La Crosse Seed

SECURE SOURCED • & SUPPLIED •

Soil First® PREMIUM COVER CROP SEED

NOW WITH Tillage Radish®

Soil First® Management Guide | Edition 7

PRODUCT BENEFIT KEY

Look for these helpful icons throughout this guide as an **EASY STARTING POINT** for choosing the best product for you.

EASY ESTABLISH | P & K CYCLING | POLLINATOR BENEFIT | COMPACTION ALLEVIATION | WEED SUPPRESSION | BIOMASS PRODUCTION | EROSION CONTROL | NITROGEN FIXER

Benefit icons reflect the highest rated benefits as referenced on pages 15-16. In most cases, each product has many more benefits. See the chart on pages 15-16 or **visit lacrosseseed.com** for additional product information.

ONLINE RESOURCES ICON

Look for the online resource icon throughout this guide to identify where additional information is available online at **lacrosseseed.com**.

ONLINE RESOURCES

TABLE OF CONTENTS

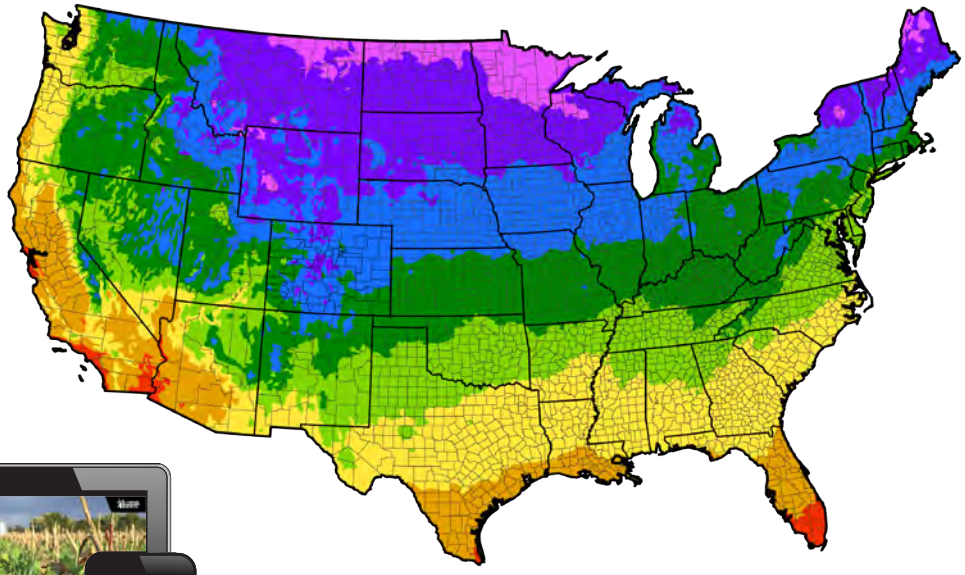
ABOUT SOIL FIRST® & LA CROSSE SEED

La Crosse Seed has been reliably supplying its customers with quality seed, expert advice and prompt service for many years. Our mission is simple, to be your preferred seed partner. We know you have options and it's our job to prove to you that doing business with La Crosse Seed is your best choice.

The team at La Crosse Seed has carefully researched and selected a family of products that we believe link sound agronomics to practical solutions. Combining solid advice on what to plant and how to manage it - from establishment practices to removal strategies - you can count on the team at La Crosse Seed and the Soil First® family to help you reach your productivity and conservation goals. Soil First® products were designed to meet the needs of farmers and landowners looking to increase productivity by preserving and bettering their soils. We believe integrating soil conservation practices like cover crops takes planning, commitment and long-term dedication. We take pride in working with a group of dealers dedicated to delivering the cover crop message to the field. We invite you to think "SOIL FIRST®" when making your cover crop planting decisions. The goal of this manual is to provide insights on soil health concepts, cover crop species, management strategies and practical solutions.

USDA PLANT HARDINESS ZONES

Look for hardiness zone recommendations for plant species throughout this guide ▸



-40 to -30	3
-30 to -20	4
-20 to -10	5
-10 to 0	6
0 to 10	7
10 to 20	8
20 to 30	9
30 to 40	10
40 to 50	11

Our new Seeding Success App can be downloaded on iOS and Android devices from the App Store or Google Play. Just search "La Crosse Seed!"

STAY CONNECTED TWITTER: @SOIL_FIRST

HAVE A GOAL & A PLAN WHEN DECIDING TO TRY COVER CROPS

Research to date proves cover crops are making strides in bettering our soils in the short term and encouraging soil structure and soil health improvements for decades to come. Initiatives across the country support the agronomics behind keeping soil and their nutrients in place and keeping our natural resources protected for the next generation.

Yet, without the proper commitment and planning, making cover crops function in today's complex cropping systems will simply not work as well and achieving gains in soil quality can certainly be delayed.

1. **Have a goal when planting a cover crop.** Ask yourself: "What do I want to accomplish by planting a cover crop and what benefits am I working toward?"

2. **Select the right cover crops to help you reach your goals.** There are many species on the market and each species has a distinct set of characteristics aimed toward achieving different outcomes. Wrong choices can be a pathway to potential problems.

3. **Have a plan!** Think about the changes that may be needed to your current farming system to allow for correct establishment (and management):
   - » Modifying your crop rotation (perhaps the addition of another crop to your rotation allows for a wider window in the fall)
   - » Altering the previous crop's harvest slightly, allowing for more timing flexibility
   - » Adjusting your herbicide program to allow for timely cover crop seeding
   - » Integrating an additional pass in fall and/or spring for planting and spring termination

4. **Select a field** or area(s) of your farm that would benefit the most from a cover crop.

5. **Think small acres starting out.** Consider any new management concepts needed when trying cover crops or green manures for the first time.

6. **Order seed sooner than later.** It may take longer than you think for less-traditional seeds to make their way to you. Good, clean seed will be the most demanded (seed, not grain, is professionally grown and maintained to ensure good quality and germination).

7. **Allocate labor and equipment.** Depending on your seeding plan, it may be imperative to have extra help in late summer/fall to allow for the quickest seeding after cash crop harvest. If plans include using custom seeding, communicate your plans early to ensure the most timely application.

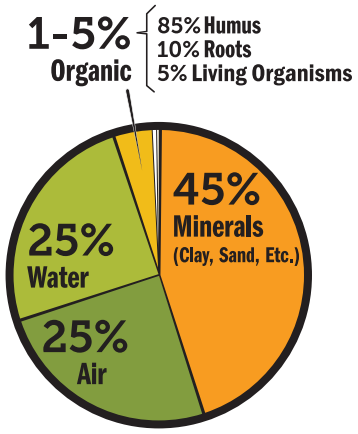
8. **Consider leaving a check strip for comparison.** How better to determine the progress than by seeing uncovered ground side-by-side?

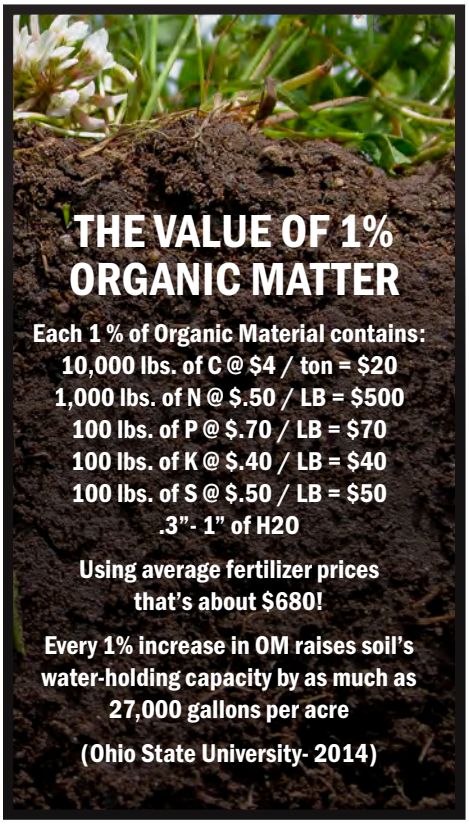
9. **Balance your goals and spring management wisely.** A perfectly established cover crop not managed or terminated correctly in the spring can create huge challenges for your subsequent cash crop.

10. **Make a commitment. Some goals are easily noticed and well defined, but improving soil health is a journey, not a destination. It takes time to regenerate soils and it requires that producers consider long term expectations, and having patience with initial goals or objectives.**

IMPACTING SOILS WITH COVER CROPS

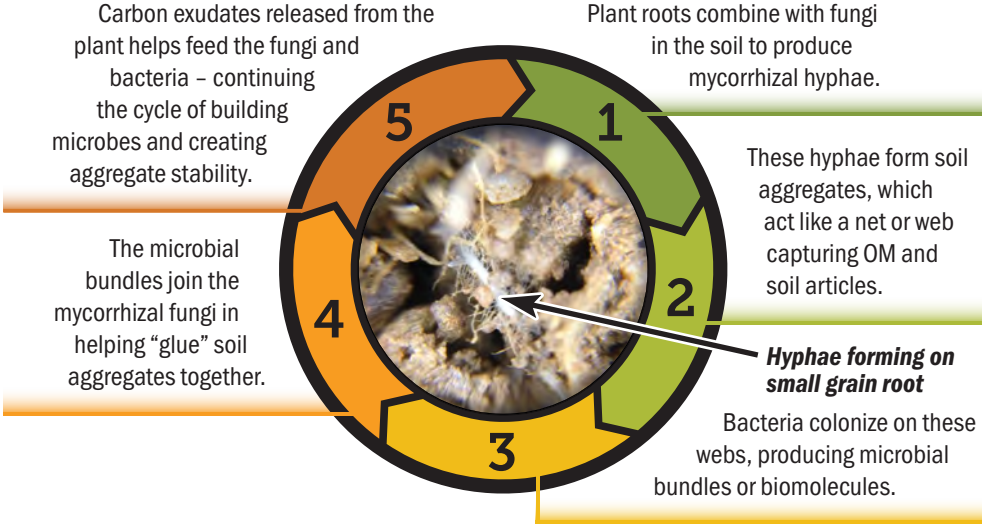
Our soils are a dynamic system composed of living and dead organisms, decomposing and residual organic matter, minerals, water and oxygen. A large portion of our soils cannot be changed or altered. No matter the soil type or condition, that fraction has some level of minerals, air, and water that together comprise 95 to 99% of the soil makeup. The balance is the segment that can be affected by conservation practices. This organic section is how we can impact nutrient cycling, water quality and overall soil structure and condition.





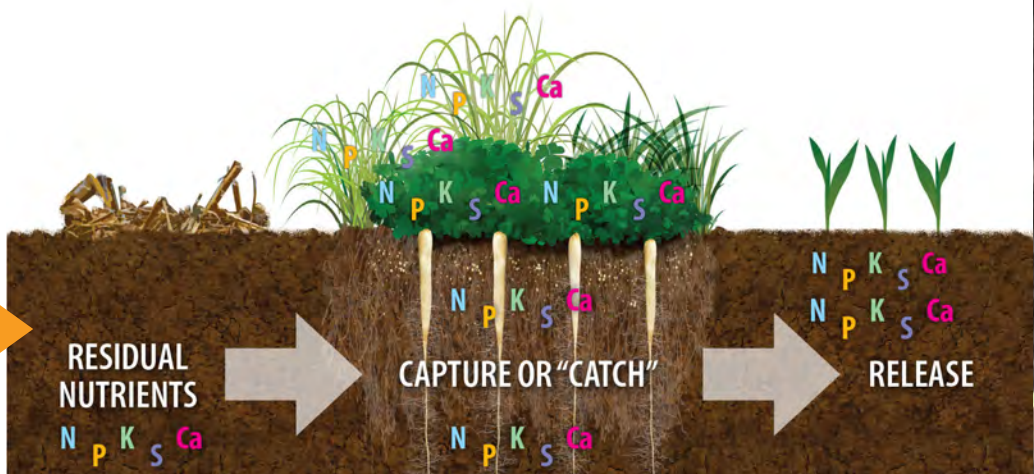
It may take time to create major advances in soil quality, however progress can be discovered by following four basic principles:

1. **Minimize Disturbance.** Unlike soil texture, the soil's structure can be greatly impacted by tillage. Disturbing the soil destroys pore space, ultimately decreasing infiltration of water and the movement of oxygen. Whereas minimum-tillage systems have had a huge impact in improving soil organic matter (a leading indicator of soil quality), however no-till by itself isn't enough.
2. **Maximize Biodiversity.** As soil is less disturbed and plant diversity is improved, nutrients become more available for cash crops while restricting unwanted plants and organisms.
3. **Maximize Soil Cover.** Bare soils introduce the probability of wind and water erosion, during which nutrients and organic matter can be carried away and the opportunity for carbon capture is lost.
4. **Provide Continuous Living Roots.** Living organic material (OM) and dead plant residues in the soil improves soil structure and stores nutrients, making them available later for cash crops. Adding continuous roots speeds up organic matter gains and at the very least maintains organic matter levels. Building OM levels offsets the "mining" action of cash crops.



Cover crops and green manures stimulate microbial activity because they supply food (carbon) for the microorganisms to feed on. Microorganisms in our soils use carbon to build organic matter and in turn store nutrients. Carbon reserves allow nutrients to be scavenged, supplying food for the soil ecosystem, instead of robbing the microbes' reserves left from the organic matter.

Aggregate stability leads to increased soil structure, which ultimately leads to better nutrient cycling, and better movement of water and oxygen. Cover crops and green manures prevent captured nutrients from being lost through soil erosion, leaching and volatilization.



MATCHING COVER CROPS TO YOUR GOAL*

*See pages 25 & 26 to see how Soil First® cover crops can be integrated into your system

1 SEQUESTER & CYCLE NUTRIENTS:

Cover crops can aggressively scavenge and cycle nutrients from deep within the soil profile making them available in the root zone of subsequent crops, improving yields and reducing runoff into sensitive watersheds.

2 REDUCE SOIL EROSION:

Extensive root systems cling to the top layer of soil creating an interior shield from erosion while top growth minimizes wind and water erosion.

3 CREATE A NITROGEN SOURCE:

Legumes produce additional nitrogen (N) by converting atmospheric nitrogen into nutrients plants can use.

4 BREAK UP SOIL COMPACTION:

Deep burrowing roots break through compacted soil to create pore space improving aeration, water movement and helping soil organisms flourish.

5 PROVIDE WEED CONTROL:

Cover crops create competition for winter annuals and other weeds by shading them out, and preventing them from robbing valuable moisture and nutrients from subsequent cash crops (with the potential of lowering herbicide requirements per acre).

6 SUPPORT PEST CONTROL:

Most cover crops that suppress weeds during the winter months can consequently reduce nematode populations. Some cover crops deplete nematode populations by causing premature egg hatching. Other species provide control by eliminating winter annuals that historically provide a refuge for nematode populations. Still other cover crops contain chemicals that naturally fumigate at-risk soil environments.

7 GENERATE EXTRA FORAGE:

Most cover crop species have the added benefit of being “dual-purpose”, meaning they provide both the benefit of a soil cover while providing a valuable forage source for livestock.

8 ADD HABITAT FOR WILDLIFE & SHELTER POLLINATORS:

Fall, winter and spring cover crops create environments crucial for wildlife protection and nesting. Additionally, the biodiversity created by many cover crop systems have positive effects on native pollinators.

9 BUILD ORGANIC MATERIAL:

As cover crops grow, die and break-down, they add carbon to soil, feeding the soil food web, improving soil tilth, soil quality and water holding capacity.

10 INCREASE SOIL STRUCTURE:

Actively growing plant roots increase mycorrhizal hyphae creating soil aggregates that act like a net capturing organic matter and soil particles. Aggregate stability builds soil structure that leads to better movement of nutrients, water and oxygen.

11 CONSERVE SOIL MOISTURE:

By converting the sun's energy into growing biomass and the opportunity for organic matter, soil moisture is increased while reducing runoff, evaporation and overall variability from weather extremes.

