
Celebrating 30 Years
of Refined Forages and Cover Crops
King's AgriSeeds Inc.
FEEDING YOUR FARM'S FUTURE.
PRODUCT INFORMATION GUIDE

King's AgriSeeds is Celebrating 30 Years in 2023!

King's was founded by Aaron King, an innovator, who saw a forage need that was not being fulfilled. Farmers were trying to improve their farm profitability through managed grazing and the seed industry was lacking improved forage grasses. In 1993, the vast majority of grasses sold in the United States were of genetics that were bred from the 1920's to the mid 1960's! The products Aaron brought to the market made a noticeable difference on his home farm and soon a service-based seed company was born.

Over the past 30 years King's AgriSeeds has grown to be a leader in the forage industry, including highly digestible corn for both silage and livestock grain. The genetics we offer are sourced from around the world, but the key to success is our local screening. We begin by screening genetics on our research farm in Lancaster County, PA. After proven on our farm, along with positive breeder data, satellite plots, state trials, etc., we rely on the feedback from you and our dealer network to continue to improve our product line. A prime example of this success is our KingFisher / Red Tail corn line. Have you ever wondered how our KingFisher and Red Tail hybrids continue to dominate the Forage Superbowl at the World Dairy Expo contest year after year? The quality of these hybrids come from the intentional forage focus that we* have been screening for from the very beginning. While the major corn-centric seed brands are moving away from livestock needs, the KingFisher group is continuing to focus intensely on that!

We have also become a leader in improving soil health. There is a direct link between soil health and farm productivity. Soil health is critical for agriculture to advance. When cover cropping is incorporated properly into cropping systems, it makes a difference. Planned cropping systems with healthy rotations and soil building cover crops have strong financial value and are part of stewarding God's resources. We encourage you to take time to learn about our products in the first half of this guide and also read the valuable support information in the second half of the guide.

Most of all- we just want to pause and say thank you for your hard work and dedication to your operation each and every day. Thank you for your role in feeding the world as your role is essential to life. And thank you for your business and support these past 30 years. We look forward to serving you for many years to come!

All the best,
Tim Fritz, President

**A Note about KingFisher: KingFisher and its traited sister line, Red Tail, are a joint project of Byron Seeds, King's AgriSeeds and Southeast AgriSeeds, effectively serving the eastern half of the United States.*

OUR MISSION

To serve the agricultural community by providing premium seed along with relevant information to our seed dealers and their customers to develop productive cropping systems. We strive for a God honoring workplace where the gifts and talents of each team member is used for His Kingdom.

PRODUCTS

King's AgriSeeds Inc.
FEEDING YOUR FARM'S FUTURE.

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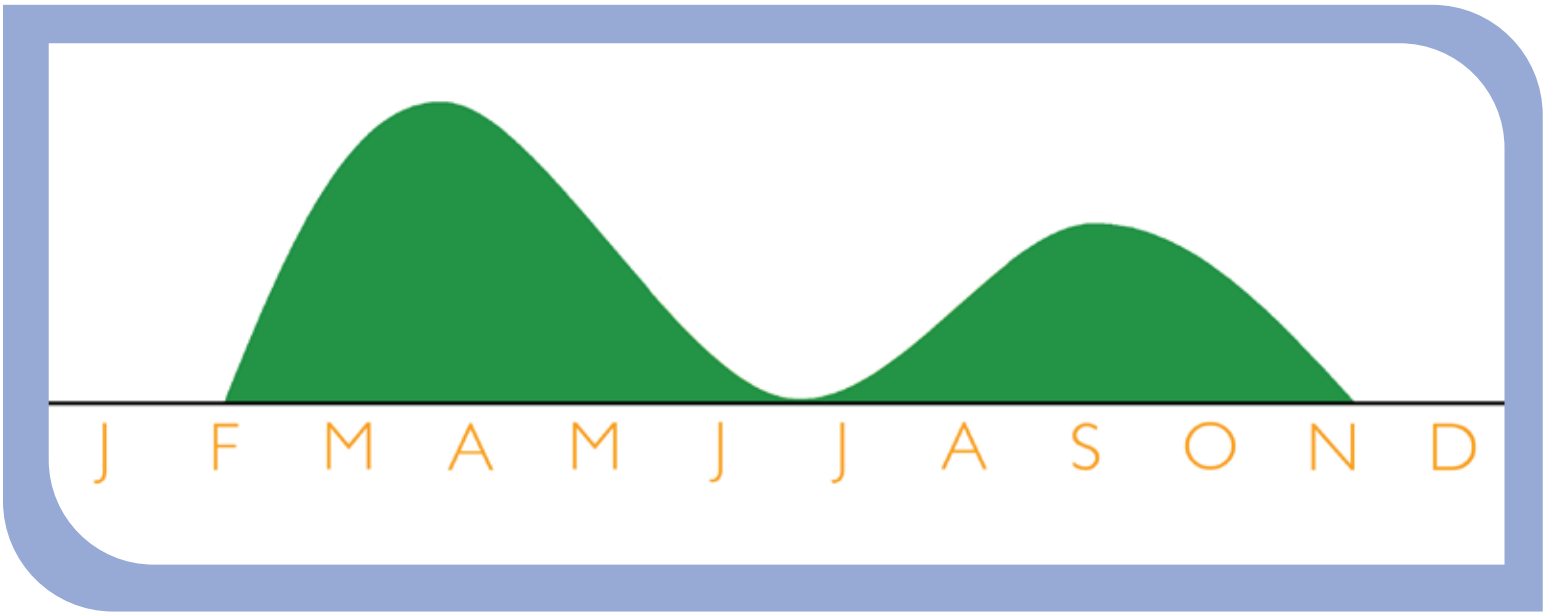
COOL SEASON PERENNIALS



