

COVER CROP PRODUCTS

FEATURED MIXES DESIGNED FOR OUR DEALER NETWORK

MIX	PLANTING WINDOW	MIX DESCRIPTION & BEST USE
Green Spring	SPRING COOL SEASON Feb-Mar-Apr 65-100 lbs/a	Designed to be planted in March to produce an early hay or pasture crop, or simply left in place to convert the ordinarily abundant spring rain into a water-saving mulch, improving late-season drought tolerance. In areas with more abundant rain, it can precede soybeans or sorghum; in more droughty areas, it is used prior to wheat and is recommended to be terminated by mid-June to allow soil profile recharge. OATS, SPRING PEAS
60/40	SPRING COOL SEASON Feb-Mar-Apr 65-100 lbs/a	Green Up is similar in function to Green Spring but with five (5) species for increased diversity and better adaptability to variable soils. It is designed to be planted in spring to produce early hay or pasture or can remain undisturbed to convert spring rain into a water-saving mulch. In areas with more abundant rain, it can precede soybeans or sorghum; in more droughty areas, it is used prior to wheat and it should be terminated by mid-June to allow soil profile recharge. OATS, SPRING PEAS
Revive	SPRING COOL SEASON Feb-Mar-Apr 50-70 lbs/a	This diverse mix includes a mix of cool season grass species, brassicas, and legume to condition the soil, scavenge nutrients, and build soil organic matter. OATS, SPRING TRITICALE, SPRING BARLEY, ANNUAL RYEGRASS, RAPESEED, COLLARDS, SPRING PEAS
Chick Magnet	SUMMER WARM SEASON May-Jul 20-25 lbs/a	A combination of cool and warm season broad leaves designed primarily for providing brood cover to upland game birds, but it has legumes for nitrogen fixation and deep top rooted crops for benefit to succeeding crops. COWPEAS, COOL SEASON PEAS, SWEET CLOVER, HYBRID BRASSICA, SUNFLOWER, BUCKWHEAT
Greenfield	SUMMER WARM SEASON May-Jul 20-30 lbs/a	Seven (7) mixed species designed to agronomically contribute to organic matter, fix nitrogen, scavenge nutrients, and condition soil. Green Field also provides the option for supplemental grazing and later season hay potential. SORGHUM SUDAN, COWPEAS, MUNG BEANS, HYBRID BRASSICA, SUNFLOWER, PEARL MILLET, RADISHES
No-Vol	SUMMER WARM SEASON May-Jul 28-35 lbs/a	An all broadleaf blend designed to allow over-the-top use of grass herbicides to kill volunteer wheat and reduce risk of transmitting wheat streak mosaic. COOL SEASON PEAS, COWPEAS, MUNG BEANS, RADISH, PURPLE TOP TURNIP
Fall Shift	FALL COOL SEASON Aug-Sep 50-60 lbs/a	Fall Shift is designed for a fall cover crop preceding nitrogen hungry sorghum or corn next spring or summer. The legumes will fix nitrogen for the crop to follow while the other grass and mixed species provide quick fall cover to reduce erosion and increase snow catch through the winter. OATS, PEAS, SPRING BARLEY, TURNIP, ANNUAL RYEGRASS, HYBRID BRASSICA, BALANSA CLOVER
Winter Shift	FALL COOL SEASON Aug-Sep 50-70 lbs/a	Designed to overwinter and provide cover from fall planting to late spring termination. This mix has a mix of cool season cereals, brassica and diverse legumes. WHEAT, TRITICALE, WINTER BARLEY, CEREAL RYE, CAMELINA, HAIRY VETCH, BALANSA CLOVER
American Aerial	FALL COOL SEASON Aug-Sep 15-20 lbs/a	Designed to be aerial applied or broadcast. This small seeded blend can be applied to standing crop corn and sequester nitrogen to prevent N loss during the winter and then reduce weed pressure the following spring while the other components condition the soil and contribute to bio-diversity. ANNUAL RYEGRASS, RAPESEED, TURNIP, RADISH, CRIMSON CLOVER, BALANSA, BERSEEM