12 CREATE FINANCIAL VALUE:

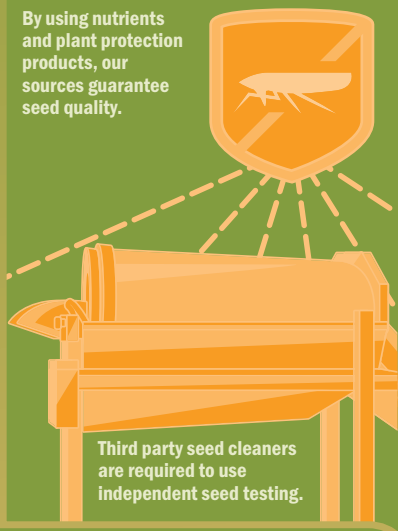
The above benefits create the opportunity for better yield potential in cash crops, lower input costs and ultimately higher land values. In addition many states and counties offer cost-sharing initiatives for this important practice.

SECURE SOURCED • & SUPPLIED •

1. PRODUCTION

Our seed is sourced to meet rigorous standards for high quality seed production, grown for seed, not grain, in regions which ensure quality and proper agronomic standards.

By using nutrients and plant protection products, our sources guarantee seed quality.



Third party seed cleaners are required to use independent seed testing.

2. QUALITY ASSURANCE

Independent seed testing verifies seed quality. By employing leading labs from across the country, we certify what we have before bringing it into our facilities.

Seed is stored in controlled conditions at our facilities with active management of environmental factors that may affect seed quality.

3. INSPECTION & DELIVERY

We conduct additional 3rd party seed tests on a sample of seed we procure. We also have a rigorous internal sampling and re-testing protocol to ensure the seed we ship to our customers meets our standards.

The tag says it all: Once it's in the bag it's a true testament to our high standards.

SMALL GRAIN COVER CROP OPTIONS

WINTER RYE

- **Fast growing and very hardy (hardiest of all the cereal grains)**
- **Tolerant of poor soil conditions**
- **Fights soil erosion and helps suppress weeds when planted at heavier seeding rates**
- **Captures excess nutrients from cash crops**
- **Works well as a nurse crop with legumes**
- **Several methods exist for successful spring management (refer to pgs. 7 & 8)**
- **Spring and fall forage option (best use – spring, fall, winter pasture)**

Winter rye is an upright, cool season annual grass that germinates in cool conditions. Also known as "fall" or "cereal" rye, very few species offer the many benefits as winter rye while allowing extended planting flexibility long into the fall.

CONSIDERATIONS:

- Ideal pH = 5.0 – 7.0
- Quick spring growth can easily get away from many producers – have a plan to manage effectively

GUARDIAN® FALL RYE

- **Developed to meet strong demand for reliable seed from a trusted, weed-free source**
- **Screened for purity & cleanliness**
- **Excellent germination & early vigor (allows for later fall seedings)**
- **≥ 90% Germ, ≥ 98% Purity**
- **Strong winter hardiness - northern genetics**
- **More management considerations on pages 7 & 8**

Seeding Rate: Varies with use, see chart on pgs. 15 & 16

Guardian® fall rye grain seed is a winter rye carefully screened to provide dependable results in cover cropping situations. Excellent germination and early vigor in cooler temperatures, combined with solid winter hardiness and quick spring green-up make Guardian® an excellent choice for a low-risk entry into cover cropping.

WINTER BARLEY

- **Drought-tolerant; low water use**
- **Ideal for suppressing weeds when planted at heavier seeding rates**
- **Captures excessive nutrients left from cash crops**
- **Known to reduce pests in fruit and vegetable crops; proven suppression to root knot nematode**
- **Fall forage option (best use – fall pasture, silage and hay)**
- **Silage value (from spring barley) resembles whole-plant corn silage**

Winter barley is an upright, cool season annual grass known for its quick growth and low water use. Barley is often used on soils where reclamation and/or rapid soil recovery is the goal.

CONSIDERATIONS:

- Prefers pH 6.0 – 8.5
- Inconsistent at overwintering versus other winter small grains
- Avoid seeding in cold, damp soils

WINTER TRITICALE

BIOMASS PRODUCTION | WEED SUPPRESSION | EROSION CONTROL

- **Performs well on marginal land and/or poor soil environments; tolerates poorly drained soils as well**
- **Fights soil erosion and helps suppress weeds planted at heavier seeding rates**
- **Captures excess nutrients left from cash crops**
- **Growth patterns favor use with legumes and brassicas**
- **Triticale can be seeded earlier in fall than other small grains (less susceptible to Hessian Fly)**
- **Higher levels of digestible energy and crude protein compared to barley**
- **Spring and fall forage option (best use – fall and spring pasture, silage and hay)**

Winter triticale is an upright, cool season annual grass bred from crossing wheat and rye. This brings together the cover crop benefits (and tonnage potential) of winter rye with the increased feed value of wheat.

CONSIDERATIONS:

- Ideal pH = 5.2 – 7.0
- Spring growth can be a management concern; terminate early when preceding a grass crop

HY OCTANE WINTER TRITICALE

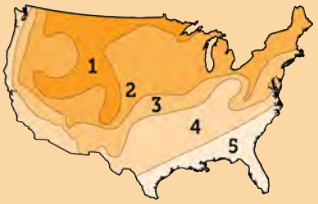
- **Reduced-awned variety to aid in livestock palatability**
- **Excellent standability**
- **Good early season vigor and earlier heading date allows greater flexibility for potential double cropping**
- **Medium straw length allows for easier hay wilting and silage packing (vs. traditional varieties)**

Seeding Rate: Varies with use, see chart on pgs. 15 & 16

Hy Octane is a winter triticale variety that has shown favorable forage yield and winter hardiness across the Midwest. Hy Octane makes a great option for fall and winter grazing, extending the season beyond that of brassicas or cool season perennial grasses.

PLANTING WINDOW

1. NO LATER THAN SEPTEMBER 25
2. NO LATER THAN OCTOBER 5
3. NO LATER THAN OCTOBER 15
4. NO LATER THAN OCTOBER 25
5. NO LATER THAN NOVEMBER 1



PLANTING WINDOW DATES ARE FOR WINTER RYE, TRITICALE AND BARLEY

MANAGEMENT TIPS FOR WINTER CEREAL GRAINS

Terminating Small Grains

Assuming the predetermined goal allows, it's always recommended to terminate small grains early. Terminating with herbicides, glyphosate and/or grass herbicides have been effective in late spring prior to boot stage. This lessens nitrogen immobilization, conserves soil moisture and reduces exposure of voles, armyworms and other pests. It's common for vegetable and orchard growers to let small grains stand as long as possible between plant rows. This practice also allows for proper bedding under many fruit and vegetable crops, reducing the risk of root rot while keeping them clean and dry.

Other Termination Methods

Tillage – usually eliminates regrowth, but should be done when rye and triticale are at least 10 - 12" tall. Once crop grows taller than 18 - 24", tillage becomes less effective and will likely take at least two passes. Tillage can be effective on barley at mid-late bloom stage (before seed set).

Mowing – wait until the stand has begun flowering (rye usually flowers with 14 hours of continuous sunlight and temps above 40°F). The use of sickle mowers usually works better than flail mowers. Mowing barley at mid-bloom has been effective.

Rollers, stalk choppers and crimpers used at milk or soft dough stage (usually around 20-24" tall) can flatten stems and potentially eliminate a burndown pass. For barley, rolling needs to take place earlier (mid-bloom).

Triticale and wheat grow more slowly in spring than rye and barley, offering more flexibility in wet conditions.

All winter cereal grains require vernalization to produce seed/grain. Spring grazing or mowing can postpone and prolong cereal grain flowering if that fits into the goal.

Seeding Cash Crops into Cereal Grain Stands

Adequate seed-to-soil contact is crucial to proper cash crop establishment, but it's a challenge where residues remain on the soil surface, especially small grain residue. Equipment that removes this residue from the immediate seeding area can help reduce stand losses, increase soil temperature in the seed zone and decrease the amount of residue that comes in contact with the seed. Equipment manufacturers have developed several tools to help manage these challenges that cover crops potentially pose to the soil surface in spring. Row cleaners are designed to clear away residue from the opening disks of the planter units, reducing the chance of hair-pinning residue into the seed furrow (common with small grains). Row cleaners should be adjusted to move only residue and not soil (soil movement results in soil drying out and potentially introducing weed competition). Spoked closing wheels improve establishment in poorly drained soils, where traditional smooth rubber closing wheels can result in soil crusting. Any planting equipment should be properly maintained with adequate weight and down pressure for ideal penetration into the soil.

Note: "Planting green", or planting cash crops into living cover crops, is not for the cover crop beginner. If dry weather is forecasted or a dry spring is expected, it is always recommended to kill the cover crop early, saving valuable soil moisture.

Planting Corn and Soybean Crops after Small Grains

Many people attribute the inhibition in corn growth by rye to allelopathy, the release of chemicals by one plant that inhibits the growth of adjacent plants. While rye does produce chemicals that can inhibit plant growth, under most situations the rye biomass on the soil surface is responsible for suppression of weeds rather than the release of phytotoxic chemicals. The chemicals produced by rye likely have little influence on corn growth. Research has shown that susceptibility to allelochemicals is indirectly related to seed size — the smaller the seed the more susceptible the plant. The large seed of corn and its relatively deep planting depth minimize the impact of any chemicals released by the cover crop. Small grains' negative effect on corn are concentrated on these factors:

1. The presence of rye mulch on the soil surface alters the soil environment in a way that inhibits corn growth. The mulch may delay soil warming and drying, creating a less favorable environment for corn.
2. The decaying rye biomass immobilizes soil nitrogen.
3. Rye may act as a 'green bridge' for plant pathogens. The dying rye could serve as a host for pathogens that move to corn seedlings after the rye dies.

Proper management reduces the risk rye poses to corn production. Terminating rye 10 to 14 days prior to planting corn greatly minimizes the chance of a negative impact. Burndown herbicides are more consistent at killing rye when applied to small plants; however, much of the benefit in suppressing weeds will be lost when treating the rye while it is small. Soybeans can tolerate heavy amounts of rye residue, thus early termination is not as critical when planting soybeans following cereal rye.

(Hartzler, Iowa State, 2011)

MANAGING SMALL GRAINS FOR FORAGE

With a greater need for quality feed sources, cereal grain options are becoming increasingly popular as forage supplements to existing perennial hay and summer annual acres. Many forage benefits are consistent across all these cereal grain options but differences do exist in quality and tonnage based on proper management.

TRITICALE

Triticale is a cross between wheat and rye. This makes for a crop with higher yields than wheat, but lower quality. Triticale is best suited for grazing pasture. Because of its large stems, hay wilting and silage packing can be difficult.

- **Best Use: Fall & Spring Pasture; Silage & Hay (boot to dough stage)**

RYE

Rye offers the advantage of being the easiest cereal grain to establish in poor soils and having the greatest cold tolerance. Rye offers the greatest production for hay or pasture ground because of its quick growth both in the fall and spring.

- **Best Use: Fall, Winter & Spring Pasture**

SPRING OATS

Oats can be planted in the fall, as long as it's early enough to justify 60 - 90 day production.

- **Best Use: Silage (milk to dough stage); Hay (boot to heading stage)**

WHEAT

Wheat has good potential for forage and is usually higher in quality than rye, triticale and oats but not barley. However, wheat usually produces more dry matter than barley.

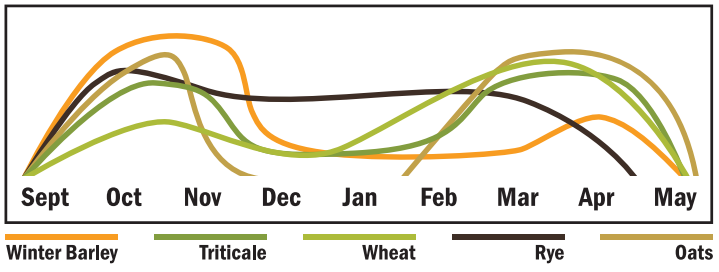
- **Best Use: Fall & Spring Pasture; Silage (boot to dough stage); Hay (boot to milk stage)**

WINTER BARLEY

Winter barley is the most susceptible to winterkill of the cereal grains. Consideration should be made when grazing late into the fall. Barley's value as a silage crop is the most comparable to whole-plant corn (90-100%).

- **Best Use: Fall Pasture; Silage & Hay (boot to dough stage)**

Relative Production of Small Grain Cereals



(Kansas State University)

FERTILITY

When utilizing cover crops as forage, it's critical to consider the nutrients being removed along with the biomass. These fertilizer levels will need to be added to ensure maximum nutrient availability for the following cash crop.

Removal Rates	
Wheat/Rye as Silage • Equivalent 60 bushel yield crop	80-100# N 40# P 60-70# K
Oats • Equivalent 80 bushel yield crop	70-90# N 30# P 100# K

HAY PRODUCTION

Hay yields often average between 2 and 4 tons/acre. Moisture content should be between 15 - 20% moisture. Hay quality is more maturity-dependent at harvest than is silage.

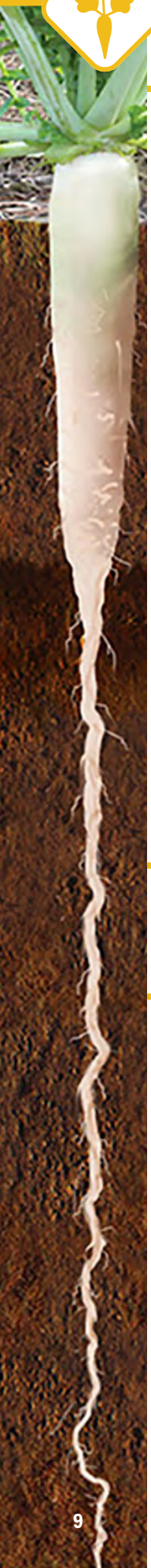
The most efficient time to harvest small grain cereals for hay is at early-milk stage. This allows for the greatest compromise between forage yield and quality (quality would be greatest at the late-boot stage). To help speed up drying, a crimper is recommended when harvesting in the late-boot stage.

SILAGE PRODUCTION

Wheat, barley, oat and triticale silage yields are similar, 4 - 7 tons/acre of 35% dry matter forage in the boot stage and closer to 6 - 10 tons/acre when harvested in the late-boot stage. Small grains should be ensiled at between 62 – 68% moisture. Chop length should be set finer than when harvesting corn or forage sorghum.

(Kansas State University)

BRASSICA COVER CROP OPTIONS



Tillage Radish®

COMPACTION ALLEVIATION | P & K CYCLING | EASY ESTABLISH

Tillage Radish® was selected based on performance in the field. This daikon type radish was evaluated across many different soil types and environments from the Northwest to across the upper Midwest and Transition Zone. A superior, deep, penetrating taproot is one characteristic that separates Tillage Radish® from other radish varieties - growing to a level of 3 - 6', based on soil type, region and planting date. The upper portion of the taproot (or tuber) can grow to a length of 12 - 24". Tillage Radish® germinates in just 2 to 3 days when moisture is present.

- **Reduces compaction and improves drainage and air/water movement (through rapid spring decay)**
- **Soaks up and releases nitrogen and other nutrients in spring when cash crops need it most**
- **Dense seed makes for easy planting, typically reaching full growth in 6 - 8 weeks (about 900 GDD)**
- **Shades out winter annuals and suppresses spring annual weeds**
- **Winterkills with temperatures in the teens**

CONSIDERATIONS:

- Benefits from nitrogen applications (30 - 60# N). Depending on goal, adding nitrogen and other nutrients may or may not be needed.
- Grows best in pH 6.0 – 7.5
- Avoid radish in cropping systems with other brassicas (disease bridge – club root)
- Radishes produce a compound when decaying that omits an odor similar to natural gas

Radish is an upright, cool season annual broadleaf. After winter rye, perhaps no cover crop species has been planted on more acres than radish. Radish tubers and taproots reduce compaction and scavenge excess nutrients left in the soil from cash crops. Radish stands suppress weed growth, reduce soil and wind erosion, and increase soil microbial activity, especially when mixed with a grass or small grain cover crop. Tolerant of many kinds of manure, radishes work especially well after late summer applications.

