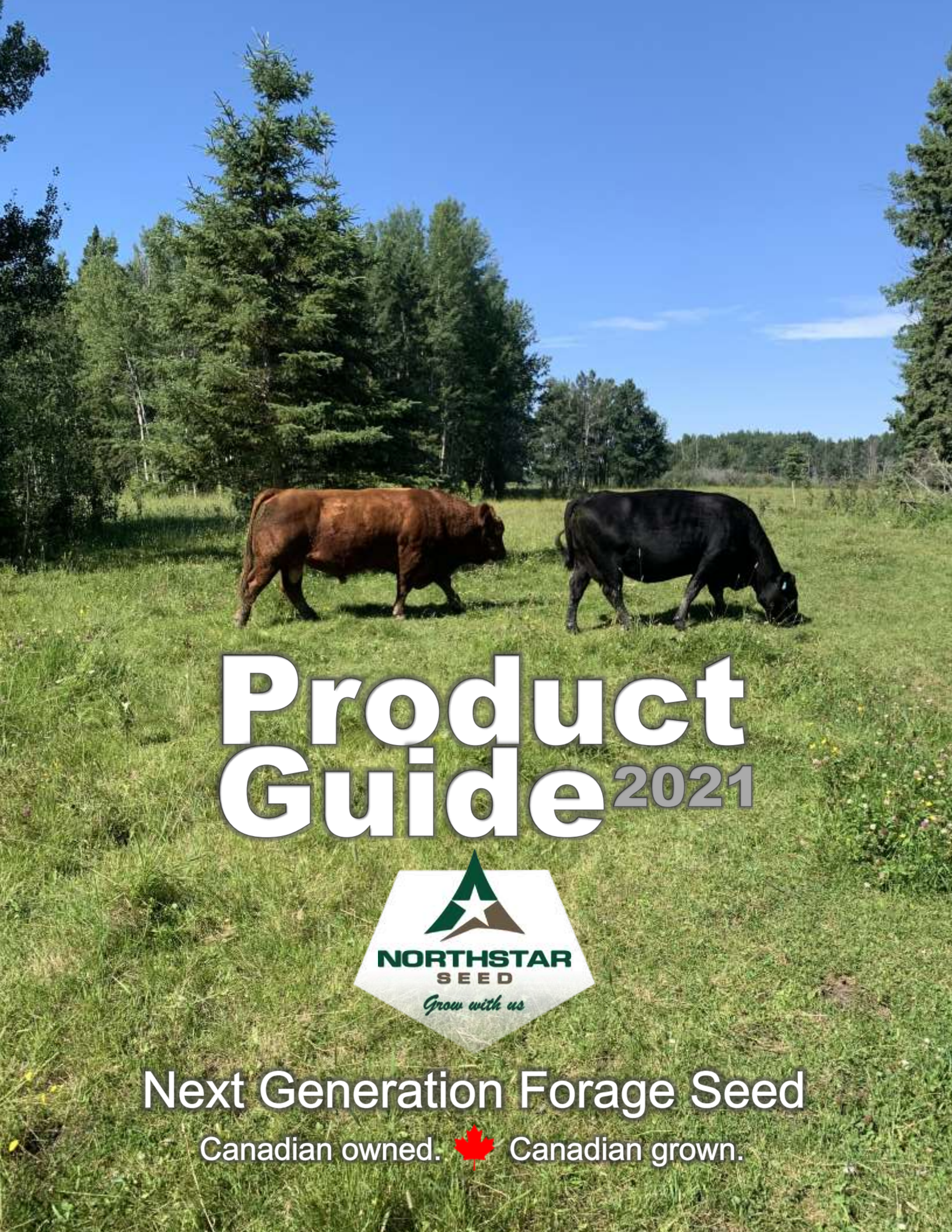


Product Guide 2021

NORTHSTAR SEED

Grow with us

Next Generation Forage Seed

Canadian owned. Canadian grown.

NORTHSTAR SEED

Grow with us

Performance. Expertise. Trust.

Northstar Seed is a proud supplier of high quality forage seed developed to perform under tough Western Canadian growing conditions. Our years of experience and focus on forage seed allow us to provide expert advice on how to maximize production on your land.

Our sales agronomists and dealers understand local growing conditions and challenges and are able to make custom recommendations for optimal production on your farm operation.

Fast turnaround on custom blends, even when they are ordered in season. We pride ourselves on getting your seed to you promptly, when you need it.

Seed quality you can count on

Our seed quality standard is less than 10 total weed seeds/25 grams for all the certified varieties we sell. This standard exceeds the requirements for Certified #1 seed that has a tolerance of 50 weed seeds per 25 grams.

Independent seed quality testing

Seed health and purity are the building blocks for proper establishment and clean fields.

Every lot of seed that is put in our bag has been analyzed by a fully independent and accredited seed lab. That means a third-party technician verifies the germination and purity of each lot of seed before a federally certified seed grader assigns a grade.

