creeping Red Fescue – *Festuca rubra*

Origin: Europe, Czechoslovakia, North America.

Longevity: Long-lived.

Uses: Turf grass, pasture, reclamation, stockpiling.

Optimal time of use: Creeping red fescue is adapted to early spring or fall grazing. Mature stands form thick sod resilient to traffic.

Recovery after use: Variable, depending on available moisture and temperature.

Yield: Creeping red fescue produces approximately 4739 lbs/acre (5385 kg/ha) in the Black soil zone and 6960 lbs/acre (7909 kg/ha) of dry matter under irrigation.

Palatability/Nutritional Value: Creeping red fescue is palatable in the spring and fall. Creeping red fescue has an average total digestible nutrients of 61% and crude protein of 12% in the vegetative state. Stockpiled creeping red fescue has adequate nutrition for a dry pregnant cow.

Competitiveness: Creeping red fescue is competitive in moist areas.

Winter Hardiness: Creeping red fescue has good winter hardiness when adequate snow cover is present.

Drought Tolerance: Creeping red fescue has limited drought tolerance.

Erosion Control: Creeping red fescue is very good at controlling erosion. It is often used for revegetation of waterways and canals because it forms a thick, soil binding sod, but does not impede water movement.

Ease of Establishment: Creeping red fescue has fair establishment vigor.

Suggested Mixtures: Legumes such as alfalfa and cicer milkvetch.

Salinity Tolerance: Creeping red fescue has moderate salinity tolerance.

Flooding Tolerance: Creeping red fescue tolerates approximately one to two weeks of spring flooding or waterlogged soils.

Soil Texture: Creeping red fescue is suited to moist sandy, loamy, and clay soils in the Black and Grey soil zones.

Acidity Tolerance: Creeping red fescue tolerates soil pH as low as 5.0.

Management Considerations: Use appropriate stocking rates. Allow adequate rest following grazing. Creeping red fescue can increase in abundance when seeded with other species in a pasture mix.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Crested Wheatgrass

Species Name: Crested Wheatgrass - *Agropyron cristatum, Agropyron desertorum*

There are 2 types of crested wheatgrass. Most new cultivars are intermediate between these two types.

### Crested wheatgrass characteristics

<table>
<thead>
<tr>
<th>Diploid (<em>A. cristatum, fairway-Parkway type</em>)</th>
<th>Tetraploid (<em>A. desertorum, Nordan/ Summit type</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- smaller seeds</td>
<td>- large seeds and seed heads</td>
</tr>
<tr>
<td>- finer leaves and stem</td>
<td>- coarser stems and leaves</td>
</tr>
<tr>
<td>- less drought tolerant</td>
<td>- more drought tolerant</td>
</tr>
</tbody>
</table>

**Origin:** Russia and Siberia

**Longevity:** Long-lived.

**Uses:** Pasture, hay.

**Optimal time of use:** Crested wheatgrass is best for early spring grazing and early season hay. Graze at the four leaf stage to promote regrowth and reduce seed head formation. Mature crested wheatgrass plants are coarse and have very low palatability.

**Recovery after use:** At least 60 days rest is required between defoliations. Regrowth is limited after late June. If moisture conditions are favorable, some regrowth can occur in late summer and fall.

**Yield:** Diploid type (Fairway type) crested wheatgrass yields approximately 3320 lbs/acre (3772 kg/ha) in the Brown soil zone, 4480 lbs/acre (5090 kg/ha) in the Dark Brown soil zone, 4280 lbs/acre (4863 kg/ha) in the Black and Grey soil zones. Tetraploid type (Nordan/Summit type) crested wheatgrass yields approximately 3160 lbs/acre (3590 kg/ha) in the Brown soil zone, 4720 lbs/acre (5363 kg/ha) in the Dark Brown soil zone, 4600 lbs/acre (5227 kg/ha) in the Black and Grey soil zones. Initial stocking rates are 0.7 AUM/acre (1.7 AUM/ha) in the Brown soil zone, 1.1 AUM/acre (2.7 AUM/ha) in the Dark Brown soil zone, and 1.4 AUM/acre (3.5 AUM/ha) in the Black and Grey soil zones.

**Palatability / Nutritional Value:** Crested wheatgrass has an average digestibility of 61% and crude protein level of 11-12% in the vegetative state. Crested wheatgrass' palatability and nutritional value decrease markedly with advancing maturity.

**Competitiveness:** Crested wheatgrass is very competitive. Crested wheatgrass is a bunchgrass, but spreads effectively through seed dispersal. Crested wheatgrass is invasive and can spread into other areas, such as native rangeland.

**Winter Hardiness:** Crested wheatgrass is extremely winter hardy.

**Drought Tolerance:** Crested wheatgrass has excellent drought tolerance.

**Erosion Control:** Crested wheatgrass has limited use for erosion control.

**Ease of Establishment:** Crested wheatgrass is an excellent establisher and spreads rapidly if it is allowed to set seed.

**Suggested Mixtures:** Alfalfa for haying or grazing.

**Salinity Tolerance:** Crested wheatgrass has moderate salinity tolerance.

**Flooding Tolerance:** Crested wheatgrass withstands up to two weeks of spring flooding or saturated soils.

**Soil Texture:** Crested wheatgrass is suited to well drained sandy through clay soils.

**Acidity Tolerance:** Crested wheatgrass tolerates soil pH as low as 6.0.

**Management Considerations:** Stocking rates, stock density, and animal distribution can be adjusted to ensure adequate utilization of crested wheatgrass and reduce ungrazed plants. Crested wheatgrass responds well to nitrogen fertilization.

**Species Name:** Dahurian Wildrye - *Elymus diahuricus*

**Origin:** Siberia, China, Mongolia.

**Longevity:** Short lived. Survives for 2-3 years in the Brown and Dark Brown soil zones, and 2-5 years in the Black and Grey soil zones.

**Uses:** Hay, pasture, short-rotation forage crop in rotation with annual crops.

**Optimal time of use:** Under good growing conditions, Dahurian wildrye can be used in the year of establishment. Cut hay prior to or during the flowering stage. Dahurian wildrye starts growing early in the season and should be grazed before it gets coarse. Dahurian wildrye does not cure well and is not recommended for fall stockpiling.

**Recovery after use:** Dahurian wildrye has rapid regrowth especially where moisture is available. It is possible to get two to three grazing rotations per year, or one hay cut followed by a grazing rotation.

**Yield:** Dahurian wildrye yields approximately 2620 lbs/acre (2977 kg/ha) in the Brown soil zone, 4870 lbs/acre (5534 kg/ha) in the Dark Brown soil zone, and 4945 lbs/acre (5619 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Dahurian wildrye pasture is more palatable than tall fescue, but less palatable than Russian wildrye and altai wildrye. Hay quality of Dahurian wildrye is similar to crested wheatgrass.

**Competitiveness:** New stands of Dahurian wildrye are very competitive. As Dahurian wildrye stands age they becomes less competitive.

**Winter Hardiness:** It is moderately winter hardy.

**Drought Tolerance:** Dahurian wildrye has poor to fair drought tolerance.

**Erosion Control:** Dahurian wildrye is poor at erosion control. It is a short lived grass with shallow roots.

**Ease of Establishment:** Dahurian wildrye establishes quickly and may be used in the establishment year if moisture is adequate.

**Suggested Mixtures:** Dahurian wildrye should be seeded at a rate of less than 25% of the mix with species that are slow to establish such as Russian wildrye or altai wildrye to reduce competition. Dahurian Wildrye is a useful component of a forage blend for saline soils.

**Salinity Tolerance:** Dahurian wildrye has good salinity tolerance (similar to Russian wildrye).

**Flooding Tolerance:** Dahurian wildrye withstands up to four weeks of spring flooding.

**Soil Texture:** Dahurian wildrye grows well on all soil textures. It is best suited to moist areas or regions with high precipitation.

**Acidity Tolerance:** Dahurian wildrye has tolerance of soil acidity.

**Management Considerations:** Fertilize according to soil test results.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Green Needlegrass

Species Name: Green Needlegrass – *Stipa viridula*

Origin: Mixed Grass Prairie.

Longevity: Long-lived.

Uses: Pasture, reclamation, stockpiling.

Optimal time of use: Green needlegrass should be grazed between early summer and fall or can be stockpiled for fall or winter grazing.

Recovery after use: For maximum persistence graze green needlegrass once per season.

Yield: Green needlegrass yields approximately 1335 lbs/acre (1517 kg/ha) per year in the Brown soil zone.

Palatability/Nutritional Value: Green needlegrass has an average digestibility ranging from 52% in May to 45% in September and crude protein levels ranging from 11% in May to 7% in September. Green needlegrass is very palatable and can decline in mixed stands due to selective grazing by livestock. Green needlegrass awns are not problematic to grazing livestock.

Competitiveness: Green needlegrass is a poor competitor.

Winter Hardiness: Healthy green needlegrass has good winter hardiness.

Drought Tolerance: Green needlegrass is moderately drought tolerant.

Erosion Control: Once established, green needlegrass has good soil holding characteristics and adds high levels of organic matter to the soil.

Ease of Establishment: Green needlegrass seeds require a period of cold or vernalization prior to germination. Late fall seeding (i.e., October) results in improved germination success. Once seedlings emerge they are vigorous. The variety ‘Lodorm’ germinates more readily than earlier cultivars.

Suggested Mixtures: Other native species for reclamation.

Salinity Tolerance: Green needlegrass has low salinity tolerance.

Flooding Tolerance: Green needlegrass withstands saturated soils for approximately one week in the spring.

Soil Texture: Green needlegrass requires 12 to 18 inches (30 to 45 cm) of annual precipitation. It is suited to loamy to clay-loam soils in well drained but moist areas. It is naturally found on north facing slopes, in slight depressions, and between hills.

Acidity Tolerance: Green needlegrass tolerates soil pH as low as 6.6.