PLANTING WINDOW

1. NO LATER THAN AUGUST 10
2. NO LATER THAN AUGUST 20
3. NO LATER THAN SEPTEMBER 1
4. NO LATER THAN SEPTEMBER 10
5. NO LATER THAN SEPTEMBER 25

CONTROL RADISH (OILSEED TYPE)

COMPACTION ALLEVIATION | P & K CYCLING | EASY ESTABLISH

- **Up to 90% nematode control (sugar beet cyst nematode)**
- **Alleviates soil compaction vertically and horizontally**
- **Suppresses weed growth**
- **Excellent at scavenging residual nitrogen and other nutrients**
- **Reduced odor when decomposing**

There are two 'types' of radish to distinguish. Daikon types are strong biomass producers, making them a great option for fall grazing. Daikon types (like Tillage Radish®) have been bred to produce a deep taproot. Some oilseed radish varieties (like Control) provide the additional advantage of suppressing nematode populations. The oilseed varieties typically do not produce as deep of a vertical taproot, but still alleviates soil compaction with their lateral taproots and fibrous root system.

DAIKON TYPE RADISH ON THE LEFT, OILSEED TYPE RADISH ON THE RIGHT

BRASSICA COVER CROP OPTIONS

RAPESEED

- **Deep, fibrous root system, scavenging both nitrogen and soluble phosphorus**
- **Strong biomass production makes it great for fall and winter grazing**
- **Offers the most grazing cycles of the brassica family when planted in late summer/early fall**
- **Performs well in poor soil fertility conditions**
- **Likely to overwinter in Transition Zone and South**

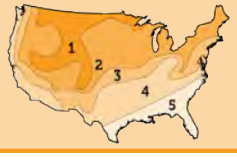
P & K CYCLING | COMPACTION ALLEVIATION | EASY ESTABLISH

CONSIDERATIONS:

- Rapeseed can be more difficult to control with only glyphosate
- Prefers soils with a pH 5.8 – 8.0
- Rapeseed may attract some non-beneficial pests

PLANTING WINDOW

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1



TURNIPS

- **Various types and varieties deliver different benefits, based on leaf/bulb ratio**
- **Small seed size is conducive for easier planting (especially in broadcast applications)**
- **Good tolerance to dry weather**
- **Good early season weed suppression**
- **Aids in breaking up compaction**
- **Longer stay-green improves sequestration of excess nutrients left from cash crops**

BIOMASS PRODUCTION | WEED SUPPRESSION | EASY ESTABLISH

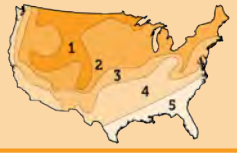
CONSIDERATIONS:

- Grows best in pH 5.5 – 6.8
- Avoid radish in cropping systems with other brassicas (disease bridge – club root)
- Turnips should be combined with other forages: lesser digestible grass or dry hay in ruminant animals (to prevent livestock disorders)
- Introduce livestock to turnips slowly

Turnips are an upright, cool season broadleaf which make the perfect dual-purpose cover crop. Their tubers and roots penetrate the soil and cycle nutrients. Early fall planted turnips provide a massive amount of dry matter, while helping to control erosion and suppress weeds. They also work great for forage, especially when mixed with small grains. While popular options like purple top turnips have large bulbs or tubers, some varieties are bred for lesser bulb size and larger tops. These options work especially well in grazing environments. Depending on how quickly they regrow, some varieties allow for multiple grazing cycles into fall and winter months.

PLANTING WINDOW

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1



VIVANT HYBRID BRASSICA

- **Known for its quick regrowth, even under close grazing**
- **As opposed to turnips, most of the energy of the plant is contained in the leaves**
- **High digestibility – suitable for dairy, beef and sheep**
- **When fed, brassicas need to be combined with other forages (no more than 1/3 of the total animal diet) to prevent potential livestock disorders**

BIOMASS PRODUCTION | WEED SUPPRESSION | EASY ESTABLISH

Vivant Hybrid Brassica is a quick-growing brassica (upright and spreading cool season annual) with very little bulb development. Vivant is best suited for multiple grazing cycle situations because of its excellent regrowth. It can be used to extend the grazing season in the fall or planted alongside warm season annuals for multiple grazings during the summer. With proper management (first grazing in 40 - 45 days AND subsequent grazing cycles every 25 - 30 days when grazed no less than 4"), it has the potential to yield over 5 tons of dry matter per acre.

LEGUME COVER CROP OPTIONS

CRIMSON CLOVER

NITROGEN FIXER | BIOMASS PRODUCTION | EASY ESTABLISH

- **Strong nitrogen fixing and high biomass potential – N production will be greatest when termination occurs at or after bud stage**
- **Really good shade tolerance – suitable for inter-seeding plantings in grass cash crops**
- **Good option for hay or grazing**
- **Increases water-holding ability and flowering stands attract many beneficial insects and pollinators**
- **Suitable for many cropping systems across the country, from potatoes to corn, to wheat to cotton**

Crimson clover is a semi-upright winter annual legume that germinates quickly and prefers well drained soil. Crimson tends to remain actively growing in cooler temperatures when warmer season clovers go dormant. Crimson can be successfully established in both fall and spring. To maximize success in late summer plantings, seed at least 6 - 8 weeks before frost. Spring plantings should occur after all danger of frost has passed.

CONSIDERATIONS:

- Heavy stands may attract voles and other pests
- Crimson clover can cause bloat
- Ideal pH of 5.5 – 7.0

FIXATION BALANSA CLOVER

POLLINATOR BENEFIT | BIOMASS PRODUCTION | NITROGEN FIXER

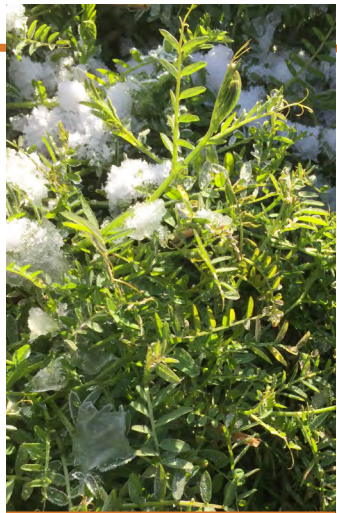
- **Erosion and runoff reduced by impressive growth and root mass**
- **Extremely drought tolerant**
- **Suitable for low pH environments (4.5 – 8.0)**
- **Great pollinator option**
- **Hollow stems provide greater palatability**
- **Dense growing clover provides good weed suppression**
- **Non-host to soybean cyst nematode**

Balansa clover is a small seeded annual legume that is quick to germinate, offers excellent forage production, and is well-adapted to a wide range of soil types. Established stands tolerate waterlogged and extreme pH soils. Due to the inherent cold tolerance of Fixation Balansa Clover, it can overwinter in climates where other annual clovers cannot.

CONSIDERATIONS:

- Quick to germinate, however it is slower to establish than other clovers (like crimson and red clover)
- Balansa is a prolific re-seeder; termination or grazing prior to flowering will reduce the risk of volunteer plants

WINTER HAIRY VETCH



BIOMASS PRODUCTION | POLLINATOR BENEFIT | NITROGEN FIXER

- **Strong nitrogen fixing and high biomass potential**
- **Reduces runoff and recharges soils during winter (water enters soil through pores created by the vetch root residue)**
- **Heavy mulch layer provides excellent weed suppression and erosion prevention**
- **Excellent to plant with cereal grain (helps spring control)**
- **Phosphorus scavenger**

Winter hairy vetch is a vigorous annual legume crop used for fixing nitrogen, biomass production and enhancing organic matter. It is slow to establish but an excellent choice for green manure. Its low carbon to nitrogen ratio (C:N) allows for quick plant decay and even quicker capture of nutrients in the soil profile. Hairy vetch tends to be tolerant of variable soil conditions, including low fertility environments, and prefers soil pH 5.5 – 7.5. Hairy vetch will overwinter in many areas of the country (USDA Zone 3 - 4) withstanding temperatures down to -25 to -30°F, especially where snow is likely.

CONSIDERATIONS:

- Little forage value (seeds/vegetation may harm livestock)
- Glyphosate alone may not be sufficient; close mowing or light disc for spring control
- High hard seed % requires proper spring management
- Keep off poorly drained sites
- Potential correlation of increased soybean cyst nematode/root knot nematode

LEGUME COVER CROP OPTIONS

WINTER PEAS

- **Strong nitrogen fixer and very high biomass potential**
- **Quick growth; good for weed suppression**
- **Plant 6 - 8 weeks before first frost to maximize growth and nitrogen production (bud stage or after)**
- **Hardy to USDA Zone 6 (-5 to -10° F)**
- **Spring peas planted in fall (as in SF 125) need 60 - 90 days to maximize growth**

BIOMASS PRODUCTION
WEED SUPPRESSION
NITROGEN FIXER

Winter peas are a rapid, low growing annual legume used across the country as a nitrogen fixing cover crop and/or a quickly decomposing green manure crop. The forage value of winter peas along with their overall management are benefited when planted alongside a cereal grain.

CONSIDERATIONS:

- Ideal soil pH 6.0 – 7.0
- Not the best option to sequester nutrients and/or break up compaction
- Large seed size makes broadcast applications more difficult
- Mowing or forage harvest in spring will terminate crop

6+ HARDINESS ZONE

SUNN HEMP

- **Produces significant amounts of nitrogen in 60 days depending on conditions**
- **Tolerant of dry conditions and low fertility**
- **Can add up to 5,000+ lbs. of biomass per acre in 7 - 8 weeks**
- **Research has shown levels of nematode suppression (root knot, burrowing)**

WEED SUPPRESSION
BIOMASS PRODUCTION
NITROGEN FIXER

Sunn hemp is a warm season legume, upright and quick in its growth habit. Sunn hemp requires 60° F soil temps before it can be planted and will kill at the first signs of frost. Higher seeding rates of sunn hemp will help with summer annual weed suppression.

CONSIDERATIONS:

- Prefers soil pH above 6.0 (6.0 – 7.0)
- Kills at first frost, or controlled by mowing or herbicide at first flower for maximum benefit
- Residue (green manure) should be incorporated while still green
- In far southern areas (below 28° latitude), sunn hemp will produce seed which can be toxic to livestock

FROST HARDINESS ZONE

FROSTY BERSEEM CLOVER

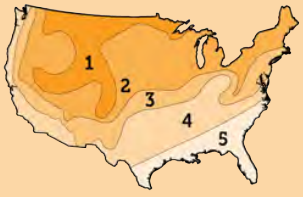
- **Good weed suppression - very large amount of biomass**
- **Highly nutritious (18-28% protein)**
- **Non-bloating legume - great for livestock forage**
- **More saline tolerant than alfalfa or red clover (pH 4.8 – 7.8)**
- **Tolerates waterlogged soil**
- **Initially slow to establish, but then grows quickly - expect forage to be ready in about 8 weeks**

WEED SUPPRESSION
BIOMASS PRODUCTION
NITROGEN FIXER

Berseem clover is a summer/winter annual legume known for its ability to tolerate waterlogged soils and soil salinity while providing higher protein levels than many other legumes. Most berseems winterkill in northern climates, however Frosty Berseem Clover offers improved winter tolerance.

8 HARDINESS ZONE

PLANTING WINDOW



CRIMSON & BALANSA CLOVER:

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1

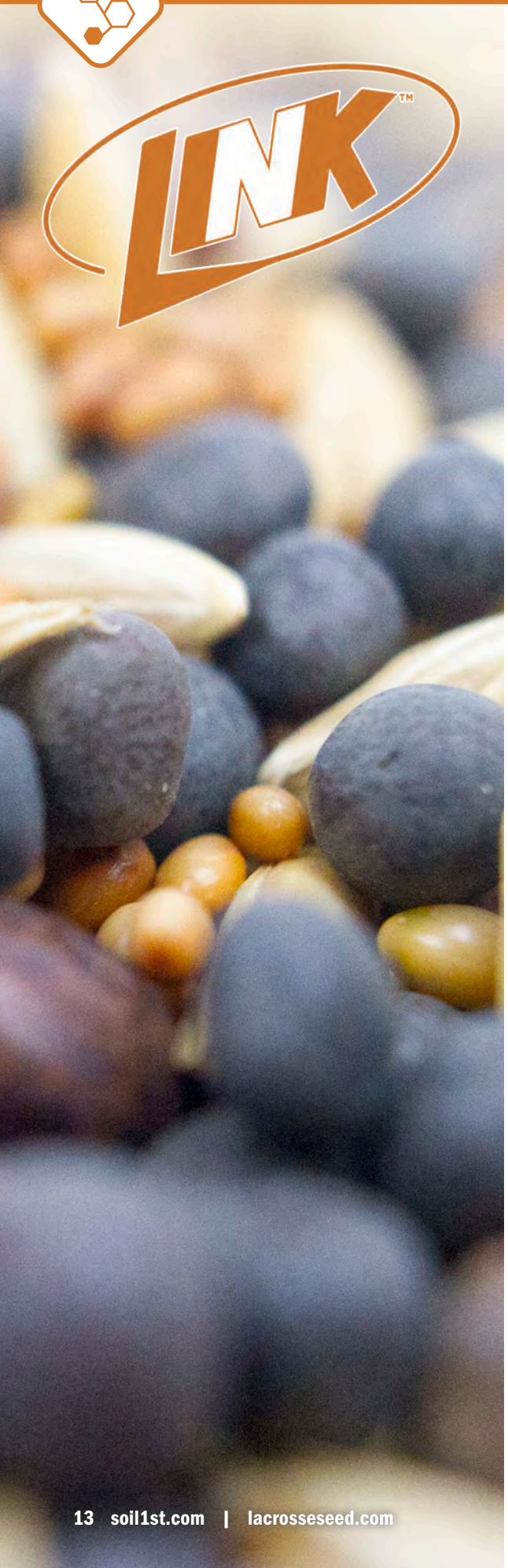
WINTER PEAS & HAIRY VETCH:

1. NO LATER THAN SEPTEMBER 1
2. NO LATER THAN SEPTEMBER 10
3. NO LATER THAN SEPTEMBER 20
4. NO LATER THAN OCTOBER 1
5. NO LATER THAN NOVEMBER 10

SPRING PEAS & BERSEEM CLOVER:

1. NO LATER THAN AUGUST 10
2. NO LATER THAN AUGUST 20
3. NO LATER THAN SEPTEMBER 1
4. NO LATER THAN SEPTEMBER 10
5. NO LATER THAN SEPTEMBER 20

IMPORTANCE OF INOCULATING LEGUMES



It is well known that rhizobia bacteria inoculants are crucial to allowing a legume to properly fix nitrogen (N). To maximize nitrogen production in cover crop legumes, and provide increased benefit for the following corn or grass crop it is vital to inoculate cover crop legumes. In most cases, the proper rhizobia background population to nodulate the cover crop legumes are not present in the soil. The challenge is that for most common legumes planted as cover crops there is no viable option to "pre-inoculate" these seeds. The rhizobium that nodulate cover crop legumes are fragile and very susceptible to desiccation. In most cases they do not survive on the seed beyond 24 hours. Beware of cover crop seed that is marketed as pre-inoculated. In most cases, there will be minimal surviving rhizobia.

SEED LOT	RESULTS
Lot A	<100 CFU/SEED
Lot B	<140 CFU/SEED
Lot C	<100 CFU/SEED

To validate this message, we recently tested 3 lots of coated crimson clover from distributors across the Midwest (December 2017). All 3 lots included seed tags showing updated testing in the fall of 2017, as well as inoculant claimed to be effective until February 2019. Here's what we found out:

For clover-sized seed, the acceptable level of rhizobia would be 1,000 per seed, according to the widely used Ag Canada standard. Even though these crimson clover lots contained rhizobia deemed to NOT expire until February of 2019, the actual amounts were merely 1/10 of the minimum standard. This level of rhizobia will generally do a poor job of nitrogen fixation. Pre-inoculation of certain legume species months (or even weeks) ahead of planting is thus not recommended.