ADAPTED TO GOOD-TO-DRIER SOILS

E-Z DRY HAY NEW

Make dry hay easily with this mixture created to dry quickly. This mixture was designed for the haymakers who want alfalfa in their bales but need quick dry down. This mixture is comprised of Meadow Brome, Orchardgrass, Alfalfa, and Timothy.
Adapted best to zones 5 to 7a.

Best Uses: Dry Hay, Fermented Forages
Seeding Rate: 20-30lbs /acre
Product Formula: 25% Meadow Brome
25% PLH 544 Alfalfa
20% Inavale Orchardgrass
19% Echelon Orchardgrass
11% Timothy (early maturing)

HIGHLAND HAY OC

Contains a blend of two PLH resistant alfalfas, this mix is well suited for a management that does not include a leaf hopper spray. Highland Hay will make excellent mixed auction hay that feeds well.

Best Uses: Dry Hay, Fermented Forages
Seeding Rate: 25 lbs/acre
Product Formula: 50% PLH Alfalfas
25% Soft Leaf Tall Fescue
25% Orchardgrass

KING'S HAY PRO

A well balanced mixture of leafy late heading grasses and traffic tolerant alfalfa that makes soft hay that livestock, calves and horses love. Add it to dairy rations for a great source of high quality effective fiber to slow down rate of passage without sacrificing production.

Best Uses: Dry Hay, Fermented Forages, Managed Grazing
Seeding Rate: 20 to 30 lbs/acre
Product Formula: 35% KingFisher Alfalfas
30% Late Heading Orchardgrasses
25% Soft Leaf Tall Fescue
10% High Yielding Timothy

NUTRAMAX HAY OC/CT

This mix was balanced by a seasoned nutritionist for super high quality! It's an alfalfa, clover and highly digestible grass mix that is primarily adapted to central PA and north. Both protein and energy levels are superb.

Best Uses: Fermented Forages
Seeding Rate: 20 to 30 lbs/acre
Product Formula: 65% KingFisher Alfalfas
8% Meadow Fescue
8% Perseus Festulolium
7% Tall Fescue Type Festulolium
6% Alice White Clover
6% Freedom Red Clover

HILLSIDE

A highly palatable mixture of drought tolerant species and varieties that tolerate managed grazing well. Contains two varieties of orchardgrass, meadow brome, and a touch of perennial ryegrass to act as a nurse crop as slower, more drought tolerant species establish. Also has a lot of grazing tolerant ladino clover and improved red clover.

Best Uses: Managed Grazing, Fermented Forages
Seeding Rate: 25 lbs/acre
Product Formula: 50% Early to Mid Maturing Orchardgrass
22% Meadow Brome
18% Tetraploid Perennial Ryegrass
5% Freedom Red Clover
5% Regalgraze Ladino Clover

Highland Hay's formulation is designed to keep the leaf hoppers at bay!

NORTH STAR CT

This mixture contains strong alfalfa varieties with modest amounts of later maturing grass for improved nutrition. It's designed primarily for central PA and North (zones 4 & 5), where grasses will provide consistent yield and quality for several years. Now with meadow fescue to increase energy fiber digestibility and quality. Meadow Fescue is both higher quality than Fojtan and less competitive, allowing the alfalfas to perform well.

Best Uses: Fermented Forages, Dry Hay
Seeding Rate: 18 to 25 lbs/acre
Product Formula: 85% KingFisher Alfalfas
8% Meadow Fescue
7% Tall Fescue Type Festulolium

ORGANIC HAY BOSS NEW

A well-balanced, alfalfa-grass mixture. The grasses in this mixture are not only very digestible, but also reduce potato leaf hopper pressure and help keep weeds from invading the stand. Makes a nice dry hay to feed on the farm or to sell on the hay market.

Best Uses: Dry Hay, Fermented Forages, Managed Intensive Grazing
Seeding Rate: 25lbs /acre
Product Formula: 70% Alfalfa
12% Fojtan Festulolium
10% Red Clover
8% Orchardgrass

ORGANIC STAR

Organic Star is a well balanced grass-clover mixture that is excellent for both grazing and baleage. This mixture will handle soil variability very well, although it is designed more for good to drier soils.

Best Uses: Grazing, Fermented Forages
Seeding Rate: 25 to 30 lbs/acre
Product Formula: 37% Late Heading Orchardgrass
27% Perennial Ryegrass
17% Meadow Fescue
7% Red Clover
6% Premium Timothy
6% White Clover

PERFORMANCE MAX CT

An alfalfa-tall fescue mixture that will excel in both agronomic and nutritional performance. The alfalfa adds drought productivity, protein, and high NSC. The tall fescue adds consistent high fiber digestibility, superb yields, traffic tolerance and wet soil tolerance.