Management considerations: To maintain productivity, provide adequate rest following defoliation and include a legume in the stand or fertilize with nitrogen fertilizer.

Forage Factsheet – Hybrid Bromegrass

**Species Name:** Hybrid Bromegrass (smooth bromegrass x meadow bromegrass)

**Origin:** Hybrid bromegrass was developed in Saskatoon, Saskatchewan from a cross between smooth bromegrass and meadow bromegrass. AC Knowles was the first cultivar developed and it has intermediate characteristics between smooth brome and meadow brome.

**Longevity:** Long-lived. Research indicates that hybrid bromegrass appears to live at least 10 years in the Dark Brown, Black and Grey soil zones. Initial trials indicate that hybrid bromegrass is well adapted to the Brown soil zone.

**Uses:** Hay, pasture, stockpiling.

**Optimal time of use:** Hybrid bromegrass matures four to seven days after smooth bromegrass and four to seven days before meadow bromegrass. Hybrid bromegrass has potential to be used as stockpiled grazing as it remains palatable into the fall.

**Recovery after use:** Hybrid bromegrass regrows more rapidly than smooth bromegrass, requiring approximately 60 days of rest following defoliation.

**Yield:** Hybrid bromegrass yields approximately 5720 lbs/acre (6500 kg/ha) in the Dark Brown soil zone and 5560 lbs/acre (6318 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Hybrid bromegrass is very palatable and has lower fibre content than other bromegrasses. Hybrid bromegrass has a large leaf area per tiller. At maturity, hybrid bromegrass crude protein levels are approximately 10-12%.

**Competitiveness:** Hybrid bromegrass has good competitiveness, similar to meadow bromegrass.

**Winter Hardiness:** Hybrid bromegrass has very good winter hardiness, equal to smooth bromegrass.

**Drought Tolerance:** Hybrid bromegrass has very good drought tolerance.

**Erosion Control:** Hybrid bromegrass is fair at erosion control. It has roots that are slightly rhizomatous.

**Ease of Establishment:** Hybrid bromegrass has excellent seedling vigor and establishes easily.

**Suggested Mixtures:** Alfalfa for hay or pasture.

**Salinity Tolerance:** Hybrid bromegrass has moderate salinity tolerance.

**Flooding Tolerance:** Hybrid bromegrass can withstand one to two weeks of spring flooding.

**Soil Texture:** Hybrid bromegrass is suited to well drained, sandy through clay soil.

**Acidity Tolerance:** Hybrid bromegrass is moderately tolerant of acidic soils similar to other brome grasses. It may tolerate pH as low as 5.5.

**Management Considerations:** To increase the productivity of hybrid bromegrass seed in a stand with a legume such as alfalfa, or fertilize.

Dryland Forage Species Adaptation CD.
Species Name: Hybrid wheatgrasses

Origin: Originally developed in the United States and Canada.

Longevity: 10 years.

Uses: Saline soil reclamation, pasture, hay.

Optimal time of use: Graze hybrid wheatgrass before heading. Hay hybrid wheatgrass as it comes into flower.

Recovery after use: Hybrid wheatgrass requires 60 days rest between defoliation events. If hybrid wheatgrass is initially grazed late in the growing season, regrowth is substantially less. Hybrid wheatgrass has low growing points and is moderately tolerant to intensive grazing.

Yield: Data from dry areas in the United States indicates yields anywhere from 2080 lbs/acre (2363 kg/ha) to 3330 lbs/acre (3784 kg/ha) and 5255 lbs/acre (5971 kg/ha) under irrigation or with high nitrogen availability. AC Saltlander yields at Swift Current, SK averaged 2526 lbs/acre (2870 kg/ha).

Palatability/Nutritional Value: The nutritional value of hybrid wheatgrass decreases rapidly as it matures. Stockpiled hybrid wheatgrass does not have sufficient crude protein to maintain a cow over winter, and is therefore not suitable for stockpiling. Average forage analyses in dryland forage trials at Swift Current, SK reported organic matter digestibility of 50.7% and crude protein levels of 6.4% for AC Saltlander. Livestock find hybrid wheatgrass palatable until heading.

Competitiveness: Hybrid wheatgrass is competitive. It spreads by rhizomes significantly less that quackgrass.

Winter Hardiness: Hybrid wheatgrass has good winter hardiness.

Drought Tolerance: Hybrid wheatgrass has good drought tolerance, similar to intermediate wheatgrass.

Erosion Control: Hybrid wheatgrass is effective at erosion control.

Ease of Establishment: Hybrid wheatgrass established readily.

Suggested Mixtures: Research indicates that hybrid wheatgrass is a strong competitor against alfalfa when planted in a mixture. It is a stronger competitor than intermediate wheatgrass or crested wheatgrass.

Salinity Tolerance: Hybrid wheatgrass has excellent salinity tolerance, a primary selection criteria when being developed. AC Saltlander has improved salt tolerance over NewHy, and equals that of tall wheatgrass.

Flooding Tolerance: NA

Soil Texture: Hybrid wheatgrass is adapted to a variety of soil textures.

Acidity Tolerance: NA

Management Considerations: Hybrid wheatgrass can become root bound. Fertilization has minimal effect on increasing production. Invasiveness may be a concern when planting hybrid wheatgrass adjacent to natural areas.

Forage Factsheet – Intermediate Wheatgrass

Species Name: Intermediate Wheatgrass – *Agropyron intermedium*

Origin: Siberia

Longevity: 3-10 years. Intermediate wheatgrass persists less than 6 years in a continuously grazed pasture. Intermediate wheatgrass can persist 10 years in a one-cut hay stand.

Uses: Hay, pasture, stockpiling, reclamation.

Optimal time of use: Cut intermediate wheatgrass hay prior to or during flowering. Intermediate wheatgrass pasture is best utilized in spring and early summer. If being used as stockpiled forage, intermediate wheatgrass should be cut or grazed lightly early in the season to increase stockpiled forage quality.

Recovery after use: Cutting or grazing more than once per season reduces vigour and stand persistence. Leave 4 inches (10 cm) of stubble following grazing.

Yield: Intermediate wheatgrass yields approximately 3690 lbs/acre (4193 kg/ha) in the Brown soil zone, 4945 lbs/acre (5619 kg/ha) in the Dark Brown soil zones, and 4890 lbs/acre (5577 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates are 0.5 AUM/acre (1.25 AUM/ha) in the Brown soil zone and 1 AUM/acre (2.5 AUM/ha) in the Dark Brown, Black and Grey soil zones.

Palatability/Nutritional Value: Intermediate wheatgrass has an average digestibility of 58% and crude protein levels of 12-15% at haying. Crude protein levels can remain as high as 11% into December. When grown with alfalfa, intermediate wheatgrass produces high quality hay. Intermediate wheatgrass matures later than other grasses, therefore providing higher quality hay than other grasses when hayed in a mixture with alfalfa.

Competitiveness: Intermediate wheatgrass is moderately competitive.

Winter Hardiness: Intermediate wheatgrass has good winter hardiness.

Drought Tolerance: Intermediate wheatgrass has good drought tolerance.

Erosion Control: Intermediate wheatgrass is effective at erosion control. It has strong sod forming tendencies in moist areas - less so in drier areas.

Ease of Establishment: Intermediate wheatgrass establishes easily.

Suggested Mixtures: Alfalfa for hay production.

Salinity Tolerance: Intermediate wheatgrass has moderate salinity tolerance.

Flooding Tolerance: Intermediate wheatgrass withstands saturated soils for approximately one week. It does not tolerate flooding.

Soil Texture: Intermediate wheatgrass requires at least 14 inches (355 mm) of annual precipitation for productivity and longevity. It is suited to fertile, well drained sandy-loam to clay textured soils.

Acidity Tolerance: Intermediate wheatgrass tolerates soil pH as low as 5.6.

Management Considerations: Adequate rest after use and fertility management will maximize intermediate wheatgrass productivity and longevity.

Forage Factsheet – June Grass

Species Name: June Grass – Koeleria gracilis

Origin: Mixed grass prairie.

Longevity: Long-lived.

Uses: Reclamation, pasture.

Optimal time of use: June grass grows quickly in the spring and forms seed heads and flowers by June. June grass should only be used as a minor component in complex native seed mixes for grazing because it has low production and is an increaser species in native grasslands. Grazing should be timed for the primary species in the mix.

Recovery after use: June grass requires a full growing season to recover following grazing.

Yield: June grass has low yield potential. Mature plant height (seed head) averages 6-23 inches (152-585 mm) depending on precipitation levels.

Palatability/Nutritional Value: June grass has an average total digestible nutrient (TDN) level of 66% and crude protein level of 16% in the vegetative state. The palatability and nutritional value of June grass is highest in the early spring but it should not be grazed until summer to coincide with the readiness of the other species in the forage mix.

Competitiveness: June grass has fair competitive ability.

Winter Hardiness: June grass has good winter hardiness.

Drought Tolerance: June grass is very drought tolerant.

Erosion Control: June grass is valuable in reclamation to enhance site biodiversity but it generally has shallow roots and is not a major contributor to site erosion control.

Ease of Establishment: June grass seed has a very low percent germination. June grass seedlings are weak when they emerge.

Suggested Mixtures: Native species for reclamation purposes.

Salinity Tolerance: June grass is not saline tolerant.

Flooding Tolerance: June grass withstands one to two weeks of saturated soils in the spring.

Soil Texture: June grass is suited to a wide range of soils (sandy through clay). It thrives on dry, well drained upland areas.

Acidity Tolerance: June grass tolerates soil pH as low as 6.0.

Management Considerations: Allow for adequate recovery time following defoliation.