Advanced Alfalfa Technology

PERFECTION Alfalfa

Maximize Yield and Quality

Perfection alfalfa is bred with StandFast™ technology. This trait provides rapid re-growth after cutting and can yield up to 3-4 cuts of hay in a season. This rapid growth trait provides higher tonnage and is ideally suited for silage production.

REVOLUTION MD Alfalfa

Lower Fiber = Higher RFQ

Revolution MD's Max Digest technology provides increased forage digestibility and high RFQ (Relative Forage Quality).

Revolution has large leaves and a high leaf to stem ratio that reduces the fiber content in the forage. It is this leafy trait that provides higher protein content and increased forage digestibility.

This is next generation forage seed.

Revolution MD alfalfa silage, near Dauphin MB.

Alfalfa Selection Guide

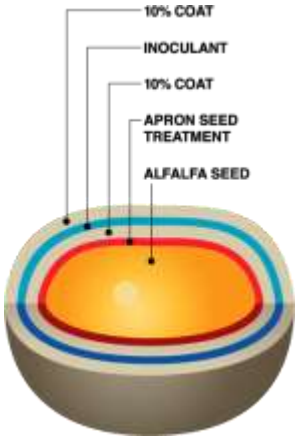
	Fall Dormancy	Winter Hardiness	Root Type	Key Features
Revolution MD Maximum Digestibility	3.7	1.7	Tap	Exceptional forage quality • High RFQ (Relative Forage Quality) rating and rate of digestion • Large leaf area with an increased leaf to stem ratio • Outstanding disease and pest resistance package • Excellent winter hardiness combined with high yield potential.
Perfection Rapid Growth	4	2	Tap	The latest advancement in StandFast Technology • Selected for high forage DM and NDF levels • High multifoliate expression and fast recovery • Well suited for silage production & dairy producers
Robust High Yield, Low Dormancy	2	1.5	Tap	High performance synthetic variety • Multifoliate with high leaf to stem ratio • High forage dry matter yield and RFV • Vigorous roots • Dense crowns
TH2 Alfalfa Top Performer	4	2.5	Tap	A top performing alfalfa that is well suited for the majority of alfalfa growers in Western Canada • High multi-leaf expression • Rapid regrowth • Superior disease resistance
Rugged ST Salt Tolerant	3	2	Tap	A very hardy variety • Large, broad, deep-set crowns • Tolerance to increased salt levels

Revolution MD alfalfa silage, near Dauphin MB.

	Fall Dormancy	Winter Hardiness	Root Type	Key Features
Sidewinder Creeping Root	2	1.6	Creeping	Selected for high forage yield with excellent winter hardiness and persistence • Later maturity to flower which adds value to a grass blend • Deep set crown with wheel traffic tolerance • Excellent disease resistance package • Multipurpose variety for forage hay or pasture
Response WT Wet Tolerant	4	2	Branching	Performs well on medium to heavy soils. A high yielding variety that should be considered in areas of high water table. • Excellent forage quality • High yielding branch rooted variety • Adjusts its root growth based on level of moisture stress
AAC Meadowview Acid Tolerant	2	Not Rated	Branching tap	Acid tolerant variety ideally suited for the foothills of AB and Peace region of AB and BC • Deep set crowns • Erect spring growth habit • Rapid regrowth after cutting
Haygrazer Grazing Tolerant	4	2	Fibrous	A flexible variety that is bred for high hay yields as well as grazing tolerance • Aggressive fibrous root system • Sunken crown stands up to grazing pressure and high traffic from equipment • Tolerant to defoliation by the Alfalfa Weevil
Alfalfa Blend 10-5 Adapted to Variable Conditions	Mix of 2-4	Mix of 1.5-2	Creeping, tap, branch and fibrous	Premium certified blend of five varieties with unique traits that enhance plant population across variable field conditions • Now contains Robust and Sidewinder alfalfas, as well as Response, Rugged, and Haygrazer alfalfa.
Ranchers Choice Brand Common #1 Blend	n/a	n/a	Combined creeping and tap	Consistent performing alfalfa blend • Blend of multifoliate, tri-foliate and creeping root varieties that are consistent performers.

Layers of protection with our STRATUM™ coating process

Our alfalfa coating process involves layers of protection between the inoculant and Apron® seed treatment. Separating the seed treatment with a 10% coating, then adding the inoculant, and a final 10% coating, will assist with improving germination and reducing seedling diseases.



Forage Grass Selection Guide

	Hay	Pasture	Saline Tolerance	Flood Tolerance	Drought Tolerance	Key Features
AAC Maximus Meadow Bromegrass	★	★			★	• Taller than Fleet Meadow Bromegrass • More upright growth habit than Fleet
Carlton Smooth Bromegrass	★	★	★	★	★	• Widely adaptable • Sod forming • Moderate saline, moisture and drought tolerance
AC Knowles Hybrid Bromegrass	★	★	★	★	★	• Smooth and meadow bromegrass hybrid • Yields like smooth brome with a longer growing season similar to meadow brome • Improved leaf expression compared to smooth brome
Early Arctic Orchardgrass	★	★	★	★		• Exceptional orchardgrass that demonstrates above average winterhardiness • Excellent companion when blended with alfalfa • Moderate drought and flooding tolerance • Selected for high quality (leafy)
Elunaria Annual Ryegrass	★	★		★		• Westerwold type • Suitable for hay, haylage or pasture • High yield opportunity • Very good quality with broad leaves
Nabucco Italian Ryegrass	★	★		★		• Tetraploid variety that delivers improved quality over annual ryegrass. • Quick regrowth • Wider and more succulent leaves than diploid annual ryegrass • Excellent palatability/digestibility
Tetrasweet Perennial Ryegrass	★	★		★		• Tetraploid variety • Highly digestible • High energy • Excellent regrowth and high yield
Toronto Perennial Ryegrass	★	★				• For short term pasture with excellent yield and digestibility • Very high levels of sugar