Best Uses: Fermented Forages, Dry Hay
Seeding Rate: 20 to 25 lbs/acre
Product Formula: 70% Kingfisher Alfalfas
30% Kora and STF 43 Tall Fescue

SALE TOPPER

This all grass mix is primarily designed to be seeded as a stand alone crop to be fed to horses, dry cows, heifers or even milking cows. Also a great complement for new alfalfa and/or clover seedings. Includes: two premium late heading orchardgrasses, one early timothy and a late timothy to throw a few timothy heads over multiple cuttings for hay marketing purposes. Works excellent seeded with legume in small box and this mix in the large box.

Best Uses: Dry Hay, Fermented Forages
Seeding Rate: 15 to 20 lbs/acre as a stand alone seeding. 5 to 10 lbs/acre with a new seeding of alfalfa and/or clover (reduce legume seeding rate by 25 to 50%)
Product Formula: 80% Late Maturing Orchardgrass
20% Premium Timothy

SOUTHERN BRAWN NEW

When quality, durability, and cost matters. This all-grass mix comprised of strong endophyte free tall fescue and earlier orchardgrasses is designed for zones 6b to 7b making it an ideal fit for VA, MD, DE, and Southeastern, PA

Best Uses: Dry Hay, Fermented Forages, Managed Intensive Grazing
Seeding Rate: 20-30lbs /acre
Product Formula: 60% Endophyte free Tall Fescue
25% Mid Maturing Orchardgrass
15% Early Maturing Orchardgrass

MADE FOR YOU

King's AgriSeeds, in conjunction with our dealer network and comments from many of you, has developed several premium perennial forage mixtures adapted to the Middle Atlantic and Northeast. All of these mixtures have great potential to make high quality forage. Selecting the best fit for your farm is primarily based on soil type and harvest methods. However, livestock needs, fertility inputs and other factors should also be considered.

ADAPTED TO GOOD-TO-WETTER SOILS

NORTHERN CREEKSIDE

A very palatable mixture of varieties and species designed for wetter soils and cooler climates. It will form a nice sod to handle hoof traffic. This mix is based on meadow fescue, which is both high quality and palatable. Best suited for USDA Hardiness Zones 4 & 5.

Best Uses: Managed Grazing, Fermented Forages
Seeding Rate: 25 lbs/acre
Product Formula: 35% Perennial Ryegrass
27% Meadow Fescue
10% Balin Kentucky Bluegrass
10% Birdsfoot Trefoil
10% Medium Maturing Timothy
7% White Clover

SOUTHERN CREEKSIDE

A mixture of varieties and species designed for wetter soils. It will form a nice sod to handle hoof traffic. Its quality will also hold well if conditions are too wet to graze or harvest. Best suited for USDA Hardiness Zones 6 & 7.

Best Uses: Managed Grazing, Fermented Forages
Seeding Rate: 25 lbs/acre
Product Formula: 45% Tall Fescue type Festulolium
30% Perennial Ryegrass
10% Balin Kentucky Bluegrass
5% Clifford Red Clover
5% Early Maturing Timothy
5% White Clover

GREENFAST

A fast starting mix that is of very high quality. This mix can be used for wet hay and/or managed grazing. The main component, Perseus Festulolium, is very fast starting, high yielding and of excellent forage quality, but is short lived (typically 3 years). Also contains longer lived species. Can be used to thicken weak alfalfa stands and thin pastures. Best used north of the Mason Dixon Line.

Best Uses: Fermented Forages, Managed Grazing
Seeding Rate: 30 to 40 lbs/acre
Product Formula: 38% Perseus Festulolium
27% Grazing Tolerant Orchardgrass
22% Premium Perennial Ryegrass
9% Freedom! MR Red Clover
4% Alice White Clover


Greenfast

ORGANIC DAIRY GREEN

Superior winter hardiness along with high palatability and quality characterize this mix that will perform well on heavier soils. While best for wetter soils, it will also tolerate drought well.

Best Uses: Grazing, Fermented Forages
Seeding Rate: 25 to 35 lbs/acre
Product Formula: 42% Meadow Fescue
31% Perennial Ryegrass
13% Premium Timothy
8% Red Clover
6% White Clover

ADAPTED TO VARIABLE SOILS

BALANCER

With balanced energy and protein, this high end mixture of grasses and legumes is designed specifically to provide livestock the nutrition they need to maintain, gain and produce in the middle Atlantic climate. From its base of Martin II Protek Novel Endophyte Fescue to its complementary blend of clovers, this mixture has the best interest of your herd in mind! Best adapted to zones 7 & 8.

Best Uses: Fermented Forages, Grazing
Seeding Rate: 25 to 5 lbs/acre
Product Formula: 65% Martin II Protek
10% Inavale Orchardgrass
10% Olathe Orchardgrass
10% Freedom Red Clover OC
5% RegalGraze Ladino Clover OC

BEEFMASTER

A premium pasture mix that consists of Barenburg's best grazing tall fescues, orchardgrass, perennial ryegrass, and Alice White Clover. Excellent for beef grazing systems along with dairy heifers and dry cows.

Best Uses: Beef, Dairy Heifer, Dry Cow/Heifer Grazing
Seeding Rate: 30 to 35 lbs/acre
Product Formula: 50% Soft Leaf Tall Fescue
20% Perennial Ryegrass
20% Leafy Orchardgrass
10% Alice White Clover

BROWSEMASTER

A grazing mixture for small ruminants, complete with forbs. Makes a very attractive mixed stand. Yellow Jacket coated.