Forage Factsheet – Kentucky Bluegrass

**Species Name:** Kentucky Bluegrass – *Poa pratensis*

**Origin:** Europe, North America.

**Longevity:** Long-lived.

**Uses:** Grazing, turf, reclamation.

**Optimal time of use:** Kentucky bluegrass is best suited for early season grazing.

**Recovery after use:** Regrowth is rapid under good moisture conditions. Graze livestock on Kentucky bluegrass to maintain a stand height of 2-6 inches (50 -152 mm). Maintaining Kentucky bluegrass in the vegetative stage will enhance yield and quality.

**Yield:** Irrigated yields of Kentucky bluegrass are 7420 lb/ac (8431 kg/ha).

**Palatability/Nutritional Value:** Kentucky bluegrass has an average total digestible nutrient (TDN) level of 67% and crude protein level of 12% in the vegetative state. Quality and palatability declines when Kentucky bluegrass matures.

**Competitiveness:** Kentucky bluegrass is grazing tolerant and can increase in pasture mixes and invade native prairie.

**Winter Hardiness:** Kentucky bluegrass has excellent winter hardiness.

**Drought Tolerance:** Kentucky bluegrass has fair drought tolerance and avoids drought by going dormant during dry periods.

**Erosion Control:** Kentucky bluegrass may be used to control erosion because it forms a dense root system.

**Ease of Establishment:** Kentucky bluegrass is slow to establish.

**Suggested Mixtures:** Legumes in irrigated pasture.

**Salinity Tolerance:** Kentucky bluegrass is not tolerant of saline soils.

**Flooding Tolerance:** Kentucky bluegrass may withstand flooding for one to two weeks in the spring.

**Soil Texture:** Kentucky bluegrass is suited to well drained, fertile soils in moist or humid regions.

**Acidity Tolerance:** Kentucky bluegrass tolerates soil pH as low as 5.8.

**Management Considerations:** Kentucky bluegrass production is very moisture dependant. Kentucky bluegrass has a high demand for nitrogen and phosphorous.

Forage Factsheet – Little Bluestem

**Species Name:** Little Bluestem - *Andropogon scoparius*

**Origin:** Native to eastern Mixed Grass Prairie and Tall Grass Prairie.

**Longevity:** Long-lived.

**Uses:** Pasture, reclamation.

**Optimal time of use:** Little bluestem is a warm season grass and does not initiate growth until late spring. Little bluestem should be grazed prior to the formation of seed heads for best palatability.

**Recovery after use:** Little bluestem should be grazed once per year to ensure stand longevity. Leave at least four inches (100 mm) of plant growth after grazing to enhance winter hardiness.

**Yield:** Little bluestem yields approximately 1500 lbs/acre (1704 kg/ha) per year.

**Palatability/Nutritional Value:** Little bluestem is nutritious and palatable until maturity. Livestock prefer to graze the lower outer leaves of little bluestem.

**Competitiveness:** Little bluestem is a poor competitor.

**Winter Hardiness:** Little bluestem has good winter hardiness.

**Drought Tolerance:** Little bluestem has good drought tolerance.

**Erosion Control:** Little bluestem is an excellent grass for erosion control and reclamation mixes. It has a dense root system that is suited to a wide range of soil including thin and gravelly sites.

**Ease of Establishment:** Little bluestem seedlings have low vigor.

**Suggested Mixtures:** Adapted warm and cool season native species for reclamation and grazing.

**Salinity Tolerance:** Little bluestem is not saline tolerant.

**Flooding Tolerance:** Little bluestem will withstand saturated soils for approximately one week in the spring.

**Soil Texture:** Little bluestem is adapted to upland soils with shallow water tables or areas where snow is trapped over winter. It is suited to sandy and rocky through clay soils.

**Acidity Tolerance:** Little bluestem tolerates soil pH as low as 5.5.

**Management Considerations:** Provide adequate rest following defoliation.

Forage Factsheet – Meadow Bromegrass

**Species Name:** Meadow Bromegrass - *Bromus biebersteinii*

**Origin:** Turkey and southeastern Europe.

**Longevity:** 10-20 years.

**Uses:** Pasture, hay, stockpiling.

**Optimal time of use:** Graze meadow bromegrass in the four leaf stage or when growth is 8 to 12 inches (203-305 mm) tall. Remove livestock from pasture when stubble is 3 to 4 inches (76-100 mm) tall. Previously hayed or grazed meadow bromegrass fields, or meadow bromegrass that has not been used during the growing season can be stockpiled for fall or winter grazing.

**Recovery after use:** Meadow bromegrass requires 30-60 days rest after grazing or cutting. Six inches (150 mm) of residue is required prior to the first killing frost to ensure winter hardiness. Meadow bromegrass's ability to regrow quickly with less moisture and nutrients than smooth bromegrass after use is one of its most desirable characteristics.

**Yield:** Meadow bromegrass yields approximately 3020 lbs/acre (3431 kg/ha) in the Brown soil zone, 4670 lbs/acre (5306 kg/ha) in the Dark Brown soil zone, and 4045 lbs/acre (4596 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates for new fields are 0.6 AUM/acre (1.5 AUM/ha) in the Brown soil zone, and 0.9 AUM/acre (2.25 AUM/ha) in the Dark Brown soil zone and 1.3 AUM/acre (3.25 AUM/ha) in the Black and Grey soil zones for one rotation.

**Palatability/Nutritional Value:** Meadow bromegrass has an average digestibility of 70-75% and crude protein level of 15-20% prior to flowering. After seed set meadow bromegrass has an average digestibility of 64% and 12% crude protein. Grazing livestock gain weight similarly on smooth bromegrass and meadow bromegrass until August, when weight gains on meadow bromegrass become superior. Feed value of stockpiled meadow brome is maintained in the fall and winter.

**Competitiveness:** Meadow bromegrass is moderately competitive. When seeded in a mix with alfalfa, alfalfa persists much longer than when seeded with crested wheatgrass or smooth bromegrass.

**Winter Hardiness:** Meadow bromegrass has good winter hardiness. Approximately 6 inches of carryover is required to enhance winter hardiness.

**Drought Tolerance:** Meadow bromegrass has good drought tolerance.

**Erosion Control:** Meadow bromegrass has fair erosion control capability.

**Ease of Establishment:** Meadow bromegrass seedings are vigorous and establish easily.

**Suggested Mixtures:** When grown with alfalfa for pasture, meadow bromegrass reduces bloat risk.

**Salinity Tolerance:** Meadow bromegrass has moderate tolerance of salinity.

**Flooding Tolerance:** Meadow bromegrass may withstand one to two weeks of spring flooding.

**Soil Texture:** Meadow bromegrass produces well on moist but well drained sandy, loamy and clay soils.

**Acidity Tolerance:** Meadow bromegrass tolerates soil pH as low as 5.7.

**Management considerations:** Seed meadow bromegrass with a legume to increase forage yield and quality. If a legume is not included in the stand, fertilize meadow bromegrass according to soil test results.

Forage Factsheet – Meadow Fescue

Species Name: Meadow Fescue – *Festuca pratensis*

Origin: Europe

Longevity: 1-10 years

Uses: Reclamation, hay, pasture, stockpiling.

Optimal time of use: Meadow fescue is best used as pasture, as it is too short for effective haying. Meadow fescue has been replaced somewhat by new tall fescue varieties that have equal adaptability and more production and longevity.

Recovery after use: Meadow fescue is slow to regrow after defoliation.

Yield: Meadow fescue yields approximately 4157 lbs/acre (4723 kg/ha) in the Black and Grey soil zones

Palatability/Nutritional Value: Meadow fescue has an average total digestible nutrient (TDN) level of 61% and crude protein level of 12.5% in the vegetative state. Meadow fescue has fair palatability. Pasture quality can be increased by including a legume in the stand. Meadow fescue remains green into the fall.

Competitiveness: Once established, meadow fescue has moderate competitive ability.

Winter Hardiness: Meadow fescue has poor winter hardiness. Meadow fescue is especially susceptible to winter injury when establishing and in years with little snow cover.

Drought Tolerance: Meadow fescue has fair drought tolerance. It is more drought tolerant than timothy.

Erosion Control: Meadow fescue is primarily used in waterways or channels to prevent erosion. It does not impede water movement.

Ease of Establishment: Meadow fescue is slow to establish and winter kills easily during the establishment year.

Suggested Mixtures: Alsike clover, birdsfoot trefoil.

Salinity Tolerance: Meadow fescue has low to moderate salinity tolerance.

Flooding Tolerance: Meadow fescue withstands two to five weeks of spring flooding. It withstands wet soils season long.

Soil Texture: Meadow fescue is best suited to moist or wet clay-loam to clay soils, but will grow on light textured soils with less moisture if managed carefully. Meadow fescue will grow where timothy grows.

Acidity Tolerance: Meadow fescue tolerates soil pH as low as 5.8.

Management Considerations: Allow for adequate rest following defoliation. Fertilize according to soil test results.

**Forage Factsheet – Meadow Foxtail**

**Species Name:** Meadow Foxtail – *Alopecurus pratensis*

**Origin:** Europe and Asia.

**Longevity:** 10-20 years.

**Uses:** Hay, pasture.

**Optimal time of use:** Meadow foxtail grows early and should be hayed or grazed before maturity during mid-June. Manage to avoid seed head formation and consequent reduction in palatability.

**Recovery after use:** Meadow foxtail recovers very quickly after grazing and may be grazed or hayed two or more times per growing season. Leave four inches (10 cm) of stubble after grazing.

**Yield:** Meadow foxtail generally yields less than reed canary grass and timothy. Yields obtained may reach 1500 lbs/acre (1704 kg/ha) in the Brown soil zone, 3300 lbs/acre (3750 kg/ha) in the Dark Brown soil zone, and 3990 lbs/acre (4534 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Meadow foxtail has an average digestibility of 70% and crude protein level of 17% in the vegetative state. Meadow foxtail is palatable and nutritious when vegetative, but quality declines rapidly as plants mature. Grazing livestock select against mature meadow foxtail when other species are present in the pasture.