Tall Fescue variety trials in Neepawa, MB

	Hay	Pasture	Saline Tolerance	Flood Tolerance	Drought Tolerance	Key Features
Preval Meadow Fescue		★		★		• Tolerates wet soils • Withstands close grazing, excellent for rotational grazing • Use in hay and pasture blends
Courtney Tall Fescue	★	★	★	★	★	• Good flood and saline tolerance • Large basal leaves, high quality • Exceptional yield potential
Boreal Creeping Red Fescue		★		★		• Great performance in pastures under high moisture conditions • Tolerates close grazing • Good quality in fall to freeze up
Express Timothy	★	★		★		• Excellent winter survivability • Medium maturity • Very good regrowth • Great leafy variety for domestic hay production
Novio Timothy	★	★		★		• Export quality with medium maturity • Large soft leaves • Extremely winterhardy
Kirk Crested Wheatgrass	★	★			★	• Fibrous root system provides good drought tolerance and winterhardiness • Excellent early spring pasture grass • Great fit for high traffic areas
NEW Spring Green Festulolium	★	★		★	★	• Meadow Fescue x Perennial Ryegrass cross • Improved tolerance to dry conditions and cold stress due to its deep root system • Very good winter hardiness for a festulolium

Northstar Seed carries a complete line of certified and common grasses.
See our Forage Adaptation Guide for a more detailed list of species available.

Max Seed Blends

Hay

Premium Hay Max

A very hardy mixture that includes Express Timothy, our high quality leafy timothy and Alfalfa Blend 10-5, our premium alfalfa blend. This blend delivers a multi-cut hay stand under good management and variable soil conditions.

- 65% Alfalfa Blend 10-5
- 30% Fleet Meadow Bromegrass
- 5% Express Timothy

Maxi

High production blend for producers wanting a high quality alfalfa and timothy hay. Express Timothy performs well in low lying areas, and will assist in holding up the swath.

- 90% Alfalfa Blend 10-5
- 10% Express Timothy

Rancher's Hay Max

Very adaptable. A blend that will deliver high yield potential under good fertility and moisture conditions.

- 50% Rancher's Choice Brand Alfalfa
- 30% Fleet Meadow Bromegrass
- 20% Carlton Smooth Bromegrass

Lowland Max

Ideally used for hay or pasture in areas with poor drainage. Has tolerance to increased moisture conditions.

- 50% Courtenay Tall Fescue
- 30% Marathon Reed Canary Grass
- 20% Express Timothy

IMPROVED Saline Hay Max

Suited for productive soils that are demonstrating early signs of salt stress. Has tolerance to increased salinity levels. The addition of Soft Brand Tall Wheatgrass will provide higher saline tolerance and improved palatability.

- 40% Courtenay Tall Fescue
- 30% Rugged ST Alfalfa
- 20% Carlton Smooth Bromegrass
- 10% Soft Brand Tall Wheatgrass

Source: Manitoba Agriculture and Resource Development

Dual Purpose: Hay or Pasture

Dual Max

High quality grasses that have very good regrowth habits. This blend is suited to most grazing or haying systems. Prefers medium to heavy soils.

- 50% Fleet Meadow Bromegrass
- 25% Carlton Smooth Bromegrass
- 20% High Arctic Brand Orchardgrass
- 5% Alfalfa Blend 10-5

Western Grass Max

High quality all grass blend. If properly managed can be a very productive hay and pasture blend. No concerns with bloat.

- 45% Fleet Meadow Bromegrass
- 25% High Arctic Brand Orchardgrass
- 15% Courtenay Tall Fescue
- 10% Express Timothy
- 5% Creeping Red Fescue

Bloat Free Max

Utilizes non-bloating legumes AAC Mountainview Sainfoin and Cicer Milkvetch combined with highly palatable grasses.

- 40% Fleet Meadow Bromegrass
- 25% AAC Mountainview Sainfoin
- 25% Cicer Milkvetch
- 10% Courtenay Tall Fescue

Dryland Dual Max

For dryland pasture production. Meadow Bromegrass offers a long grazing season with very good quality and regrowth. Crested Wheatgrass has excellent early season growth.

- 65% Fleet Meadow Bromegrass
- 15% Kirk Crested Wheatgrass
- 15% Pubescent Wheatgrass
- 5% Sidewinder Alfalfa

Saline Pasture Max

High quality all grass blend designed for saline areas in the low to mid EC levels.

