COYOTE SEEDS™

A DIVISION OF MUSTANG SEEDS

SEED GUIDE

JASON DEVANEY

FORAGES AND SMALL GRAIN PRODUCT MANAGER

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Jason DeVaney has an extensive background in agriculture and small grains. His experience includes warehouse manager, sales agronomist and soybean production manager. As a sales agronomist, Jason gained valuable experience of being in the fields with the customer and he takes great pride in learning about the different soil types, soil health and the products that will work best for each individual operation. Along with every producer, Coyote Seeds fully intends to continue to provide excellent customer service along with top quality products for your farms.

DAVE STEPHENSON

DISTRICT SALES MANAGER

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Dave Stephenson has been a District Sales Manager at Coyote Seeds/Mustang Seeds since 2012. Dave began working almost entirely with Coyote Seeds in 2014. His territory covers the southern part of South Dakota, Nebraska and Iowa and he works with over 60 dealers. Dave graduated from the University of Kentucky with a BS degree in Agronomy/ Ag Production. Before coming to Mustang Seeds he gained valuable experience working in the Coop system. Dave enjoys working for a family owned business and he feels our service is a huge advantage as we can quickly adjust to the changing needs of our farmers, customers and dealers.

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Coyote Seeds has been a premiere field seed provider since the early 1940's. The company was and is most well known for its Coyote 990 Alfalfa, which is a very winter hardy Midwestern blend alfalfa that has performed for farmers and ranchers for decades.

Coyote Seeds is sold by retailers throughout Iowa, Nebraska, South Dakota, North Dakota, and Minnesota. It has provided growers different options in field seeds at competitive prices for decades. The quality seed that Coyote offers is also grown in this region and is well adapted to handle the Midwestern hot dry summers and cold winters.

Coyote Seeds from its inception until 2008 was distributed out of Bridgewater, South Dakota. In 2008 Coyote was purchased by Mustang Seeds Inc. and is distributed out of Madison, South Dakota.

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The importance of alfalfa cannot be underestimated. It is considered the most outstanding forage plant due to its capacity for building soil fertility and furnishing large yields of high quality feed for livestock. Alfalfa hay rated highest in feed value of any of the common hay crops. It has a high protein and mineral content and as a supplier of calcium it is superior to any other forage crop. Alfalfa is an excellent source of Vitamin A.

Coyote Seeds is striving to give growers the benefits of that research by supplying the best of these alfalfas. In the pages that follow, you will find information on alfalfa varieties and blends available from Coyote Seeds.

ALFALFA SEED BED SUGGESTIONS

A firm seedbed is one of the main requirements for stand establishment when planting alfalfa or grasses. A loose seedbed causes nothing but problems when starting alfalfa. A firm seedbed provides soil-to-seed contact to wick moisture and nutrients to the seed. The seedbed needs to be packed with a roller.

When planting warm-season grasses you should use a grassland drill or some kind of a drill that has an agitator in the seed box, because the seeds are fluffy and difficult to move through the drill.

A common way of seeding alfalfa is with an oats companion crop which decreases erosion while the alfalfa is getting established. The oats can be clipped for forage and the process does suppress weeds. A disadvantage of an oats cover crop is the competition the oats presents to the alfalfa seedlings for light, moisture and nutrients. The companion crop may preclude before harvesting alfalfa the seeding year.

TRAVOIS ALFALFA

Travois has a low (decumbent) growth, aggressive root proliferation, winter hardiness, predominantly yellow variegated flowers and a large percentage of pickle shaped seed pods. Its winter hardiness is superior to most alfalfa varieties tested throughout our region. Plants of Travois have the ability to produce stem buds on laterally spreading roots. Shoots from the stem buds emerge at the soi surface and develop into young plants at distances that sometimes exceed 36 inches from the mother plant. This characteristic permits a close association between grass and legume, reduces trampling injury, thickens stand and decreases winter loss from soil heaving.

COMMON ALFALFA

SD - NE - ORIGIN

Common Alfalfa is a winter hardy alfalfa grown and adapted in the state of origin, but is of an unknown variety or varieties. It is usually not noted for high yields but is usually lower in price.

VERNAL

A winter hardy alfalfa variety released by Wisconsin. It is wilt resistant and produces fine stemmed, leafy quality hay.

MUSTANG 425HD

ALFALFA

Mustang 425HD is a high forage yielding, high forage quality HD® alfalfa variety. Mustang 425HD is protected by a broad spectrum of pest resistance package.

FEATURES:

- Exceptionally high forage yield potential
- Outstanding forage quality attributes
- Solid disease resistance package

MUSTANG 625APH2

ALFALFA

Mustang 625APH2 is a high forage yielding, good forage quality, sunken crown alfalfa with branch root tendencies, which allows it to be more productive in well and poorly drained soils. It was selected for resistance to multiple races of Aphanomyces root rot.

FEATURES:

- Very high forage yield potential
- Resistance to Aphanomyces Race 1, 2 and isolates of Race 3
- Branch root trait
- Solid disease resistance package

ALFALFA PRODUCT	FALL DORMANCY	WINTERHARDINESS	RECOVERY RATE	MULTIFOLIATE	CROWN PLACEMENT	ROOT TYPE	DRI	YIELD	DIGESTIBILITY/FEED VALUE	BACTERILA WILT	FUSARIUM WILT	VRTICILLUM WILT	ANTHRACNOSE	PHYTOPHTHORA ROOT ROT	APHANOMYCES ROOT ROT RACE 1	APHANOMYCES ROOT ROT RACE 2	APHANOMYCES ROOT ROT RACE 3
425 HD	4.5	1.9	Fast	25%	Sunken	Branch	35/35	Excellent	Excellent	HR	HR	HR	HR	HR	HR	HR	--
625 APH2	4.5	1.9	Fast	Very Low	Sunken	Branch/ Tap	35/35	Excellent	Very Good	HR	HR	HR	HR	HR	HR	HR	R
GA306SS	4	2.1	Fast	Low	Large	Tap	28/30	Good	Good	HR	HR	HR	HR	HR	MR		
995/990	4	2	Fast	Low	Large	Tap	30/30	Good	Good	--	--	--	--	--	S	S	--

GA306SS

ALFALFA *SALT TOLERANT VARIETY*

MANAGEMENT PROFILE

- Selected for yield and persistence; its persistence is excellent under both normal and aggressive harvest schedules
- Especially well-suited to areas where nematodes threaten yield production and reduce stand life
- Offers producers broad-spectrum pest resistance and excellent persistence; this high-yielding variety will keep producing quality hay for many years
- Excellent salt tolerance
- Dark green foliage and medium-fine stems make it ideal for hay

BROAD SPECTRUM PEST RESISTENCE

- GA306SS offers producers broad-spectrum pest resistance and excellent persistence
- Resists Phytophthora and Verticillium Wilt, which can significantly reduce production and stand life
- Resistance to Fusarium Wilt, Anthracnose and moderate resistance to all major aphids

COYOTE 990

ALFALFA

A special blend of alfalfa for upper Midwest with carefully selected viable pure seeds with high germination. Coyote 990 has the ability to produce a lush stand quickly and produce for many years. Excellent production on good years and also will perform well on marginal ground and with limited rain fall. Seed is pre-inoculated — Apron® treated available.

Ratings are based on average performance of the variety over a wide range of climate and soil types. Actual performance may be adversely affected by extreme conditions. Unless stated, ratings are based on standardized testing procedures endorsed by the North American Alfalfa Improvement Conference.

FALL DORMANCY
The reaction of alfalfa varieties to decreasing day length and temperatures in the fall versus check varieties.
1 = Norseman | 2 = Vernal | 3 = Ranger | 4 = Saranac | 5 = Archer, etc.

PEST RESISTANCE RATINGS:
S = Susceptible with 0-5% resistant plants
LR = Low Resistance with 6-14% resistant plants
MR = Moderate Resistance with 15-30% resistant plants
R = Resistance with 31-50% resistant plants
HR = High Resistance with greater than 50% resistant plants.

WISCONSIN DISEASE RATING INDEX:
For the six major diseases of alfalfa, a variety is awarded: HR = 5 points | R = 4 points | MR = 3 points
LR = 2 points | S = 1 point | Perfect Score = 35 of 35
(Bacterila Wilt, Fusarium Wilt, Anthracnose, Phytophthora Root Rot, Vrticillum Wilt and Aphanomyces)

WINTER HARDINESS INDEX:
1 = Most hardy and least winter injury
6 = Least hardy and injury resulting in plant death
Ratings are in relationship to the winter injury incurred by standard check varieties.

MUSTANG S-8751BMR

CANE FORAGE

S-8751BMR is a medium early 95-100 day maturity 8-9 ft soft dough hybrid. Yield on dryland is great due to rapid growth. With wide leaves and quick growth this hybrid yields well.

MUSTANG S-8255BMR

SORGHUM-SUDANGRASS HYBRID WITH BROWN MIDRIB

S-8255 may be used for direct grazing, hay or haylage. This hybrid is completely "Brown Midrib." It has significantly increased digestibility of its stems and leaves. This 6-8 foot tall sorghum offers the grower excellent quality and energy for his animals.

M40SSD60BMR

M40SSD60BMR is an early hybrid with 40% more leaf density due to the leaf count and leaf width. The results are a digestible high-quality forage. Fiber quality is improved 15-20% due to the BMR and 5-10% for the increased leaf to stem ratio. Grazability is improved as the cattle prefer the reduced height and standability. It produces similar tonnage, superior standability and reduced seeding rates compared to tall hybrids.

M20FS25

M20FS25 is a full season, sweet stalked, drought tolerant hybrid that produces high yields and good quality forage in 120 to 125 days.

MUSTANG S-8500

HYBRID PEARL MILLET

S-8500 offers excellent grazing and hay potential.Fast re-growth after clipping. Clipping should be done in the pre-boot stage. Under good conditions hybrid is 5-6 feet tall in the pre-boot. Grazing should begin at approx. 25" tall.

BMR COYOTE GRAZE

BMR Coyote Graze has a dry stalk trait which improves dry down time after cuttings. This improves harvestability and quality due to delays. You can expect 3-5% lower moisture in the boot state. BMR Coyote Graze is used for silage, baleage, hay and grazing. This hybrid is economical to plant, produces leading tonnage, and the overall forage quality is great. The digestibility is 20% greater than conventional. BMR sorghum increases animal intake and daily gains substantially. BMR Coyote Graze is grassy tillering more than other hybrids producing fine sweet soft stems.