COVER SPECIES	WINTER HARDINESS	PURE STAND SEEDING RATE, LBS/ACRE	C/N RATIOS	SEEDING DEPTH, INCH	SEEDING SEASON
GRASSES					
Annual Ryegrass	0°	20-25	28	0-.5	Fall
Winter/Spring Barley	-5° / -20°	60-90	40	1-2	Spring, Fall
Spring/Winter Triticale	NA	60-120	41	1-1.5	Fall, Spring
Oats	25°	60-90	46	1	Spring, Fall
Cereal Rye	Winter Hardy	60-120	40	1-2	Fall
German Millet	32°	15-25	40	0-.5	Spring, Summer, Fall
Japanese Millet	32°	15-25	40	0-.5	Spring, Summer, Fall
Proso Millet	32°	15-25	40	.5	Spring, Summer, Fall
Pearl Millet	32°	12-15	54	.5-1	Spring, Fall
Sudan	32°	15-20	42	.5-1	Spring, Fall
BRASSICAS					
Appin, Purple Top Turnips	10°	3-5	31	0-.5	Fall, Spring
Daikan Radish	15°	6-8	20	.5-.75	Fall
Ethiopian Cabbage	10°	5	41	0-.5	Fall
Kale	5°	3-5	9	0-.5	Spring, Fall
Pajsa, Winfred	0°	5	10	0-.5	Spring, Fall, Summer
Rapeseed	10°	4-8	25	0-.5	Fall, Spring
BROADLEAFS					
Buckwheat	32°	40-60	42	1	Spring, Fall
Collards	5°	8	9	.5	Summer, Fall
Flax	25°	30-50	27	1	Spring, Fall, Summer
Phacelia	20°	5-10	12	.25	Spring, Fall
Safflower	25°	15-20	24	1	Summer
Sunflowers	32°	4-7	45	1-2	Summer
LEGUMES					
Austrian Winter Pea	10°	30-60	12	1-2	Fall
Berseem Clover	25°	10-12	20	0-.5	Spring
Chickling Vetch	25°	20-50	15	1-2	Spring, Fall
Hairy Vetch	Winter Hardy	20	5	.5-1	Fall
Cowpeas	32°	30-60	20	1	Summer
Mung Beans	32°	15-20	41	1	Summer
Crimson Clover	5°	10-20	20	0-.5	Fall
Spring Forage Peas	20°	60-100	12	1-2	Spring, Fall
Sunn Hemp	32°	20	42	.5-1	Summer
Sweet Clover Yellow/White Blossom	Winter Hardy	10-12	18	0-.5	Spring, Fall

MANY OTHER SPECIES AVAILABLE

COVER CROP PRODUCTS

CRITICAL DECISION MAKING CONSIDERATIONS

1. PLANTING WINDOW: WHAT IS THE PLANTING WINDOW FOR THE COVER CROP?

SPRING COVER COOL SEASON · FEB-MAR-APR	SUMMER COVER WARM SEASON · JUN-JUL	FALL-WINTER COVER COOL SEASON · AUG-MID SEP
Buckwheat, Oats, Cool Season Peas, Spring Barley, Spring Triticale	Sorghum Forages, Millets, Cowpeas, SunnHemp, Hybrid Brassica, Safflower, Flax, Buckwheat	Cool Season Peas, Lentils, Chickling Vetch, Crimson Clover, Tillage Radishes, Turnips, Ethiopian Cabbage, Oats, Triticale, Annual Ryegrass