- 30% Courtney Tall Fescue
- 30% Carlton Smooth Bromegrass
- 20% Slender Wheatgrass
- 20% Dahurian Wildrye

NEW Equine Pasture Max

An all grass blend for horse owners providing a palatable grazing option from spring to late fall. This blend can also be used as baled forage to provide a nutritious feed source for all classes of horses.

- 40% ACC Maximus Meadow Bromegrass
- 20% Early Arctic Orchardgrass
- 10% Preval Meadow Fescue
- 10% Tetrasweet Perennial Ryegrass
- 10% Boreal Creeping Red Fescue
- 10% Express Timothy

Forage Adaptation Guide

Legumes

Forage	Use	Longevity	Winter hardiness	Root	Seeds/lb.*	Growing Period
Alfalfa	Hay/Pasture	Long	Good	Tap, branch, creeping rooted and sunken crown	200,000	Spring-Fall
Alsike Clover	Hay/Pasture	Short	Fair	Branched	700,000	Spring
Birdsfoot Trefoil	Pasture	Long	Good	Tap rooted with branches	370,000	Spring-Fall
Cicer Milkvetch	Pasture	Long	Good	Creeping rooted	130,000	Late Spring-Fall
Red Clover	Hay/Pasture	Long	Poor	Tap rooted with side branches	275,000	Spring
Sainfoin	Pasture	Long	Fair	Tap rooted	18,000 un-	Spring-Summer
Sweet Clover	Hay/Silage	Short	Fair	Tap rooted	260,000	Spring of 2nd Year
White Clover	Pasture	Short/Long	Good	Rhizomatous	800,000	Spring-Fall

**Seeds/lb. may vary*

NEW Soft Brand Tall Wheatgrass

Northstar Seed is pleased to introduce this new trait to the marketplace in 2021. We will be incorporating it into our saline hay blend. Soft Brand Tall Wheatgrass provides improved palatability, with increased initial plant vigor to assist in stand establishment.

Soft Brand Tall Wheatgrass has a high density of tillers with excellent summer forage production. It is well positioned for high salinity areas to promote forage growth while enhancing the relative feed quality of the forage grown.

Look to Northstar Seed to provide solutions for saline areas and add value to your forage operation.

Forage Grasses

Forage	Use	Longevity	Winter hardiness	Root	Seeds/lb.*	Growing Period
Altai Wild Ryegrass	Pasture	Long	Excellent	Bunch grass	60,000	Early Spring-Mid Summer
Annual Ryegrass (Italian)	Hay/Pasture	Annual	Poor	Bunch grass	230,000	Spring-Fall
Creeping Foxtail	Pasture	Long	Good	Sod forming	750,000	Early Spring-Fall
Creeping Red Fescue	Pasture/Lawn	Long	Excellent	Sod forming	615,000	Spring-Fall
Crested Wheatgrass	Pasture/Hay	Long	Excellent	Bunch grass	175,000	Early Spring
Dahurian Wild Ryegrass	Pasture	Short	Good	Bunch grass	80,000	Spring-Fall
Intermediate Wheatgrass	Hay/Pasture	Short/Medium	Good	Sod forming	88,000	Late Spring-Mid Summer
Kentucky Bluegrass	Pasture/Lawn	Long	Excellent	Sod forming	2,180,000	Spring-Fall
Meadow Bromegrass	Hay/Pasture	Long	Good	Bunch grass	80,000	Early Spring-Late Summer
Meadow Fescue	Pasture	Short/Medium	Good	Bunch grass	230,000	Early Spring-Late Fall
Meadow Foxtail	Pasture	Long	Good	Bunch grass	575,000	Early Spring-Fall
Orchardgrass	Hay/Pasture	Short	Fair	Bunch grass	650,000	Spring-Fall
Perennial Ryegrass	Hay/Pasture	Short 2-3 yrs.	Poor	Bunch grass	330,000	Spring-Fall
Pubescent Wheatgrass	Hay/Pasture	Medium	Good	Sod forming	100,000	Early Spring-Mid Summer
Russian Wild Ryegrass	Pasture	Long	Excellent	Bunch grass	175,000	Early Spring-Mid Summer
Smooth Bromegrass	Hay/Pasture	Long	Excellent	Sod forming	136,000	Mid Spring-Mid Summer
Tall Fescue	Pasture	Medium	Good	Bunch grass	225,000	Late Spring-Fall
Tall Wheatgrass	Hay/Pasture	Long	Excellent	Bunch grass	79,000	Late Spring-Mid Summer
Timothy	Hay/Pasture	Medium	Good	Bunch grass	1,230,000	Spring-Summer
Western Wheatgrass	Hay/Pasture	Long	Excellent	Sod forming	110,000	Late spring - Summer

Lawn Seed Blends

Northstar Seed sells environmentally friendly, untreated lawn seed that is safe for the whole family. Our uncoated seed means more live seeds per pound and higher seeds per square foot based on the same seeding rate compared to coated seed.