COYOTE GRAZE

Coyote Graze is an annual forage plant for silage, grazing, cover crop or green chopping. It has excellent early growth and grows very tall. The tonnage is extremely high and is very palatable. It can be planted either in rows, drilled or broadcast. Seeding should be at 10 to 12 pounds per acre in rows or 20 to 30 pounds per acre broadcast. It is very sweet juicy and leafy. The heavier the planting, the finer the stems will be. For pasture uses, a rotating system is suggested. Ideal grazing height is 24 to 36 inches. Normal grazing precautions should be observed. Before green chopping, the plants should reach a height of 24 to 36 inches. Usually Coyote Graze will yield 3 to 6 cuttings depending on planting time, moisture and temperatures. For hay, the plants should reach boot stage and ideally be followed by a conditioner after cutting. Recommended usage: silage crops where it is not practical to use corn, such as when circumstances require a fast-growing crop for late or delayed re-planting. Planting should be delayed until the soil is warm enough to germinate seed (60 to 70 degrees).

99FS24 DT NEW!

99FS24 DT is a medium- early maturity hybrid that produces high quality silage with whole plant digestibility and large grain heads. 99FS24 DT reaches silage maturity in 100 to 110 days.

57MB61 DT NEW!

57MB61 DT is a bronze grain medium early maturity hybrid with high yield potential. It is ideally suited for dry-land or irrigated acres. This hybrid can be utilized as a double crop hybrid behind wheat.

55MB59 DT

55MB59 DT is a bronze grain early maturity hybrid with high yield potential. The hybrid is ideally suited for dry-land acres in the Great Plains where higher soil pH may be a problem. Can also be utilized as double crop in areas with longer growing seasons.

54MC58 DT

54MC58 DT is a cream grained, early maturity hybrid with good drought tolerance and uniform appearance. Suitable for high pH soils, shorter growing seasons, and areas where double crop is planted following wheat or other early summer harvested crops.

WG5963

HYBRID GRAIN SORGHUM

Is a medium-early hybrid with high yield potential, good drought tolerance and good standability. WG5963 is a Good Grade hybrid with cream colored grain and a tan plant.

GP5862

HYBRID GRAIN SORGHUM

GP5862 is a medium-early maturity grain hybrid with high SCA tolerance. This hybrid has an excellent appearance with a semi-open head type and stiff stalk and staygreen traits to provide excellent drought stress tolerance. GP5862 is well adapted for dryland fields in

EH4852

HYBRID GRAIN SORGHUM

The earliest grain hybrid in the Mustang line. EH4852 has a good performance in the shorter growing areas of the sorghum belt in the High Plains and can be double cropped after wheat. EH4852 has excellent standability with good drought tolerance. Can also be planted later in the southern growing areas and is resistant to Biotype "E" greenbugs.

OTHER MILLETS & FORAGES ARE ALSO AVAILABLE

WHEN SHOULD SORGHUMS & GRASSES BE HARVESTED?

SILAGE

Forage Sorghums should be harvested at the mid-dough stage for ensiling. At this point, quality is still good and most types have dried down enough for ensiling.

HAY

Highest yields are obtained when sudangrass and sorghumsudangrass hybrids are harvested at the soft-dough stage. However, curing is difficult and quality is low when harvested this late. The general recommendation is to harvest either type for hay whenever forage is about 30 inches tall. Sorghumsudangrass hybrids are generally more difficult to make hay because of the larger stems. Crop should be cut 6 inches above the ground to encourage re-growth and two cuttings maybe expected.

GREEN CHOP

Sudangrass and sorghum-sudangrass hybrids can be used to provide green chopped forage over summer. Begin chopping after the plant is 18 inches tall or cut at least 10 days after a killing frost to avoid prussic acid concerns. First cutting should be taken prior to heading.

PASTURE

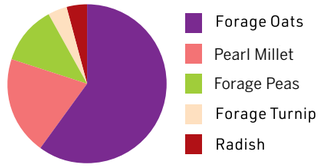
Sudangrass and sorghum sudangrass hybrids can be grazed any time after the plant has reached a height of 18 inches, which is usually 5 to 6 weeks after planting. For best results, it should be grazed rotationally with a sufficiently heavy stocking rate to remove forage down to a 6 to 8 inch height in a few days. The pasture will grow rapidly when the cattle are removed for more total tonnage.

MID-LATE SEASON GRAZING MIX

40 POUNDS PER ACRE

Plant late spring for grazing as well as building soil health.

PLANT JUNE 1 - AUGUST 1

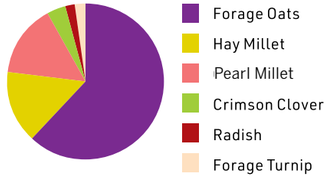


EARLY SEASON GRAZING MIX

40 POUNDS PER ACRE

Can plant early in the spring for supplemental grazing.

PLANT MAY 15 - JUNE 15

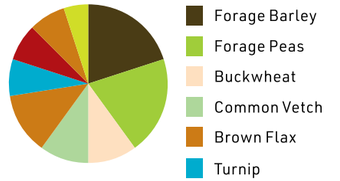


SOIL HEALTH PLUS MIX

20 POUNDS PER ACRE

This mix is the real deal! Plant after small grain harvest, prevent plant acres or early corn silage acres. Will add nitrogen plus breakdown phosphorus for next year's crop. Will also add late season grazing, biomass and soil activity in alkali soils.

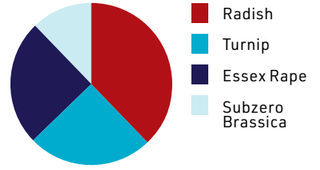
PLANT JULY 15 - SEPTEMBER 15



BRASSICA PLUS

8 POUNDS PER ACRE

PLANT MID JULY - MID SEPTEMBER

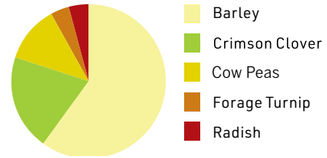


SOIL BUILDER MIX

26 POUNDS PER ACRE

Will produce nitrogen and also scavenge nitrogen to help build soil health.
The species in this mix should provide an earthworm haven and help establish growth in Alkaline soils.

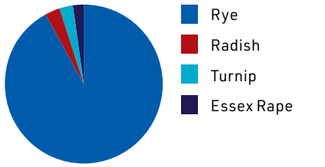
PLANT JULY 15 - SEPTEMBER 5



FALL GRAZER MIX

59 POUNDS PER ACRE

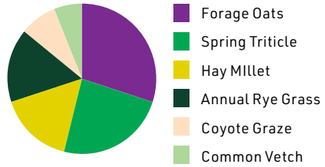
PLANT MID JULY - MID SEPTEMBER



SEASON LONG MIX

64 POUNDS PER ACRE

PLANT APRIL - MAY



CLOVERS

ALSIKE CLOVER
Popular in regions where red clover is the main rotation crop and areas where red clover will not thrive. It is used on low, wetland and soils that are low in lime content or have become run down. Alsike is suitable for either hay or pasture. It is especially valuable when used with Timothy and is usually used only in mixtures.

MEDIUM RED CLOVER
A good nitrogen producer. Good root system-soil builder. Is a tall clover. Excellent for forage.

CRIMSON CLOVER
With its rapid, robust growth, crimson clover provides early spring nitrogen for full-season crops. Rapid fall growth or summer growth in cool areas, also makes it a top choice for short-rotation niches as a weed suppressing green manure. Popular as a staple for age and roadside cover crop throughout the southeast, crimson clover is gaining increased recognition as a versatile summer-annual cover in colder regions.

BERSEEM CLOVER
An annual pasture legume. Grows best on fertile, medium to heavy textured soils of mild acidity. It is a heavy nitrogen producer.

MAMMOTH RED CLOVER
A short-lived perennial that produces only one cutting per season and is taller and much coarser than medium red clover. Lodging and leaf loss may be a problem if it is allowed to go to full bloom before cutting. Mammoth red clover requires less moisture than medium red but will perform better in poorer soils.

LADINO CLOVER
Ladino Clover is a giant white clover. The plants grow up to 14 inches high. Ladino recovers quickly from grazing or clipping, as new leaf and flower buds are continually developing on the running stems. Ladino has done best on medium to heavy soils with abundant moisture. It ranks high in feed value, is highly palatable and is a valuable soil improvement crop.

WINTER PEAS
Winter peas are a leafy variety that produce excellent forage yields and standabillity. They provide excellent forage quality when chopped in combination with a small grain.

SUBZERO BRASSICA
Brassica is a cross between kale and turnip. Improved forage quality and fast regrowth give forage brassica an advantage over common rapeseed.

BUCKWHEAT
Can be harvested for grain or excellent for use as a cover crop.

RYE
Also called Winter Rye or Cereal Rye. Scavenger of excess nitrogen, prevents erosion, adds organic matter and suppress weeds. The hardiest of the cereal grains. Taller and quicker growing than wheat. Available in 3 varieties: Rymin, Dylan, Hazlet

TRITICALE
There are fall and spring varieties. A cross between wheat and rye and is excellent for Fall/Spring Grazing or for a forage crop.

TEFF GRASS
A self-pollinated, warm season annual grass which can be harvested multiple times during the growing season as dry hay, silage or pasture. As a fast-growing crop, Teff combines excellent forage quality with high yield during a relatively short growing season.

COMMON VETCH
A nitrogen fixing leguminous plant. This hardy plant is often grown as green manure. It is tolerant of light mowing and will regrow in pastures after moderate grazing.

FORAGE BARLEY
Forage Barley is a two-rowed hay barley that is well adapted for a wide variety of growing conditions and climates that produce a high yielding, high quality and uniform hay crop. Forage Barley has a fine stem which aids in feeding and digestibility.

GERMAN MILLET
An annual grass with slim, vertical, leafy stems. It is a warm season crop that is planted in late spring. Harvest for hay or silage. Does not regrow.

YELLOW BLOSSOM
Sweet Clover Primarily used as a cover crop as it has deep roots that help break up compaction and build organic matter. Not a good forage crop.

BUSTER RADISH
A late maturing cover crop radish that produces a significant root mass. This deep root system allows it to pull nitrogen and other nutrients from deep within the soil and bring them back.

DWARF ESSEX RAPE SEED
A very popular, lower growing rape seed that is very nutritious to all classes of livestock. Dwarf Essex belongs to the cabbage family and has high protein and high energy levels. It is cold, heat, and drought tolerant and is a feed source during summer months when it is hot and dry.

PURPLE TOP TURNIPS
Most commonly used turnip in the U.S. Works well for late fall and winter grazing. Good choice for low fertility soils.

HAIRY VETCH
A winter hardy annual. It should be planted in late September or early October. The stems are weak and viny. When planted with oats and cut green it makes an excellent livestock feed. Hairy Vetch is used mainly as a green manure crop in the cotton belt.