**Competitiveness:** Meadow foxtail is very competitive, strongly creeping rooted, and displaces less adapted vegetation.

**Winter Hardiness:** Meadow foxtail has good winter hardiness.

**Drought Tolerance:** Meadow foxtail has poor drought tolerance.

**Erosion Control:** Meadow foxtail is useful for stabilizing waterways and banks, but its sod is inferior to reed canary grass for this purpose. Meadow foxtail has the ability to displace native vegetation in waterways.

**Ease of Establishment:** Meadow foxtail is easy to establish and may be utilized in the establishment year under good growing conditions.

**Suggested Mixtures:** Meadow foxtail is effective in a mix with timothy and alsike clover.

**Salinity Tolerance:** Meadow foxtail is not recommended for use on saline soils.

**Flooding Tolerance:** Meadow foxtail withstands two to five weeks of spring flooding. It grows best on wet soils found in and around wetlands and lowlands.

**Soil Texture:** Meadow foxtail is best suited to wet areas with heavy textured soils (clay-loam and clay soils). Ideal areas to seed meadow foxtail include peat and muskeg sites, sloughs, flood plains with very high water tables and other wet areas.

**Acidity Tolerance:** Meadow foxtail tolerates soil pH as low as 5.

**Management Considerations:** Allow for adequate rest after defoliation. Fertilize based on soil test results.

Forage Factsheet – Needle-and-Thread Grass

Species Name: Needle-and-Thread Grass - *Stipa comata*

Origin: Mixed grass prairie.

Longevity: Long-lived.

Uses: Reclamation, pasture.

Optimal time of use: Graze needle-and-thread grass prior to seed set or after seed drop to avoid hard, awned seeds.

Recovery after use: One year of rest is recommended after defoliation. In native rangelands needle-and-thread grass is an increaser species on moist sites and a decreaser species on dry sites.

Yield: NA

Palatability/Nutritional Value: Needle-and-thread grass has an average digestibility of 40-50% and crude protein level of 6-10% during the grazing season. Palatability is reduced while seeds are present.

Competitiveness: Needle-and-thread grass is a fair competitor.

Winter Hardiness: Needle-and-thread grass has excellent winter hardiness.

Drought Tolerance: Needle-and-thread grass has excellent drought tolerance.

Erosion Control: Needle-and-thread grass is fair at controlling erosion.

Ease of Establishment: Needle-and-thread grass seedlings have low vigour. Two or more years may be required for full establishment.

Suggested Mixtures: Needle-and-thread grass is a good component of a native species mix with western wheatgrass, northern wheatgrass, June grass and western porcupine grass.

Salinity Tolerance: Needle-and-thread grass is not salinity tolerant.

Flooding Tolerance: Needle-and-thread grass withstands saturated soils for approximately one week in the spring.

Soil Texture: Needle-and-thread grass is suited to coarse sandy to loamy soils. It grows best on dry, well drained sites.

Acidity Tolerance: Needle-and-thread tolerates soil pH as low as 6.6.

Management Considerations: Ensure adequate rest following defoliation.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Northern Wheatgrass

**Species Name:** Northern Wheatgrass - *Agropyron dasystachyum*

**Origin:** Mixed grass prairie.

**Longevity:** Long-lived.

**Uses:** Pasture, hay, reclamation.

**Optimal time of use:** Northern wheatgrass may be cut for hay but yields are low. Cut northern wheatgrass for hay before flowering. Northern wheatgrass is best used for grazing starting in mid-June. Quality declines in the fall.

**Recovery after use:** Northern wheatgrass should be grazed once per year.

**Yield:** Northern wheatgrass yields approximately 2900 lbs/acre (3295 kg/ha) in the Brown soil zone, 3080 lbs/acre (3500 kg/ha) in the Dark Brown soil zone, and 3230 lbs/acre (3670 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Northern wheatgrass is palatable and has an average digestibility of 45% throughout the year and crude protein levels drop from 20% in May to 4% in September.

**Competitiveness:** Northern wheatgrass is competitive, forming a sod when established.

**Winter Hardiness:** Northern wheatgrass has excellent winter hardiness.

**Drought Tolerance:** Northern wheatgrass is very drought tolerant.

**Erosion Control:** Northern wheatgrass is effective at controlling erosion due to its sod forming tendencies.

**Ease of Establishment:** Fair.

**Suggested Mixtures:** Native wheatgrasses and needlegrasses.

**Salinity Tolerance:** Northern wheatgrass is moderately saline tolerant.

**Flooding Tolerance:** Northern wheatgrass withstands one to two weeks of spring flooding.

**Soil Texture:** Northern wheatgrass is best suited to dry, coarse loamy to clay-loam soils but it may establish on sandy sites.

**Acidity Tolerance:** Northern wheatgrass has low tolerance of acidic soils.

**Management Considerations:** Ensure adequate rest following defoliation.
Forage Factsheet – Orchard Grass

Species Name: Orchard Grass – *Dactylis glomerata*

Origin: Europe

Longevity: 2-6 years

Uses: Hay, pasture, stockpiling.

Optimal time of use: Orchard grass begins growth in the spring later than meadow bromegrass. Grazing should begin when the orchard grass plants are 8-10 inches (20-25 cm) tall. Leave at least 4 inches (10 cm) of stubble. Time grazing to avoid the formation of seed heads to ensure forage quality. Hay mixed orchard grass stands when the other species in the stand are at their best quality. Orchard grass regrowth may be stockpiled as its feed value is adequate for dry pregnant cows until January.

Recovery after use: Orchard grass regrows rapidly after cutting or grazing if adequate fertility and moisture are available. Overgrazing drastically reduces winter hardiness and stand longevity because energy reserves are stored in the lower stems.

Yield: Orchard grass yields approximately 1300 lbs/acre (1477 kg/ha) in the Brown soil zone, 3300 lbs/acre (3750 kg/ha) in the Dark Brown soil zone, and 4320 lbs/acre (4909 kg/ha) in the Black and Grey soil zones. Under irrigation, orchard grass has the capability of producing 7230 lbs/acre (8215 kg/ha).

Palatability/Nutritional Value: Orchard grass is highly palatable. Orchard grass has an average digestibility of 67% and crude protein levels ranging from 13-16% just prior to haying.

Competitiveness: Lack of winter hardiness limits competitiveness in Saskatchewan.

Winter Hardiness: Orchard grass has poor winter hardiness. Hardiness can be improved by maintenance of adequate snow cover and carryover (at least 8 inches or 20 cm).

Drought Tolerance: Orchard grass is moderately drought tolerant. It is more drought tolerant than timothy.

Erosion Control: Orchard grass has limited value for erosion control.

Ease of Establishment: Orchard grass establishes easily.

Suggested Mixtures: Alfalfa.

Salinity Tolerance: Orchard grass has poor salinity tolerance.

Flooding Tolerance: Orchard grass is tolerant of up to one week of flooding or saturated soils in the spring, but does not tolerate waterlogged soils during the growing season.

Soil Texture: Orchard grass is suited to loamy through clay soils with good moisture holding capacity. Orchard grass requires at least 18 inches (45 cm) of annual precipitation and fertile soils.

Acidity Tolerance: Orchard grass tolerates soil pH as low as 5.0.

Management Considerations: Orchard grass responds well to nitrogen fertilization based on soil test recommendations.

Forage Factsheet – Plains Rough Fescue

**Species Name:** Plains Rough Fescue – *Festuca hallii*

**Origin:** Native to parkland and mixed grass prairie.

**Longevity:** Long-lived.

**Uses:** Pasture, stockpiling, hay, reclamation.

**Optimal time of use:** Plains rough fescue is excellent for grazing from early summer through fall and winter. Early grazing (spring) reduces vigour and persistence. Plains rough fescue can be stockpiled for grazing during calving before spring growth begins. Plains rough fescue makes very good hay. Cutting for hay should occur after July 15.

**Recovery after use:** Plains rough fescue produces approximately 73% of peak annual production by the beginning of June. Regrowth is slow with twelve months rest required for full recovery. Utilizing 50% of production and leaving 50% as litter enhances recovery and survival.

**Yield:** NA

**Palatability/Nutritional Value:** Plains rough fescue is very palatable year round. Plains rough fescue maintains an organic matter digestibility between 40-50% year round with a crude protein level between 4-9%.

**Competitiveness:** Plains rough fescue is not competitive during establishment. It decreases in abundance when overgrazed.

**Winter Hardiness:** Plains rough fescue is very winter hardy.

**Drought Tolerance:** Plains rough fescue has very good drought tolerance.

**Erosion Control:** Plains rough fescue is not recommended for erosion control because it is a bunch grass.

**Ease of Establishment:** Plains rough fescue seedlings are weak and have specific soil moisture requirements when establishing. Establishment requirements of plains rough fescue are poorly understood. Optimal germination occurs with early spring planting. Utilizing locally adapted seed from within a 100 mile radius of the seeding site increases establishment success.

**Mixtures:** Plains rough fescue may be used with purple prairie clover, green needle grass, needle-and-thread, northern wheatgrass, and western wheatgrass for native pasture or reclamation mixes.

**Salinity Tolerance:** Plains rough fescue has poor salinity tolerance.

**Flooding Tolerance:** Plains rough fescue has poor flooding tolerance but will withstand soils that are saturated for approximately one week in the spring.

**Soil Texture:** Plains rough fescue is suited to sandy-loam to clay soils in the moist but well drained areas of the Dark Brown and Black soil zones.

**Acidity Tolerance:** Plains rough fescue tolerates soil pH as low as 6.0.

**Management Considerations:** Overgrazing significantly decreases the productivity of plains rough fescue.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Pubescent Wheatgrass

Species Name: Pubescent Wheatgrass - *Agropyron trichophorum*

Pubescent wheatgrass is similar in appearance to intermediate wheatgrass but has short stiff hairs on the heads and seeds. Pubescent wheatgrass is more strongly creeping than intermediate wheatgrass.