	Components	Moisture Requirement	Key Features
Deluxe Blend	70% Kentucky Bluegrass 20% Creeping Red Fescue 10% Perennial Ryegrass	💧💧💧💧	• Contains the highest percentage of Kentucky Bluegrass • For homeowners wanting a lush, vibrant green lawn
Sun and Shade	50% Kentucky Bluegrass 30% Creeping Red Fescue 20% Perennial Ryegrass	💧💧💧	• Best suited for sunny areas and will tolerate partial shade
Instagreen	40% Kentucky Bluegrass 40% Creeping Red Fescue 20% Annual Ryegrass	💧💧💧	• Very quick to establish • Most economical blend for general use
Eco-Grow	25% Sheep's Fescue 25% Hard Fescue 20% Gibraltar Creeping Red Fescue 15% Boreal Creeping Red Fescue 15% Chewings Fescue	💧	• Low maintenance blend of premium fescues • Low-growing • Less mowing • Ideal for small acreages or for securing ground cover for livestock habitat.
Playground Blend	30% Creeping Red Fescue 30% Hard Fescue 20% Sheep`s Fescue 10% Corsair Kentucky Bluegrass 10% Turf Type Perennial Ryegrass	💧💧	• A low maintenance, easy to manage blend that will last for years. • Stands up to heavy foot traffic

Reclamation & Native Species

Northstar Seed is proud to offer a full line of high quality native cool and warm season grass species, legumes, and wetland grasses across Western Canada. We provide native blends for all types of projects; from reclamation sites and wetland habitats to major infrastructure projects and national parks.

Our team of sales agronomists work closely with contractors, engineers and conservation districts to meet the specification requirements for purity and germination for projects, large or small.

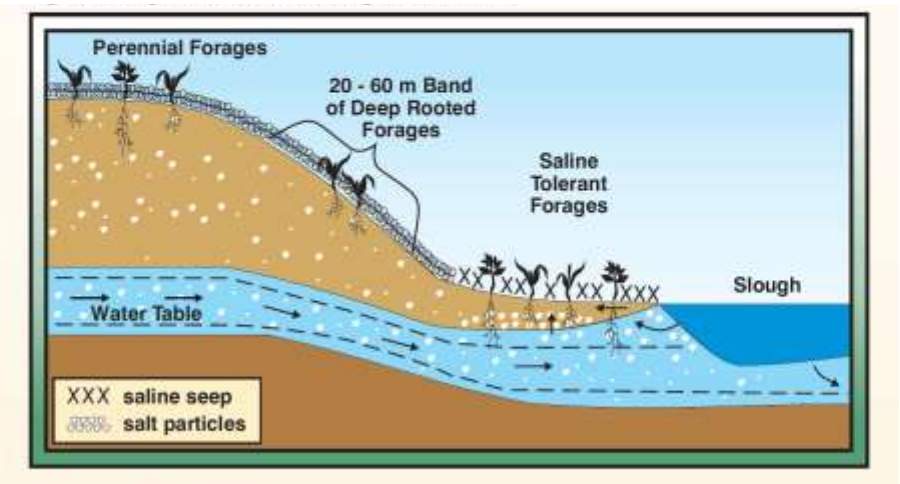
Available Native Species			
Awned Wheatgrass	Fringed Brome	Nodding Brome	Spike Trisetum
Alpine Bluegrass	Fults Alkaligrass	Prairie Cordgrass	Streambank Wheatgrass
Beaked Sedge	Green Needlegrass	Prairie Sandreed	Tall Mannagrass
Baltic Rush	Hairy Wildrye	Red Top	Ticklegrass
Big Bluestem	Idaho Fescue	Rocky Mountain Fescue	Tufted Hairgrass
Blue Grama	Indian Grass	Rough Fescue	Violet Wheatgrass
Bluebunch Wheatgrass	Indian Ricegrass	Sand Dropseed	Western Porcupine
Bluejoint Reedgrass	Inland Saltgrass	Sandberg Bluegrass	Western Wheatgrass
Canada Bluegrass	Junegrass	Side Oats Grama	American Vetch
Canada Wildrye	Little Bluestem	Sheeps Fescue	Canadian Milkvetch
Common Sedge	Mountain Brome	Slender Wheatgrass	Hairy Vetch
Fowl Bluegrass	Needle and Thread	Slough Grass	Lewis Blue Flax
	Northern Wheatgrass	Smooth Wildrye	Purple Prairie Clover

Right of way seeding to match surrounding species in central Alberta

Managing Salinity with Forages

Many cultivated areas of Western Canada face issues associated with salinity. Saline soils form when excess water in a recharge area moves into the ground water table and flows laterally. As the ground water moves through the water table, it dissolves and transports soluble salts until it reaches a discharge location where it surfaces. At the soil surface the water will evaporate, leaving the salts behind and throughout the soil profile.