LENTILS
A member of the legume family. Lentils can supply a significant part of its nitrogen requirement by fixing nitrogen from the air. It is a cool season crop with a relatively shallow root. It is moderately resistant to high temps and drought. Lentils have an indeterminate growth habit. This cover crop will not tolerate waterlogged soils, flooding or high salts.

FLAX
Is a brown-seeded, blue flowered variety. The variety is early in maturity and fairly tall.

ANNUAL RYEGRASS
A very popular cover crop in parts of the Midwest. It is fast establishing, provides excellent weed suppression, can be grazed and helps to reduce nematode populations. Deep roots improve compaction, quick establishment and heavy top-growth to prevent soil erosion or runoff. Loves nitrogen, can uptake extensive amounts of phosphates.

FESTULOLIUM
A hybrid cross between Meadow Fescue and Ryegrass. Festulolium is mainly utilized in pastures for grazing and stockpiling, either in mixes or pure stands. Benefits include higher forage yields than perennial ryegrass, increased mid-summer growth, high disease resistance and winter hardiness.

4010 FORAGE PEAS
Is a cool season legume developed for the production of high-quality forage for livestock.

SUDANGRASS
Fast growing with fine stems, aggressive tillering and a mass of leaves at harvest. Adapted to all areas. Can be used as pasture or for hay. Could have risk for prussic acid. Do not graze until 18" tall.

SORGHUM SUDANGRASS
An intermediate plant size. It would be slightly taller than straight sudangrass. Yield is generally less than that for forage sorghums, but similar or slightly higher than sudangrass. It can be used for hay, greenchop, or pasture. Larger stems make drying for hay more difficult than for sudangrasses.

FORAGE SORGHUM
Major use is for silage. Usually can grow between 8-13 feet tall. Stems and leaves are similar in size to corn. Feeding value of sorghum silage is 80-90% of comparable corn silage.

GRAIN SORGHUM
Also called Milo, used for grain production. This type grows 3-5 feet tall depending on variety and growing conditions. It is usually not considered for forage production because of low dry matter yields.

PEA/BARLEY MIX

50%	Peas
50%	Barley

Plant Early Spring (April-May). Seeding rate 100#/acre

3 WAY FORAGE

50%	Peas
25%	Oats
25%	Barley

PEA/OAT MIX

60%	Peas
40%	Oats

Plant Early Spring (April-May). Seeding rate 100#/acre

PEA/TRITICALE MIX

60%	Peas
40%	Triticale

CERTIFIED GOLIATH OATS

A white-hulled, spring oat developed by the South Dakota Agricultural Experiment Station (SDAES) and released in 2012. The line was tested as SD090552 and was developed from the two-parent population IL99-1338/SD97575-38-154. Varieties in the pedigree include Rise, Settler and Troy. Goliath has late maturity, heading 1.7 days later than Stallion. Goliath is 4.3 inches taller than Stallion. Goliath has excellent grain yield and forage yield potential, as well as good test weight.

CERTIFIED SD MOMENTUM

(Hayden/MN11140) was tested as SD170935 and a potential replacement for Goliath and Rushmore. It is similar to Goliath in maturity, height, test weight and forage dry matter yield with lower forage quality. SD Momentum is higher in yield with better straw strength. It is resistant to crown rust and smut along with moderate resistance to barley yellow dwarf virus. Grain characteristics are acceptable for milling with a similar Beta-glucan level as Goliath.

CERTIFIED SD BUFFALO OATS

The South Dakota Agricultural Experiment Station is releasing a new white oat variety named SD Buffalo to Certified Seed growers in the spring of 2022. SD Buffalo is result from the cross SD081107//SD070394/SD060130 and tested as SD150012. It is two days earlier than Rushmore in maturity, similar in plant height with superior straw strength, but slightly lower in test weight. SD Buffalo ranked 2nd in yield in CPT trials compared to all varieties from 2018-2021. It is moderately resistant to crown rust and the BYD virus and has good milling characteristics.

CERTIFIED DEON OATS

Deon is a variety of oats developed and released by the Minnesota Agricultural Experiment Station (MAES) in 2012. Deon was selected from a cross Sesqui*2/Bettong//MN02108. Deon is a yellow seeded oat with medium large sized kernels. Deon has a late maturity. Deon is medium tall and has very high grain yield with medium test weight and medium groat and grain protein percentages. PVT protected.

CERTIFIED WARRIOR OATS

Warrior oat is a white-hulled, spring oat developed by the South Dakota Agricultural Experiment Station (SDAES) and released in 2018. The line was tested as SD120419 with the pedigree of SD041405/SD060130. Warrior is a medium maturing line, heading about 1 day later than Horsepower. Warrior is 2" taller than Horsepower. Warrior has high yield potential and average test weight. Warrior is moderately resistant to smut and moderately susceptible to BYDV. The variety is resistant to crown rust. Lodging resistance is excellent.

CERTIFIED RUSHMORE OATS

White-hulled, spring oat developed by the South Dakota Agricultural Experiment Station (SDAES) and released in 2019. Pedigree of SD80015/SD0070110/SD060130. Rushmore is a medium-late maturing line, heading about 1 day earlier than Hayden. Similar in height to Hayden with better lodging resistance. Rushmore has high-yield potential and good test weight. Resistant to moderately resistant to crown rust and moderately resistant to BYDV and smut.

CERTIFIED SD TITAN

(MN11140/SD120638) was tested as SD181245 and a potential replacement for Goliath. It is one day earlier than Goliath in maturity, one inch shorter in height and a lower than average test weight. SD Titan is higher in yield and forage dry matter yield, but slightly less relative feed value than Goliath, but higher than SD Momentum. It is moderately resistant to crown rust, smut and barley yellow dwarf virus. Grain characteristics are not acceptable for milling, but is an excellent choice for oat forage.

MORTON OATS

Morton oats was developed by the North Dakota Agricultural Experiment Station (NDAES) in cooperation with USDA and released in June 2001. The line was tested as ND941119 and resulted from the cross ND880922/IAB605X. Morton is medium-late in maturity being similar to Troy and two days later than Jerry. The variety has high test weight with groat percent slightly higher than Jerry. Kernels are uniform and large in size with white hulls. Protein percent is similar to Jerry. Morton is a tall oat with good straw strength. The variety is resistant to smut. Morton is moderately resistant to stem rust, crown rust and is moderately susceptible to barley yellow dwarf virus (BYD). Morton is protected under the U.S. Plant Variety Protection Act (PVP-94).

MUSTANG M-120 FORAGE OATS

It is a late maturing forage oat that has good leaf rust resistance. M-120 oats is a high tonnage forage oat that has out yielded Jerry and Loyal by tons per acre. It is a tall variety with a wide leaf for those extra tons per acre.

OAT CHARACTERISTICS CHART

Variety	Origin	Year Released	Leaf Rust	Stem Rust	Stripe Rust	Relative Maturity	Straw Strength	Relative Plant Height	Protein	Grain Color	PVP+
HAYDEN	SD	2014	Mod-Resis.	Mod-Sus	Resistant	7	Good	Tall	Medium	White	Yes
GOLIATH	SD	2012	Mod-Resis.	Resistant	Mod-Resis.	9	Good	Tall	Med. High	White	Yes
SD BUFFALO	SD	2021	Mod-Resis.	Resistant	Resistant	6	Very Good	Medium	Medium	White	Pending
DEON	MN	2013	Mod-Sus.	Mod-Resis.	Resistant	9	Good	Tall	Med. High	Yellow	Yes
WARRIOR	SD	2018	Mod-Sus.	-	Resistant	1	Good	Medium	Medium	White	Yes
RUSHMORE	SD	2019	Mod-Sus.	--	Resistant	6	Very Good	Medium	Medium	White	Yes
MORTON	ND	2001	Mod-Sus.	Mod-Resis.	Mod-Resis.-Mod-Sus.	7	Very Good	Tall	Medium	White	No
M-120	SD	1990	Mod-Resis.	Susceptible	Susceptible	7	Good	Tall	Medium	White	--

COYOTE LAWN MIX

4 TO 6 POUNDS PER 1000 SQ. FT.

60%	Kentucky Bluegrass
25%	Fine Leaf Perennial Rye
15%	Creeping Red Fescue

Coyote lawn mix is a grass mixture that gives you a healthy, attractive lawnwith a combination of sun and shade tolerance. We have just enough fine leaf perennial ryegrass to get your lawn off to a fast start. Kentucky bluegrass and creeping red fescue will continue to fill in and form a dense sod that will give you that quality appearance. This mix is recommended for all applications and will do especially well under intensive lawn practices.

ENDURANCE LAWN MIX

8 TO 10 POUNDS PER 1000 SQ. FT.

70%	Fine Leaf Turf Type Tall Fescue
10%	Kentucky Bluegrass
10%	Fine Leaf Perennial Rye
10%	Creeping Red Fescue

Endurance lawn mix gives you exactly what the name says – a lawn that willendure. We have added enough perennial rye to give you that fast start, tallfescue to keep your lawn green when others have gone dormant and Kentucky bluegrass to help fill in and give you that dense full lawn. Tall fescue blades are slightly wider than perennial rye or Kentucky bluegrass but will blend in nicely if you keep the seeding rate at recommended levels. Tall fescue has a much deeper root system that keeps it green during drought stress, requiring less water and fertility. It will tolerate shade and is widely used for athletic areas. Endurance lawn mix should be planted in spring or very early fall to allow tall fescue to develop root system before winter.

THREE WAY LAWN MIX

6 TO 7 POUNDS PER 1000 SQ. FT.

33 ⅓%	Kentucky Bluegrass
33 ⅓%	Fine Leaf Perennial Rye
33 ⅓%	Creeping Red Fescue

Economy lawn mix for those areas not requiring the higher quality Kentucky bluegrass. Perennial ryegrass establishes quickly with creeping red fescue and Kentucky bluegrass completing the lawn. This mixture does well in sun and shady areas, but will create more thatch than either Premium Lawn or Endurance Lawn mixes.

TURF GRASSES

KENTUCKY BLUEGRASS
CREEPING RED FESCUE
PERENNIAL RYEGRASS
TURF-TYPE TALL FESCUE
BOWIE BUFFALO GRASS

MAXLAWN LAWN FERTILIZER

LAWN FOOD 26-0-4 | 5,000 SQ. FT.
WEED & FEED 24-0-4 | 5,000 SQ. FT.
CRABGRASS PREV. 22-0-4 | 5,000 SQ. FT.
FALL LAWN FOOD 22-0-10 | 5,000 SQ. FT.
STARTER 12-24-6 | 5,000 SQ. FT.
ALL PURPOSE 10-10-10

MUSTANG REBOUND GRAZING MIX

20-25 POUNDS PER ACRE

30%	Bromegrass
25%	Orchardgrass
20%	Intermediate Wheatgrass
15%	Forage Perennial Ryegrass
10%	Grazing Alfalfa

An excellent mixture of grasses to give you that rapid establishment and high yield production from every acre. This highly palatable mixture will give you early production with orchardgrass and forage perennial ryegrass. The Bromegrass and intermediate wheatgrass assure you full season production. This dual purpose mix may be used for hay or pasture use.