2. COVER CROP OBJECTIVES: WHAT ARE THE PRIMARY GOALS OF THE COVER CROP?

OBJECTIVE	GENERAL PURPOSE	COVER CROP SPECIES
Nitrogen Fixing	To generate nitrogen credits beneficial for the next primary crop.	Cool Season Peas, Cowpeas, SunnHemp, Chickling Vetch, Hairy Vetch, Clovers, Alfalfa
Nutrient Scavenge	To consume and temporarily sequester (tie-up) nitrogen or to reclaim unreachable reservoirs of nutrients.	N Scavenge: Millets, Oats, Triticale, Annual Ryegrass. P Scavenge: Brassicas including Tillage Radish, Hybrid Brassicas, Sunflower.
Mulching and Organic Matter	To improve soil health (moisture retention and water holding capacity) as well as to reduce soil erosion.	Oats, Triticale, Annual Ryegrass, Millets, SunnHemp
Soil Conditioning	To reduce soil compaction, fracture hard-pan, and generally improve soil structure.	Tillage Radish, Annual Ryegrass, Hybrid Brassica
Soil Pest Management	To suppress nematodes and disrupt pest cycles.	SunnHemp (many species including soybean cyst), Annual Ryegrass (suppresses SCN), Sorghum Sudan (many species but not SCN), Ethiopian cabbage
Upland Birds	Creates brood rearing cover when planted in the spring through late summer.	Cowpeas, Cool Season Peas, Yellow Blossom Clove, Hybrid Brassica, Buckwheat, Sunflower, SunHemp

3. CROP ROTATION: WHAT IS THE INTENDED PRIMARY CROP FOLLOWING COVER?

CORN	Corn is best preceded by legumes (like SunnHemp, Cowpeas, Chickling Vetch, or Cool Season Peas) and brassicas (like Tillage Radish, Hybrid Brassica, and Turnip). These are plants that either produce nitrogen or decay quickly to release nitrogen and/or other nutrients they have scavenged and stored.
SORGHUM	Sorghum is best preceded by the same crops as corn. In addition, Crimson Clover and Hairy Vetch can also be included because the later sorghum planting date allows these species to bring value as well.
SOYBEANS	Soybeans are best preceded by crops that sequester nitrogen such as annual Ryegrass and Rye. These crops will tie up nitrogen the next spring, suppressing weed pressure in soybeans while slowly decaying to release nitrogen later in the soybean crop when beans are podding.
WHEAT	Wheat is best preceded by legume dominated mixtures. A cover crop can be utilized during traditional fallow periods such as spring seeded mix of Oats that produce a light colored, persistent mulch, as well as legumes to provide a slow release nitrogen source. It is recommended to terminate or harvest spring seeded covers by mid-June to allow time for a rain to recharge the profile prior to wheat planting. In areas suited to continuous wheat, a summer legume such as SunnHemp or Cowpeas planted immediately after harvest and terminated a month prior to wheat planting fixes nitrogen and produces a rapidly decaying mulch to release that nitrogen. SunnHemp also leaves a stiff-stalked residue that excels at trapping snow.



CONSIDERATIONS FOR COVER CROP MIXES

QUICK PICK Cover Crop Selection		Intended Primary Crop After Cover Crop		
		SOYBEANS	CORN/SORGHUM	WHEAT
Current Primary Crop Before Cover Crop	SOYBEANS	Triticale/Rye Wintershift Seed following soybean harvest. May be seeded as late as mid-November.	American Aerial Seed into standing beans when leaves yellow; a mix designed for aerial application. Requires irrigation or timely rainfall to initiate seed establishment.	Revive/Greenspring/No-Vol Fallow alternative: Seed in March and terminate by mid-June to recharge moisture before fall wheat planting.
	CORN/SORGHUM	American Aerial Seed into standing corn when corn matures and canopy opens; a mix designed for aerial application.	Revive/Fall Shift Seed into standing corn when corn matures and canopy opens; a mix designed for aerial application.	Revive/Greenspring Fallow alternative: Seed in March and terminate by mid-June to recharge moisture before fall wheat planting.
				Chick Magnet A combination of cool and warm season broad leaves designed primarily for providing brood cover to upland game birds, but it has legumes for nitrogen fixation and deep top rooted crops for benefit to succeeding crops.
	WHEAT	Greenfield/Wintershift These mixes, put in early will provide great biomass and potentially supplemental grazing.	Fall Shift Provides quick fall cover to prevent erosion and increase snow catch.	Greenfield For continuous wheat cropping, seed immediately following wheat harvest, terminate prior to fall wheat seeding.
			Chick Magnet A combination of cool and warm season broad leaves designed primarily for providing brood cover to upland game birds, but it has legumes for nitrogen fixation and deep top rooted crops for benefit to succeeding crops.	No-Vol An all broad leaf blend designed to allow over-the-top use of grass herbicides to kill volunteer wheat and reduce risk of transmitting wheat streak mosaic.
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Maximize Performance: A mix can accomplish multiple objectives at the same time, better than a single species. For example, a half-seeding rate of Tillage Radish may provide nearly as much compaction alleviation as a full rate, while a half seeding rate of field peas can fix nearly as much nitrogen as a full rate. Combining a half-seeding rate of each can accomplish both objectives at the same time.