To maximize N production from cover crop legumes, we recommended adding fresh inoculant to the seed at the time of planting. Keep in mind, crimson clover, peas, vetches, etc. all require their own specific strains. Likewise, any leftover soybean or alfalfa inoculant will not work with cover crops.

Soil First® LINK™ Inoculant is a unique, peat-based product that will inoculate all the common cover crop legumes in one convenient package. In many cover crop mixes, legumes generally make up only a portion of the mix, along with grasses and other seeds. Soil First® LINK™ Inoculant was designed to be applied to the entire mix, offering ease of use and convenience. The advantage of applying inoculant to the entire mix is that the non-legume seed components "carry" the inoculant into the soil, where the legumes need it. This benefit provides more complete nodulation of the legume and enhanced nitrogen fixation than if the inoculant was applied only to the legume seed.

OFFERS 170.25 TRILLION CFU'S/3.75 LB BAG

Assuming crimson clover is 150,000 seeds/LB, that's **2,270 CFUs per seed**

- **LINK™ Inoculant is provided with all Soil First® cover crop mixes that include legumes (on orders ≥ 500 lbs.).**
- **LINK™ is available individually for custom mixes and other legume products.**
- **LINK™ is offered in a package that treats 500 pounds of seed, matching up well with both 50# bags as well as 2000# bulk bags.**
- **LINK™ can be used effectively on over 50 legumes making it a super-convenient option for forage plantings**
- **How long will LINK™ stay viable after it's been applied to the seed?** 24 hours
- **Is LINK™ a GMO product?** No, there are no ingredients of LINK™ that would render it a GMO. For more info on LINK™, visit **lacrosseseed.com/link**

ONLINE RESOURCES

**Soil First® LINK™ Inoculant is only provided on orders of at least 500 lbs*

ANNUAL RYEGRASS

COMPACTION ALLEVIATION | WEED SUPPRESSION | EROSION CONTROL | EASY ESTABLISH

- **Establishes quickly - excellent at controlling erosion and suppressing weed development**
- **Ability to break up hard pans and alleviate compaction with its deep root system**
- **Fibrous root system is excellent at scavenging residual nitrogen**
- **Tolerant to poor soil conditions & tolerant to flooding once established**
- **Good for fields where manure applications are likely**
- **Proven to help reduce soybean cyst nematode populations**
- **Beware of annual ryegrass blends - harder to manage because they exhibit different maturity stages when herbicide control is needed in the spring**

Annual ryegrass is a quick growing, cool season annual grass. Annual ryegrass has come under scrutiny recently as a cover crop, however the species still provides many benefits across the Midwest: nutrient sequestration, erosion control and compaction alleviation. It also adds biomass and organic matter while improving soil structure. With proper management in areas where it over winters, annual ryegrass should be considered as a viable option - both for cover cropping and/or forage needs.

CONSIDERATIONS:

- Prefers pH between 6.0 – 7.0
- Intolerant of heat and dry weather
- Hundreds of annual ryegrass varieties are on the market – choose the best to meet your goals

PLANTING WINDOW

1. NO LATER THAN SEPTEMBER 5
2. NO LATER THAN SEPTEMBER 15
3. NO LATER THAN SEPTEMBER 25
4. NO LATER THAN OCTOBER 1
5. NO LATER THAN OCTOBER 10

HARDINESS ZONE

9 KEY DETAILS WHEN USING GLYPHOSATE FOR ANNUAL RYEGRASS BURNDOWN

1. **Use full glyphosate rates and include ammonium sulfate (AMS)**
2. **Check your water to ensure the correct pH levels**
3. **Standard or XR flat fan nozzles are the best for most applications (medium droplet size)**
4. **Keep spray application volume to 10 gallons/acre**
5. **Top growth should be taller than 4 - 8”**
6. **Soil temperatures need to be at least 45°F and climbing**
7. **Ambient air temperatures need to be above 55 - 60°F – delay applications when night-time temperatures drop below 38°F (ideally need 3 nights above 40°F)**
8. **Spray in the middle of the day (after dew has dried but 4 hours prior to sunset to allow for adequate translocation)**
9. **If a 2nd application is needed, wait at least 2 weeks after the 1st pass, annual ryegrass becomes harder to control after it joints (begins stem elongation)**

Oregon Ryegrass Growers - 2014
(RyegrassCovercrop.com)

COLDSNAP™ ANNUAL RYEGRASS

- **Excellent for scavenging nutrients and holding them for following crop**
- **Known for its dense root structure for added compaction relief**
- **Provides uniform stand maturity for easier spring control**
- **Slower to mature than cereal rye and other cereal grains**
- **ColdSnap™ has been screened and selected for cover crop use**
- **Superior winter hardiness when compared to other annual ryegrasses**

	ANNUAL COVER CROP FORAGE	PLANTING SEASON				CARBON/ NITROGEN RATIO (C:N)	SEEDING INFORMATION									
		SPRING	SUMMER	LATE SUMMER	FALL		SEEDING RATE (DRILL) LBS/ACRE	SEEDING RATE (MIX) LBS/ACRE	SEEDING RATE (FOR FORAGE) LBS/ACRE	SEEDING DEPTH (WITH DRILL)	SEEDS/LB	SEEDING TIME	BULK DENSITY * LBS/FT^3	AERIAL SEEDING RATE*	GERMINATION SOIL TEMPERATRURE (DEGREES FAHRENHEIT)
BRASSICA/MUSTARD	Daikon Radish			✓		Tops - 9:1	3 - 8	1 - 3	5 - 8	¼”	30 - 40,000	Aug-Sep	44	3-8	45°
	Oilseed Radish			✓		Tops - 9:1	8 - 12	3 - 8	8 - 12	¼”	30 - 40,000	Aug-Sep	44	6-12	45°
	Turnips (Top)			✓		Tops - 9:1	2 - 6	2 - 4	3 - 8	¼”	220,000	Aug-Sep	45	2-6	45°
	Vivant Brassica		✓	✓		10:1 - 15:1	4 - 6	2 - 3	5 - 6	¼”	165,000	July-Sep	44	5-6	45°
	Forage Collards	✓	✓	✓		15:1 - 25:1	5 - 12	1 - 4	10 - 12	¼” - ½”	175,000	Mar-Apr; Aug-Oct	44	8-12	40°
	Rapeseed	✓		✓		20:1 - 22:1	4 - 6	2 - 4	6 - 8	¼” - ½”	145,000	Apr-May; Aug-Sep	45	5-8	41°
	Yellow/White Mustard	✓		✓		20:1 - 30:1	6 - 15	2 - 5	◦	¼” - ¾”	100,000	Apr-May; Aug-Sep	46	10-15	40°
LEGUMES	Crimson Clover	✓		✓		15:1 - 20:1	10 - 15	4 - 8	6 - 15	¼”	150,000	Feb-Mar; Aug-Sep	52	6-15	42°
	Berseem Clover	✓		✓		15:1 - 20:1	8 - 20	5 - 10	15 - 20	¼”	150,000	Mar-Apr; Aug-Sep	52	6-15	40°
	Balansa Clover	✓		✓		15:1 - 20:1	3 - 6	1 - 4	3 - 6	¼”	500,000	Feb-Mar; Aug-Sep	56	3-6	40°
	Winter Hairy Vetch			✓	✓	10:1 - 15:1	15 - 30	10 - 20	30 - 40	1”	16,000	Aug-Sep	52	NR	60°
	Sunn Hemp		✓	✓		18:1 - 29:1	15	5 - 8	5 - 15	½” - 1”	15,000	July-Sep	◦	NR	65°
	Austrian Winter Peas			✓	✓	15:1 - 20:1	30 - 80	10 - 30	40 - 60	1”	2,000	Aug-Sep	52	NR	41°
	Peas (Hay)	✓		✓		20:1 - 25:1	75 - 120	10 - 50	75 - 120	1”	3,000	Mar-Apr; Aug-Sep	50	NR	41°
	Peas (Silage)	✓		✓		Pea Straw - 29:1	75 - 120	10 - 50	75 - 120	1”	3,000	Mar-Apr; Aug-Sep	◦	NR	41°
	Peas and Oat Mix	✓	✓	✓	✓	◦	75 - 120	◦	75 - 120	¾” - 1”	Varies	Mar-Apr; Aug-Sep	◦	NR	41°
	Medium Red Clover	✓		✓	✓	12:1 - 16:1	8 - 12	6 - 8	8 - 12	¼”	270,000	Feb-May; Aug-Oct	48	4-10	41°
GRASSES	Annual Ryegrass	✓		✓	✓	Vegetative - 20:1	15 - 30	10 - 15	25 - 35	¼”	215,000	Mar-Apr; Aug-Oct	32	15-35	40°
	Spring Oats (Hay)	✓		✓		Vegetative - 20:1	30 - 50	20 - 40	80 - 120	¾” - 1”	15 - 18,000	Mar-Apr; Aug-Sep	38	20-60	38°
	Spring Oats (Silage)	✓		✓		Straw - 80:1	30 - 50	20 - 40	80 - 120	¾” - 1”	15 - 18,000	Mar-Apr; Aug-Sep	◦	20-60	38°
	Fall Rye (Hay)			✓	✓	Vegetative - 20:1	30 - 50	20 - 40	80 - 120	¾” - 1”	16 - 18,000	Aug-Oct	50	20-60	34°
	Fall Rye (Silage)			✓	✓	Straw - 70:1	30 - 50	20 - 40	80 - 120	¾” - 1”	16 - 18,000	Aug-Oct	◦	20-60	34°
	Triticale (Fall)			✓	✓	Vegetative - 20:1	30 - 50	20 - 40	80 - 120	¾” - 1”	14 - 16,000	Aug-Oct	48	20-60	38°
	Triticale (Spring)	✓		✓		Straw - 80:1	30 - 50	20 - 40	80 - 120	¾” - 1”	14 - 16,000	Mar-Apr; Aug-Sep	◦	NR	38°
	Barley (Fall)			✓	✓	Vegetative - 20:1	30 - 50	20 - 40	80 - 120	¾” - 1”	14 - 16,000	Aug-Oct	40	20-60	38°
	Barley (Spring)	✓		✓		Straw - 80:1	30 - 50	20 - 40	80 - 120	¾” - 1”	14 - 16,000	Mar-Apr; Aug-Sep	◦	NR	38°
	Wheat (Hay)			✓	✓	Vegetative - 20:1	30 - 50	20 - 40	80 - 120	¾” - 1”	11 - 12,000	Aug-Oct	48	20-60	38°
	Wheat (Silage)			✓	✓	Straw - 80:1	30 - 50	20 - 40	80 - 120	¾” - 1”	11 - 12,000	Aug-Oct	◦	20-60	38°
	Forage Sorghum		✓			Vegetative-20:1	6 - 20	◦	6 - 20	¾” - 1 ½”	17,000	May-July	45	NR	65°
	Sorghum x Sudan		✓			Leftover Stalks-80:1	25 - 70	5 - 20	25 - 70	¾” - 1 ½”	21,000	May-July	45	NR	65°
	Sudangrass		✓			◦	20 - 45	◦	20 - 45	½” - 1”	43,000	May-July	40	NR	65°
	Teff Grass		✓			Vegetative - 20:1	8 - 12	◦	8 - 12	¼”	1,300,000	May-July	◦	NR	65°
	Pearl Millet		✓	✓		12:1 - 20:1	20 - 30	5 - 20	20 - 30	½” - 1”	60,000	May-Aug	42	NR	65°
	German Millet		✓	✓		12:1 - 20:1	20 - 25	5 - 15	20 - 25	1”	220,000	May-Aug	◦	NR	65°
	White Proso Millet		✓	✓		12:1 - 20:1	20 - 30	5 - 20	20 - 30	1"	80,000	May-Aug	37	NR	65°
SOIL FIRST® MIXES	SF 101 Cover Starter			✓	✓	◦	30 - 35	◦	40 - 50	¼” - 1”	◦	Aug-Sep	48	30-40	45°
	SF 102 Cover Starter+			✓	✓	◦	30 - 35	◦	40 - 50	¼” - 1”	◦	Aug-Sep	54	30-40	45°
	SF 125 N-Hancer		✓	✓		◦	35 - 40	◦	40 - 50	¼” - 1”	◦	July-Sep	44	NR	45°
	SF 140 Multi-Purpose		✓	✓	✓	◦	35 - 40	◦	40 - 50	¼” - 1”	◦	July-Sep	50	NR	45°
	SF 142 Classic		✓	✓		◦	12 - 15	◦	15 - 20	¼” - ½”	◦	Aug-Sep	52	20-25	45°
	SF 150 Field Fit		✓	✓		◦	30 - 35	◦	40 - 50	¼” - 1”	◦	Aug-Sep	36	30-40	45°
	SF 160 Rooting			✓	✓	◦	15 - 20	◦	20 - 25	¼” - ½”	◦	Aug-Sep	50	20-25	45°
	SF 167 Summer Grazer		✓	✓		◦	25 - 30	◦	25 - 30	¼” - 1”	◦	July-Sep	50	NR	60 - 65°
	SF 175 AccuSpread			✓	✓	◦	20 - 25	◦	25 - 30	¼”- ½”	◦	Aug-Sep	35	25-30	45°
OTHER	Phacelia		✓	✓		12:1 - 18:1	8	1 - 2	8	¼”	230,000	Jun-Sep	◦	8-10	37°
	Sunflower		✓	✓		Leaves 20:1, Stalks 40:1	3 - 5	1 - 2	3 - 5	¾” - 1”	8,000	May-Aug	28	NR	50°
	Buckwheat	✓	✓			10:1 - 18:1	40 - 55	5 - 20	40 - 55	½” - 1”	15,000	May-Aug	40	NR	65°
	Sugar Beet		✓	✓		Tops - 19:1	2 - 5	1 - 3	2 - 5	¼”	10,000	May-July	24	NR	50°

Days to Harvest = Estimations based on average growing season to reach optimum quality

*** +/- 5%. Bulk Density averages are only a guide. Moisture, humidity and seed quality all affect bulk density.**

REFERENCES: Texas Tech University, Oklahoma State University, Iowa State University, Mississippi State University, North Dakota State University, Colorado State University, University of Florida, Michigan State University, University of Wisconsin, Kansas State University