COYOTE HORSE PASTURE MIX

25 POUNDS PER ACRE

20%	Orchardgrass
20%	Bromegrass
20%	Forage Perennial Ryegrass
20%	Intermediate Wheatgrass
20%	Timothy

Coyote Horse Pasture mix is a selection of 5 grasses on which your horses will thrive. Legumes have been purposely left out because horses are prone to bloat on legumes and so that you may spray with 2-4D. This mix is a high-quality mix that will thrive for many years. This mix is well suited for all types of livestock, not just horses.

MUSTANG PASTURE MIX

25 POUNDS PER ACRE

25%	Orchardgrass
20%	Bromegrass
20%	Forage Perennial Ryegrass
15%	Intermediate Wheatgrass
10%	Timothy
10%	Forage Bluegrass - Ginger

Our hay and pasture mix is for those producers not wishing to have a legume in their mix. Forage perennial ryegrass, orchardgrass and Bromegrass assure rapid stand establishment and early season production. This is a highly palatable mix for grazing or haying.

MUSTANG THOROUGHBRED MIX

25 POUNDS PER ACRE

30%	Orchardgrass
20%	Bromegrass
20%	Forage Perennial Ryegrass
10%	Ginger Forage Bluegrass
10%	Timothy
10%	Ladino Clover

This grass mix is especially suited for horses. Forage perennial ryegrass and orchardgrass give quick establishment and lush early season production. Together with timothy, forage bluegrass and ladino clover, your horse will have high protein and highly productive pasture throughout the entire season.

MUSTANG ORCHARD MIX

75 POUNDS PER ACRE

This grass mix is a perfect mix for orchards. With crested wheatgrass and creeping red fescue, it will be a low grow mix with fine stems and have the ability to handle dry conditions.

50%	Crested Wheatgrass
50%	Creeping Red Fescue

WATERWAY MIX

25 POUNDS PER ACRE

Is intended for quick establishment into highly erodible areas. Will be a long lasting and low maintenance sod forming mix.

30%	Bromegrass
30%	Forage Tail Fescue
25%	Forage Perennial Ryegrass
15%	Timothy

SMOOTH BROMEGRASS

Smooth Bromegrass is a long-lived perennial sod forming grass that grows 2 to 4 feet tall. Smooth bromegrass spreads by creeping rhizomes and produces in the spring and late summer. Brome is one of the most productive, nutritious, and palatable forage grasses in the central and north central states. Bromegrass is a good soil builder when grown with legumes. It withstands hot, dry weather and has a long growing season. It is highly palatable, and all classes of livestock relish it.

RUSH INTERMEDIATE WHEATGRASS

Rush, a variety of intermediate wheatgrass developed by USDA NFCS Plant Materials Center (Aberdeen, SD) from northern European germplasm for superior seedling emergence and vigor. Rush has equal to or superior forage production compared with other intermediate wheatgrass releases.

OAHE INTERMEDIATE WHEATGRASS

Oahe was developed by South Dakota and is a large heavy seed. It is very leafy and yields higher than other intermediate wheatgrass varieties. Oahe Intermediate Wheatgrass is used later than bromegrass and is mainly used for hay and pasture.

CRESTED WHEATGRASS

Crested Wheatgrass is fine stemmed and leafy. It is shorter than Standard Crested and is used extensively for turf in the drier areas.

TIMOTHY

Timothy is valuable in pasture mixtures but is not suited for permanent pasture except in combination with other grasses and legumes. It is an ideal grass to plant with Alsike. Timothy is adapted to a considerable range of soil reactions but is adversely affected by high acidity to about the same degree as corn. As compared to clover or alfalfa hay, Timothy is relatively low in protein and also in minerals, especially calcium or lime. Timothy is a cool season short lived perennial bunch grass, is tall and late maturing.

ORCHARDGRASS

Orchardgrass is a long-lived perennial bunch type grass. Orchardgrass recovers from grazing more rapidly than bromegrass and continues growth during mid-summer. This mid-summer growth helps in preventing bloat when mixed with alfalfas for pasture.

FORAGE PERENNIAL RYEGRASS

Perennial ryegrass is a high yielding, high quality grass. Under grazing management, the best varieties are very persistent and nutritious. This grass is also very adaptable to all kinds of environment conditions including poorly drained soils. Perennial ryegrass is compatible in most mixtures with other grass species and clovers used as green chop and in pastures.

ANNUAL RYEGRASS

A quick growing, non spreading bunch grass that has excellent forage values. Annual Ryegrass will also aid in holding soil with an extensive root system.

REED CANARYGRASS

Reed Canarygrass is a tall, course, bigious, long live perennial that grows to a height of from 2 to 8 feet. It spreads by short, scaly underground rhizomes that form a heavy sod in well managed solid seedings. It is adapted for permanent pastures on poorly drained, wet areas. Reed Canarygrass is very tolerant to flooding, even for several weeks duration. It can be used for pasture, hay or silage. Hay quality may be improved by early spring pasturing to delay maturity, thus reducing the coarseness of the growth. Although this grass grows best on moist, cool sights, it makes excellent growth on upland soils. One of the earliest grasses to begin growth in the spring, it produces large yields of nutritious forage. Reed Canary is an excellent waterway grass because of its tolerance to waterlogged situations and should be considered a first choice under these conditions.

FAWN TALL FESCUE

Fawn Tall Fescue is an early maturing variety adapted to the central and northwest states. It has good seedling vigor, good palatability and great forage production.

ALKAR TALL WHEATGRASS

Alkar Tall Wheatgrass is a hardy, drought resistant perennial bunch type grass with coarse foliage. It is quite palatable and easy to establish. It is also quite alkali tolerant and best adapted to low marshy and high-water table areas.

MEADOW BROMEGRASS

A cool season, long lived perennial, sod-former with short rhizomes. Adapted to most sites, but performs best on moderately deep, well-drained moist soils. Provides excellent forage and is often used in blends with legumes and other grasses because of its ability to survive but not compete with them.

WARM SEASON GRASSES

A plant that makes most of its growth during the spring and summer flowering in the summer or autumn.

SWITCHGRASS

Switchgrass is a warm season perennial that grows to a height of 2 to 5 feet, although bunch like in appearance. Switchgrass has strong rhizomes that produce a coarse sod, particularly if grazed. It prefers area where moisture is abundant and can stand flooding for short periods and is used in water ways. This grass exhibits rapid growth in late spring and early summer and is readily grazed by cattle, horses and sheep. It is high yielding and produces best if cut early. Newer varieties of this grass are Nebraska 28, Forestburg and Sunburst.

LITTLE BLUESTEM

Little Bluestem is a warm season, leafy perennial bunch grass which grows to a height of 1 to 4 feet. It can be grazed and has food forage value when the leaves are tender and succulent. It does not cure well and has only moderate palatability for fall or winter grazing.

SIDE OATS GRAMA

Side Oats Grama is a warm season, erect native perennial grass which grows in tufts and open bunches to a height of 1 to 2 feet tall. It is more tolerant to drought than Indiangrass or Big Bluegrass. It grows fast in late spring and early summer and stays green late into the summer. Side Oats Grama has good forage value and is grazed mostly in late summer and fall. Improved varieties are Butte, Tailway and Pierre.

BLUE GRAMA

Blue Grama is short growing native warm season perennial bunch grass. It is found mostly in the western Dakotas and Nebraska and withstands heavy grazing. It has high drought tolerance on all types of soil. This grass can be grazed in late summer, fall or winter. Blue Grama is used for lawns in drier areas in mixtures with Buffalograss.

BIG BLUESTEM

Big Bluestem is a warm season perennial bunch grass which grows to a height of 3 to 8 feet. It has roots that permeate the top 2 feet of soil. Big Bluestem is adapted to moist, deep, well drained soils. It is very palatable and nutritious. Big Bluestem that is continuously grazed closer than 6 to 8 inches will be replaced by less desirable grasses. Some of the better varieties are Bonilla, Bison, Pawnee and Roundtree.

COOL SEASON GRASSES

A plant that makes most of its growth and flowers during spring and slows growth or becomes dormant during the hot part of the summer, and may resume growth in the fall with the advent of cool temperatures.

INDIANGRASS

Indiangrass is a warm season grass that spreads by seed and short rhizomes. It grows to a height of 3 to 6 feet and will grow on sandy soil, however it is better adapted to moist, well drained bottom lands. Indiangrass exhibits moderate salt tolerance and will withstand occasional flooding. It makes good quality hay if cut before flower stalks develop. Improved varieties of Indiangrass are Holt and Tomahawk.

BUFFALOGRASS

Buffalograss is a fine leaved, native, sod forming, warm season perennial and is very low growing. It has leaves that are from 4 to 8 inches long. It makes rapid growth in late spring and summer. It recovers rapidly after a drought and can withstand heavy grazing. Buffalograss does a good job of erosion control and is used in lawns for drier areas and for airport runways, picnic areas, etc.

GREEN NEEDLE GRASS

Green Needle Grass is a cool season, perennial bunch type grass that grows from 1-1/2 to 3 feet tall. It is a native grass that grows on medium to fine textured soil. Green Needle Grass starts growth early in the spring, is nutritious and palatable and remains green through the summer, except in very dry years. It has good regrowth in the fall and is grazed throughout the year. Stand establishment may be slow because of slow germination, caused in part to a high dormant seed content.

WESTERN WHEATGRASS

Western Wheatgrass is a native, cool season perennial, sod forming grass which reproduces from underground rhizomes and seeds. Western Wheatgrass spreads rapidly and forms a dense sod, making it valuable for erosion control. It produces an abundance of forage early in the season that is nutritious and readily eaten by livestock until late summer when it becomes harsh and fibrous. It makes a good quality hay if cut during the late bloom stand and can stand close grazing. Western Wheatgrass will do well on a wide range of soils, from sands to clay. It is very tolerant to alkali. This grass can be seeded in pure stands but is usually used in mixtures because it provides ground cover quite slowly.

GARRISON CREEPING FOXTAIL

Garrison Creeping Foxtail is a long lived, cool season, sod forming grass. It is adapted to wet soils, sub-irrigated sites or high mountain meadows. It can be used in mixtures on irrigated pastures. This grass grows fast in hot or cool weather, and forage production is very high, palatable, nutritious and relished by all classes of livestock. Garrison Creeping Foxtail is recommended for use in pasture mixes with other adaptable grasses.