Origin: Siberia

Longevity: 4-10 years.

Uses: Hay, pasture, reclamation.

Optimal time of use: Cut pubescent wheatgrass for hay prior to flowering.

Recovery after use: Pubescent wheatgrass should have at least 60 days rest between defoliations. Increased frequency of use reduces stand life. Leave 4 inches (10 cm) of stubble following grazing.

Yield: Pubescent wheatgrass yields approximately 3360 lbs/acre (3818 kg/ha) in the Brown soil zone, 4650 lbs/acre (5284 kg/ha) in the Dark Brown soil zones, and 4840 lbs/acre 5500 kg/ha) in the Black and Grey soil zones. Initial stocking rate recommendations are 0.4 AUM/acre (1 AUM/ha) in the Brown soil zone and 0.75 AUM/acre (1.88 AUM/ha) in the Dark Brown, Black and Grey soil zones.

Palatability/Nutritional Value: Pubescent wheatgrass has an average digestibility of 57% and crude protein level of 7.5% near maturity. Pubescent wheatgrass is palatable. When mixed with alfalfa, pubescent wheatgrass produces high quality hay. The dense basal leaves of pubescent wheatgrass hold their green color and nutritional value late into the fall.

Competitiveness: Pubescent wheatgrass is a competitive, sod forming grass.

Winter Hardiness: Pubescent wheatgrass has good winter hardiness. More winter hardy than intermediate wheatgrass.

Drought Tolerance: Pubescent wheatgrass has good drought tolerance. More drought tolerant than intermediate wheatgrass.

Erosion Control: Pubescent wheatgrass is useful for erosion control because it establishes easily and forms a thick sod.

Ease of Establishment: Pubescent wheatgrass establishes easily.

Suggested Mixtures: Alfalfa for hay production.

Salinity Tolerance: Pubescent wheatgrass is moderately tolerant of saline soils.

Flooding Tolerance: Pubescent wheatgrass withstands saturated soils for approximately one week. Does not tolerate flooding.

Soil Texture: Pubescent wheatgrass requires at least 12 inches (300 mm) of annual precipitation for productivity and longevity. It is suited to all soil textures and has lower fertility and moisture requirements than intermediate wheatgrass.

Acidity Tolerance: Pubescent wheatgrass tolerates soil pH of 6.5-7.

Management Considerations: Production of pubescent wheatgrass decreases as it becomes sod bound. Coultering, knifing or aerating with an application of nitrogen may increase production of sod-bound pubescent wheatgrass. Adequate rest following use increases production and stand life.

Forage Factsheet – Purple Prairie Clover

**Species Name:** Purple Prairie Clover – *Petalostemon purpureum*

**Origin:** Mixed grass prairie.

**Longevity:** 5-10 years

**Uses:** Reclamation, pasture.

**Optimal time of use:** Graze purple prairie clover in the bud to bloom stage. If purple prairie clover is a minor component in the pasture mix, time grazing for the forage species that makes up the majority of the production.

**Recovery after use:** Purple prairie clover regrows slowly after defoliation. It should be grazed once per year to promote longevity. Allow purple prairie clover four to six weeks of rest before the first killing frost to reduce winter injury.

**Yield:** NA

**Palatability/Nutritional Value:** Purple prairie clover is a palatable warm-season native legume. Purple prairie clover has an average digestibility of 68% in the vegetative stage to 50% in late flower. Crude protein levels ranging from 20% in the vegetative stage and 12-13% in late flower. Purple prairie clover can cause bloat during periods when plants are in the pre-bud or bud stage.

**Competitiveness:** Purple prairie clover is able to persist in native species mixtures used in livestock pastures.

**Winter Hardiness:** Purple prairie clover has good winter hardiness.

**Drought Tolerance:** Purple prairie clover has good drought tolerance.

**Erosion Control:** Purple prairie clover has limited value for controlling soil erosion.

**Ease of Establishment:** Purple prairie clover seeds require scarification to maximize germination. During the establishment year purple prairie clover grows approximately 6 to 12 inches tall (15-30 cm).

**Suggested Mixtures:** Include with native grass species for pasture.

**Salinity Tolerance:** Purple prairie clover has poor salinity tolerance.

**Flooding Tolerance:** Purple prairie clover will tolerate up to one week of saturated soils in the spring.

**Soil Texture:** Occurring on well drained, dry, coarse textured upland areas in nature, purple prairie clover is suited to sandy through loamy-clay soil textures in the Brown, Dark Brown, and Black soil zones. Purple prairie clover grows well on sandy sites.

**Acidity Tolerance:** Purple prairie clover has poor tolerance of acidic soils.

**Management Considerations:** Inoculate seed to encourage nitrogen fixation. Fertilize according to soil test results, paying particular attention to phosphorous levels.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Red Clover

Species Name: Red Clover - *Trifolium pratense*

Origin: Europe and Asia

Longevity: 1-3 years

Uses: Hay, stockpiling, green manure.

Optimal time of use: Single cut varieties are recommended for forage production in Saskatchewan. Cut red clover hay when 25% of the flower buds start to show color. Use a mower conditioner to hasten dry down. Red clover is generally not recommended for pasture as it does not withstand animal traffic or high intensity defoliation. Red clover can cause bloat. Regrowth may be grazed after the killing frost.

Recovery after use: After haying, red clover regrows well and can provide fall grazing. Haying red clover twice per year significantly decreases stand longevity.

Yield: Red clover yields approximately 3800 lbs/acre (4318 kg/ha) in the Black and Grey soil zones.

Palatability/Nutritional Value: Red clover cut at 25% flower-color has between 65-70% dry matter digestibility and 19% crude protein. Red clover hay does not maintain a green color, but does maintain good nutritive value as hay or stockpiled forage.

Competitiveness: Red clover is moderately competitive once established.

Winter Hardiness: Red clover requires good snow cover and adequate rest in the late summer to ensure winter survival.

Drought Tolerance: Red clover has poor drought tolerance.

Erosion Control: Red clover can be used as a plow down crop to add organic matter and nutrients to the soil.

Ease of Establishment: Red clover has moderate establishment vigor.

Suggested Mixtures: Red clover works well in a mix with timothy.

Salinity Tolerance: Red clover has poor salinity tolerance.

Flooding Tolerance: Red clover withstands one to two weeks of spring flooding.

Soil Texture: Red clover is suited to well drained fertile soils. It requires consistent moisture throughout the growing season.

Acidity Tolerance: Red clover tolerates soil pH as low as 5.0.

Management Considerations: Red clover a is short-lived forage. Inoculate seed and fertilize according to soil test results.
Forage Factsheet – Reed Canary Grass

**Species Name:** Reed Canary Grass - *Phalaris arundinacea*

**Origin:** Native to wetlands of North America and northern Europe. Improved cultivars originate from Swedish parental lines.

**Longevity:** Long-lived.

**Uses:** Hay, pasture, stockpiling, reclamation.

**Optimal time of use:** Reed canary grass should be used at the initiation of heading to maximize palatability, digestibility, yield and protein. Leave at least 2.5 inches (63 mm) of stubble after grazing to hasten regrowth. Reed canary grass has adequate feed value when stockpiled to maintain a pregnant cow until the end of the third trimester.

**Recovery after use:** Reed canary grass regrows quickly after use. Allow reed canary grass to regrow approximately 12 inches (30 cm) before regrazing.

**Yield:** Reed canary grass yields approximately 1470 lbs/acre (1670 kg/ha) in the Brown soil zone, 4410 lbs/acre (5011 kg/ha) in the Dark Brown soil zone, and 4460 lbs/acre (5068 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Reed canary grass has an average digestibility of 55-65% and crude protein levels ranging from 12-15% just prior to haying. Late harvesting lowers digestibility to approximately 40% and crude protein to 6%. Reed canary grass must be kept in a vegetative stage during grazing to remain palatable. Reed canary grass can accumulate alkaloids, which can lower feed intake, and cause diarrhea, watery eyes, fast breathing, and lack of thrift in livestock. All reed canary grass varieties registered in Canada have low alkaloid levels. Use certified seed of a registered variety to avoid problems with alkaloids.

**Competitiveness:** Reed canary grass is a strong sod former and is very competitive. With correct harvesting and fertility management, reed canary grass will fill in bare patches and out-compete weeds in the stand.

**Winter Hardiness:** Reed canary grass has good winter hardiness. Winter hardiness can be further improved by allowing four weeks rest after use before the first killing frost, minimizing traffic on young stands and maintaining snow cover.

**Drought Tolerance:** Reed canary grass has moderate drought tolerance.

**Erosion Control:** Reed canary grass is excellent at controlling erosion. It forms a thick sod which holds soil in place.

**Ease of Establishment:** Reed canary grass seedlings do not tolerate flooding. Seed reed canary grass so that germination occurs later in the season when soil moisture levels are lower. Stands that are initially thin will fill in within one to two years.

**Suggested Mixtures:** NA

**Salinity Tolerance:** Reed canary grass has poor salinity tolerance.

**Flooding Tolerance:** Reed canary grass withstands five to eight weeks of spring flooding and grows well in waterlogged soils.

**Soil Texture:** Reed canary grass is suited to loamy, clay, and peat soils. Suitable sites include flood plains, creeks, and slough and wetland margins or riparian areas.

**Acidity Tolerance:** Reed canary grass tolerates soil pH as low as 5.0 to 5.5.

**Management Considerations:** Spiking, coultering or knifing old reed canary grass stands will cut rhizomes or roots and stimulate new growth. Reed canary grass responds well to nitrogen fertilization.

Forage Factsheet – Russian Wildrye

**Species Name:** Russian Wildrye Grass - *Elymus juncea*

**Origin:** Siberia

**Longevity:** Long-lived.

**Uses:** Pasture, stockpiling.

**Optimal time of use:** Russian wildrye is well suited for early spring, fall, and winter grazing. After freeze up the leaves soften and become palatable. Russian wildrye has predominantly basal growth making it unsuitable for hay production.