Best Uses: Grazing for goats, sheep – mixed species grazing
Seeding Rate: 22 lbs/acre
Product Formula: 36% Freedom Red Clover
28% Soft Leaf Tall Fescue
22% Hybrid Alfalfa X42
8% White Clover
6% Chicory

CLEAN & GREEN

This mix is primarily designed for conservation, but it can be used for forage also. Clean & Green will typically contain two durable endophyte free tall fescue varieties and annual ryegrass to give it quick cover while the tall fescue establishes.

Best Uses: Exercise lots, waterways, filter strips, around farm structures, bank stabilization, and cow calf operations. Can also be used as a forage.
Seeding Rate: 35 to 75 lbs/acre, depending on soil erosion risk.
Product Formula: 80% Rugged, Endophyte Free Tall Fescue
20% Annual Ryegrass

EQUINEMASTER PADDOCK

This mixture is designed specifically for exercise areas as it is rugged and will not get clumpy. EquineMaster is slower growing and is endophyte free.

Best Uses: Exercise lot
Seeding Rate: 30 to 100 lbs/acre
Product Formula: 50% Soft Leaf Tall Fescue
35% Kentucky Bluegrass
15% Perennial Ryegrass

EQUIFLEX FORAGE

An easy-to-dry hay mix of high-quality species designed for horse hay product that both looks exceptional for resale and performs well in the field.

Best Uses: Dry Hay, Managed Grazing.
Seeding Rate: 25 to 30 lbs/acre.
3 to 8 lbs/acre with legumes.
Note: Reduce legume seeding rate by 25 to 50% from pure stand.
Product Formula: 53% Orchardgrass
30% Meadow Brome
10% Timothy
7% Kentucky Bluegrass

GRASSPRO

An all grass mix that is great for stored forage, based on premium tall fescues as the dominant grass. Can be seeded alone or with the legume of your choice.

Best Uses: Fermented Forages, Dry Hay
Seeding Rate: 20 to 30 lbs/acre without a legume
3 to 8 lbs/acre with legumes.
Note: Reduce legume seeding rate by 25 to 50% from pure stand.
Product Formula: 50% Kora and Soft Leaf Tall Fescue
38% Premium Late Heading Orchardgrass
12% European / Premium Timothy

GRASS MAXX

A rugged mix of Martin II novel endophyte tall fescue with early new-release orchardgrass. Grass Maxx provides the diversity you need in a hayfield or pasture while giving you the option of broadleaf weed control during the establishment year. After establishment, frost-seeding a clover or clover blend into the stand in late winter can be a great option to thicken the stand further and boost protein.

Best Uses: Fermented Forages, Dry Hay, Grazing
Seeding Rate: 20 to 30 lbs/acre
Product Formula: 60% Martin II Novel Endophyte Tall Fescue
20% Inavale Orchardgrass
20% Olathe Orchardgrass

HORSE SUPREME

Horse Supreme is excellent for all classes of livestock. Forage type Kentucky Bluegrass gives this mix excellent longevity and dense cover. Meadow brome and grazing tolerant orchardgrass add drought productivity while the diploid ryegrass gives it a quick start and excellent spring and fall production. A touch of white clover has been added for nitrogen production.

Best Uses: Continuous & Managed Grazing
Seeding Rate: 25 lbs/acre
Product Formula: 37% Grazing Tolerant Orchardgrass
20% Meadow Brome
20% Diploid Perennial Ryegrass
15% Balin Kentucky Bluegrass
6% Premium Timothy
2% White Clover

KING'S NORTHERN GRAZING MIX

A highly palatable mixture of winter hardy perennial ryegrasses, soft orchardgrasses, meadow fescue, clovers and forage chicory. Excellent for high producing livestock including dairy, grass finished beef and goats. Ideal for good soils that have high fertility. Chicory is included for better mineral nutrition and other animal health benefits. Adapted to USDA Hardiness Zones 4 & 5.

Best Uses: Managed Grazing, Fermented Forages
Seeding Rate: 25 to 35 lbs/acre
Product Formula: 35% Perennial Ryegrass
25% Grazing Tolerant Orchardgrass
25% Meadow Fescue
7% Medium Red Clover
6% White Clover
2% Chicory

KING'S SOUTHERN GRAZING MIX

A highly palatable mixture that is excellent for high producing livestock including dairy, grass finished beef and goats. Ideal for good soils that have high fertility. Chicory is included for better mineral nutrition and other animal health benefits. Adapted to USDA Hardiness Zones 6a, 6b & 7a.

Best Uses: Managed Grazing, Fermented Forages
Seeding Rate: 25 to 35 lbs/acre
Product Formula: 33% Perennial Ryegrass
33% Grazing Tolerant Orchardgrass
25% Meadow Brome
7% Medium Red Clover
6% White Clover
2% Chicory

LOWLAND HAY

A late heading mix that tolerates wetter soils and has a wide harvest window. Tall fescue adds consistent high fiber digestibility, superb yields and traffic tolerance. This mix includes a very late heading timothy that dries easily and does not absorb high potassium levels.This mix can also be blended with alfalfa on marginal alfalfa soils.