CANADA WILD RYE

Canada wildrye is a short-lived, cool-season grass found on sandy shores and dunes; wooded areas, especially along trails, rivers and streams; and other disturbed sites throughout much of North America. Seedlings are vigorous and establish quickly, but are not highly competitive with other grasses. Growth begins later in the spring and lasts longer into the summer than growth of smooth brome. It is moderately drought tolerant and winter hardy. It has good tolerance to salinity and tolerates shade very well.

ANTLER CHICORY

Chicory is an herb and develops a rather deep tap-root that prefers loamy, well-drained soils. While chicory was originally used as a coffee substitute, it has now become a dynamic tool in food plots for land managers. For a change of pace, try growing chicory, a tough cool-season perennial crop that is a preferred deer forage, in your next fall food plot.

WGF

OPEN POLLINATED SORGHUM WILD GAME FOOD USAGE

Wild Game Food is an early-maturing sorghum that is 24-34 inchesin height. The seed becomes palatable at maturity and is readily consumed by quail, turkey, pheasant, prairie chicken, as well as migratory birds and deer. Mid-bloom 43 to 50 days.
Mature seed 85 to 100 days.

Rows:	10 pounds per acre
Drill:	25-30 pounds per acre
Broadcast:	25-30 pounds per acre

UPLAND GAME BIRD MIX

25 POUNDS PER ACRE

45%	Grain Sorghum
35%	Sorghum Sudangrass
20%	Golden German Millet

MUSTANG TROPHY BUCK MIX

20 POUNDS PER ACRE

30%	Forage Ryegrass
10%	Medium Red Clover
10%	Vernal Alfalfa
10%	Alsike Clover
10%	Dutch White Clover
10%	Chicory
10%	Purple Top Turnips
10%	Ladino Clover

EMERGENCY LATE CROP PLANTING

	APPROX LATEST DATE TO PLANT	LBS PER ACRE	READY FOR USE
Grain Sorghum	June 25	8-12	Grain Medium to Hard Dough
Sudangrass	July 1	6-8 (18-24" rows)	Pasture 18-24"
Sudangrass Hybrid	July	15-25 drilled 8-12 (32-42"rows)	Green chop-heading
Sorg-Sudangrass	July 1-15	10-20 drilled	Pasture 24-30"
Millet	July 5 July 10	15 25	Seed hard Heading
Rape	July 20	5	When 10" tall
Buckwheat	July 10	40-50	Mature
Rye	July 15	80-110	Plants well established

PURE LIVE SEED (PLS)

A purity of 99.50 x a germination of 90% = 99.50 x .90 = 89.55 PLS

100 lbs. of this seed would contain 89.55 lbs.. of pure live seed. If needed 80 PLS lbs. you would need 89.34 bulk lbs. (80.00/89.55)

NITRATE AND PRUSSIC ACID POISONING

Plant nitrate poisoning in ruminants usually occurs as a result of consuming forages of high nitrite or nitrate content. Some plants have a tendency to exhibit high nitrate content and others under certain conditions, have the ability to accumulate large quantities of nitrates. Toxic levels of nitrate are sometimes found in common pasture grasses, especially during rapid growth at high rates of nitrogen fertility.

Corn grown under droughty conditions may concentrate nitrates in the base of the stalk. However, most losses occur in the Great Plains states when oats, barley or wheat are fed after a recent rain.

A variety of common weeds growing on marsh or muck soils, which have high nitrogen and relatively low phosphorus and potassium content, can cause nitrate poisoning problems in livestock. Low temperatures, limited sunlight, poor mineral sources and application of plant hormone type herbicides can also contribute to increased nitrate Levels. Other causes and aggravating conditions may be shallow wells and nitrate type fertilizers where animals feed. Animals fed a high ratio of high energy grain feed are better able to withstand high nitrate levels in forage.

Prussic acid poisoning symptoms are very similar to those of nitrate poisoning. The most important cause of prussic acid poisoning among domestic animals is the ingestion of such plants as arrowgrass, johnsongrass, sudangrass, common sorghum or sorghum sudan hybrids, several berry type plants and flax. These plants contain cyanogenetic glycosides which, when acted upon by digestive enzymes, yield prussic acid. These conditions can also be aggravated by heavy nitrogen fertilization, wifting, trampling and plant diseases. Very young, rapidly developing plants contain greater quantities of these glycosides. Spraying of these plants with herbicides may also increase the toxic hazard.

Grazing plants such as sorghums should be avoided during periods of early growth (under 18 inches) or directly after a frost. New growth after a frost should be avoided, as concentrations may be high. There is little danger from feeding well cured hay. The risk of prussic acid poisoning may be decreased by feeding of ground cereal grains or other feed before animals are turned out to graze.

SEED PLANTING RATE GUIDE

	APPROX NUMBER OF LBS/ACRE	LBS./BU.	DEPTH IN INCHES	TIME TO PLANT
Alfalfa (Drilled)	15-20	60	1/2	April 1 to Sept. 1
Alsike Clover	6-8	60	1/2	April 1 to May 1
Barley	90-110	48	2	April to June
Berseem	10-12		1/2	April to May
Birdsfoot Trefoil	3-5	60	1/2	April 1 to May 1
Bluestem, Big & Little	6-10		1/2	May to June 15
Bluegrass (Pasture)	20-30	14	1/4	Spring/Summer/Fall
Bluegrass (Lawns)	4 lbs../1000 sq.ft.		1/4	Spring & Fall
Bromegrass	15-25	14	1/2	Spring & Fall
Buckwheat	40	48	1/2 - 3/4	June 15 - July 15
Canarygrass (Reed)	5-10	44	1/2	Spring & Fall
Chicory	2-5	60	1/2	August & September
Fescue (Meadow)	20-25	24	1/2	Spring
Fescue (Tail)	15-25	24	1/2	Spring & Fall
Fescue (Creeping Red)	4 lbs../1000 sq.ft.	24	1/4	Spring & Fall
Field Peas	100	60	1-2	Spring & Fall
Flax	42-56	56	2	April to May
Forage Peas	100	60	1-2	Spring & Fall
Garrison Creeping Foxtail	3-5		1/2	Spring
Green Needlegrass	6-8		1/2	Spring
Ladino Clover	3-5	60	1/2	April to June
Lawn Mix	4 Lbs../1000/sq/ft	18	1/4	Spring & Fall
Lola Festulolium	25-35		1/4	Spring & Fall
Mammoth Red Clover	6-12	60	1/2	April to May
Millet, Hay (Foxtail)	15-20	50	1	May to July
Millet, Grain (Proso)	20-30	56	1	May to July
Milo	4-6	56	1	
Oats	64-96	32	1	March to April

SEED PLANTING RATE GUIDE

	APPROX NUMBER OF LBS/ACRE	LBS./BU.	DEPTH IN INCHES	TIME TO PLANT
Orchardgrass	15-20	14	1/2	Spring & Fall
Orchard Mix	75		1/2	June
Pasture Mixes	20-25		1/2	Spring & Fall
Radishes	2-4	50	1/2	May to September
Rape (Dwarf Essex)	5-8	50	1	April to August
Red Clover - Medium	6-12	60	1/2	April to May
Red Top	6-10	32	1/2	April
Russian Wildrye	10-12		1/2	April
Rye (Grain)	56-84	56	2	September
Ryegrass (Ann/Per)	30-40	24	1/2	Spring & Fall
Sunflowers	3-5	24	1	May to June
Side Oats Grama	8-10		1/2	June to August
Sorghum Sudan (Rows) (Broadcast)	10-12 20-30	56	1	May to July
Sudangrass	20-30	40	1	May to July
Sun Hemp	15-25		1/4 - 1/2	July - September
Sweet Clover	6-10	60	1/2	April & May
Switchgrass	6-8		1/2	May to June
Teff Grass	3-8		1/2	June
Timothy	8-15	45	1/2	April to September
Tritacale	80-110	56	1	Spring & Fall
Turnip - Purple Top	3	60	1/2	May - September
Wheatgrass, Oahe Int.	10-15	20	1/2	Spring & Fall
Wheat (Winter)	60-75	60	1-1/2	September

REFERENCE

Herbicide Rotational Restrictions

FOR COVER AND FORAGE CROPPING SYSTEMS

Daniel H. Smith, Richard Proost, Nutrient and Pest Management Program;
Maxwel Coura Oliveira, Ryan Dewerff and Rodrigo Werle, Department of Agronomy;
University of Wisconsin-Madison

This publication provides a starting point of reference when considering using cover crops following herbicides in the cropping system. This publication does not replace the herbicide label. This publication outlines rotational intervals for many commonly used herbicides in Wisconsin. The rotational interval is the required amount of time from herbicide application to subsequent crop establishment for forage or harvest value. For example, a herbicide is applied to soybeans with a 10-month rotational interval for winter cereal rye. The rye could be established 10 months after the herbicide application for food or feed value. This rotational interval is legally required period prior to crop harvest for feed or forage. Cover crops intended for forage value must follow the rotation interval. Cover crops utilized for soil building do not need to follow the rotational interval, however, they may still be prone to herbicide injury. This herbicide injury is often attributed to herbicide carryover and the chances of injury can be better understood after a field bioassay. The herbicide label must be referenced prior to making any management decisions. The rotational intervals stated in this publication are the maximum rotational restriction taken from the most current herbicide label available at time of printing.

Herbicide Carryover

For cover crops to accomplish their intended goals, they must establish well; establishment of cover crops can be compromised by use of residual herbicides, the herbicide activity in the soil for a period of time after application and are applied to the preceding cash crop. The persistence of these residual herbicides may affect cover crop establishment later in the growing season and can be affected by a wide range of management (tillage, application rate, and herbicide application method) and soil properties (moisture, temperature, soil colloid properties, chemical reactions, pH, microbial population, soil texture and organic matter) (Krausz et al., 1992). Cover cropping and using residual herbicides is not impossible but is challenging. Herbicide resistant weed management should be considered when planning herbicide applications. The cost of herbicide program, cover crop benefits, and resistance management should all be considered.

Cover Crop vs. Forage Crop

A crop is classified as a cover crop when no forage or grain biomass is harvested. A cover crop is established for benefits to the soil, cropping system, and environment. A cover crop becomes a forage crop when biomass is harvested for feed. This includes harvesting the crop via grazing or mechanical collection. A cover crop can be used for forage; however, most pesticide labels do not provide the plant back restriction time required from pesticide application to grazing or harvest for cover crops, only forage crops. Therefore, requiring the maximum rotational restrictions be utilized. If these restrictions are not followed, harvesting a cover crop for forage value is illegal. Crop rotation restrictions will vary in length and should be examined for all pesticides and crops in the rotation. A cover crop that will not be harvested for any value can be legally established following any herbicide application, however, the grower takes all responsibility for cover crop injury or failure that may result. Several herbicide labels provide guidance for using cover crop following application. A bioassay is often recommended to evaluate herbicide injury potential.