		NON-FORAGE BENEFITS									NUTRITIONAL VALUE INFORMATION (VALUES VARY GREATLY DEPENDING ON MATURITY)										
			NON-FORAGE BENEFITS (5 = EXCELLENT, 1 = POOR)																		
USDA HARDINESS ZONE	DAYS TO EMERGENCE	NITROGEN FIXES OR SCAVENGES	COMPACTION ALLEVIATION	WEED SUPPRESSION	BIOMASS PRODUCTION	EROSION CONTROL	DISEASE/PEST CONTROL	POLLINATOR/ BENEFICIALS	P & K CYCLING	EASE OF ESTABLISHMENT	CRUDE PROTEIN	NEL † MCAL/LB	ADF% ‡	NDF% ◇	TDN	DM TONS PER ACRE	DAYS TO 1ST HARVEST	DAYS TO NEXT HARVEST	GRAZE	BALEAGE	CHOP
† - Net Energy for Lactation = Energy available after subtracting digestive and metabolic losses | ‡ - Acid Detergent Fiber = Low values mean more digestible | ◇ - Neutral Detergent Fiber = Low values mean cows can eat more																					
9	3 - 5	Scavenger	5	5	4	4	3	2	4	5	18	0.73	26	21	70	2-4	45	◦	+++	◦	+
9	3 - 5	Scavenger	4	5	4	4	4	3	4	5	18	0.73	26	21	70	2-4	45	◦	+++	◦	+
6 - 7	4 - 10	Scavenger	3	5	4	3	3	3	3	5	16	0.70	23	20	69	2-5	60-80	◦	+++	◦	+
7	4 - 6	Scavenger	3	4	4	3	3	3	3	5	14	◦	23	22	78	2-5	35-40	25-30	+++	++	+
5	4 - 10	Scavenger	3	4	4	4	3	3	3	5	20	0.74	25	21	70	2-4	35-40	25-30	+++	◦	+
5	4 - 10	Scavenger	5	3	4	4	4	4	4	5	14	TBD	28	41	57	1.5-4	60-80	◦	+	++	+++
7	5 - 7	Scavenger	4	3	4	3	4	5	3	5	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	-
7	7 - 10	Fixer	2	4	3	3	3	3	3	4	17	0.56	31	42	59	.5-2	60	◦	++	+++	+
8	5 - 8	Fixer	2	4	3	4	1	3	4	4	18	0.73	23	36	69	1-2.5	60	◦	+	+++	++
5	14	Fixer	3	4	4	4	3	5	3	4	16	TBD	31	45	65	1-4	40-50	◦	++	+	+++
3 - 4	14	Fixer	3	4	4	3	3	5	4	3	26	0.58	33	48	64	1-3	Spring	◦	+++	◦	+
Frost	3 - 7	Fixer	2	4	5	3	3	4	3	3	25	---------- Varies Greatly ----------				1-5	40-45	◦	+++	+	++
6+	9	Fixer	2	4	3	3	3	4	2	4	28	0.60	38	54	70	0.5-2	Spring	◦	++	+	+++
Frost	9	Fixer	2	4	3	3	3	4	2	4	10	0.60	52	62	60	1.5-3	60-80	◦	++	+	+++
Frost	9	Fixer	2	4	3	3	3	4	2	4	16	0.58	44	55	58	1.5-3	60-80	◦	◦	+	+++
Frost	5 - 9	Both	2	4	4	4	3	3	3	4	17	0.57	30	57	59	3-5	60	◦	++	+	+++
4	7 - 10	Fixer	4	4	4	3	2	4	4	3	16	0.56	36	46	55	2-5	Spring	40	++	+++	+
6	7	Scavenger	5	5	3	5	3	2	3	5	9	0.58	38	65	58	.5-2	90	◦	++	+	+++
7	5 - 8	Scavenger	2	4	5	4	3	1	3	4	10	0.54	39	63	54	3-6	60-70	◦	++	+	+++
7	5 - 8	Scavenger	2	4	4	4	3	1	3	4	12	0.60	39	59	60	1.5-3.5	80	◦	◦	+	+++
3	5 - 8	Scavenger	4	5	4	5	3	1	4	4	10	0.58	38	65	58	3-5	Spring	◦	+	++	+++
3	5 - 8	Scavenger	4	5	4	5	3	1	4	4	14	0.59	37	59	59	2.5-4	Spring	◦	◦	+	+++
3	6 - 8	Scavenger	2	4	5	4	3	1	4	4	12	0.58	41	69	56	2.5-4	Spring	◦	+	++	+++
3	6 - 8	Scavenger	2	4	5	4	3	1	4	4	12	0.58	39	56	58	3-4	50-60	◦	++	+	+++
6	6 - 8	Scavenger	1	4	5	4	3	2	3	4	9	0.57	37	65	57	3-4	Spring	◦	++	+	+++
6	6 - 8	Scavenger	1	4	5	4	3	2	3	4	12	0.58	37	58	59	2-4	50	◦	++	+	+++
3	6 - 10	Scavenger	3	4	4	5	3	1	4	4	9	0.57	38	66	59	2-3	Spring	◦	++	+++	+
3	6 - 10	Scavenger	3	4	4	5	3	1	4	4	12	0.59	37	62	59	2-3	Spring	◦	◦	+	+++
Frost	10	Scavenger	4	5	5	4	4	3	3	4	9	0.59	38	59	59	6-9	80-105	◦	++	+	+++
Frost	10	Scavenger	4	5	5	4	4	3	3	4	16	0.70	29	55	55	5-8	45-70	30	+	++	+++
Frost	3 - 5	Scavenger	4	5	5	4	4	3	3	4	9	0.57	43	67	57	2-6	50	30	+	++	+++
Frost	3 - 5	Scavenger	1	3	3	4	3	2	3	4	18	0.60	33	57	64	3-5	35	25	◦	+	+++
Frost	3 - 5	Scavenger	3	5	5	4	4	3	3	5	16	0.66	39	48	52	3-6	45	35	++	+	+++
Frost	3 - 5	Scavenger	3	3	4	5	3	1	3	4	14	N/A	34	60	60	2-4	50	◦	+++	◦	◦
Frost	3 - 5	Scavenger	3	3	4	5	3	1	3	4	12	N/A	39	72	62	1.5-2.5	50	◦	+++	◦	◦
◦	Varies	Scavenger	5	5	5	4	3	2	4	4	10-13	Nutrition values vary due to differences in the forage quality of the mix components and differences in how and when each component is harvested (grazed versus baleage)				2-5	45-50	Spring	+++	+	++
◦	Varies	Both	5	5	4	5	3	2	4	4	12-15					2-5	45-50	Spring	+++	+	++
◦	Varies	Fixer	4	4	4	5	2	3	4	4	14-18					2-5	45-50	◦	+++	+	++
◦	Varies	Both	4	5	5	3	3	2	3	5	11-14					3-5	45-50	25	+++	+	++
◦	Varies	Both	4	3	3	3	3	3	4	4	16-18					2-4	45-60	Spring	+++	+	++
◦	Varies	Scavenger	5	5	4	3	3	2	3	5	13-17					2-4	45-50	◦	+++	◦	+
◦	Varies	Scavenger	5	4	4	4	4	3	4	4	10-14					2-4	45-50	Spring	+++	+	++
◦	Varies	Both	4	5	5	4	4	4	3	3	10-14					3-6	40-45	◦	+++	+	++
◦	Varies	Both	5	4	4	4	4	3	4	4	10-16					2-5	45-50	Spring	+++	+	++
8	10 - 14	Scavenger	2	5	3	3	4	5	2	4	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	+
Frost	4 - 10	Scavenger	4	3	3	4	3	5	4	3	11	TBD	36	42	63	2-3	Varies	◦	+++	◦	++
Frost	3 - 5	Scavenger	3	5	4	2	1	5	5	5	12	0.68	33	44	65	1.5-4	60	◦	++	◦	+
8	7 - 14	Scavenger	4	4	4	3	3	2	3	4	14	0.58	14	25	58	2-4	60-80	◦	+++	◦	+
Some Benefit = +		Not Recommended = ⊘								Alfalfa (Silage)	18	0.55	37	49	55	3-8	◦	30	◦	◦	+++
More Benefit = ++		Not Applicable = ◦								Alfalfa (Hay)	19	0.59	35	45	59	3-8	◦	30	+	++	+++
Best Benefit = +++										Corn (Silage)	8	0.74	27	46	72	7-10	120	◦	◦	◦	+++

SUMMER SEEDED COVER CROPS

When the opportunity exists to plant early, warm season annuals provide large amounts of biomass while improving soil tilth and absorbing excess nutrients left behind from cash crops. Summer Annuals provide quality forage suitable for all classes of ruminants (usually during periods where traditional perennial crops are less effective). Although sometimes referred to as "emergency forage", summer annuals can be part of a planned cover crop program where the dual benefit of forage is the goal.

TIPS FOR MANAGING SUMMER ANNUALS AND OTHER COVER CROPS FOR FORAGE

NITRATE TOXICITY is common when fertility or manure applications are followed by a period of drought or stress. Cut plants do not lessen in their nitrate levels as they cure. If high levels are suspected, forage should be tested for a period of a few weeks until levels subside. Though often linked to summer annual grasses, increased nitrate levels can show up in most cover crops and forages.

1. Nitrates are concentrated more in the lower stalk – raising cutting height can reduce the risk
2. When a stressful drought precedes a moisture event, it is recommended to delay harvest by 1 - 2 weeks
3. Consider split applications of nitrogen (especially useful on summer annuals) to decrease nitrate accumulations

PRUSSIC ACID poisoning can occur when feeding forage sorghums after periods of drought or other stress, including frost. Toxic levels dissipate usually after 2 - 3 weeks and will further decrease when ensiled. Prussic acid is most concentrated in new growth, so sorghum forages should not be grazed until they are at least 18" tall. Storing hay or silage for at least 30 days generally dissipates the concern.

BRASSICA CROPS can cause animal health disorders if not grazed properly. Introduce grazing animals to brassica pastures slowly (usually over 3 - 5 days). With extremely high forage values, brassicas can cause problems if hungry animals are turned out into predominate brassica pastures. Even though traditional recommendations allow for 2/3, we actually recommend keeping brassicas to under 1/3 of the grazing animal's diet - always supplement brassicas with dry hay or other grasses (higher in fiber).

BLOAT can be an issue with most legume species. Reduce bloat by:

1. Utilizing grasses alongside the legumes
2. Pre-fill livestock with coarse hay prior to turning onto pasture, ensuring animals are not turned out to fresh pasture when hungry
3. Do not start grazing when the pastures are wet from dew or rain

GRASS TETANY can occur when grazing lush cereal grain crops in the spring or fall. Tetany risk can be lessened by adding legumes (which offset low magnesium levels that induce tetany) and by keeping livestock out of fields recently fertilized or manured.

GRAZING SUMMER SEEDED COVER CROPS IN NE

When fields are open during late spring /summer, whether part of a planned system or created by unfortunate weather, it's critical to keep soils covered, taking advantage of the longer seeding window to maintain soil health benefits.

1 **DO SOMETHING.** Leaving the ground fallow greatly increases the threat of soil erosion and improves the likelihood of leaching nitrates, sulfates and other nutrients that could be utilized by the following year's crop. Bare ground also encourages the risk of "Fallow Syndrome" the following year. **Fallow Syndrome** occurs when there is no plant growth in an area for an extended period of time. Populations of "good fungi", called active mycorrhizae, are reduced because they need actively growing roots to survive. These fungi are dependent on host plants to complete their life cycle. Adding a grass (ryegrass, oats, etc.) or a legume such as peas or hairy vetch are extremely beneficial and will better support the good fungi in the soil. Corn and small grains tend to be more affected by fallow syndrome, although it has also been reported as an issue in soybean stands. Planting some kind of annual crop on prevented planting acres or on drowned-out spots can help maintain levels of mycorrhizae in the soil. From a biological standpoint, weeds could serve as a "cover crop" to help prevent fallow syndrome, but the resulting weed seed production and contributions to the weed seed bank may lead to increased weed management issues in the future.

2 **DETERMINE YOUR GOALS.** The crop rotation goals of the producer should help steer the decision on what cover crop species to utilize. Normally, crop harvest limits the time available to plant a cover crop, but because the planting window is now early, just about everything can be considered. Again, this should depend on what the producer wants to accomplish with the cover crop planting.

3 **UNDERSTAND THE GUIDELINES.** If taking the full prevented plant option, haying or grazing is not allowed until after November 1 (or other dates in the Midwest, depending on state or region). Please check with your local state or county FSA office for further info on grazing restrictions with this program, or find resources at **lacrosseseed.com/resources**

ONLINE RESOURCES

4 **THINK ABOUT HERBICIDE RESTRICTIONS.** Consider herbicides already applied on the acres not yet planted. In many cases, cover crops and other non-traditional crops will not be listed on the herbicide label. The University of Wisconsin and other land grant universities are doing more and more work to help determine what options farmers have in the case of "prevent plant" or other cropping systems that offer quick seeding windows. If a cover crop is being planted for a non-forage goal (and will not be harvested), the grower then assumes the risk if that cover crop doesn't appear on the herbicide label. However, if that cover crop will be harvested as forage, either mechanically or by livestock, then rotational restrictions on the label must be followed. For more information, visit **lacrosseseed.com/resources**

ONLINE RESOURCES

5 **USE MIXES.** Using cover crop mixes allows for diversity and the opportunity to spread risk. Mixes also allow for reduced weather risks, help break pest cycles and prevent erosion that some monoculture species are vulnerable to. Added benefits include nitrogen fixing and improved soil health as well.

PREVENT PLANT OPTION	EARLIEST PLANTING DATES	COMPACTION BUSTER	EROSION PREVENTER	NITROGEN FIXER	NUTRIENT SCAVENGER	WEED SUPPRESSOR	FORAGE PROVIDER
GRASSES							
Annual Ryegrass	July 10	+++	++	◦	+++	++	++
Winter (Fall) Rye	July 10	++	+++	◦	+++	+++	+++
Winter Wheat	July 10	+	+++	◦	+++	++	++
Winter Triticale	July 10	+	+++	◦	+++	++	+++
Winter Barley	July 10	+	++	◦	++	++	++
Spring Oats	July 10	+	++	◦	++	++	++
Millets	May 20	+	++	◦	++	++	++
Sorghum x Sudangrass	May 20	+	++	◦	+++	+++	+++
Sudangrass	May 20	+	++	◦	+++	+++	+++
Teff Grass	May 20	◦	+	◦	++	+	+++
BROADLEAVES							
Buckwheat	June 1	◦	+	◦	++	++	◦
Sunflower	June 1	++	+	◦	++	++	++
LEGUMES							
Crimson Clover	July 25	+	++	+++	++	++	++
Red Clover	July 25	+	+++	+++	++	+++	+++
White Clover	July 25	◦	++	++	++	++	+++
Berseem Clover	July 25	+	++	+++	++	++	++
Cowpea	May 1	◦	+	+++	+	+	+++
Winter Peas	July 25	+	++	++	+	+	++
Hairy Vetch	July 25	+	++	+++	++	++	+
Sunn Hemp	June 1	◦	++	+++	+	++	+
BRASSICAS							
Daikon Radish	July 25	+++	++	◦	+++	+++	++
Oilseed Radish	July 25	++	++	◦	+++	+++	+
Turnip	July 25	+	++	◦	+++	++	++
Rapeseed	July 25	++	++	◦	+++	++	+
Mustard	July 25	++	++	◦	+++	++	+

SOIL FIRST® COVER CROP MIX				NITROGEN FIXER OR SCAVENGER			
SF 101 Cover Starter	Late July/Early Aug	+++	+++	Scavenger	+++	+++	++
SF 102 Cover Starter+	Late July/Early Aug	+++	+++	Both	+++	+++	+++
SF 125 N-Hancer	Mid July	++	++	Fixer	++	++	++
SF 140 Multi-Purpose	Late July/Early Aug	++	+++	Both	+++	+++	+++
SF 142 Classic	Late July/Early Aug	++	++	Both	++	++	++
SF 150 Field Fit	Mid July	++	++	Scavenger	++	++	+++
SF 160 Rooting	Late July/Early Aug	+++	++	Scavenger	+++	++	++
SF 167 Summer Grazer	Mid July	++	++	Both	++	++	+++
SF 175 AccuSpread	Late July/Early Aug	+++	+++	Both	+++	+++	++

◦ No Benefit | + Some Benefit | ++ More Benefit | +++ Best Benefit

SOIL FIRST® MIXES

SF 101 COVER STARTER

TILLAGE RADISH® + GUARDIAN® FALL RYE

COMPACTION ALLEVIATION · WEED SUPPRESSION · BIOMASS PRODUCTION

SEEDING RATE: 30 - 35 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
40 - 50 LBS/ACRE FOR FORAGE

- **SF 101 meets the objectives of nutrient scavenging, erosion control, weed suppression and soil building**
- **Perfect for the first time cover cropper; radish winterkills in many regions and winter rye is fairly easy to control**
- **Works well in multiple parts of the country and in marginal soil environments**
- **Ideal after silage harvest or before/after fall manure applications**

Termination: Rye can be controlled with traditional glyphosate rates prior to 12 - 18" growth. 2' tall rye should be controlled with roller or crimper. If mowing, wait until rye begins to flower. Radish will terminate with multiple nights in the teens. If radishes survive, glyphosate and 2,4-D offer an effective control method.

Considerations: When seeded early in summer, additional grains or grass will need to be added to compete against radish growth. Rye can tie-up nitrogen and other nutrients. Controlling rye early results in less nutrient tie-up and conserves more water.