Best Uses: Fermented Forages, Dry Hay
Seeding Rate: 20 to 25 lbs/acre
Product Formula: 60% Kora and Soft Leaf Tall Fescue
20% European / Premium Timothy
20% Freedom & Clifford Red Clovers

MILKWAY

A mix of meadow fescue and soft leaf tall fescue for high quality, highly digestible forage. Milkway is traffic tolerant and can sustain multiple manure or N applications. Excellent with or without legume. Superior for dairies!

Best Uses: Fermented Forages, Dry Hay, Possible Grazing

Seeding Rate: 35 to 40 lbs/acre
3 to 10 lbs with legumes.
NOTE: Reduce legume seeding rate by 25 to 50% from pure stand.

Product Formula: 50% Meadow Fescue
50% Soft Leaf Tall Fescue

ORGANIC PARTNER

An all grass mixture that will give both high quality forage plus yield across many soils. Can be seeded alone or with the legumes of your choice. Use the large box for the grasses and the small box for the legumes.

Best Uses: Dry Hay, Fermented Forages

Seeding Rate: 20 to 30 lbs/acre without a legume
3 to 8 lbs/acre with legumes.
NOTE: Reduce legume seeding rate by 25 to 50% from pure stand.

Product Formula: 60% Kora Tall Fescue
25% Late Maturing Orchardgrass
15% European / Premium Timothy

VERSA

An all grass mixture with very good drought and heat tolerance. Featuring Fojtan Festulolium, it maintains the durability of fescue, but is high in nutritional quality. Great for southern zones.

Best Uses: Dry Hay, Fermented Forages

Seeding Rate: 15 to 30 lbs/acre straight seeding,
2 to 10 lbs/acre with legumes.
NOTE: Reduce legume seeding rate by 25 to 50% from pure stand.

Product Formula: 70% Tall Fescue type Festulolium
30% Early and Mid maturing Orchardgrass.

Versa is a versatile grass mixture that remains balanced over time.

DRILL CALIBRATION

Calibration of equipment by trial and error over several acres into planting can be costly in many ways and quite often profitable for your seed supplier. Seed lots and species vary in their flowability. To calibrate your seeding equipment right, all you need is a calculator, measuring tape, a small accurate scale, and something to collect seed before it is planted, such as a plastic sandwich bag and rubberbands or a small bucket wedged in place. A postage scale or dietary scale are adequate. It really does not take a lot of time and pays off in the big picture. Call us with your row spacing and we can send you a calibration chart.

STEPS TO DROP SEEDER CALIBRATION

1. Place tray or Half PVC Pipe under seed dispenser.
2. Make sure the Tray or Half PVC is attached to the drill securely.
3. Engage seeder and drive 100 feet.
4. Measure the amount of seed dispensed in grams or oz. (convert grams or ounces to lbs.)
5. Using the chart to the right, calculate the acceptable amount of seed.
   Ex. If you are using a 5.5” row spacing, with 16 rows and collect a total of 6.24oz, or .39oz/row, you are seeding between 20 and 25 lb / acre.
6. If depth or rate is off, make adjustments and redo until acceptable.
7. Check for seed to soil contact. Soil needs to be firm.

SMALL SEED ESTABLISHMENT TIPS

1. Note soil types (droughty, wet, etc.)
2. Soil test and apply fertility before tillage. Lime should ideally be applied 6-12 months in advance.
3. Control perennial weeds prior to land preparation.
4. Select appropriate mixture for soil types, livestock and marketing needs and harvest management.
5. Determine ideal seeding time for your local area. (Late winter to early spring or late summer is usually ideal.)
6. Prepare a level, firm seedbed, or if using no-till, control vegetation prior to seeding with appropriate nonresidual herbicide.
7. Calibrate seeder for appropriate seeding rate and depth.
   a. Our mixtures work best in the large box.
   b. Call for a calibration sheet. Need to collect and weigh seed over a small distance to determine seeding rate.
   c. Seed at 1/8 to 1/4” with about 10% of seed on surface.
   d. Press wheels and/or cultipacking are critical to a good seeding. If conditions are dry, cultipacking twice is very beneficial.

Example: 5.5” Row Space Drill	
Goal	**Collection Per Row Needed**
10 lb/acre	0.17 oz or 4.8 grams
15 lb/acre	0.25 oz or 7.2 grams
20 lb/acre	0.34 oz or 9.6 grams
25 lb/acre	0.42 oz or 11.9 grams
30 lb/acre	0.51 oz or 14.3 grams

Example: 7” Row Space Drill	
Goal	**Collection Per Row Needed**
10 lb/acre	0.21 oz or 6.1 grams
20 lb/acre	0.43 oz or 12.2 grams
30 lb/acre	0.64 oz or 18.2 grams
40 lb/acre	0.86 oz or 24.3 grams

Example: 7.5” Row Space Drill	
Goal	**Collection Per Row Needed**
10 lb/acre	0.23 oz or 6.5 grams
20 lb/acre	0.46 oz or 13 grams
30 lb/acre	0.69 oz or 19.5 grams
40 lb/acre	0.92 oz or 26.1 grams

DIGESTIBLE ENERGY KingFisher®

ALFALFA King's selects alfalfas for forage quality, persistence and yield. All of these listed have excellent leaf to stem ratios, impressive disease resistance, yield and winter hardiness. These products are the latest, superior varieties on the market. Let these alfalfas work for you by choosing the product(s) that are most adapted to your management and soils.