Winter Cereal Rye Termination for Forage Systems

Winter cereal rye is often harvested as forage and questions arise when the rye should be terminated prior to the subsequent crop. Pre-harvest termination treatment is often illegal. Harvesting winter rye without another termination treatment is effective at reducing biomass and slowing regrowth, however, a second termination method is often required. Chemical treatment of rye regrowth, which may include residual herbicides for the following crop, should accommodate the pre-harvest interval, plant back restrictions for the subsequent crop and not have an antagonistic effect on the rye termination. Post-harvest glyphosate treatments are effective and legal methods of terming winter rye, and these applications can occur immediately following harvest with no reduction in efficacy.

Bioassay

A field bioassay is often required or recommended prior to establishing crops following residual herbicides. A bioassay is a test that measures the effects of residual herbicides in the soil on a crop in a controlled trial. Herbicide residues may vary in strength and be variable thought the field depending management and environmental conditions. A few variables include soil texture, pH, and drainage. A bioassay should be done using the typical management practices for the crop to be planted following herbicide application.

Two types of bioassay may be recommended. The most common, field bioassay, is done by using a small area of the field to plant a small trial area of the intended crop. This crop should be monitored for injury symptoms, stand reductions, reduced biomass/grain production. If injury occurs, extend the rotational interval to the next growing season. If the cover crop planted is for soil building and will not be harvested, a small tolerance for injury may be acceptable.

The second type of bioassay is done in a controlled setting. This includes collecting a small amount of treated soil from the field and placing in pots. These pots should be in a controlled environment (near a window and heated indoor area). The intended crop should be planted in these pots and observed for herbicide injury. More info can be found here "A Quick Test for Herbicide Carry-over in the Soil" Klein et al. 2008. A bioassay does not replace the rotational interval.

Crop Variety and Hybrid Sensitivity to Herbicides

The data presented in this publication shows the rotational cropping intervals for common Wisconsin forage, grain and cover crops. Hybrids and varieties make a difference in herbicide tolerance. Genetic engineering allows crops traditionally injured by some herbicides to allow over the top applications and limited plant back restrictions. Always understand what traits and tolerances are in being used in your cropping system.

When using these data tables use these ground rules:

1. Always read, follow, and understand the herbicide label. The label is the law.
2. This data is intended to be an introduction to herbicide rotational intervals; ***always consult the label before making management decisions***.
3. Maximum rotation length is shown; rotation length is often dependent upon herbicide application rate, tillage, soil type, and yearly rainfall.
4. The data is formulated for Wisconsin producers and utilizes rotational data for areas that receive +30 inches of precipitation per year.
5. Some herbicide rotations do not consider frozen soils to count towards the minimum rotation interval; consult the label to clarify this information.

References

Klein, R.N., M.L. Bernards, P.J. Shea. 2018. *A Quick Test for Herbicide Carry-over in the Soil*. University of Nebraska-Lincoln Extension Publication G1891.

Krausz, R.F., G. Kapusta, E. L. Knake. 1992. *Soybean (Glycine max) and Rotational Crop Tolerance to Chlorimuron, Clomazone, Imazaquin, and Imazethapyr*. Weed Technol. 1:77-80. doi:10.1017/S0890037X00034321z

Adapted from Bosak, E. and V.M. Davis. 2014. "Herbicide Rotation Restrictions in Forage and Cover Cropping System" University of Wisconsin Crop Weed Science Publication.

Maximum Rotational Restriction Intervals for Labeled Herbicides in Wisconsin Table

Herbicide-Trade Name	Bioassay Required or Recommended	Cover Crop Language	COMMON WI CROPS			SMALL GRAINS/GRASSES						BRASSICAS			LEGUMES						page 3
			CORN (field & silage)	SOYBEAN	ALFALFA	WHEAT	OATS	WINTER RYE	WINTER TRITICALE	BARLEY	ANNUAL RYEGRASS	RADISH	TURNIPS	RAPESEED	BERSEEM CLOVER	CRIMSON CLOVER	RED CLOVER	VETCH	FIELD PEAS	COWPEA	Maximum Rotation
2,4-D Amine 4, Shredder	--	--	14 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
2,4-D LV4 Shredder	--	--	14 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Aatrex	--	--	0	12 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M
Accent Q	--	--	0	0.5 M	12 M	4 M	4 M	4 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	12 M	18 M	10 M	10 M	18 M
Acuron	--	--	0	10 M	18 M	4 M	18 M	4 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Acuron Flexi	--	--	0	10 M	18 M	4 M	18 M	4 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Affinity Broadspec	--	--	1.5 M	1.5 M	1.5 M	0	1.5 M	0	0	0	1.5 M	1.5 M	1.5 M	2 M	1.5 M	1.5 M	1.5 M	1.5 M	1.5 M	1.5 M	1.5 M
Afforia	yes	--	14 D	0	10 M	2 M	10 M	4 M	12 M	4 M	12 M	12 M	12 M	12 M	10 M	10 M	10 M	10 M	4 M	10 M	12 M
Aim	--	--	0	0	0	0	0	0	0	0	12 M	0	0	0	0	0	0	0	0	0	12 M
Ally XP	yes	--	34 M	34 M	34 M	1 M	10 M	34 M	34 M	10 M	34 M	34 M	34 M	34 M	34 M	34 M	34 M	34 M	34 M	34 M	34 M
Alphanex	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Anthem	--	--	0	4 M	10 M	6 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	8 M	18 M	18 M
Anthem ATZ	--	--	0	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	8 M	18 M	18 M
Anthem Flex	--	--	0	4 M	10 M	6 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	8 M	18 M	18 M
Anthem Maxx	--	--	0	4 M	10 M	6 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	4-8 M	18 M	18 M
Armezon	--	--	0	9 M	9 M	3 M	3 M	3 M	3 M	3 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	9-18 M	18 M	18 M
Armezon Pro	--	--	0	9 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	9-18 M	18 M	18 M
Assure II	--	--	120 D	0	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	0	120 D	120 D
Authority Assist	yes	--	10 M	0	12 M	4 M	30 M	4 M	30 M	9.5 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M
Authority Elite	yes	yes	10 M	0	12 M	4.5 M	12 M	4.5 M	4.5 M	4.5 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Authority First	yes	yes	18 M	0	12 M	4 M	12 M	12 M	30 M	12 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M
Authority Maxx	yes	yes	18 M	0	18 M	4 M	18 M	4 M	36 M	4 M	36 M	36 M	36 M	36 M	18 M	18 M	18 M	18 M	36 M	36 M	36 M
Authority MTZ	yes	--	10 M	0	12 M	4 M	18 M	18 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Authority Supreme	yes	--	4 M	4 M	10 M	6 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Authority XL	yes	yes	10 M	0	12 M	4 M	12 M	4 M	36 M	4 M	36 M	36 M	36 M	36 M	18 M	18M	18 M	36 M	36 M	36 M	36 M
Autumn	yes	--	30 D	90 D	18 M	8 M	9 M	4 M	18 M	8 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Autumn Super	yes	--	1M	2 M	18 M	3 M	18 M	18 M	18 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Axial Star	--	--	4 M	4 M	4 M	0 M	4 M	4 M	4 M	0 M	4 M	4 M	4 M	4 M	4 M	4 M	4 M	4 M	4 M	4 M	4 M
Axial XL	--	--	90 D	90 D	90 D	0	90 D	90 D	90 D	0	90 D	90 D	90 D	90 D	90 D	90 D	90 D	90 D	90 D	90 D	90 D
Balance Flexx	yes	yes	0	6 M	10 M	4 M	18 M	4 M	4 M	6 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Banvel	yes	no	0	45 D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30 DAT
Basagran	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Basis Blend	--	--	0	10 M	18 M	3 M	9 M	3 M	3 M	3 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Beacon	--	--	14 D	8 M	8 M	3 M	18 M	3 M	18 M	3 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	8 M	18 M	18 M
Beyond	--	--	8.5 M	0	3 M	3 M	9 M	4 M	18 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M

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Maximum Rotational Restriction Intervals for Labeled Herbicides in Wisconsin Table

Herbicide-Trade Name	Bioassay Required or Recommended	Cover Crop Language	COMMON WI CROPS			SMALL GRAINS/GRASSES						BRASSICAS			LEGUMES						page 4
			CORN (field & silage)	SOYBEAN	ALFALFA	WHEAT	OATS	WINTER RYE	WINTER TRITICALE	BARLEY	ANNUAL RYEGRASS	RADISH	TURNIPS	RAPESEED	BERSEEM CLOVER	CRIMSON CLOVER	RED CLOVER	VETCH	FIELD PEAS	COWPEA	Maximum Rotation
Bicep II Magnum	--	--	FY	FY	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Bicep Lite II Magnum	--	--	FY	FY	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Boundary	--	yes	4 M	12 M	12 M	8 M	12 M	12 M	12 M	8 M	12 M	18 M	18 M	18 M	12 M	12 M	12 M	12 M	8 M	12 M	18 M
Breakfree NXT ATZ	--	yes	0	FY	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Breakfree NXT	--	yes	0	FY	9 M	4 M	FY	FY	FY	18 M	18 M	18 M	18 M	18 M	9 M	9 M	9 M	18 M	FY	FY	18 M
Breakfree NXT Lite	--	yes	0	FY	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Broadaxe XC	yes	--	10 M	0	12 M	4.5 M	12 M	4.5 M	4.5 M	4.5 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Brox 2EC	--	--	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Brox M	--	--	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Cadet	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callisto	--	--	0	10 M	10 M	4 M	18 M	4 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	10 M	10 M	10 M	18 M
Callisto GT	--	--	0	10 M	10 M	4 M	18 M	4 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Callisto Xtra	--	--	0	FY	FY	FY	18 M	18 M	18 M	FY	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Canopy	--	--	10 M	0	10 M	4 M	30 M	4 M	30 M	4 M	4 M	30 M	30 M	30 M	12 M	12 M	12 M	30 M	12 M	30 M	30 M
Canopy Blend	--	--	10 M	0	10 M	4 M	30 M	30 M	30 M	4 M	4 M	30 M	30 M	30 M	18 M	18 M	18 M	30 M	12 M	30 M	30 M
Canopy EX	--	--	10 M	0.25 M	12 M	4 M	4 M	4 M	4 M	4 M	4 M	30 M	30 M	30 M	12 M	12 M	12 M	30 M	12 M	30 M	30 M
Caparol	--	yes	5 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Capreno	yes	yes	0	10 M	18 M	4 M	18 M	18 M	18 M	10 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Cinch ATZ	--	--	FY	FY	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Cinch ATZ Lite	--	--	FY	FY	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Clarity	--	--	120 D	120 D	120 D	30 D	30 D	30 D	30 D	30 D	30 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D
Classic	--	--	10 M	0	10 M	4 M	4 M	4 M	4 M	4 M	4 M	30 M	30 M	30 M	12 M	12 M	12 M	30 M	12 M	12 M	30 M
Cobra	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colt + Salvo	--	--	120 D	120 D	120 D	29 D	120 D	120 D	120 D	29 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D
Colt + Sword	--	--	120 D	120 D	120 D	0	0	120 D	120 D	0	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D
Command 3ME	--	yes	9 M	0	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	9 M	9 M	12 M
Corvus	yes	yes	0	9 M	17 M	4 M	17 M	4 M	4 M	9 M	17 M	17 M	17 M	17 M	17 M	17 M	17 M	17 M	17 M	17 M	17 M
Curtail	yes	--	30 D	18 M	18 M	30 D	30 D	30 D	30 D	30 D	30 D	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Curtail M	yes	--	60 D	18 M	18 M	30 D	30 D	30 D	30 D	30 D	30 D	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Degree	--	yes	0	FY	9 M	4 M	FY	FY	FY	FY	FY	FY	FY	FY	9 M	9 M	9 M	9 M	FY	FY	FY
Degree Xtra	--	yes	NL	FY	9 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	9 M	9 M	9 M	9 M	18 M	18 M	18 M
Diflexx	yes	yes	120 D	60 D	180 D	120 D	120 D	120 D	120 D	120 D	120 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D
Diflexx Duo	yes	yes	0	8 M	10 M	4 M	4 M	4 M	4 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	10 M	18 M	18 M
Diuron	--	--	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M
Diuron 80 WDG	--	--	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M	24 M