Reduce Risk of Seeding Failure: Mix diversity reduces the risk of seeding failure, insect problems, diseases, variable soils, etc. A diverse mix will often exhibit the phenomenon of “over-yielding” in which the total yield far exceeds the weighted average of the components in the mix.

Mix Design: Many factors must be considered when developing cover crop mixes. For example, mixing species may reduce herbicide options in the event weed control is needed or may be limited dependent upon previous herbicide use. Species compatibility is important; some species during certain seasons may be so dominant that mixing other species brings little value (such as Rye in a very late fall planting). Conversely, some species may not compete well in a mix yet have great value when planted alone (such as Chickling Vetch).

COVER CROP PRODUCTS

COVER CROPS SOIL HEALTH

Soil health comes by understanding the microbial diversity and functional capabilities of soil. Prairie ecosystems should be used to guide your soil reconstruction efforts and assessment of the health of agricultural land. Your soil is alive—filled with microorganisms like bacteria, actinomycetes, fungi, protozoa, arthropods, plus a wide variety of larger soil fauna. These all work together to naturally cycle nutrients and develop soil and providing a perfect place for your crops to thrive. This microbial activity is fed by the roots of growing plants—and the longer these beneficial soil organisms are fed, the richer the soil becomes.

ORGANIC MATTER

› INCREASED WATER HOLDING CAPACITY

Organic matter has a very high water holding capacity that can be utilized by plant roots as the soil dries out.

› RELEASE OF NUTRIENTS

When organic matter is mineralized in the summer months, nutrients become available to the plant.

› INCREASE WATER INFILTRATION

With improved soil structure and water holding capacity, the permeability of the soil can be greatly increased.

› IMPROVE SOIL STRUCTURE

Abundance of organic matter along with soil biology can help form soil aggregates.

WHAT ARE THE BENEFITS OF ORGANIC MATTER?

› NUTRIENT SUPPLY

Organic matter is a reservoir of nutrients that can be released to the soil. Each percent of organic matter in the soil releases 20 to 30 pounds of nitrogen, 4.5 to 6.6 pounds of P₂O₅, and 2 to 3 pounds of sulfur per year. The nutrient release occurs predominantly in the spring and summer, so summer crops benefit more from organic-matter mineralization than winter crops.

› WATER-HOLDING CAPACITY

Organic matter behaves somewhat like a sponge, with the ability to absorb and hold up to 90 percent of its weight in water. A great advantage of the water-holding capacity of organic matter is that the matter will release most of the water that it absorbs to plants. In contrast, clay holds great quantities of water, but much of it is unavailable to plants.

› SOIL STRUCTURE AGGREGATION

Organic matter causes soil to clump and form soil aggregates, which improves soil structure. With better soil structure, permeability (infiltration of water through the soil) improves, in turn improving the soil's ability to take up and hold water.

› EROSION PREVENTION

This property of organic matter is not widely known. Data used in the universal soil loss equation indicate that increasing soil organic matter from 1 to 3 percent can reduce erosion 20 to 33 percent because of increased water infiltration and stable soil aggregate formation caused by organic matter.



KEYS TO COVER CROP SUCCESS

1. PLANNING CROP ROTATION

Look 3 to 5 years down the road and the possibility of cover crops to enhance flexibility and value.

Simple rotation rule... alternate grass and broadleaf crops (G-G).

GRASS CROPS

- › Corn
- › Sorghum
- › Wheat
- › Millets
- › Triticale
- › Oats
- › Barley
- › Rye

BROADLEAF CROPS

- › Soybeans
 - › Sunflower
 - › Brassicas (turnips and radish)
 - › Cowpeas
 - › Winter Peas
 - › Chickling Vetch
 - › Alfalfa
 - › Clovers
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2. LOOK AT THE BIG PICTURE AND CONSIDER THE MANAGEMENT IMPLICATIONS OF ONE CROP UPON THE NEXT

- | | |
|------------------|------------------------|
| › Weed Control | › Fertility Management |
| › Growing Season | › Residue Management |
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3. PATIENCE AND REALISTIC EXPECTATIONS

Long-term challenges such as soil loss, low organic matter, soil structure, pest pressures, and fertility deficiencies require long-term management strategies to manage, correct, and then build upon.