**Recovery after use:** Rest Russian wildrye for at least 60 days after grazing. If Russian wildrye is grazed in the spring it may regrow sufficiently to be regrazed in the fall or stockpiled until late fall.

**Yield:** Russian wildrye yields approximately 1930 lbs/acre (2193 kg/ha) in the Brown soil zone, 4150 lbs/acre (4715 kg/ha) in the Dark Brown soil zone, and 3390 lbs/acre (3852 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates for established fields are 0.6 AUM/acre (1.5 AUM/ha) in Brown soil zone, 0.7 AUM/acre (1.75 AUM/ha) in Dark Brown soil zone and 0.6 AUM (1.5 AUM/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Russian wildrye's palatability is greatest during the spring and fall. Russian wildrye cures well on the stem in the fall and quality is maintained into winter. Russian wildrye has an average digestibility of 66% and crude protein of 14% in the early summer.

**Competitiveness:** Russian wildrye is very competitive once established. It begins growing early in the spring and has deep fibrous roots.

**Winter Hardiness:** Russian wildrye is extremely winter hardy.

**Drought Tolerance:** Russian wildrye has excellent drought tolerance once established.

**Erosion Control:** Russian wildrye is not suitable for erosion control.

**Ease of Establishment:** Russian wildrye is difficult to establish. Do not use a cover crop with Russian wildrye as seedlings are poor competitors and have poor vigor. When seeding in a mixture, seed Russian wildrye in rows at 90° angles to other forage species to reduce competition.

**Suggested Mixtures:** Alfalfa, cicer milkvetch.

**Salinity Tolerance:** Russian wildrye has good salinity tolerance. It is often included in mixtures for saline areas.

**Flooding Tolerance:** Russian wildrye does not tolerate flooding. It can be used in areas where the soil is saturated for approximately one week in the spring.

**Soil Texture:** Russian wildrye is best suited to loam to clay soils. Once established, Russian wildrye is productive on sandy sites.

**Acidity Tolerance:** Russian wildrye tolerates soil pH as low as 6.4.

**Management Considerations:** Russian wildrye has a relatively low yield response to nitrogen fertilization. Appropriate grazing management will help keep Russian wildrye stands productive.

Forage Factsheet – Sainfoin

**Species Name:** Sainfoin – *Onobrychis viciaefolia*

**Origin:** Europe, Asia, Russia and Turkey.

**Longevity:** 5 + years. Sainfoin stand longevity is dependent on growing conditions and management.

**Uses:** Pasture, hay, stockpiling.

**Optimal time of use:** Cut sainfoin hay at 75-100% bloom. Sainfoin maintains its quality into full bloom. Graze sainfoin in the spring and early summer. Fall grazing can occur after the first killing frost.

**Recovery after use:** To maximize stand longevity, allow a full season of rest after use. Graze sainfoin in the early bud to early bloom stage. Leave 12 inches (30 cm) of stubble to maximize stand longevity. Sainfoin should not be grazed or hayed during the six weeks prior to the first killing frost.

**Yield:** Sainfoin yields approximately 1625 lbs/acre (1846 kg/ha) in the Brown soil zone, 5930 lbs/acre (6738 kg/ha) in the Dark Brown soil zone, and 5170 lbs/acre (5875 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates for established fields are 0.7 AUM/acre (1.75 AUM/ha) in the Brown soil zone, and 0.8 AUM/acre (2 AUM/ha) in the Dark Brown, Black and Grey soil zones.

**Palatability/Nutritional Value:** Sainfoin is palatable to all types of livestock. Sainfoin has an average digestibility of 63% and crude protein of 18% during early bloom. Sainfoin is similar to alfalfa in feed value and digestibility but sainfoin stems remain more palatable and digestible through maturity. Sainfoin does not cause bloat in livestock.

**Competitiveness:** Sainfoin is a fair competitor.

**Winter Hardiness:** Sainfoin has good winter hardiness. Haying or grazing within six weeks of the first killing frost significantly decreases winter hardiness.

**Drought Tolerance:** Sainfoin has moderate drought tolerance.

**Erosion Control:** Sainfoin has fair erosion control potential.

**Ease of Establishment:** Sainfoin seedlings are vigorous and grow quickly. Sainfoin seeds must be scarified to make the hard seed coat permeable to moisture for germination to occur.

**Suggested Mixtures:** Sainfoin is effective in mixes with bunch grasses but is out-competed when included with rhizomatous grasses.

**Salinity Tolerance:** Sainfoin is not recommended for use on saline sites.

**Flooding Tolerance:** Sainfoin withstands wet or saturated soils for approximately one week in the spring.

**Soil Texture:** Sainfoin is suited to well drained soils of all soil textures. It is well adapted to thin and gravelly sites. Sainfoin requires approximately 11.8 inches (30 cm) of annual precipitation for consistent production.

**Acidity Tolerance:** Sainfoin tolerates soil pH as low as 6.0.

**Management Considerations:** Inoculate and scarify sainfoin seeds prior to seeding. Fertilize according to soil test results. Sainfoin is typically an inferior nitrogen fixer, which appears to be associated with it's lack of a suitable strain of nitrogen-fixing bacteria.
Forage Factsheet – Sheep Fescue

Species Name: Sheep Fescue – Festuca ovina

Origin: Naturalized from Eurasia. A native type of sheep fescue is found in the Canadian Rocky Mountains.

Longevity: 10-20 years

Uses: Reclamation, pasture.

Optimal time of use: Sheep fescue should be grazed in the spring. It can withstand a high degree of animal traffic and trampling.

Recovery after use: Ensure adequate rest following defoliation to minimize winter kill.

Yield: Sheep fescue matures to approximately 10 inches tall (25 cm).

Palatability/Nutritional Value: Sheep fescue is moderately palatable and of adequate quality in the spring through the summer for sheep.

Competitiveness: Sheep fescue is very competitive with weeds. Sheep fescue can be invasive in tame or native forage stands.

Winter Hardiness: Sheep fescue has good winter hardiness.

Drought Tolerance: Established sheep fescue has good drought tolerance. Sheep fescue seedlings are very susceptible to heat or drought stress.

Erosion Control: Sheep fescue is most often used for erosion control. It can be used to stabilize eroding soil and cutbanks.

Ease of Establishment: Sheep fescue germinates readily but seedlings are susceptible to impaired emergence due to crusted soil and mortality due to high temperatures.

Suggested Mixtures: Pasture mixes with other grazing tolerant grasses and legumes.

Salinity Tolerance: Sheep fescue is not recommended for saline areas.

Flooding Tolerance: Sheep fescue is not recommended for areas that flood or where the soil is saturated in the spring.

Soil Texture: Sheep fescue is suited to all soil textures in well drained areas but produces especially well in sand or other coarsely textured soils. Sheep fescue requires approximately 12 inches (30 cm) of annual precipitation.

Acidity Tolerance: Sheep fescue tolerates soil pH as low as 5.5.

Management Considerations: NA

Dryland Forage Species Adaptation CD.
Forage Factsheet – Slender Wheatgrass

**Species Name:** Slender Wheatgrass - *Agropyron trachycaulum*

**Origin:** Native to mixed grass prairie.

**Longevity:** 3-4 years.

**Uses:** Hay, pasture, reclamation mixes.

**Optimal time of use:** Hay slender wheatgrass soon after head emergence for the best forage quality and yield.

**Recovery after use:** Use slender wheatgrass once per year for grazing or haying. Leave 4 inches (10 cm) after grazing or haying to maintain stand longevity.

**Yield:** Slender wheatgrass yields approximately 3290 lbs/acre (3738 kg/ha) in the Brown soil zone, 4140 lbs/acre (4704 kg/ha) in the Dark Brown soil zone, and 4550 lbs/acre (5170 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Slender wheatgrass has adequate nutritional value for fall grazing until November, but has low palatability. Slender wheatgrass has an average digestibility of 55% and crude protein levels ranging from 11% prior to heading to 9.5% at maturity.

**Competitiveness:** Slender wheatgrass is short lived and often decreases in abundance over time.

**Winter Hardiness:** Slender wheatgrass has good winter hardiness.

**Drought Tolerance:** Slender wheatgrass has fair drought tolerance.

**Erosion Control:** Slender wheatgrass is effective at erosion control due to its rapid establishment. It should be used with a longer lived creeping grass to maintain site protection in the long-term.

**Ease of Establishment:** Slender wheatgrass establishes easily.

**Suggested Mixtures:** Slender wheatgrass is most often used as a component of a mix for saline soil reclamation purposes.

**Salinity Tolerance:** Slender wheatgrass has good salinity tolerance.

**Flooding Tolerance:** Slender wheatgrass withstands two to five weeks of spring flooding.

**Soil Texture:** Slender wheatgrass is suited to moist sandy-loam through clay soils. Slender wheatgrass is adapted to areas that receive at least 14 inches (35 cm) of annual precipitation. It is well adapted to moist low-lying areas that are not waterlogged.

**Acidity Tolerance:** Slender wheatgrass tolerates soil pH as low as 5.6.

**Management Considerations:** Provide adequate fertility. To prolong the presence of slender wheatgrass within the stand, allow for seed drop and establishment of new plants.

Species Name: Slough Grass - *Beckmannia syzigachne*

Origin: Native to sloughs and wetlands.

Longevity: Biennial

Uses: Reclamation, hay.

Optimal time of use: Cut slough grass when heads emerge and before flowering for the best forage quality and quantity. Seed set should be permitted periodically to allow for reseeding of the stand.

Recovery after use: Slough grass regrows very slowly after cutting and should be used only once per year.

Yield: NA

Palatability/Nutritional Value: Slough grass has an average total digestible nutrient (TDN) level of 55% and crude protein of 9% at heading. As it matures, forage palatability and quality decrease rapidly.