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Maximum Rotational Restriction Intervals for Labeled Herbicides in Wisconsin Table

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Herbicide-Trade Name	Bioassay Required or Recommended	Cover Crop Language	COMMON WI CROPS			SMALL GRAINS/GRASSES						BRASSICAS			LEGUMES						Maximum Rotation
			CORN (field & silage)	SOYBEAN	ALFALFA	WHEAT	OATS	WINTER RYE	WINTER TRITICALE	BARLEY	ANNUAL RYEGRASS	RADISH	TURNIPS	RAPESEED	BERSEEM CLOVER	CRIMSON CLOVER	RED CLOVER	VETCH	FIELD PEAS	COWPEA	
Dual II Magnum	--	--	0	0	4 M	4.5 M	4.5 M	4.5 M	12 M	4.5 M	12 M	12 M	12 M	12 M	9 M	9 M	9 M	12 M	12 M	12 M	12 M
Elevore	yes	no	14 DAT	14 DAT	9 M	14 DAT	14 DAT	14 DAT	14 DAT	14 DAT	14 DAT	15 M	15 M	15 M	9 M	9 M	9 M	9 M	9 M	9 M	15 M
Engenia	--	no	0	28 D	120 D	28 D	28 D	28 D	28 D	28 D	28 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D
Enlist Duo	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Enlist One	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Enlite	--	--	9 M	0	12 M	3 M	10 M	4 M	30 M	4 M	12 M	30 M	30 M	30 M	12 M	12 M	12 M	30 M	30 M	9 M	9 M
Envive	--	--	10 M	0	10 M	4 M	10 M	4 M	30 M	4 M	4 M	30 M	30 M	30 M	12 M	12 M	12 M	30 M	12 M	12 M	30 M
Eptam	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Everest	yes	--	11 M	9 M	NL	4 M	NL	NL	NL	9 M	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Everprex	--	--	0	0	4 M	4.5 M	4.5 M	4.5 M	12 M	4.5 M	12 M	12 M	12 M	12 M	9 M	9 M	9 M	9 M	0	0	12 M
Expert	--	--	0	FY	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Express	--	--	21 D	8 D	45 D	0	8 D	45 D	0	0	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	60 D
Extreme	yes	--	9.5 M	0	4 M	3 M	18 M	4 M	40 M	9.5 M	40 M	40 M	40 M	40 M	4 M	4 M	4 M	40 M	0	40 M	40 M
Facet	yes	--	10 M	10 M	24 M	0	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M	10 M
Fierce	--	--	1 M	0	10 M	2 M	12 M	12 M	12 M	12 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	6 M	18 M	18 M
Fierce EZ	--	--	2 M	0	10 M	2 M	12 M	12 M	12 M	12 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	6 M	18 M	18 M
Fierce MTZ	--	--	1 M	0	10 M	8 M	12 M	12 M	12 M	12 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	11 M	11 M	18 M
Fierce XLT	--	--	10 M	0	18 M	4 M	30 M	18 M	30 M	18 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	30 M	18 M	30 M	30 M
Firstrate	yes	--	9 M	0	9 M	4 M	9 M	18 M	18 M	12 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	9 M	18 M	18 M
Flexstar	--	--	10 M	0	18 M	4 M	4 M	4 M	4 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	4 M	12 M	18 M
Flexstar GT	--	--	10 M	0	18 M	4 M	4 M	4 M	4 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	4 M	12 M	18 M
Forefront HI	yes	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Fultime NXT	yes	--	18 M	18 M	18 M	18 m	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Fusilade DX	--	--	60 D	NL	NL	60 D	60 D	60 D	60 D	60 D	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Fusion	--	--	60 D	NL	NL	60 D	60 D	60 D	60 D	60 D	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Glean XP	yes	--	NL	NL	NL	NL	10 M	0	0	16 M	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Goldsky	--	--	9 M	9 M	9 M	1 M	9 M	12 M	1 M	9 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	9 M	12 M	12 M
Gramoxone SI	--	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Halex Gt	--	--	0	10 M	10 M	4.5 M	4.5 M	4.5 M	18 M	4.5 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	10 M	10 M	18 M
Harmony	--	--	0	0	45 D	0	0	45 D	0	0	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D
Harmony Extra	--	--	28 D	14 D	45 D	0	45 D	45 D	0	0	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	60 D
Harmony GT XP	--	--	0	0	45 D	0	0	45 D	0	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D
Harness	--	yes	0	FY	9 M	4 M	FY	FY	FY	18 M	18 M	18 M	18 M	18 M	9 M	9 M	9 M	9 M	FY	FY	18 M
Harness Max	--	yes	0	10 M	10 M	4 M	FY	FY	18 M	FY	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M

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page 6

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			CORN (field & silage)	SOYBEAN	ALFALFA	WHEAT	OATS	WINTER RYE	WINTER TRITICALE	BARLEY	ANNUAL RYEGRASS	RADISH	TURNIPS	RAPESEED	BERSEEM CLOVER	CRIMSON CLOVER	RED CLOVER	VETCH	FIELD PEAS	COWPEA	
Harness Xtra	--	yes	0	FY	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Hornet	yes	yes	NL	10.5 M	10.5 M	4 M	4 M	4 M	26 M	4 M	26 M	26 M	26 M	26 M	26 M	26 M	26 M	26 M	18 M	26 M	26 M
Huskie	yes	--	4 M	4 M	4 M	7 DAT	1 M	1 M	1 M	7 DAT	1 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	9 M	18 M	18 M
Huskie Complete	yes	--	9 M	9 M	9 M	3 M	9 M	18 M	18 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	9 M	18 M	18 M
Impact	--	yes	0	9 M	9 M	3 M	3 M	3 M	18 M	9 M	3 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Instigate	yes	yes	0	10 M	10 M	9 M	9 M	9 M	9 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	10 M	18 M	18 M
Kerb	--	--	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12M
Keystone	--	--	0	FY	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M
Keystone NXT	--	yes	0	FY	2Y	18 M	18M	18 M	18 M	18 M	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y
Laudis	yes	yes	0	8 M	10 M	4 M	4 M	4 M	4 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Lexar EZ	--	--	0	FY	18	FY	FY	FY	FY	FY	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Liberty	--	--	0	0	180 D	70 D	70 D	70 D	70 D	70 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D	180 D
Linex	--	--	0	0	12 M	4 M	4 M	4 M	12 M	4 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Lorox	--	--	NL	0	NL	12 M	4 M	4 M	12 M	4 M	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Lumax EZ	--	--	0	FY	18 M	4.5 M	FY	4.5 M	18 M	4.5	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Marvel	--	--	10 M	0	18 M	4 M	4 M	4 M	4 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
MCPA Amine	--	--	NL	NL	NL	0	0	0	60 D	0	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
MCPA L.V. 4 Ester	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Milestone	yes	--	12 M	24 M	24 M	12 M	12 M	12 M	12 M	12 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M
northstar	--	--	14 D	8 M	8 M	3-8 M	8 M	3 M	18 M	3 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
nortron	--	--	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	0	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Optill	yes	--	0 - 8.5 M	0-1M	4 M	3 M	18 M	4 M	40 M	9.5 M	40 M	40 M	40 M	40 M	40 M	40 M	40 M	40 M	40 M	40 M	40 M
Optill Pro	--	--	8.5 M	1 M	9 M	4 M	18 M	4 M	40 M	9.5 M	40 M	40 M	40 M	40 M	9 M	9 M	9 M	40 M	40 M	40 M	40 M
Orion	--	--	3 M	9 M	9 M	1 M	1 M	1 M	1 M	1 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Outlook	--	yes	0	0	4-6 M	4 M	4 M	4 M	4 M	4 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	9 M
Panoflex	--	--	14 D	7 D	45 D	0	1 D	0	0	0	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	45 D	60 D
Peak	yes	--	1 M	22 M	22 M	0	0	0	0	0	22 M	22 M	22 M	22 M	22 M	22 M	22 M	22 M	22 M	22 M	22 M
Permit	--	--	1 M	5-9 M	9 M	2 M	2 M	2 M	36 M	2 M	36 M	12 M	36 M	36 M	9 M	9 M	9 M	36 M	9 M	36 M	36 M
Phoenix	--	--	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Plateau	yes	--	36 M	18 M	36 M	12 M	24 M	12 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	36 M	48 M
Poast	--	yes	30 D	0	0	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Poast Plus	--	yes	30 D	0	0	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Prefix	--	yes	10 M	0	18 M	4.5 M	4.5 M	4.5 M	18 M	4.5 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Princep 4L	--	--	0	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Prowl H20	--	--	FY	0	6 M	4 M	10 M	FY	FY	4 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	18 M

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Restrictions assume cover crop planted in summer/fall shown in months; the most restrictive data is shown.