COVER CROP PRODUCTS

CONSIDERATIONS CONCERNING NITROGEN AND COVER CROPS

Legume cover crops can be used to fix atmospheric nitrogen and incorporate it into their tissues, which is released upon decay of the residue. It is important to match the proper strain of rhizobia inoculant to the species of plant you intend to plant. Soybean inoculant will not nodulate alfalfa or any other legume. Refer to this table to match the correct bacteria to the plant you grow.

PLANT	INOCULANT
Alfalfa, Sweet Clover	Alfalfa
Red Clover, White Clover, Ladino Clover, Crimson	Clover
Peas, Vetch, Lentil	PVL
Soybeans	Soybean
Cowpeas, Peanut, Lespedeza, SunnHemp, Partidge Pea	Peanut
Field beans (navy, pinto), Green beans	Garden

Nitrogen is in plants in the form of protein. When the protein breaks down, it releases nitrogen. There is very little breakdown of legume residue below 50 F. Crops that do most of their growth during the cool weather, like wheat, will not respond as well to legume cover crops as well as warm season crops like sorghum and corn.

The “slow release” nature of nitrogen from cover crops can be advantageous in conditions in which readily available nitrogen sources can be lost. Nitrate nitrogen can be lost from either leaching or denitrification under conditions of standing water or high rainfall; ammonia sources of nitrogen are rapidly converted into nitrate nitrogen. Since nitrogen in cover crop residue is in

the form of protein, it is not subject to loss until it is thoroughly decayed.

Cover crops can also be used to reduce the amount of available nitrogen in the soil and convert it into protein. In areas where nitrate leaching into groundwater is a concern, high nitrogen uptake covers like Cereal Rye, Annual Ryegrass, Triticale, and Sudangrass are very effective at taking up excess nitrate and sequestering it for a long period of time. Brassica crops can take up nitrogen from deep in the soil profile and deposit it into their taproots. Since brassicas decay very rapidly their nitrogen taken in is available rather quickly.



HOW DO I SET MY DRILL FOR THIS COVER CROP BLEND?

› 43,560 ft²/acre

(wheel circumference ft x drill width ft) = Tire revolutions to cover 1 acre

Example: If you had a 12 ft drill with a drive tire that covers 8 ft, your equation would look like this:

› 43,560 ft²/acre

43,560 ft²

$$(8 \text{ ft} \times 12 \text{ ft}) = 96 \text{ ft}^2 = \mathbf{453.75 \text{ tire rotations to reach 1 acre}}$$

To make calibration a little easier, you can divide it down into a tenth of an acre, so you do not need to spin your tire as many times. This can be done by dividing your rotations by ten and then your pounds per acre by ten.

Example: If you need to rotate your tire 453.75 times to reach 1 acre, and you are wanting to plant 60 lbs per acre, your 1/10th equations would be as follows.

453.75 rotations

60 lbs/acre

$$10 = \mathbf{45.375 \text{ revolutions for .1 acre}}$$

$$10 = \mathbf{6.0 \text{ lbs/ .1 acre}}$$

After spinning your tire slightly over 45 times, the weight of seed collected should be around 6.0 lbs., if it is not, adjust the drill setting and spin the tire again to see how close you are to the desired weight.

Now some of these are just arbitrary numbers, your numbers will most likely be different in some way than what is given in the examples. The only number that stays as a constant is the square feet within an acre, because that number will never change. As long as you follow the same basic steps as shown above, you should be able to reach the right calibration.



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MOST COVER CROPS CAN BE USED FOR GRAZING AND CAN PROVIDE BOTH HIGH YIELDS AND HIGH QUALITY.

Doesn't grazing reduce the value of cover crops?