Competitiveness: Slough grass is competitive with weeds if moisture is plentiful.

Winter Hardiness: Slough grass is a winter hardy bunch grass.

Drought Tolerance: Slough grass has poor drought tolerance. In naturally occurring populations, some seeds will remain dormant in the ground during drought.

Erosion Control: Slough grass holds soil firmly in place in moist areas. It is one of the primary wetland species capable of filtering sediment from run-off water.

Ease of Establishment: Slough grass has very high seedling vigor and establishes easily on moist sites.

Suggested Mixtures: Slough grass works well in a mix with reed canary grass

Salinity Tolerance: Slough grass tolerates moderate salinity.

Flooding Tolerance: Slough grass withstands up to five weeks of spring flooding and requires wet or waterlogged soils during the growing season.

Soil Texture: Slough grass grows in very wet areas around lowlands and sloughs. Slough grass is best suited to loamy through clay textured soils.

Acidity Tolerance: Slough grass tolerates soil pH as low as 5.5.

Management considerations: For optimal stand longevity and production, allow slough grass to go to seed. High levels of soil moisture are required for a productive stand.

**Forage Factsheet – Smooth Bromegrass**

**Species Name:** Smooth Brome – *Bromus inermis*

**Origin:** Germany, Hungary, and France.

**Longevity:** Long-lived.

**Uses:** Hay, pasture.

**Optimal time of use:** To maximize both yield and nutritional value, hay smooth bromegrass during flowering. Begin grazing at the four leaf stage. Smooth bromegrass does not stockpile well for fall grazing.

**Recovery after use:** Smooth bromegrass is slow to recover after defoliation, with limited probability of two defoliations per growing season.

**Yield:** Smooth bromegrass yields approximately 3110 lbs/acre (3534 kg/ha) in the Brown soil zone, 5340 lbs/acre (6068 kg/ha) in the Dark Brown soil zone, and 4420 lbs/acre (5022 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates for established fields are 0.5 AUM/acre (1.25 AUM/ha) in the Brown soil zone, 1.0 AUM/acre (2.5 AUM/ha) in the Dark Brown soil zone, and 1.2 AUM/acre (3.0 AUM/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Smooth bromegrass is very palatable to livestock. Smooth bromegrass has an average digestibility of 67% and crude protein levels ranging from 11-14% at flowering.

**Competitiveness:** Smooth bromegrass is very competitive. Smooth bromegrass can become invasive, especially in rangelands and wetlands.

**Winter Hardiness:** Smooth bromegrass has good winter hardiness.

**Drought Tolerance:** Smooth bromegrass has good drought tolerance.

**Erosion Control:** Smooth bromegrass is excellent at controlling erosion due to formation of durable sod.

**Ease of Establishment:** Smooth bromegrass establishes easily.

**Suggested Mixtures:** Smooth bromegrass may be mixed with alfalfa and other forage species but often dominates the site over time due to it’s creeping growth habit.

**Salinity Tolerance:** Smooth bromegrass has moderate salinity tolerance. If included in a saline mix, smooth brome will establish on patches with lower salinity levels. As the saline levels in the field gradually decrease, smooth bromegrass can spread.

**Flooding Tolerance:** Smooth bromegrass withstands two to four weeks of spring flooding.

**Soil Texture:** Smooth bromegrass is suited to all soil textures but does especially well on loam soils.

**Acidity Tolerance:** Smooth bromegrass tolerates soil pH as low as 5.5.

**Management Considerations:** Smooth bromegrass becomes root bound as the stand ages. Spiking or coultering the stand releases nitrogen stored in the roots and promotes growth. Smooth bromegrass yields are often limited by available nitrogen. Apply nitrogen fertilizer based on soil test results.

Forage Factsheet – Streambank Wheatgrass

**Species Name:** Streambank Wheatgrass - *Agropyron riparium, Elymus lanceolatus spp. psammophilus*

**Origin:** Riparian and moist areas across the Prairies.

**Longevity:** Long-lived.

**Uses:** Reclamation, pasture, erosion control, turf.

**Optimal time of use:** Streambank wheatgrass may be used for pasture, but has relatively low production and palatability. If grazed, streambank wheatgrass should be used in the spring and early summer because of decreased palatability as it matures. Streambank wheatgrass makes good low maintenance turf because it withstands drought and a high amount of traffic.

**Recovery after use:** Streambank wheatgrass regrows slowly after grazing.

**Yield:** Streambank wheatgrass yields approximately 2475 lbs/acre (2812 kg/ha) in the Brown soil zone, 2800 lbs/acre (3181 kg/ha) in the Dark Brown soil zone, and 3000 lbs/acre (3409 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Streambank wheatgrass has low palatability and an average digestibility of 54% and crude protein of 9% in the late vegetative stage.

**Competitiveness:** Streambank wheatgrass is very competitive once established. It is more vigorous than northern wheatgrass.

**Winter Hardiness:** Streambank wheatgrass is very competitive when established.

**Drought Tolerance:** Streambank wheatgrass is extremely drought tolerant.

**Erosion Control:** Streambank wheatgrass is effective for water erosion control. It can be used in streams, canals, and erosion gullies. Streambank wheatgrass is short and does not impede water flow.

**Ease of Establishment:** Streambank wheatgrass has fair establishment vigor.

**Suggested Mixtures:** Streambank wheatgrass can be used with other vigorous native species for reclamation.

**Salinity Tolerance:** Streambank wheatgrass has moderate salinity tolerance.

**Flooding Tolerance:** Streambank wheatgrass can tolerate two to five weeks of spring flooding.

**Soil Texture:** Streambank wheatgrass is adapted to well to moderately drained sandy, loamy and clay soils in the Brown, Dark Brown, Black and Grey soil zones.

**Acidity Tolerance:** Streambank wheatgrass is not recommended for use on acidic soils.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Sweet Clover

**Species Name:** Sweet Clover - *Melilotus officinalis*

- White flowered sweet clover has low coumarin levels, coarse stems, and has poor winter hardiness
- Yellow flowered sweet clover has some low coumarin varieties, finer stems and leaves, and has greater winter hardiness

**Origin:** Asia Minor.

**Longevity:** Biennial.

**Uses:** Pasture, hay, soil improvement, silage.

**Optimal time of use:** Graze sweet clover when it is between 9.75-14 inches (25-35 cm) tall to maximize palatability and feed quality. Cut sweet clover at the bud stage for the best quality hay. Use a mower/conditioner to speed dry down and reduce leaf loss. If cut late, sweet clover hay is very stemmy and relatively unpalatable.

**Recovery after use:** In the establishment year leave at least 12 inches (30 cm) of stubble after use to enhance stand survival. If two cuts of hay are desired in the second year of production, cut at 12 inches (30 cm) during the first cut.

**Yield:** Sweet clover yields approximately 2620 lbs/acre (2977 kg/ha) in the Brown soil zone, 6405 lbs/acre (7278 kg/ha) in the Dark Brown soil zone, and 5790 lbs/acre (6579 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Sweet clover is palatable in the vegetative through the bud stage but palatability decreases as it matures. Yellow sweet clover has an average digestibility of 58% and crude protein of 16% in the early bloom stage. Sweet clover can cause bloat in livestock. Use a low coumarin variety of sweet clover. Dicoumarol, formed in moldy sweet clover hay, interferes with blood clotting in livestock.

**Competitiveness:** Sweet clover is competitive with weeds.

**Winter Hardiness:** Sweet clover has very good winter hardiness.

**Drought Tolerance:** Sweet clover has good drought tolerance.

**Erosion Control:** Sweet clover is fair at reducing erosion. Sweet clover can be used as a plow down crop to add organic matter and nitrogen to the soil.

**Ease of Establishment:** Sweet clover seedlings are vigorous and establish easily. Sweet clover has a high hard seed count and should be scarified before seeding.

**Suggested Mixtures:** Can be used as a short lived component of a forage mixture. Avoid high seeding rates in a mix, as sweet clover is very competitive.

**Salinity Tolerance:** Sweet clover has moderate salinity tolerance, superior to all other common forage legumes.

**Flooding Tolerance:** Sweet clover can withstand saturated soils for approximately one week in the spring.

**Soil Texture:** Sweet clover is suited to all soil textures (sandy, loamy, clay), but produces best on fertile clay to clay loam soils.

**Acidity Tolerance:** Sweet clover has poor tolerance of acidic soils.

**Management Considerations:** Inoculate and scarify sweet clover seed. Conduct a soil test at the beginning of the second year of production and fertilize accordingly to maximize sweet clover production.

**Forage Factsheet – Tall Fescue**

**Species Name:** Tall Fescue - *Festuca arundinacea*

**Origin:** England.

**Longevity:** 5-10 years.

**Uses:** Pasture, hay, erosion control.

**Optimal time of use:** Tall fescue can be cut for hay but is best suited to grazing, due to its basal growth form. Haying should be carried out when the seed heads begin to form but before flowering. Graze tall fescue pastures early in the growing season when the plant leaves are young and succulent. Tall fescue becomes coarse and less palatable as it matures.

**Recovery after use:** Tall fescue has very slow regrowth and produces few leaves per tiller. After early summer grazing it takes until fall for any significant regrowth to occur.

**Yield:** Tall fescue yields approximately 65-70% of meadow bromegrass. Tall fescue yields approximately 4700 lbs/acre (5430 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Tall fescue palatability is good if grazed early. Palatability can be affected by high alkaloid and endophyte concentrations within the plant. High alkaloid levels can cause lower feed intake, diarrhea, watery eyes, fast breathing and lack of thrift. Canadian varieties have been developed to have low alkaloid levels. Livestock consuming tall fescue with high endophyte levels can exhibit lower performance, forage intake, weight gains, milk production and reproduction. In severe cases, cattle can contract “fescue foot” where constricted circulation to the extremities can cause sloughing of feet and tails. Management practices to reduce the risk of endophyte toxicity include the following: prevent the vegetation from maturing, dilute tall fescue hay with other feeds and avoid applying excess nitrogen fertilizer. There are endophyte-free varieties available. Purchasing certified seed of a low alkaloid and endophyte-free variety ensure palatability. Tall fescue has an average total digestible nutrient (TDN) level of 59% and crude protein of 9-12% mid-summer.