Forage Placement for Reducing Saline Problems



Source: Forages for Improving Saline Soils (MAFRD)

It is important to recognize the difference between a saline or sodic soil. Many producers will use the term “Alkali soils“ to identify both types. A saline soil with a normal PH of around 6-7 will have a high concentration of soluble salts like Sodium Chloride or Calcium Sulfate. These soils will have a combination of sodium, calcium, potassium or magnesium that combine with other ions in the soil creating a salt that will precipitate out. Sodic soils on the other hand have a pH over 8.5 and have a high proportion of sodium, but not necessarily salt. The high level of sodium relative to calcium and magnesium will cause the clay particles to disperse and cause a breakdown of the soil structure.

Soil Testing is Critical

It is very important to take a soil test in those areas where you experience reduced growth and yields to determine what soil properties you are working with.

Soil electrical conductivity (EC) is a measure of the amount of soluble salts in a soil.

E.C (dS/m, mS/cm or mmho/cm)*	Degree of salinity	Hazard for crop growth	Plant Response	Relative tolerance of crops**
0-2	Non-saline	Very low	Negligible	
2-4	Slightly saline	Low	Restricted yield of sensitive crops	Beans, peas, corn, soybean, sunflower, clovers and timothy
4-8	Moderately saline	Medium	Restricted yield of many crops	Canola, flax, oats, wheat, rye, barley, bromegrass, alfalfa, sweet clover and trefoil
8-16	Severely saline	High	Only a few tolerant crops yield satisfactorily	Western, slender and tall wheatgrass, Tall fescue, Russian and altai wildrye
>16	Very severely saline	Very high	Only a few salt tolerant grasses grow satisfactorily	

Source: Soil Management Guide (MAFRD)

Potential Management Strategies for Saline Areas

Effective water management under irrigation and cropping selection can be used to reduce soil salinity effects on your land. One can employ mechanical measures such as surface or tile drainage, or use the crop selection alternative. Seeding a deep rooted forage crop such as alfalfa in a recharge area will reduce the water table and the effects of salinity in the discharge area. The use of barley in the discharge area as the most salt tolerant grain crop would be recommended. If barley production is an issue, consider seeding forages when the discharge area dries up or as a late fall dormant seeding.

Increase your seeding rate to compensate for the soil salinity concentration and select a multi species blend to provide cover, recognizing that the timing of forage establishment will vary with individual species. Species such as Tall Wheatgrass have a very high saline tolerance level, but are slower to establish verses Slender Wheatgrass, which is very quick to establish but not as long lived a perennial.

Look to species such as Dahurian Wildrye, Tall Fescue, Western, Slender and Tall Wheatgrass, Bromegrass, and some saline tolerant legumes such as our Rugged Alfalfa. It is important to note that the legumes will be rated as moderate in tolerance to salinity, so the perennial grasses listed above would be the predominate species in the blend.

Source: Manitoba Agriculture and Resource Development

Check out our saline stock blends for hay or pasture, or contact your local Northstar Seed dealer to assist you with a custom blend for your situation.

Fertility Needs for Forage Production

Nutrient deficiency in soil is an important factor that limits forage productivity in Western Canada. Often forages are seeded on marginal land that limits yield success from low soil nutrient levels after 3-5 years. Forages remove more nutrients from the soil than many other crops due to the large amount of biomass that is harvested yearly.

Management systems will affect the long term nutrient status of forage fields. A fertility program is usually implemented when seeding a tame forage or legume in the year of establishment. The concern is the replenishment of the soil nutrients that are being extracted from the soil profile over time to sustain the desired yield. Hay production removes a large amount of nutrients from the soil profile and there is a requirement to replace those nutrients each year to maintain the yield response.

Nutrients Removed in Hay Production (in lbs./acre)

NUTRIENT	2.5 TONS/ACRE ALFALFA	1.5 TONS/ACRE GRASS
Nitrogen (N)	145 lb/acre	51 lb/acre
Phosphorus (P_2O_5)	35	15
Potassium (K_2O)	150	65
Sulphur (S)	15	6

Multiply lbs. /acre by 1.121 to convert to kg/ha

Source: Nutrient uptake and removal by field crops (Fertilizer Canada)

Livestock grazing removes fewer nutrients than a physical haying operation as the biomass is not removed from the land under a grazing scenario. The majority of the Nitrogen, Phosphorus, Potassium and Sulphur that are consumed by the livestock are excreted as urine and feces and the nutrient cycle continues.

The goal of a fertility program is to decrease the per unit cost of production and optimize sustainable biomass production. It is important to soil test yearly to determine the nutrient status of the forage stand and to plan for the production requirements.

Take the time to visit with your Northstar Seed sales agronomist regarding forage production planning and visit with your fertilizer dealer to evaluate your soil nutrient profile. Employ the correct fertility program for your operation to improve the bottom line and remain a sustainable forage producer.

Annual & Cover Crop Program

Northstar Seed has been involved in cover crops for a decade, and have developed our product lineup to meet the demand of this diverse and growing market.

We can provide various cover crop blends for double cropping under irrigation, summer/fall grazing, stored forage, nitrogen fixation, and soil health improvements. We have also used annual legumes as a part of intercropping with cereal grain production.

Please contact your Northstar Seed sales agronomist or Northstar Seed dealer, and let us assist you in your perennial and annual forage planning.