Since mulch is a major benefit of cover crops, it is often assumed that grazing will reduce the benefit of cover crops. While true that grazing to the point where the soil is left bare will reduce cover crop benefits, moderate grazing that leaves enough residue to provide full soil coverage can be used to realize immediate cash returns to cover cropping. It is becoming more evident that much of the improved drought tolerance seen following cover crops is due to enhanced microbial activity in the soil, and the deposition of manure pats creates a perfect growing medium for soil microbes. Although only a small percentage of the soil gets covered by manure pats during the grazing of a single cover crop, if cover cropping and grazing are continued over several years then a higher and higher amount of soil gets permanently improved by manure pats.

Doesn't grazing cause compaction?

Many landowners do not want cattle grazing on their land because they are afraid of compaction. The University of Nebraska has conducted over 100 grazing trials on corn stalks to see if grazing stalks has a negative effect on yields of subsequent crops. These trials encompassed both no-till and conventional tillage, both continuous corn and corn-soybean, both fall and spring grazing, and soil types ranging from sandy to heavy clay. In no trial was yield decreased from stalk grazing. The depth of compaction is directly related to the total weight of the compacting agent, in this case a cow. Compaction caused by cattle is relatively shallow and is usually alleviated through natural processes of freezing and thawing, wetting and drying and action of plant roots and soil organism (earthworms, fungi, bacteria, etc.). Compaction caused by vehicles, tractors, combines and grain carts

is much deeper and less likely to be removed by natural processes. Since many of the cover crops that can be used for grazing have very aggressive root systems that can break up compaction, having a system of grazed cover crops can actually reduce compaction over time. Additionally, a soil with additional root mass, additional surface residue and additional organic matter is much less subject to compaction than unprotected soil. A cover-cropped, no-till soil usually has a firm sod-like condition that resists compaction. If pugging during extreme mud is a concern, planning for a means by which livestock can be removed during wet conditions to a perennial pasture sod, a rocky area, or a fenced off sacrifice area can spare an entire field from pugging that can create planting issues.

Why should I plant cover crops for grazing if I have plenty of grass?

Perennial grass pastures are most productive and nutritious during the first half of the growing season. About 70% of total pasture production of cool-season pastures like brome and fescue is produced in April, May, and June, while 70% of native grass production is produced in May, June, and July. However, the nutrient demands of a typical spring calving cowherd are increasing as the season progresses at the same time the forage production is decreasing. Cover crops can be selected to provide grazing during times when perennial pastures are not productive or are not nutritious. Additionally, grazing cover crops rather than perennial grasses can allow for rest during critical times of grass growth, like late summer for native grass. This can result in better, deeper root formation and more drought tolerant pastures in future years.



COVER CROPS FOR LATE SUMMER GRAZING:

- › Sorghum Sudangrass (Brown Mid-Rib varieties most nutritious)
 - › Pearl Millet
 - › Greenfield
 - › Japanese Millet
 - › Teff Grass
 - › Cowpeas
 - › Forage Soybeans
 - › Annual Lespedeza
-

COVER CROPS FOR FALL GRAZING:

- › Oats
 - › Spring Barley
 - › Winfred Hybrid Brassica
 - › Turnips
 - › Radish
 - › Spring Field Peas
 - › Chickling Vetch
 - › Spring Seeded Sweet Clover
 - › Winter Barley
 - › Rye
 - › Winter Triticale
 - › Wheat (varieties differ greatly)
 - › Annual Ryegrass
 - › Crimson Clover
 - › Greenfield
 - › Fall Shift
-

COVER CROPS FOR WINTER GRAZING:

- › Stockpiled male-sterile BMR Forage Sorghum, or late-planted long maturity BMR Forage Sorghum
 - › Fall planted Oats
 - › Fall planted Spring Barley
 - › Rye (most active winter growth)
 - › Greenfield
 - › Fall Shift
 - › Winter Shift
-

COVER CROPS FOR SPRING GRAZING:

- › Fall planted Rye (earliest to green up), Triticale (best total tonnage for mechanical harvest), Winter Barley, Wheat, Ryegrass (last to green up, but best quality and most regrowth)
- › Fall planted Hairy Vetch or Crimson Clover
- › Spring planted Oats or Spring Barley
- › Spring planted Field Peas or Chickling Vetch
- › Winter Shift
- › Green Spring
- › Revive