PLANTING WINDOW

1. NO LATER THAN AUGUST 15
2. NO LATER THAN AUGUST 25
3. NO LATER THAN SEPTEMBER 5
4. NO LATER THAN SEPTEMBER 15
5. NO LATER THAN OCTOBER 1

BENEFITS

COMPACTION ALLEVIATION	5
WEED SUPPRESSION	5
BIOMASS PRODUCTION	5
EROSION CONTROL	4
DISEASE/PEST CONTROL	3
POLLINATOR/BENEFICIALS	2
P & K CYCLING	4
EASE OF ESTABLISHMENT	4

SF 102 COVER STARTER+

TILLAGE RADISH® + GUARDIAN® FALL RYE + CRIMSON CLOVER

COMPACTION ALLEVIATION · WEED SUPPRESSION · EROSION CONTROL

SEEDING RATE: 30 - 35 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
40 - 50 LBS/ACRE FOR FORAGE

- **Crimson clover allows entire mix to decompose quicker, conserve water and decrease nitrogen immobilization**
- **SF 102 is SF 101 with the addition of crimson clover, fixing nitrogen for grass cash crops**
- **Crimson clover is fairly quick to establish, adding biomass and additional root structure**
- **Nitrogen is maximized at clover flowering, however spring management will need to be considered**

Termination: Rye can be controlled with traditional glyphosate rates prior to 12-18" growth. 2' tall rye should be controlled with roller or crimper. If mowing, wait until rye begins to flower. Radish will terminate with multiple nights in the teens. If radishes survive, glyphosate and 2,4-D offer an effective control method. If crimson clover overwinters, control with glyphosate and 2,4-D.

Considerations: When seeded early in summer, additional grains or grass will need to be added to compete against radish growth. Rye can tie up nitrogen and other nutrients. Controlling rye early results in less nutrient tie-up and conserves more water. Crimson clover may attract voles and may need to be terminated even earlier to decrease the residue.

PLANTING WINDOW

1. NO LATER THAN AUGUST 15
2. NO LATER THAN AUGUST 25
3. NO LATER THAN SEPTEMBER 5
4. NO LATER THAN SEPTEMBER 15
5. NO LATER THAN OCTOBER 1

BENEFITS

COMPACTION ALLEVIATION	5
WEED SUPPRESSION	5
BIOMASS PRODUCTION	4
EROSION CONTROL	5
DISEASE/PEST CONTROL	3
POLLINATOR/BENEFICIALS	2
P & K CYCLING	4
EASE OF ESTABLISHMENT	4

PRODUCT BENEFIT KEY

EASY ESTABLISH | P & K CYCLING | POLLINATOR BENEFIT | COMPACTION ALLEVIATION | WEED SUPPRESSION | BIOMASS PRODUCTION | EROSION CONTROL | NITROGEN FIXER

Benefit icons reflect the highest rated benefits as referenced on pages 15-16. In most cases, each product has many more benefits. See the chart on pages 15-16 or **visit lacrosseseed.com** for additional product information.

SF 125 N-HANCER

BIOMASS PRODUCTION | NITROGEN FIXER | EROSION CONTROL

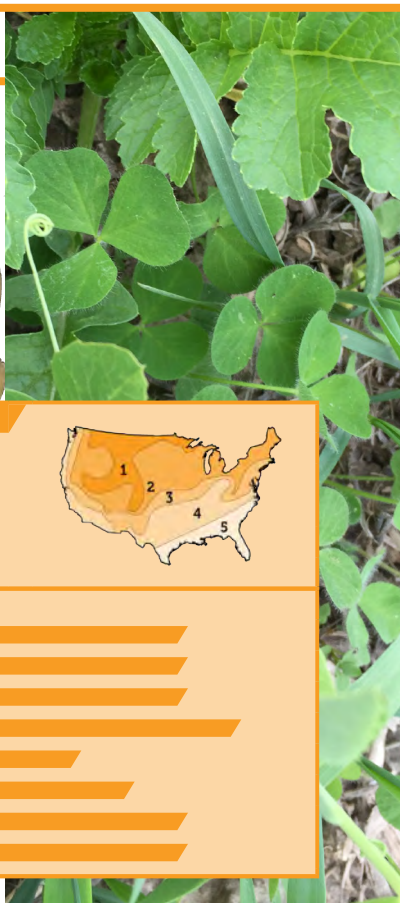
TILLAGE RADISH® + SPRING OATS + FIXATION BALANSA CLOVER + SPRING PEAS + CRIMSON CLOVER

SEEDING RATE: 35 - 40 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
40 - 50 LBS/ACRE FOR FORAGE

- **Designed as a nitrogen booster in front of grass cash crops; decreased spring management needed**
- **Oats work as a carrier, but also keep nitrogen from leaching or leaving the system**
- **Heavy legume mix will work in grazing environments, supplying high protein and digestibility**
- **Nitrogen production will be widely varied, based on planting date, climate, spring termination date, etc.**

Termination: In most environments, only the clovers will demand spring control. Both crimson and balansa clovers can be successfully terminated with glyphosate and 2,4-D. Radish will terminate with multiple nights in the teens. If radishes survive, glyphosate and 2,4-D provide effective control.

Considerations: Early planting is the goal with SF 125. More biomass equals greater nitrogen contribution. Because of peas' larger seed size, broadcast or aerial applications are not recommended.



PLANTING WINDOW

1. NO LATER THAN AUGUST 10
2. NO LATER THAN AUGUST 20
3. NO LATER THAN SEPTEMBER 1
4. NO LATER THAN SEPTEMBER 10
5. NO LATER THAN SEPTEMBER 20

BENEFITS

COMPACTION ALLEVIATION	4
WEED SUPPRESSION	4
BIOMASS PRODUCTION	4
EROSION CONTROL	5
DISEASE/PEST CONTROL	2
POLLINATOR/BENEFICIALS	3
P & K CYCLING	4
EASE OF ESTABLISHMENT	4

SF 140 MULTI-PURPOSE

WEED SUPPRESSION | BIOMASS PRODUCTION | EASY ESTABLISH

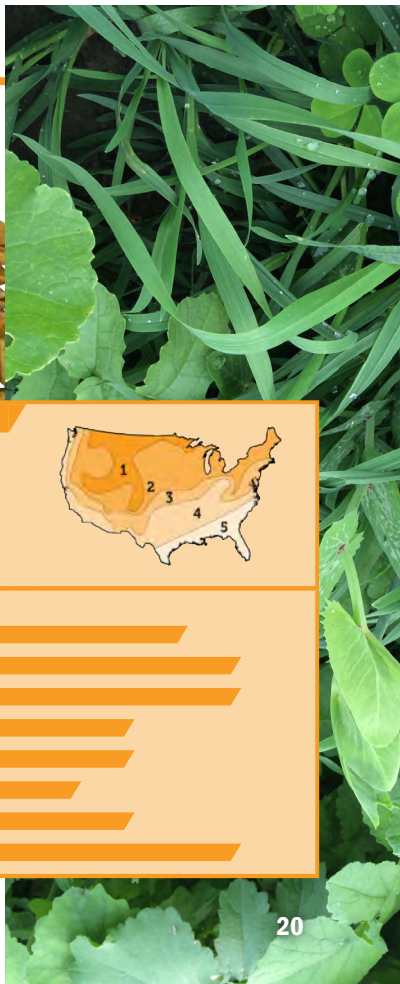
TILLAGE RADISH® + HY OCTANE WINTER TRITICALE + VIVANT BRASSICA + FORAGE COLLARDS + WINTER PEAS

SEEDING RATE: 35 - 40 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
40 - 50 LBS/ACRE FOR FORAGE

- **Fits into several systems – after silage or small grain harvest**
- **Good option to seed on acres where leftover nutrients exist**
- **Formulated ideally for maximizing forage through multiple grazing cycles**
- **Forage collards mean additional grazing opportunity, but may need to be spring terminated in some regions**
- **Great option after silage or small grain harvest (or acres where leftover nutrients exist)**

Best Use: Designed for maximizing biomass on open opportunity ground late summer and/or early fall; can be utilized prior to any cash crop when taken off as forage.

Termination: Triticale can be controlled with traditional glyphosate rates prior to 12 - 18" growth. 2' tall triticale should be controlled with roller or crimper. If mowing, wait until triticale begins to flower. Radish will terminate with multiple nights in the teens. If radishes survive, glyphosate and 2,4-D offer an effective control method. Forage brassicas will typically winterkill with temperatures below 25° F and collards are winder-hardy to Zone 5 (-15° F). Forage brassica can be controlled with glyphosate and 2,4-D, however, collards require other broadleaf herbicides if not removed by grazing completely.



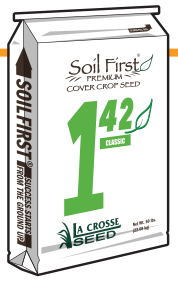
PLANTING WINDOW

1. NO LATER THAN AUGUST 10
2. NO LATER THAN AUGUST 20
3. NO LATER THAN SEPTEMBER 1
4. NO LATER THAN SEPTEMBER 10
5. NO LATER THAN SEPTEMBER 20

BENEFITS

COMPACTION ALLEVIATION	4
WEED SUPPRESSION	5
BIOMASS PRODUCTION	5
EROSION CONTROL	3
DISEASE/PEST CONTROL	3
POLLINATOR/BENEFICIALS	2
P & K CYCLING	3
EASE OF ESTABLISHMENT	5

SOIL FIRST® MIXES

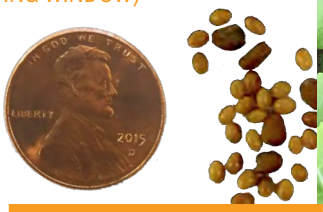


SF 142 CLASSIC

TILLAGE RADISH® + COATED CRIMSON CLOVER

COMPACTION ALLEVIATION · P & K CYCLING · EASY ESTABLISH

SEEDING RATE: 12 - 15 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
15 - 20 LBS/ACRE FOR FORAGE



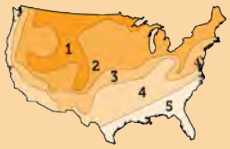
- **Ideal for acres going to corn or other grass crops; research shows positive results in V3 - V6 corn interseeding**
- **Simple mix to use on acres where excess moisture can be an issue, or prevent plant acres, etc.**
- **Low seeding rates work well in aerial seedings and where application options are limited**

Termination: Radish will terminate with multiple nights in the teens. If radishes survive, glyphosate and 2,4-D offer an effective control method. If crimson clover overwinters, control with glyphosate and 2,4-D.

Considerations: When seeded early in summer/fall, consider additional grasses to help compete with the quick radish growth. Heavy crimson clover may invite voles.

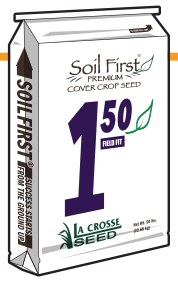
PLANTING WINDOW

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1



BENEFITS

COMPACTION ALLEVIATION	4
WEED SUPPRESSION	3
BIOMASS PRODUCTION	3
EROSION CONTROL	3
DISEASE/PEST CONTROL	3
POLLINATOR/BENEFICIALS	3
P & K CYCLING	4
EASE OF ESTABLISHMENT	4



SF 150 FIELD FIT

TILLAGE RADISH® + SPRING OATS

COMPACTION ALLEVIATION · WEED SUPPRESSION · EASY ESTABLISH

SEEDING RATE: 30 - 35 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
40 - 50 LBS/ACRE FOR FORAGE

- **Very simple cover crop mix; will completely winterkill in many northern climates**
- **If sequestering leftover nutrients is the goal, this is the mix to use**

Termination: Radish will terminate with multiple nights in the teens. If radish overwinters, glyphosate and 2,4-D provide effective control.

Considerations: Because of its large percentage of oats, there is minimal lasting residue with SF 150. If grazing, introduce SF 150 slowly and don't allow brassicas to ever make up more than 1/3 of livestock's diet.

PLANTING WINDOW

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1

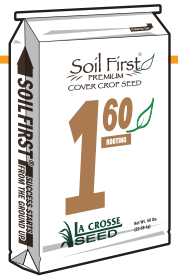
BENEFITS

COMPACTION ALLEVIATION	5
WEED SUPPRESSION	5
BIOMASS PRODUCTION	4
EROSION CONTROL	3
DISEASE/PEST CONTROL	3
POLLINATOR/BENEFICIALS	2
P & K CYCLING	3
EASE OF ESTABLISHMENT	5

PRODUCT BENEFIT KEY

EASY ESTABLISH | P & K CYCLING | POLLINATOR BENEFIT | COMPACTION ALLEVIATION | WEED SUPPRESSION | BIOMASS PRODUCTION | EROSION CONTROL | NITROGEN FIXER

Benefit icons reflect the highest rated benefits as referenced on pages 15-16. In most cases, each product has many more benefits. See the chart on pages 15-16 or **visit lacrosseseed.com** for additional product information.

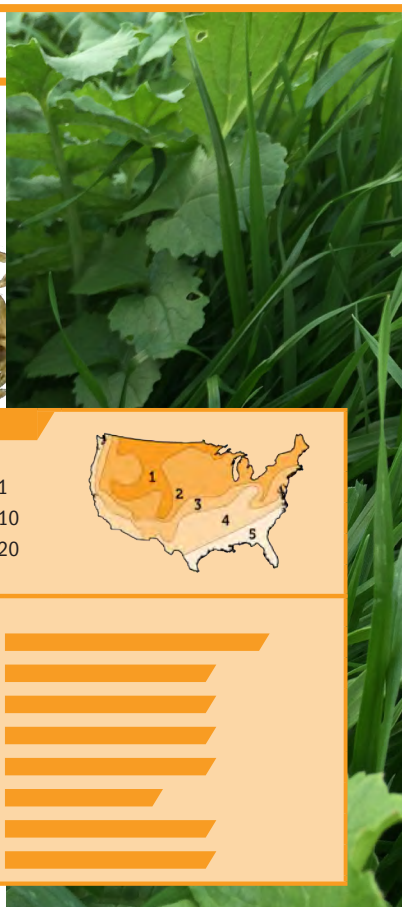


SF 160 ROOTING

TILLAGE RADISH® + COLDSNAP® ANNUAL RYEGRASS

P & K CYCLING | EROSION CONTROL | COMPACTION ALLEVIATION

SEEDING RATE: 15 - 20 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
20 - 25 LBS/ACRE FOR FORAGE



- **Best combination of species for breaking up hard pans and retaining leftover nutrients**
- **Flexible mix to use in front of corn, soybeans and many other cash crops**
- **SF 160 works well with fall manure applications; annual ryegrass is fairly tolerant to salt differences in manure**
- **Annual ryegrass requires spring management planning in areas where it's known to overwinter**

Termination: Radish will terminate with multiple nights in the teens. If radish overwinters, glyphosate and 2,4-D provide effective control. For annual ryegrass termination, using glyphosate by itself or with other grass herbicides can be used, but several key management criteria need to be met to ensure success. See page 14.

Considerations: Any time annual ryegrass is used, spring management has to be a main priority. Care should be taken to prevent ryegrass from going to seed. Annual ryegrass not terminated can have adverse effects on any subsequent grass crops. The use of ryegrass blends have given ryegrass a bad reputation – make sure it is a single, respected variety. Multiple maturities make control even more complex.

PLANTING WINDOW

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1

BENEFITS

COMPACTION ALLEVIATION	5
WEED SUPPRESSION	4
BIOMASS PRODUCTION	4
EROSION CONTROL	4
DISEASE/PEST CONTROL	4
POLLINATOR/BENEFICIALS	3
P & K CYCLING	4
EASE OF ESTABLISHMENT	4

SF 167 SUMMER GRAZER

TILLAGE RADISH® + SORGHUM X SUDANGRASS + SUNN HEMP

NITROGEN FIXER | WEED SUPPRESSION | BIOMASS PRODUCTION

SEEDING RATE: 25 - 30 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
25 - 30 LBS/ACRE FOR FORAGE

- **SF 167 needs to be planted in the summer/late summer**
- **Tolerates many conditions – poor soil, low pH, hot/droughty weather**
- **Conventional sorghum x sudangrass offers increased tonnage potential in grazing systems**
- **Formulated to maximize biomass growth when planted early**

Termination: Any frost will terminate both sorghum x sudangrass and sunn hemp. Small sunn hemp (less than 3 - 4') can be effectively controlled with light rates of glyphosate. Taller plants require higher rates and equipment to allow for proper coverage. Radish will terminate with multiple nights in the teens. If radishes overwinter, glyphosate and 2,4-D provide effective control.