Available annual and cover crop species and varieties:

- Berseem Clover
- Crimson Clover
- Collards
- Jumbo Ladino Clover
- Driller brand Radish
- Vivant Hybrid Forage Brassica
- Gorilla Forage Rape
- Kale
- Purple Top Turnips
- Appin Turnips
- Sugar Beets
- Hairy Vetch
- Chicory
- Austrian Winter Peas
- Forage Peas
- Plantain
- Beehappy Phacelia
- Buckwheat
- Sunflowers
- NS Drystalk brand BMR Sorghum Sudangrass
- Golden German Millet
- Japanese Millet
- Proso Millet
- Nabucco Italian Ryegrass
- Elunaria Annual Ryegrass

German millet, berseem clover, turnip and rape that was silage baled, then grazed the regrowth in early winter, near Melfort, SK.

Japanese millet near Prince George, BC

Annual Forage Selection

The interest in using annual forages as cover crops continues to grow with a strong focus on improving soil health. The integration of livestock into a cover cropping system assists in the efficiency of the nutrient cycling ecosystem.

As we explore the benefits of Regenerative Agriculture, the use of cover cropping with annual forages combined with the use of perennial forages are key to improving soil health. The focus of regenerative agriculture is to increase biodiversity, improve the water cycle, and strengthen the health and vitality of the soil. This means protecting the soil with armour, and keeping root activity alive for an extended period.

COOL SEASON					WARM SEASON	
GRASS	BROADLEAF					GRASS
Barley			LEGUMES			Pearl Millet
Oats			Jumbo Ladino Clover			Japanese Millet
Ryegrass	Phacelia	Turnip	Forage peas			Golden German Millet
Wheat	Kale	Radish	Berseem Clover		Buckwheat	Proso Millet
Cereal Rye	Canola	Beets	Sweet Clover	Soybeans	Sunflowers	Sorghum Sudangrasss
Triticale	Mustard	Forage Brassica	Hairy Vetch	Chickpeas	Chicory	Corn

The use of Annual forages in your rotational program allows you to increase biodiversity within your cropping systems. The overall goal is to increase soil carbon through vegetative growth with moisture being the caveat.

Producers use many different prescriptions to achieve biodiversity and their ability to affect soil health on their operation. Regenerative Agriculture is most often unique to an individual operation requiring site specific recommendations.

Improving soil health will require using the Five basic principles of Regenerative Agriculture:

- Create soil armor by keeping the soil covered, with no bare ground.
- Minimize soil disturbance by utilizing reduced/no till practices on cropland and adaptive grazing strategies on grazing lands.
- Increase plant diversity; rotate crops and include warm and cool-season grasses and forbs in pastures.
- Keep living roots in the ground all year.
- Integrate livestock grazing.

Polycropping Principals

A well planned rotation is key as we plan for the use of cover crops. Whether it is the addition of a perennial forage, the use of a cover crop following or within a cash crop such as silage or greenfeed, or the integration of livestock into a cropping system, all systems require a plan to be successful.

Soil Health

Polycrop blend of turnip and radish for improving soil health, near Elkwater, AB

Dark green area was bale grazed in winter of 2019, near Quesnel, BC

Double Cropping and Interseeding

Producers looking at the use of annuals in a mono crop to increase plant diversity and assist with adding soil armor. In the case of the wheat photo below, the crimson clover was able to fix nitrogen during the growing season as well. The use of intercropping tools will require consideration as you plan for harvest and crop rotations into the future.

Crimson clover interseeded in wheat, near Tilley, AB

Italian ryegrass interseeded in corn, near Taber, AB

Swath Grazing to Extend the Season

A planned strategy to grow a poly crop for the purpose of grazing into the winter season. The use of cover crops added to a cereal such as oats or triticale is most common and swathed just prior to freezing. The addition of cover crop species into the swath graze mix enhances the nutritive value of the swathed forage. Keeping the livestock on the land grazing allows for nutrient recycling while reducing feed yard costs under a traditional winter feed scenario.

Kale, hairy vetch, Japanese millet, turnip and brassica after grazing, near Viscount, SK.

Blend of Japanese millet, brassicas and oats for swath grazing in early winter, near Birch Hills, SK

Hay and pasture renovation

Direct seeding into an unproductive forage stand can be successful, with a planned approach. Producers will often reduce the amount of carryover forage on the acreage that they are wanting to rejuvenate. Selecting the grass or legume to complement the existing forage is important to stand establishment. Fall and spring moisture reserves are key to the success of your stand renovation.

Alfalfa seeded at 3 lb/ac into an old crested wheatgrass stand near Irvine, AB

Direct seeding with Cache Brand meadow brome, tall fescue, pubescent wheatgrass, cicer milkvetch and annual ryegrass into an old pasture near Brooks, AB

Successful Forage Establishment

Careful planning and attention to detail are essential to ensure successful forage establishment. A successful forage stand depends on the selection of species and cultivars that are adapted to your environment and for the intended use of the forage. Your decision to plant a forage should be made with consideration of the following:

Weed Control: Consider the herbicides used in the last couple of years to ensure no herbicide residue as some products may inhibit or reduce seedling survival. Plan for a weed control program on the forages that you are seeding to control and reduce weed competition.