Our recommended seeding rate for straight stands of alfalfa is 18 to 22 lbs/acre.

40LR ALFALFA OC NEW

An improved leafhopper resistant alfalfa with a solid disease package. King's AgriSeeds 40LR Alfalfa has a deep tap root, making it more drought tolerant during the heat of the summer. Low-lignin alfalfa from the industry usually has a drag on yield. Our 40LR alfalfa is not only excellent in quality but it increases yield and has improved fiber digestibility.

- Fall Dormancy: 3.9
- Winter Hardiness: 1.7
- Disease Rating: 29/30
- ***Only Available as organic***

KING'S ECONO ALFALFA CT/OC

A solid alfalfa that is priced very competitively. Good agronomics and quality.

KINGFISHER 409 AP2 ALFALFA OC NEW

Organically produced, exceptionally high yielding, persistent alfalfa with branch rootedness and excellent plant health. KF409 AP 2 has an excellent agronomic package that has resistance to multiple strains of Aphanomyces Root Rot Race 2. The strong disease resistance package expands the acres that this fine alfalfa will be productive, providing more yield per field.

- Fall Dormancy: 4.0
- Winter Hardiness: 2.0
- Disease Rating:35/35
- ***Only available as organic***

LOW-LIGNIN FOR 2023?

KingFisher 435HD is a highly digestible alfalfa that is marked by reduced lignin. Enhance your alfalfa production in 2023 by reducing lignin and improving quality.

- ☑ **Reduced lignin**
- ☑ **Agronomic strength**
- ☑ **Non GMO**
- ☑ **No trait technology cost**

KINGFISHER 435HD CT/OC

A next generation high digestibility alfalfa, and was bred for quality. It has an excellent agronomic package that provides a very persistent and healthy plant for top production over a broad range of soils.

- Fall Dormancy: 4.6
- Winter Hardiness: 1.7
- Disease Rating: 35/35
- ***Also Available as organic***

KINGFISHER PLH 422 OC

A high performing PLH resistant variety of alfalfa. In addition to the Potato Leaf Hopper resistance, PLH 422 features multifoliate leaf structures for a high leaf to stem ratio.

- Fall Dormancy: 4.2
- Winter Hardiness: 2.4
- Disease Rating: 30/30

KING'S 544 PLH OC

A new high yielding fall dormancy 5 PLH resistant variety of alfalfa, that can rival elite conventional varieties even when leaf hopper pressure is low.

- Fall Dormancy: 5.0
- Winter Hardiness: 2.0
- Disease Rating: 35/35

KINGFISHER STRONGHOLD 35-2 CT/OC

Stronghold brings a great defense to our alfalfa lineup. It features a sunken crown for great traffic tolerance, and branched roots keep it firmly in the ground and keeps more roots above the water table.

- Fall Dormancy: 4.3
- Winter Hardiness: 1.8
- Disease Rating: 35/35

WHITE CLOVER is the backbone legume of grazing systems and can be mixed with other species in wet hay systems. What makes our white clovers different? Focused on forage growth, these varieties grow larger, and recover quick. They are high quality and excel agronomically.

Seed 2 to 4 lbs/acre.

ALICE OC/YJ

Alice is a tall, large-leafed clover developed for exceptional yields of palatable, high quality, high protein forage. Its vigorous spring and summer growth makes it a good choice for cutting or grazing management. Alice has greater stolon density than most ladino types, allowing for better persistence under intensive, continuous grazing.

KAKARIKI OC

A large-leafed clover boasting high stolon density, high yields and excellent rooting. This combination provides increased yields and greater persistence. Ideal for both hay and grazing.

KLONDIKE LADINO OC NEW

A quick growing, large leaf clover. Include with pasture seeding or overseed into pastures.
Only available in organic

RENOVATION OC

Renovation was bred for increased stolon density utilizing a combination of long-living Southern Plain ecotypes and disease resistant ladino types. The result is increased persistence, even under grazing. Increased stolon density also makes it ideal for erosion control and long term conservation.

RIVENDEL OC

A shorter and small leaved white clover that is very persistent in pastures. Very suitable for both cattle and sheep grazing. ***Only available in organic.***

ALSIKE CLOVER is available in VNS only. Alsike clover is adapted to cool, moist, acidic soils and can tolerate more flooding than other clovers. Blooms continue throughout the season, making it suitable for hay over an extended window. Excellent winter-hardiness, intolerant of drought and extreme heat.

Seed 6 to 8lbs/acre, alone.
Not appropriate for equine feed.

RED CLOVER is more drought tolerant and productive than white clover, but not quite as high quality. Use some of each for grazing. Red clover is more tolerant of wet soils and lower pH than alfalfa.

Seed 6 to 8 lbs/acre in mixtures. 20 lbs/acre alone.

CLIFFORD OC

Named for its very large leaf size, this exciting new medium red clover was selected from premium genetics to deliver high quality forage during multiple harvests over multiple years. A great choice for both dairy and beef producers.

COMMON MEDIUM VNS OC/CT

A short lived, lower cost red clover. Common Medium is good for cover crop programs or frost-seeding into pastures. ***Also available in organic.***

FREEDOM MR OC/YJ

Freedom MR is bred for yield, persistence and easier drydown as it has less pubesence. (hair) MR is a selection with exceptional resistance to mildew (MR). Great overall palatability and forage quality.