Considerations: Sunn hemp, wherever it may be planted, flowers when temperature allows but only produces seed far south, below the 28th degree north latitude such as Orlando, FL or Corpus Christi, TX. These seeds contain toxic alkaloids harmful to grazing animals. Sunn hemp are not ideal in every no-till system, leftover residue can be tough to plant through in the spring . Sorghum x sudangrass may produce prussic acid toxicity after fall frosts. To maximize forage, nitrogen applications are recommended, but fertility supplements increase risk of elevated nitrates in sorghum x sudangrass after plant stress. See page 17 for more details on prussic acid and nitrate poisoning.

PLANTING WINDOW

1. NO LATER THAN JULY 25
2. NO LATER THAN AUGUST 5
3. NO LATER THAN AUGUST 15
4. NO LATER THAN AUGUST 25
5. NO LATER THAN SEPTEMBER 5

BENEFITS

COMPACTION ALLEVIATION	4
WEED SUPPRESSION	5
BIOMASS PRODUCTION	5
EROSION CONTROL	4
DISEASE/PEST CONTROL	4
POLLINATOR/BENEFICIALS	4
P & K CYCLING	3
EASE OF ESTABLISHMENT	3

SF 175 ACCUSPREAD

TILLAGE RADISH® + COATED COLDSNAP™
ANNUAL RYEGRASS + COATED CRIMSON CLOVER

WEED SUPPRESSION | P & K CYCLING | COMPACTION ALLEVIATION

SEEDING RATE: 20 - 25 LBS/ACRE (HEAVIER RATE LATER IN PLANTING WINDOW)
25 - 30 LBS/ACRE FOR FORAGE

- **Traditional "three-way" combination of species for breaking up compaction, sequestering leftover nutrients and building soil structure**
- **Flexible mix to use in front of corn, soybeans and many other cash crops**
- **Annual ryegrass in SF 175 utilizes CrosseCoat™ Technology – aiding in ballistics, spread patterns and more consistent germination**
- **Annual ryegrass requires spring management planning in areas where it's known to overwinter**

Termination: Radish will terminate with multiple nights in the teens. If radish overwinters, glyphosate and 2,4-D provide effective control. Crimson clover should winterkill north of Zone 7; if crimson overwinters, control with glyphosate and 2,4-D. For annual ryegrass termination, glyphosate by itself or with other grass killers can be used, but several key management criteria must be met to ensure success. For more information, see page 14.

Considerations: Any time annual ryegrass is used, spring management has to be a main priority. Care should be taken to prevent ryegrass from going to seed. Annual ryegrass not terminated can have adverse effects on any subsequent grass crops. Use of blends have given ryegrass a bad reputation – make sure it is a single, respected variety. Multiple maturities make control more complex. Crimson clover may attract voles and may need to be terminated even earlier to decrease the residue.

PLANTING WINDOW

1. NO LATER THAN AUGUST 20
2. NO LATER THAN SEPTEMBER 1
3. NO LATER THAN SEPTEMBER 10
4. NO LATER THAN SEPTEMBER 20
5. NO LATER THAN OCTOBER 1

BENEFITS

COMPACTION ALLEVIATION	5
WEED SUPPRESSION	4
BIOMASS PRODUCTION	4
EROSION CONTROL	4
DISEASE/PEST CONTROL	4
POLLINATOR/BENEFICIALS	3
P & K CYCLING	4
EASE OF ESTABLISHMENT	4

SF 175 SEEDED POST CORN HARVEST IN OH

Below is a chart derived with data from the University of Wisconsin and Penn State University, with additional input from our experience in the field. We encourage you to visit our DIRT newsletter library on our website, where you'll find many useful tips on everything related to cover crop management.

Cover Crop Termination Chart

		Winter kill	Rolling / Crimping	Mowing	Tillage	Herbicide	Cover Crop Growth Stage	Herbicides for Termination
Brassicas	Radish / Turnips	*	No	No	Yes	Yes		Glyphosate / Paraquat
	Canola / Rapeseed							
	Mustard							
Legumes	Crimson Clover	*	No	No	*	Yes		Glyphosate; 2,4-D + Dicamba
	Winter Pea	*	No	Yes	*	Yes		Glyphosate + 2,4-D; Paraquat + 2,4-D
	Hairy Vetch	No	Yes (Full Bloom)	No	Yes, but 2 passes may be needed	Yes	Yes (Pre or Mid-Bloom)	Glyphosate + 2,4-D or Dicamba; Paraquat + 2,4-D
Grasses	Annual Ryegrass	*	No	No		Yes	< 6 - 8"	See Page 14
	Winter Barley	No	Yes, at Milk or Dough Stage	Yes		Yes	Prior to Boot Stage (<18")	Glyphosate 4.5 lb ae Per Gal; 22 fl. oz Per Acre
	Winter Triticale							
	Winter Wheat							
	Winter Rye							

*Varies based upon region and climate

Adapted from University of Wisconsin & Penn State University

FREQUENTLY ASKED QUESTIONS

From strategies around nitrogen cycling and release to pest management to salt tolerance and several topics in-between, our website includes many practical solutions along with helpful links to other sites from respected industry partners and universities. We also encourage you to review the many useful tips included on cover crop management in our DIRT newsletter library at **lacrosseseed.com/resources.**

ONLINE RESOURCES

GUARDIAN® FALL RYE BURNED DOWN AT SOYBEAN PLANTING IN KY

MATCHING THE GOAL TO THE CROPPING SYSTEM

GOAL/BENEFIT	INTENDED CROP: Corn/Sorghum	Cotton	Cole/Brassica Crops	Potatoes
EROSION REDUCTION	**SF 125, SF 150, SF 175** Grasses work well at reducing erosion. Small grains are an obvious choice, but consider spring management if planting anything other than oats.	Any grass will help control wind and water erosion. Guardian® fall rye, Hy Octane triticale, ColdSnap™ annual ryegrass are the best options. Spring oats help, but ineffective in spring/ late spring.	Any grass will help control wind and water erosion. Guardian® fall rye, Hy Octane triticale, ColdSnap™ annual ryegrass are the best options. Spring oats help, but ineffective in spring/ late spring.	**SF 142, SF 150** The addition of small grains is a possibility, but consider green bridge with other cereals in the rotation. Legumes (including winter peas, hairy vetch and others should be considered).
SEQUESTERING NUTRIENTS	**SF 150, SF 160, SF 175** Annual ryegrass and brassicas work well. Small grains do really well also, but will need a spring management plan if anything other than oats. **Other Options: SF 140, SF 102**	Grasses are the recommendation. Small grains - Guardian® fall rye, Hy Octane triticale will work well. The addition of radish and turnips can help sequester nutrients.	Grasses are the recommendation. Guardian® fall rye, Hy Octane triticale, ColdSnap™ annual ryegrass will all work well.	**SF 125, SF 140, SF 150** Brassicas work well at scavenging all important nitrogen. If considering small grains (spring grains or otherwise), control early to minimize nitrogen tie-up.
COMPACTION ALLEVIATION	**SF 160, SF 175** Two options best equipped for deeper rooting are annual ryegrass and brassicas. Balansa clover's taproot works well too.	Plant brassicas (radish and turnips) when conditions allow for earlier seedings. Small grains will help break up hard pans, but to a lesser degree.	Plant ColdSnap™ annual ryegrass when conditions allow for earlier seedings. Small grains will help break up hard pans, but to a lesser degree.	**SF 125, SF 142, SF 150, SF 175** Brassicas should be the selection and ryegrass can help too. The addition of brown mustard will help break up hard pans as well.
FORAGE PRODUCTION	**SF 102, SF 140, SF 150** Several options depending on timing in the fall. When considering small grains, harvest or graze early in spring to minimize fertility concerns.	Small grains (Guardian® fall rye, Hy Octane triticale) deliver forage and legumes enhance the protein content while supplying nitrogen. Summer annuals can deliver excellent biomass with less water.	Small grains (Guardian® fall rye, Hy Octane triticale) deliver forage in cole crop rotations. Legumes enhance the protein content while supplying nitrogen for the growing grasses.	**SF 125, SF 140, SF 150** Brassicas, legumes will provide biomass and protein for grazing animals. If considering small grains (spring grains or otherwise), control early to minimize N immobilization.
WEED SUPPRESSION	**SF 125, SF 150, SF 160, SF 175** Early plantings, use heavy biomass covers (brassicas, legumes, annual ryegrass). Limited fall timing, plant small grains (but only with a spring management plan).	Small grains (Guardian® fall rye, Hy Octane triticale) and legumes bring excellent weed competition. Summer annuals can deliver excellent biomass on low water inputs.	Small grains (Guardian® fall rye, Hy Octane triticale) deliver heavy biomass in cole crop rotations. Legumes help supply nitrogen for the growing grasses, while aiding in weed competition.	**SF 142, SF 150, SF 160** Both brassicas and legumes can provide enough competition by themselves. Adding a grass or grain will help.
NEMATODE SUPPRESSION	Legumes and brassicas have shown some effectiveness to nematodes that negatively impact corn. If nematode control is an objective, avoid grasses as most are host to nematodes affecting corn.	Several nematodes pose a threat to cotton. Guardian® fall rye makes the most sense for potential nematode suppression in cotton growing areas.	Sudangrass and sorghum x sudan offer some biofumigant properties. To maximize effectiveness, they need to be incorporated into the soil. Soil temps need to be above 65° and enough time for 6 weeks growth.	Brown mustards have higher glucosinolate levels and have proven to be effective at reducing potato cyst and root knot nematode levels. Need to be chopped and incorporated quickly to achieve max control.
INCREASED SOIL MOISTURE	Many parts of the Midwest and Plains demand cover crops provide additional moisture for cash crops during a portion of the growing season. Deciding on the right cover crops to help minimize moisture loss can be complex depending on climate, region, and soil type. Consider how long cover crops will persist before termination and when and how the cash crop will be planted into leftover residue. ›››			
KEY POINTS	Main objectives should be adding legumes whenever possible and managing any cover crop that includes a small grain (see page 7). Don't forget about using annual ryegrass.	Small grains and legumes form the base for most covers in cotton. Delays in cotton establishment after a cover are common, but select covers based on reducing weeds, insects and overall water requirement.	There are many cover crop options for cole crops, but other brassicas should not be included. Brassica cover crops allow disease and pest cycles in cole crops to persist and worsen.	Managing nitrogen is a major objective. Consider options that include legumes and brassicas for additional fumigation opportunities.

FOLLOWING THE COVER CROP

Soybeans	Sugar Beets	Vegetable/Fruit	Wheat/Small Grains
SF 101, SF 102, SF 140, SF 150, SF 160 Several options based on time in the fall. Small grains will work great, but consider adding other species to accomplish multiple objectives.	Any grass will help control wind and water erosion. Guardian® fall rye, Hy Octane triticale, ColdSnap™ annual ryegrass are the best options. Spring oats help, but ineffective in spring/late spring.	Use small grains (Guardian® fall rye, Hy Octane triticale, barley) before long season vegetable crops (90 - 120 days).	**WINTER GRAINS: SF 142, SF 175** Fallow alternative - spring cereals and legumes (crimson, berseem clover). Continuous winter grains - options are limitless based on other benefits desired. **SPRING GRAINS: SF 142, SF 150** Using species that terminate quickly will not impede on spring grain planting while still providing soil coverage for as long as desirable.
SF 101, SF 102, SF 140, SF 150, SF 160 Depending on time in the fall, utilize a brassica if possible. Consider adding other species to small grains to accomplish multiple objectives.	Guardian® fall rye, Hy Octane triticale, ColdSnap™ annual ryegrass will all work well. Legumes impact nutrient scavenging very little, but adding N in sugar beet crops could be an added bonus.	Use small grains prior to long season vegetable crops (90 - 120 days); utilize summer annual grasses prior to short season vegetables (60 - 90 days).	**WINTER GRAINS: SF 142, SF 167** Fallow acres - spring cereals and summer brassica mixes. Continuous grain - plant legumes and brassicas as time will allow for many options. **SPRING GRAINS: SF 125, SF 142, SF 150** Depending on how much time exists in fall, there may be limited time to plant non-cereal grain options to scavenge excess nutrients.
SF 101, SF 102, SF 160, SF 175 Two options best equipped for deeper rooting are annual ryegrass and brassicas (if time allows). Fall rye is better than nothing, but not the best option.	Plant ColdSnap™ annual ryegrass when conditions allow for earlier seedings. Small grains will help break up hard pans, but to a lesser degree.	Plant ColdSnap™ annual ryegrass and brassicas, but only if the following cash crop is a different family of the cover crop to break up pest and disease cycles.	**WINTER GRAINS: SF 142, SF 160, SF 167** Fallow ground - use grasses that will be easier to manage (ryegrass, summer annuals). Continuous grain - brassicas planted in summer will reach max growth quickly. **SPRING GRAINS: SF 125, SF 150, SF 160, SF 167** When time allows, choose a brassica crop (radish and turnips).
SF 140, SF 125 Biomass is the goal and small grains will be needed for maximum growth. Including legumes will add protein and brassicas increase digestibility.	Small grains (Guardian® fall rye, Hy Octane triticale) deliver forage in beet rotations. Legumes enhance the protein content while supplying nitrogen for the growing grasses.	Several options exist for forage production in front of vegetable or fruit plantings. Be cognizant of any adverse effects the biomass/residue could have on the following crop.	**WINTER GRAINS: SF 142, SF 160, SF 167** Fallow acres - plant grasses like ryegrass and summer annuals; as well as legumes and brassicas. Continuous grain - brassicas and summer annuals will grow quickly in short summer windows. **SPRING GRAINS: SF 125, SF 150, SF 167** Utilizing grasses like summer annuals can generate good tonnage; adding brassicas or overwintering legumes can boost biomass and forage quality.
SF 101, SF 102, SF 150 Small grains are the key ingredient for reducing competition. Plant higher rates if that's the main objective.	Small grains (Guardian® fall rye, Hy Octane triticale) offer the biomass needed for competition against weeds. Legumes can help as well, however N will need to be managed prior to beet planting.	Grasses and small grains (Guardian® fall rye, Hy Octane triticale, barley, ColdSnap™ annual ryegrass) will provide suitable weed suppression. Consider nutrient available following grasses to next crop.	**WINTER GRAINS: SF 142, SF 160, SF 167** Fallow acres - grasses like ryegrass and summer annuals; as well as legumes and brassicas. Continuous grain - brassicas and summer annuals will grow quickly in short summer windows. **SPRING GRAINS:** To maximize weed suppression, plant heavy biomass cover crops early. Brassicas and legumes will help without compromising spring cereal grain planting.
SF 160, SF 175 For SCN control, the best defense is controlling winter annuals. Annual ryegrass has shown very positive results.	Control Radish works well to control beet cyst nematode. Image is not only a non-host, but this radish encourages early cyst egg hatch that results in lack of food and eventual control.	Depending on the cash crop, any number of cover crops may provide some level of nematode control and/or suppression. For individual recommendations, please contact La Crosse Seed.	The use of summer annual grasses has shown the ability to limit nematodes in small grains (root lesion and cereal cyst). Current research with certain brassica varieties has shown promise and may be available from La Crosse Seed soon.
For example, residue left from small grain cover crops in the Midwest may hold onto more moisture in early spring. These residues have the potential to help supply moisture to cash crops later in the summer too, as long as the residue doesn't impede cash crop establishment. Cover crops that use the least amount of moisture for establishment are millets, winter and spring barley, berseem and red clovers, cowpeas and field peas.			
Sequestering nitrogen and capturing any nutrients is key. Select mixes that provide this and other benefits as well.	Concentrate on small grains as the base to eliminate any added concerns of increased pest pressure and N management. Other species (like nematode radish) are available depending on the objective.	Select the right cover crop to provide the residue/mulch desired. Consider how the cover crop will be successfully terminated and the vegetable will be paired into that residue.	It's all about time... With winter grains, one has a limited summer and fall for establishment. Spring planted small grains offer the flexibility of using overwintering species, but spring control/termination should be planned. Small grain cover crops may initiate a "green bridge" that could lead to added disease pressure.