Seedbed Preparation: The seedbed should be firm and weed–free prior to seeding. It is important to achieve close seed to soil contact to allow for accurate seed placement which means a firm, solid seedbed. Walking or driving across a seedbed should only leave a faint imprint. A clean stubble field makes for a perfect environment.

Seeding Date: Spring seeding is ideal when soil temperatures have reached 8-10 degrees C and moisture levels are good for ideal germination to occur. Moisture deficiency is often a cause of poor stand establishment, so seeding with anticipated precipitation in the spring is most successful. If you choose to dormant seed, plant when the soil temperature is below 2 degrees C to prevent germination until the following spring.

Select the Correct Species: When selecting your forage species, plan for the length of time the stand will be in production. Longevity and the yield of your forage stand starts with choosing the correct species adapted to your soil and field conditions. Select a quality seed that has a high level of germination and has an excellent seed purity with modern genetics for high production levels. Purchasing cheap seed may compromise yield and quality, and persistence of the stand due to lack of disease resistance and winter hardiness. Cost of the seed input in forage production accounts for less than 5%, so selection of the best species for your operation is critical to the success of your stands.

Seeding Rate and Equipment: Producers have used various equipment to successfully seed and establish forages. What is most important is the ability to control the seeding depth and accurately meter small amounts of seed and avoid bridging when using chaffy seeds. Having an agitator in the seed box or mixing in an inert carrier or phosphate fertilizer with a ratio of 1 to 3 by weight will eliminate bridging and result in good seed flow.

Using equipment such as double disc drills, hoe drills, or air seeders and drills provide for excellent seed to soil contact, the exception may be the use of a broadcast applicator. With a broadcast applicator, it is recommended that you increase seeding rate by 20% to adjust for seed that remains on the top of the ground following incorporation after seeding. Broadcast seedings are more reliant on rainfall for germination than any other seeding method.

Seeding rates should be determined based on a combination of factors such as: the end use requirement, the predicted survival rate of the seedlings, moisture conditions, and most importantly the seeds per square foot in the field rather than percent by weight. Contact your Northstar Seed sales agronomist for the ideal seeds per square foot for the various soil zones.

Seeding Depth: Seed your forages shallow with the maximum seeding depth on clay type soils at ¼ to ½ inch deep with some seed evident on top of the ground. If you are seeding into loam or sandy-type soil, depth may increase to a maximum of ¾ inch, keeping the importance of a firm seedbed in mind.

Fertility: Plan for a fertility program when seeding legumes and grasses. You may wish to bank your Phosphorus requirements for a period of 3-4 years as we understand that Phosphorus is not very mobile with annual applications. Soil testing prior to seeding and fertilizing to the required nutrient levels is recommended.

Companion Crop Management: If you choose to use a companion crop, **seed the companion crop at 20-40% of normal rate** to reduce competition in your forage establishment. If possible, seed at right angles to reduce in–row competition with your forages, and under ideal conditions, harvest as a silage crop. The goal is to reduce the length of time the swath lays on the ground. Remember to use recommended herbicides to control weed growth and reduce competition. Avoid using a competitive crop such as barley or wheat and look to crops like flax, millet or oats as a companion crop.

Production Opportunities

Northstar Seed is known in the global forage and turf seed industry as a supplier of pure, clean, high quality seed. We are proud to export forage and turf seed, produced in Western Canada, around the world. Currently, Northstar Seed ships to countries within Europe, East Asia, Latin America, the United States, Africa and the Middle East.

As a forage or turf seed producer, you are an integral part in helping increase Canadian exports and developing our ability to be a primary source of quality seed production.

Northstar Seed is looking for leading-edge farmers to ***Grow with Us***. If you are interested in finding out about grower opportunities, please contact one of our local production agronomists.

Gerry Duynisveld
(204) 476-0644

Brett Wilson
(204) 476-6828

Darrel Theroux
(204) 212-0991

NORTHSTAR SEED
Grow with us

Our Dealers - Local Forage Experts

Who are Northstar Seed Dealers?

They are people from your community who are passionate about the forage and turf industry, and customer service. They are your local seed retailers based on-farm, independent farm supply companies with multiple sites, feed dealers, auction marts, landscape suppliers and many others!

What are the benefits to you?

Northstar Seed's sales agronomists work with your local retailer to combine information on cutting edge varieties and agricultural practices used across Western Canada, with knowledge of your local climate and soil conditions. Many of our dealers are also producers who have experience growing the varieties we offer.

Want to start a conversation?

Simply work with your local dealer — they can engage their Northstar Seed agronomist to help answer your questions and provide innovative ideas. Forage is our passion, and we would love to help improve your

New Dealer Opportunities

Northstar Seed is continuing to expand its presence in Manitoba, Saskatchewan, Alberta and B.C. If you are have a passion for forage, turf or native seed, speak to one of our sales agronomists about the possibility of becoming a dealer.

Call us today for more information: 1(800) 430-5955 **Email: info@northstarseed.com**

For additional information or to place an order please contact:

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