HARMONIE OC

A European variety with good late season cuts.
Only available in organic.

CT= Conventional Coating
OC= OMRI Approved Organic Coating
Coating includes inoculant.

Red Clover Improves Protein Utilization And Protection

If your rations have too much NPN (non protein nitrogen), consider adding red clover to your forage system. During ensiling, red clover has 30 to 90% less conversion of protein to NPN than alfalfa.

MILVUS RED CLOVER UT NEW

It's back by popular request for northern areas Zone 4 and 5. A strong European Red Clover bred for persistence. Second year productivity is remarkably high. Milus belongs to the "Mattenklee" family which can be described as "mat clovers" that produce stolens (runners) . Milvis has the ability to fill in the gaps, a major advantage compared to other varieties.

REDKIN OC NEW

A new Kentucky bred red clover that has excellent persistence and potato leafhopper resistance that results in excellent productivity.

FORBS are broadleaf forages. Many farmers may consider them weeds, but forage quality can actually be quite high, including medicinal properties. Chicory, plantain and dandelion are a few examples of forbs that are good grazing species.

Because of its very high energy, chicory boosts milk production and is fantastic for fattening lambs and steers. It will not persist if it doesn't have a 25 day rest period between grazings. However, it really boosts first year production in new seedings of dry land pastures. It's very high in mineral content and digestibility, low in lignin, and high in protein.

FORB FEAST CHICORY OC

Forb Feast Chicory is a high quality, reduced bolting chicory blend. Reduced bolting means better feed value throughout the season. An excellent source of digestible energy, protein and minerals, with key anti-parasitic properties in small ruminants.
Seed 2 to 5 lbs/acre.

Our **CLOVER** mixes combine species to create a balanced solution to perennial hay and grazing ground. By combining red and white clovers we get short term aggressive yield and a long term durability clover stand.
Seed 4 to 6 lbs/acre.

CLOVER POLLINATOR MIX OC

This mixture of clovers is purposefully designed to attract pollinators. The variable maturity/flowering within the mixture allows for a full season attractant. Best suited to fall plantings.

Product Formula:
27% Yellow Blossom Sweet Clover
18 % White Sweet Clover.
18% Crimson Clover
9% Kakariki White Clover
9% Ladino Clover
9% Balansa Clover
9% Alsike Clover

PREMIUM CLOVER MIX OC

A mixture of our best perennial clovers. Red and white clovers combine to make a mixture that is great for interseeding into thinning alfalfa or grass stands, frost seeding or combining with your favorite grass mixture. Varieties utilized are hardy and long lived.

BIRDSFOOT TREFOIL A non-bloating legume that holds quality well and provides tannins that benefit livestock. Even though the yield is not robust the animal productivity benefits are high.
Seed 20-25lbs/acre.

BULL BIRDSFOOT TREFOIL UT/OC NEW

A semi erect variety that grows 2 to 3 feet tall.

DAWN BIRDSFOOT TREFOIL OC NEW

A low growing grazing type, tolerant of lower pH and wetter soils.

BROMEGRASS

The bromegrass family is quite diverse from each other in their use and areas of adaption. Bromegrasses have larger seed size than other grasses, so attention to drill calibration is important.

ARTILLERY SMOOTH

Artillery is a drought-tolerant, productive smooth bromegrass. It is rhizomatous and early-maturing, and was developed from selections from arid regions of Turkey, Iran, Spain and Mongolia. The developed population was then selected in Oklahoma high stress conditions that included no irrigation with low nitrogen input.
Seed 30 to 40 lbs/acre.

ARSENAL MEADOW

A new release Barenbrug variety selected for drought tolerance. Arsenal's selection focused on plant vigor, seedling emergence from a deep planting depth, forage and seed yield, and seed mass under dry land environments.
Seed 35 to 45 lbs/acre.

CACHE MEADOW BROME

Developed by USDA-ARS for improved seedling establishment and increased forage yields. It is widely used for hay, pasture and forage production.
Seed 25 to 30 lbs/acre.

VNS SMOOTH

A long lived species when allowed to head out in the spring. Most of its yields is upfront with the first cut. Smooth brome retains its green color and hold quality well. Mixes well with timothy.
Seed 30-35 lb/acre.

FESTULOLIUMS

are crosses between ryegrass and tall fescue or meadow fescue. The variety differences can range from short lived to perennial. They also range in their agronomic traits from ryegrass-like to fescue-like.
Seed 30 to 40 lbs/acre.

FOJTAN

Fojtan is a tall fescue type festulolium with great nutritional qualities. The appearance of Fojtan is much like tall fescue and the two species share many properties: very high yield potential in combination with high persistence, drought resistance and tolerance to periodic flooding. What separates Fojtan from other festoliums is the higher feeding value and it is less agressive, so it works well in mixtures.
Also available in organic.

PERSEUS

Perseus is a three year Italian Ryegrass type that is later maturing than Perun. Perseus is a cross between Italian ryegrass and meadow fescue and belongs to the Italian ryegrass type of festulolium. The result is a variety with a very vigorous growth during spring and fall, with quality similar to perennial ryegrass. Best adapted to zones 4 and 5.