PLANTING CONSIDERATIONS

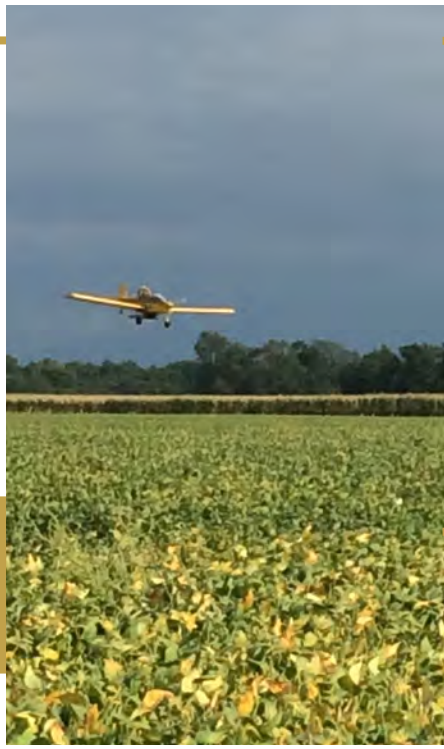
DRILL OR TRADITIONAL/AIR SEEDER

Using a drill or seeder to plant cover crops and green manures ensures the best seed-to-soil contact and an ideal environment for the quickest germination. Clearly, this is not an option until the standing crop has been removed or harvested. The best methods for seeding cover crops require sufficient planning to ensure its success.

Considerations:

- Keep in mind changing field conditions that may alter seeding depth and seed spacing
- Make sure your drill is calibrated correctly, knowing the various sizes of cover crop seeds
- As a rule of thumb, use the largest seed in your blend as the indicator for calibration - see drill chart on page 29.

AERIAL/SURFACE SEEDING



When aerial seeding, consider the ideal planting window for the cover crop being planted. For example, radishes typically need 800-900 Growing Degree Days (GDD), or at least 4 - 6 weeks and preferably 8 - 10 weeks of growth prior to winter termination. That planting period needs to be taken into account so it coincides with the proper maturity stage of the crop in the field. Moisture or irrigation is crucial when surface seeding to make up for the lack of seed-to-soil contact. When time could be a hurdle, aerial and "over-the-top" seedings offer a worthy alternative.

Considerations:

Assuming seeding intervals match, the ideal time to aerial seed into traditional cash crops are as follows:

CORN	When at least 50% of sunlight can penetrate to the soil surface
SOYBEANS	At leaf senescence typically, but that depends to some degree on row width and soybean architecture. Delaying seedings into soybeans decreases seed-to-soil contact and increases the risk of poor moisture retention needed for maximizing germination.
SUNFLOWERS	When the back of the seed head turns yellow

When crop stage and the seeding calendar do not align, always tends towards earlier seedings, especially when a moisture event is forecasted or irrigation can be planned. It's better to have the cover crop seed in the field to begin the germination process rather than planting later where the seed may have to compete with excess cash crop residue.

For other crops, concentrate on sunlight infiltration to the soil surface. Sunlight and moisture are the limiting factors for bare surface seedings.

BROADCAST APPLICATIONS

Most broadcast seedings occur after cash crop harvest and are followed with a culti-packer or light tillage pass to encourage better germination. A common practice is combining cover crop seed and fall fertilizer to increase efficiency when time may be an obstacle in the fall. It's not uncommon for growers to attach seeders directly to their tillage equipment, eliminating a trip through the field. Even though moisture isn't as critical for establishment versus an aerial application, any tillage will decrease soil moisture, lessen soil microbe activity and slow gains in soil structure.

Considerations:

- A common mistake is planting the seed too deep. Take extra caution to keep tillage depth shallow. Most cover crop seeds only need to be placed between ¼" - ½" deep.
- Due to the width and variance of some broadcasters, a double-spread pattern may be needed to ensure even spreader distribution
- Rule of thumb: increase seeding rates by 20 - 25% or more to guard against imperfect seed bed environments

FROST SEEDING

Frost seeding works well during the late winter months (usually February - March) taking advantage of the upcoming freeze-thaw cycles. Legumes like red clover are commonly frost seeded into small grain or perennial fields, but many cereal cover crops can be frost seeded as well to get a jump start on early spring growth.

PRECISION/ ROW-CROP PLANTERS

Precision planters allow for the precise seeding of cover crops, while making it an option to plant subsequent cash crops exactly in the same location using today's technology. Row-crop planters guarantee consistent seeding depth and seed spacing (assuming seed plates and other planting equipment is used properly).

INTERSEEDING

Interseeding cover crops into cash crops (like V3 - V6 corn) lengthens the growing season for the cover crop seeding. Besides the benefit of earlier establishment, improved nutrient cycling and greater biomass for grazing are further advantages of getting covers seeded roughly 60 - 90 days ahead of typical plantings. Interseeding implements are becoming more widely available, however most interseeded acres we've witnessed have been seeded using broadcast equipment, many along with a fertilizer application. Interseeding continues to gain traction, especially in northern areas where the post-harvest seeding window is reduced by colder temperatures and unpredictable weather.

SLURRY MANURE SEEDING

Mixing cover crop seed and slurry manure can be effective assuming the proper equipment is used – specifically a tank and delivery system with the proper tines and/or coulters. It's important to inject the seed into the soil rather than simply leaving on the surface. Not all types of seed work well in this system and can tolerate the high salinity and/or ammonia of the manure slurry. Rainfall or irrigation after seeding can minimize the effects that the slurry might have on the seed. Cover crops typically being seeded with manure are grasses and other nutrient scavengers that can also lessen runoff and leaching.

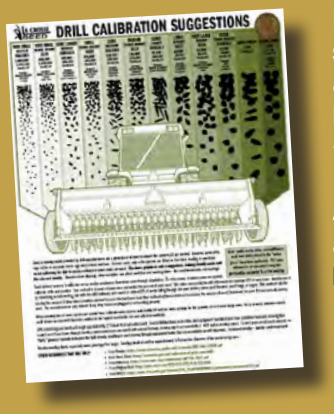
OTHER SEEDING METHODS

We've seen many methods work across the country. Don't be afraid to try something that makes sense. For example, growers across the Midwest and western states are affixing seed boxes to their combines (some on the rear of the machine to get spread within the residue, and others on the combine head). Ultimately, whatever method is chosen, the goal should be getting cover crops seeded in a timely, agronomic manner that increases the likelihood for success.

DRILL & SEEDING CHART

	PLANTING WINDOW (WEEKS BEFORE FROST)	SEEDING DEPTH (INCHES)	DRILLED (7.5" ROWS SEEDING RATE LBS/ACRE)	COMPARABLE SEED ON DRILL CHART	CAN USE SMALL SEED BED BOX?	PRECISION PLANTING (PP) 4" IN-ROW SPACING. REFER TO BAG LABEL FOR SEEDS/LB.	(PP) 15" ROWS 4" IN-ROW LBS/ACRE	SEED SPACING	VACUUM PRESSURE (PSI)	PLATE
SF 101 Cover Starter	3 - 10	¼" - 1"	30 to 35	Wheat	No	Kinze Brush Meter w/ Backing Plate (60 Cell Soybean Plate)	60 (5" in-row)	◦	◦	◦
SF 102 Cover Starter +	3 - 10	¼" - 1"	30 to 35	Wheat	No	Kinze Brush Meter w/ Backing Plate (60 Cell Soybean Plate)	60 (5" in-row)	◦	◦	◦
SF 125 N-Hancer	3 -10	¼" - 1"	35 to 40	Oats	No	Kinze Brush Meter w/ Backing Plate (60 Cell Soybean Plate)	20 (5" in-row)	◦	◦	◦
SF 140 Multi-Purpose	3 - 10	¼" - 1"	35 to 40	Wheat	No	Kinze Brush Meter w/ Backing Plate (60 Cell Soybean Plate)	60 (5" in-row)	◦	◦	◦
SF 142 Classic	3 - 10	¼" - ½"	12 to 15	Alfalfa	Yes	Kinze Brush Meter w/ Backing Plate (60 Cell Milo Plate)	8 (1.5" in-row)	1.5" in-row	18	Large Sugar Beet (720220)
SF 150 Field Fit	3 - 10	¼" - 1"	40 to 50	Oats	No	Kinze Brush Meter w/ Backing Plate (60 Cell Soybean Plate)	20 (5" in-row)	◦	◦	◦
SF 160 Rooting	3 - 10	¼" - ½"	15 to 20	Tall Fescue (reduce by 25%), Crested Wheat Grass (reduce by 15%) or Annual Ryegrass	No	Kinze Brush Meter w/ Backing Plate (60 Cell Milo Plate)	12 (2" in-row)	◦	◦	◦
SF 167 Summer Grazer	After last frost in Spring /8 weeks prior to first-frost date in Fall	¼" - 1"	25 to 30	Wheat	No	Kinze Brush Meter w/ Backing Plate (60 Cell Soybean Plate)	12 (4" in-row)	4" in-row	20	Large Sugar Beet (720220)
SF 175 AccuSpread	3 - 10	¼" - ½"	20 to 25	Tall Fescue (reduce by 25%), Crested Wheat Grass (reduce by 15%), or Annual Ryegrass	No	Kinze Brush Meter w/ Backing Plate (60 Cell Milo Plate)	12 (2" in-row)	◦	◦	◦
Guardian® Fall Rye	4 weeks prior to first killing frost to 6 weeks after	¾" - 1"	30 to 50	Wheat	No	Kinze Brush Meter - 60 cell Soybean Plate (2" in-row) White - Wheat Plate	50	◦	◦	◦
Hy Octane Winter Triticale		¾" - 1"	30 to 50	Wheat	No		50	◦	◦	◦
ColdSnap™ Annual Ryegrass	3 - 10	¼"	15 to 30	Tall Fescue (reduce by 20%), Crested Wheat Grass (reduce by 10%) or Annual Ryegrass	Yes	Kinze Brush Meter w/ Backing Plate (60 Cell Milo Plate)	10 (1.5" in-row)	◦	◦	◦
Tillage Radish®	3 - 10	¼"	8 to 12	Alfalfa (reduce by 10%)	Yes	Small Sugar Beet Plate	◦	◦	◦	◦
Crimson Clover	3 - 10	¼"	10 to 15	Crimson Clover	Yes	Not Rec.	Not Rec.	1.5" in-row	18	Small Sugar Beet (720220)
Winter Peas	3 - 10	1"	30 to 80	Soybean	No	Soybean Plate	9	4" n-row	20	60 Cell Soybean (720265)
Hairy Vetch	2 - 10	1"	15 to 30	Vetch or Sorghum	No	Small Sugar Beet Plate	9	4" in-row	16	Large Sugar Beet (720220)

PURITY & GERMINATION AFFECT SEEDING RATES



Find more information on calibrating drills and seeders, taking into account seed size, density and PLS % with our new **Drill Calibration Suggestion Sheet**.

Always plant cover crop seed with a current analysis tag. For more resources, visit **lacrosseseed.com/resources**

ONLINE RESOURCES

PLS (PURE LIVE SEED) EXAMPLES			
Seed Purity %	**90% Germ**	**85% Germ**	**80% Germ**
99.50	89.55	84.58	79.60
99.00	89.10	84.15	79.20
98.00	88.20	83.30	78.40
97.00	87.30	82.45	77.60
95.00	85.50	80.75	76.00
90.00	81.00	76.50	72.00
85.00	76.50	72.25	68.00
80.00	72.00	68.00	64.00
65.00	58.50	55.25	52.00

Example:
Guardian® Fall Rye has
≥ 90% germ &
≥ 98% purity, so:

$$\frac{(98 \times 90)}{100} = 88.2\ \%\ \text{PLS}$$

Cover crops are one of many conservation tools on the farm to better protect our soil and water. There are many choices when it comes to conservation and environmental farming practices, and we provide a diverse selection of conservation seed solutions.

Benefits

Conservation seed helps protect vital resources on various types of agricultural land including cropland, grassland or pasture, wildlife or food plots, and more. Some of the environmental perks include:

- Soil erosion and sediment runoff reduction
- Soil health improvement
- Water quality protection or improvement
- Increased profits (by reducing farm expenses, improving yields or both)
- Added wildlife habitat or food sources

Seed Options

La Crosse Seed offers a vast portfolio of seed designed for many sustainability applications. A partial list available through La Crosse Seed includes seed for:

- Conservation cover – including CRP and pollinator habitat seeds
- Contour buffer strips
- Field borders
- Filter strips
- Forage and biomass plantings
- Grassed waterways
- Stream bank protection

These conservation seed options work effectively when combined with others, as part of a larger resource management system.

NATIVES FIRST™

Native Grasses & Wildflowers

Our Natives First™ native grass and wildflower portfolio contributes to land stewardship, pollinator habitat and forage source development. The lineup includes mixes pre-formulated to meet the needs of various state and regional programs. To learn more about our conservation seed options or to get management information, contact us.

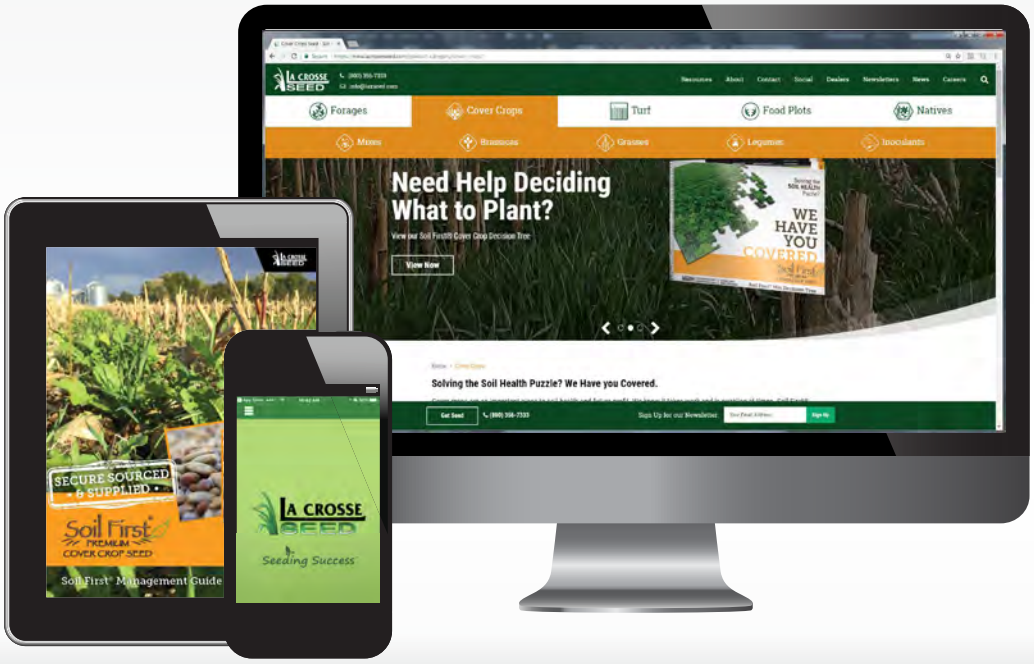
CUSTOM CRP MIXES

Natives First™ offers custom mixing capabilities to meet any of your CRP needs. Contact us to learn more.

Soil First®
PREMIUM
COVER CROP SEED

LOOKING FOR DIGITAL TOOLS & RESOURCES?

WE HAVE YOU COVERED



For more, visit lacrosseseed.com/resources

La Crosse Seed Headquarters
2541 Commerce Street
La Crosse, WI 54603

800.356.SEED
soil1st.com
info@laxseed.com