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Maximum Rotational Restriction Intervals for Labeled Herbicides in Wisconsin Table

Herbicide-Trade Name	Bioassay Required or Recommended	Cover Crop Language	COMMON WI CROPS			SMALL GRAINS/GRASSES						BRASSICAS			LEGUMES						page 7 Maximum Rotation
			CORN (field & silage)	SOYBEAN	ALFALFA	WHEAT	OATS	WINTER RYE	WINTER TRITICALE	BARLEY	ANNUAL RYEGRASS	RADISH	TURNIPS	RAPESEED	BERSEEM CLOVER	CRIMSON CLOVER	RED CLOVER	VETCH	FIELD PEAS	COWPEA	
Pursuit	yes	yes	8.5 M	0	4 M	4 M	18 M	4 M	40 M	9.5 M	40 M	40 M	40 M	40 M	4 M	4 M	4 M	40 M	40 M	40 M	40 M
Python	yes	yes	0	0	4 M	4 M	4 M	4 M	26 M	4 M	26 M	26 M	26 M	26 M	9 M	9 M	9 M	9 M	26 M	26 M	26 M
Quelex	yes	--	3 M	3 M	9 M	0	3 M	3 M	0	0	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M	15 M
Raptor	--	--	8.5 M	0	3 M	3 M	9 M	4 M	18 M	9 M	18 M	18 M	8 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Realm Q	--	--	0	10 M	10 M	4-9 M	9 M	4 M	4 M	9 M	18 M	18 M	18 M	10 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Reflex	--	--	10 M	0	18 M	4 M	18 M	4 M	18 M	4 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Reglone	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Resicore	--	yes	0	10.5 M	10.5 M	4 M	10.5 M	10.5 M	18 M	10.5 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Resolve SG	--	--	0	10 M	10-18 M	4 M	9 M	18 M	18 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Resolve Q	--	--	0	10 M	10-18 M	3 M	9 M	3 M	3 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Resource	--	--	0	0	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Revulin Q	yes	yes	0	10 M	10 M	4 M	8 M	4 M	4 M	8 M	18 M	19 M	20 M	21 M	22 M	23 M	24 M	25 M	26 M	27 M	28 M
Rimfire Max	--	yes	10 M	10 M	10 M	0	12 M	12 M	12 M	10 M	12 M	12 M	12 M	10 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Roundup Weathermax	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Roundup Xtend	--	--	0	28 D	120 D	45 D	45 M	45 D	45 D	45 D	45 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	180 D
Rowel FX	--	--	10 M	0	12 M	4 M	NL	4 M	4 M	4 M	4 M	30 M	30 M	30 M	18 M	18 M	18 M	30 M	30 M	30 M	30 M
Scepter	--	--	18 M	0	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Select Max	--	--	30 D	0	0	30 D	30 D	30 D	30 D	30 D	30 D	30 D	0	0	30 D	30 D	30 D	30 D	30 D	30 D	30 D
Sequence	--	--	0	0	4 M	4.5 M	4.5 M	4.5 M	NL	FY	NL	NL	NL	NL	9 M	9 M	9 M	NL	NL	NL	9 M
Sharpen	--	yes	0	3 M	6 M	0	0	0	0	0	6 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	6 M	9 M
Sinbar	yes	--	2 Y	2 Y	12 m	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y
Solstice	--	--	0	10 M	10 M	4 M	ACH	4 M	4 M	4 M	18 M	18 M	18 M	10 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Sonalan HFP	--	--	NL	0	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Sonic	yes	--	10 M	0	12 M	4 M	12 M	12 M	NL	12 M	NL	NL	NL	24 M	NL	NL	NL	NL	NL	NL	30 M
Spartan	yes	--	10 M	0	12 M	4 M	12 M	4 M	12 M	4 M	12 M	12 M	12 M	24 M	12 M	12 M	12 M	12 M	12 M	12 M	18 M
Spartan Charge	yes	--	4 M	0	12 M	4 M	12 M	4 M	4 M	4 M	12 M	12 M	12 M	24 M	12 M	12 M	12 M	12 M	12 M	12 M	18 M
Spartam Elite	yes	--	10 M	0	12 M	4.5 M	12 M	4.5 M	4.5 M	4.5 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Spirit	--	--	4 WK	18 M	18 M	3 M	3 M	3 M	3 M	3 M	18 M	18 M	18 M	10 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Stanza	yes	yes	0	10.5 M	10.5 M	4 M	4 M	4 M	26 M	4 M	26 M	26 M	26 M	26 M	10.5 M	10.5 M	10.5 M	10.5 M	26 M	26 M	26 M
Starane Flex	--	--	3 M	9 M	9 M	0	0	12 M	12 M	0	0	12 M	12 M	9 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
Status	--	--	7 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D
Steadfast Q	--	--	0	15 D	10 M	8 M	8 M	8 M	18 M	8 M	18 M	18 M	18 M	10 M	18 M	18 M	10 M	18 M	18 M	18 M	18 M
Stinger	yes	--	0	10.5 M	10.5 M	0	0	NL	NL	NL	0	NL	0	0	NL	NL	NL	NL	NL	NL	18 M
Storm	--	--	100 D	0	100 D	40 D	40 D	40 D	40 D	40 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D
Surestart II	yes	--	0	FY	FY	4 M	FY	FY	NL	FY	NL	NL	NL	26 M	FY	FY	FY	NL	FY	FY	26 M

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Herbicide-Trade Name	Bioassay Required or Recommended	Cover Crop Language	COMMON WI CROPS			SMALL GRAINS/GRASSES						BRASSICAS			LEGUMES						page 8 Maximum Rotation
			CORN (field & silage)	SOYBEAN	ALFALFA	WHEAT	OATS	WINTER RYE	WINTER TRITICALE	BARLEY	ANNUAL RYEGRASS	RADISH	TURNIPS	RAPESEED	BERSEEM CLOVER	CRIMSON CLOVER	RED CLOVER	VETCH	FIELD PEAS	COWPEA	
Surpass	--	--	0	FY	FY	4 M	NL	FY	FY	FY	NL	NL	NL	NL	FY	FY	FY	FY	NL	NL	NL
Surveil	yes	--	9 M	0	10 M	3 M	9 M	NL	NL	NL	NL	NL	NL	30 M*	NL	NL	NL	NL	NL	NL	30 M
Synchrony XP	--	--	9 M	0	9 M	3 M	3 M	3 M	3 M	3 M	3 M	30 M	30 M	19 M	9 M	9 M	9 M	NL	9 M	9 M	30 M
Taraga	--	--	120 D	NL	120 D	NL	120 D	120 D	120 D	NL	120 D	120 D	120 D	NL	120 D	120 D	120 D	120 D	120 D	120 D	120 D
Tavium	yes	yes	4 M	42 D	6 M	4.5 M	4.5 M	4.5 M	12 M	4.5 M	12 M	6 M	12 M	12 M	9 M	9 M	9 M	12 m	6 M	6 m	12 M
Treflan HFP	--	yes	5 M	5 M	5 M	14 M	14 M	14 M	14 M	14 M	14 M	5 M	5 M	5 M	5 M	5 M	5 M	5 M	5 M	5 M	14 M
Tricor	--	yes	4 M	4 M	4 M	8 M	NL	NL	NL	8 M	0	0	0	0	0	0	0	0	0	0	18 M
Tripleflex II	--	--	0 M	FY	FY	4 M	FY	FY	NL	FY	26 M	26 M	26 M	26 M	FY	FY	FY	FY	NL	NL	26 M
Trivence	--	--	10 M	0 M	10 M	4 M	18 M	30 M	30 M	4 M	12 M	30 M	30 M	30 M	18 M	18 M	18 M	30 M	30 M	30 M	30 M
Ultra Blazer	--	--	100 D	0	100 D	40 D	40 D	40 D	40 D	40 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D	100 D
Valor	yes	--	14 D	0	10 M	60 D	12 M	12 M	12 M	4 M	12 M	12 M	12 M	12 M	10 M	10 M	10 M	12 M	12 M	12 M	12 M
Valor XLT	--	--	10 M	0	12 M	4 M	30 M	4 M	30 M	4 M	4 M	30 M	30 M	30 M	18 M	18 M	18 M	30 M	30 M	30 M	30 M
Varisto	--	--	8.5 M	0	3 M	3 M	9 M	4 M	18 M	9 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Velpar	yes	--	12 M	2 Y	NL	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	12 M	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y
Velpar Alfamax	yes	--	12 M	2 Y	NL	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	12 M	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y	2 Y
Verdict	--	--	0	0	FY	4 M	FY	4 M	4 M	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY
Warrant	--	yes	0	0	9 M	4 M	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY
Warrant Ultra	--	yes	10 M	0	18 M	4 M	4 M	4 M	FY	4 M	ACH	ACH	ACH	ACH	ACH	ACH	ACH	ACH	ACH	ACH	18 M
Weld	yes	--	60 D	10.5 M	10.5 M	0	0	0	0	0	0	18 M	120 D	120 D	10.5 M	10.5 M	10.5 M	10.5 M	18 M	18 M	18 M
Widematch	yes	--	0	10.5 M	10.5 M	0	0	0	0	0	0	10.5 M	120 D	120 D	10.5 M	10.5 M	10.5 M	10.5 M	10.5 M	10.5 M	10.5 M
Wolverine	yes	--	9 M	4 M	4 M	1 M	1 M	1 M	1 M	1 M	9 M	9 M	NL	9 M	NL	NL	NL	NL	9 M	NL	9 M
Wolverine Advanced	yes	--	9 M	4 M	4 M	1 M	1 M	1 M	1 M	1 M	9 M	9 M	NL	9 M	NL	NL	NL	NL	9 M	NL	9 M
XtendiMax	--	no	120 D	28 D	120 D	60 D	60 D	60 D	60 D	60 D	60 D	102 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D	120 D
YUKON	--	--	1 M	5 M	9 M	2 M	2 M	2 M	2 M	2 M	2 M	12 M	36 M	15 M	9 M	9 M	9 M	36 M	9 M	36 M	36 M
Zemax	--	--	0	FY	18 M	4.5 M	4.5 M	4.5 M	4.5 M	4.5 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M
Zidua	--	--	0	0	10 M	6 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	2 M	18 M	18 M
Zidua Pro	yes	--	8.5 M	0	10 M	4 M	40 M	11 M	40 M	11 M	40 M	40 M	40 M	40 M	18 M	18 M	18 M	18 M	1 M	40 M	40 M
Zidua SC	--	--	0	0-4 M	10 M	1- 6 M	18 M	11-18 M	11-18 M	11-18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	18 M	4-8 M	18 M	18 M

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Resources

Wisconsin Herbicide Label Data
https://www.kellysolutions.com/WI/

University of Wisconsin Extension Cover Crop Team
https://fyi.extension.wisc.edu/covercrop/

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