**Competitiveness:** Tall fescue is competitive with weeds and other grasses.

**Winter Hardiness:** Tall fescue has moderate winter hardiness. Stand longevity is reduced by poor snow cover.

**Drought Tolerance:** Established tall fescue is moderately drought tolerant. Tall fescue has reduced persistence in the Brown and Dark Brown soil zones.

**Erosion Control:** Tall fescue is deep rooted and contributes a large quantity of organic matter to the soil. Tall fescue may be used in eroded areas and waterways.

**Ease of Establishment:** Tall fescue seedlings are slow growing and require at least one full year to establish before the stand can be used.

**Suggested Mixtures** Including legumes with tall fescue will improve feed palatability and quality. Tall fescue can displace other grasses in a mix.

**Salinity Tolerance:** Tall fescue has very good salinity tolerance.

**Flooding Tolerance:** Tall fescue withstands approximately two to five weeks of spring flooding. It thrives on wet and/or poorly drained sites.

**Soil Texture:** Tall fescue is adapted to moist loamy to clay soils. It will grow on dry soils but persistence is reduced.

**Acidity Tolerance:** Tall fescue tolerates soil pH as low as 5.0.

**Management Considerations** Rotationally graze to allow adequate rest. Maintain snow cover to reduce winter injury.

Dryland Forage Species Adaptation CD.
Forage Factsheet – Tall Wheatgrass

Species Name: Tall Wheatgrass - *Agropyron elongatum*

Origin: Saline meadows of southern Russia.

Longevity: Long lived.

Uses: Saline area reclamation, hay, pasture.

Optimal time of use: Cut tall wheatgrass just prior to or shortly after heading for the most nutritious and palatable hay. Rotationally graze tall wheatgrass late in the summer.

Recovery after use: Tall wheatgrass produces one hay crop per year. Tall wheatgrass may be grazed more than once per grazing season but should have at least four weeks of rest between defoliations. Leave 6 to 8 inches (15-20 cm) of stubble or regrowth prior to killing frost.

Yield: Tall wheatgrass yields approximately 3255 lbs/acre (3698 kg/ha) in the Brown soil zone, 3320 lbs/acre (3772 kg/ha) in the Dark Brown soil zone, and 3550 lbs/acre (4034 kg/ha) in the Black and Grey soil zones.

Palatability/Nutritional Value: Tall wheatgrass has poor palatability due to the stiff, robust basal leaves and coarse stems. Hay is palatable if cut before or at heading. Tall wheatgrass has an average digestibility of 47% and crude protein of 10.6%.

Competitiveness: Tall wheatgrass competes poorly with weeds until it is well established.

Winter Hardiness: Tall wheatgrass is extremely winter hardy.

Drought Tolerance: Tall wheatgrass has poor drought tolerance.

Erosion Control: Tall wheatgrass has poor erosion control due to its bunch grass growth form.

Ease of Establishment: Tall wheatgrass seedlings are slow to germinate and do not compete well with weeds. Allow tall wheatgrass to grow and set seed for at least two years before utilizing. Seeds germinate over an extended period of time.

Suggested Mixtures: Tall wheatgrass is most frequently used in a mixture with other saline tolerant species for reclamation.

Salinity Tolerance: Tall wheatgrass is the most salinity tolerant tame grass species.

Flooding Tolerance: Tall wheatgrass tolerates up to five weeks of spring flooding.

Soil Texture: Tall wheatgrass is best suited to areas with at least 15 inches (37 cm) of annual precipitation, where the water table is high, in areas with relatively poor drainage, or where the ground remains moist year round. It is adapted to moist loamy to clay soils in all soil zones in Saskatchewan.

Acidity Tolerance: Tall wheatgrass tolerates soil pH as low as 6.6.

Management Considerations: Effective weed control when establishing tall wheatgrass increases establishment success.

Forage Factsheet – Timothy

**Species Name:** Timothy – Phleum pratense

**Origin:** Europe.

**Longevity:** 4-10 years.

**Uses:** Hay.

**Optimal time of use:** In Saskatchewan, timothy is generally used for export hay, seed production, and horse hay. Cut timothy for hay prior to the bloom stage for maximum quality.

**Recovery after use:** Timothy regrows slowly if cut after July.

**Yield:** Timothy yields approximately 4777 lbs/acre (5428 kg/ha) in the Black and Grey soil zones.

**Palatability/Nutritional Value:** Pre-bloom timothy has an average digestibility of 61% and crude protein of 11%. Timothy is generally higher in energy and lower in protein than other grasses. Nutritional value decreases rapidly during flowering.

**Competitiveness:** Timothy has poor to fair competitiveness during establishment and fair competitiveness when established.

**Winter Hardiness:** Timothy has good winter hardiness when adequate snow cover is present.

**Drought Tolerance:** Timothy has poor drought tolerance.

**Erosion Control:** Timothy is fair at soil erosion control in moist areas. Timothy is a short lived, bunch grass with shallow roots therefore long-term benefits to the site are minimal.

**Ease of Establishment:** Fair.

**Suggested Mixtures:** Timothy works well in mixes with legumes such as alfalfa, alsike clover, birdsfoot trefoil.

**Salinity Tolerance:** Timothy is not recommended for use on saline soils.

**Flooding Tolerance:** Timothy withstands approximately one to two weeks of spring flooding but does not withstand flooding during the growing season. Timothy thrives in moist to wet soils.

**Soil Texture:** Timothy is best suited to sandy through clay soils and peat. Timothy is well adapted to Black and Grey soil zones.

**Acidity Tolerance:** Timothy tolerates soil pH as low as 4.5 to 5.0.

**Management Considerations:** Timothy responds well to nitrogen fertilization.

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Species Name: Western Porcupine Grass – *Stipa curtiseta*

Origin: Mixed grass prairie.

Longevity: Long-lived.

Uses: Pasture, reclamation.

Optimal time of use: Graze western porcupine grass prior to seed set or late in the season after seed drop to avoid hard, awned seeds.

Recovery after use: Western porcupine grass requires a full growing season to recover from grazing.

Yield: NA

Palatability/Nutritional Value: Western porcupine grass is a decreaser in rangelands and is palatable to livestock prior to seed set and after seed drop. Western porcupine grass has an average digestibility of 45% and crude protein of 6-10% in late summer.

Competitiveness: Western porcupine grass is a poor competitor.

Winter Hardiness: Western porcupine grass has good winter hardiness.

Drought Tolerance: Western porcupine grass has good drought tolerance.

Erosion Control: Western porcupine grass is effective in a reclamation mix. It is deep rooted and anchors soil well.

Ease of Establishment: Difficult.

Suggested Mixtures: Western porcupine grass is effective in native seed mixes with needle-and-thread grass, northern wheatgrass, western wheatgrass, legumes, green needlegrass, June grass, and blue grama.

Salinity Tolerance: Western porcupine grass is not recommended for saline areas.

Flooding Tolerance: Western porcupine grass tolerates saturated soils for approximately one week in the spring.

Soil Texture: Western porcupine grass grows best on moist, fertile, loamy-clay soils in the Dark Brown and Black soil zones.

Acidity Tolerance: Western porcupine grass is not tolerant of acidic soils.

Management Considerations: In a seeded stand, include a legume with western porcupine grass in the native seed mix to provide a nitrogen source.

Species Name: Western Wheatgrass – *Agropyron smithii*

Origin: Native to the mixed grass prairie.

Longevity: Long-lived.

Uses: Hay, pasture, reclamation, stockpiling.

Optimal time of use: Cut western wheatgrass hay during early heading through flowering for the best quality hay. Western wheatgrass can be grazed at any stage of growth. Western wheatgrass may be utilized for fall stockpiling as it cures well on the stem and remains erect.

Recovery after use: Western wheatgrass requires a complete growing season to recover from defoliation.

Yield: Western wheatgrass yields approximately 2345 lbs/acre (2664 kg/ha) in the Brown soil zone, 2320 lbs/acre (2636 kg/ha) in the Dark Brown soil zone, and 3185 lbs/acre (3619 kg/ha) in the Black and Grey soil zones. Recommended initial stocking rates for established fields are 0.5 AUM/acre (1.25 AUM/ha) in the Brown soil zone, and 0.8 AUM/acre (2 AUM/ha) in the Dark Brown, Black and Grey soil zones.

Palatability/Nutritional Value: Western wheatgrass is a palatable and nutritious native grass for all classes of livestock. Western wheatgrass has an average digestibility of 60% to 50% and crude protein levels of 14% to 8.5%, June to September, respectively.

Competitiveness: Western wheatgrass is competitive when established.

Winter Hardiness: Western wheatgrass has excellent winter hardiness.

Drought Tolerance: Western wheatgrass has very good drought tolerance.

Erosion Control: Western wheatgrass is excellent for erosion control due to its soil binding, creeping roots.

Ease of Establishment: Western wheatgrass establishes relatively easily.

Suggested Mixtures: Western wheatgrass works well in mixtures but creeps aggressively. Seeding rates in mixtures should be kept low to avoid having western wheatgrass dominate the stand.

Salinity Tolerance: Western wheatgrass has moderate salinity tolerance.

Flooding Tolerance: Western wheatgrass withstands approximately five weeks of spring flooding.

Soil Texture: Western wheatgrass is suited to all soil textures but produces best on clay-loam to clay textured soils.

Acidity Tolerance: Western wheatgrass is not recommended for acidic soils.

Management Considerations: Western wheatgrass can be easily overgrazed. To maintain productivity, implement a rest-rotation grazing system leaving at least 50% carry over.