INTERMEDIATE RYEGRASS

ASTONCRUSADER

AstonCrusader is a certified organic, intermediate tetraploid variety that produces a very high total annual yield with extraordinary early spring growth. Combined with excellent disease resistance, AstonCrusader is a top ryegrass variety.
Only available in organic.

KENTUCKY BLUEGRASS

is a shorter-height, sod-forming grass that makes a nice, smooth-looking pasture. Bluegrass spreads by rhizomes and can survive very short grazing. The majority of its forage production is in the spring and fall, with its yields usually being relatively low compared to most other pasture species. Its persistence is excellent, but establishment is slow. Bluegrass seed is very fine, and a little seed goes a long way.
Seed 15 lbs/acre.

BALIN

Balin is a fast establishing, taller bluegrass. Balin is one of the few, true forage Kentucky bluegrasses on the market.

Finishing beef on forage requires high energy grasses.

MEADOW FESCUE, a very winter

hardy species with forage quality similar to ryegrass. It is very palatable but lower yielding than tall fescue. It does very well in variable soil conditions. We only recommend it to be planted as part of a mixture. It will fit organic farms well in that it does not have as high of a nitrogen requirement, but is still of high quality. Less summer headiness than perennial ryegrass. Meadow fescue is best adapted to USDA Hardiness Zones 4 and 5, which includes areas that are north of I-80 or areas further south with high elevation with good summer rainfalls.
Seed 35 to 45 lbs/acre.

DRIFTLESS NEW

A very strong disease resistant variety by Barenbrug that moves south better than our other varieties. Driftless may go as far south as Zone 6b.

HDR BLEND

HDR stands for High Disease Resistance. The quality and palatability of HDR approaches that of ryegrass.

LIHEROLD

A strong variety with exceptional spring yield. Liherold is an earlier meadow fescue, making it an ideal component for grazing mixtures. Liherold will be included in many of King's grazing mixtures.

TETRAX MEADOW FESCUE

A tetraploid variety that excels in digestibility and is less aggressive than traditional improved diploid varieties. It also has excellent winter hardiness and disease tolerance. These combined attributes make Tetrax ideal to seed with alfalfa in areas that many grasses compete too heavily with alfalfa.

ORCHARDGRASS is more heat and drought tolerant than most cool season grasses, and thus produces more feed in the summer. Orchardgrass is sensitive to cutting height, so we recommend a residual cutting/grazing height of 4 inches. Our later heading orchardgrass varieties work great seeded with alfalfa. ***Seed 20 to 25 lbs/acre***.

DONATA NEW

A late maturing, highly digestible, non-aggressive orchardgrass. Bred for mixtures, it's nonaggressive characteristics will keep it from taking over a mix in 2 to 3 years. Donata persists very well from spring to fall. Excellent performer in zones 4&5. Good rust resistance

ECHELON

Echelon is a very late maturing, high yielding orchardgrass with great quality. Pairs with alfalfa well due to the maturity timeline.
Also available in organic.

HLR BLEND UT/YJ

A mixture of Barenbrug leafy late maturing varieties. Stands for High Leaf Ratio. HLR holds its quality for longer periods of time allowing for late cuttings.

YELLOW JACKET ENHANCED SEED COATING

INAVALE UT/OC

A true medium-maturing leafy orchardgrass with strong disease resistance. Its summer heat tolerance makes it a great choice for grazing or hay. This orchardgrass was screened heavily in northern Kentucky and also looks strong in our Lancaster plots.

OLATHE

An early orchardgrass that stands up well to disease and heat. Olathe has become our top choice orchardgrass for the south but will also do well in the north. Because of its early maturity, we do not recommend it to be seeded with alfalfa unless 1st cutting quality is less important on your farming operation. Olathe is included in many of our grazing mixes.

PERSIST NP

A southern orchardgrass bred by University of Tennessee for persistence under hot, humid conditions and abusive grazing management. Its maturity is similar to Pennlate.
Persist will be offered with NitroNP coating.

HLR Orchardgrass Blend

PERENNIAL RYEGRASS is the highest quality grass, especially when it comes to digestibility and sugars. Cows maintain better body condition and make more milk or meat on ryegrass versus orchardgrass or even alfalfa. However, ryegrass is harder to dry and does not perform well in hot or dry weather. Perennial ryegrass, if seeded by itself, should be planted in cooler climates on fertile, moist soils. Ryegrass comes in many different forms: Perennial, Hybrid, Italian and Annual. Besides this, it can be either diploid or tetraploid. ***Seed 30 to 50 lbs/acre.***

DIPLOID / TETRAPLOID BLEND

BG-24T

A unique, innovative blend of early and intermediate maturing diploid and tetraploid varieties. Includes varieties that are both heat and cold tolerant.

TD BLEND

A tetraploid-diploid blend of European bred Perennial Ryegrasses. An excellent choice for overseeding pastures as part of a regular maintenance program.
Only available in organic.

DIPLOID

MARA

An Intermediate maturity diploid perennial ryegrass with high yields. Mara has exceptional winter hardiness and exhibits more tolerance to heat and drought than traditional perennial ryegrasses. Mara establishes quickly, exhibits rapid regrowth and easily forms a dense sward.

PREMIUM

Premium is an excellent later diploid with superior winter and summer hardiness.
Only available in organic.

TETRAPLOID

KENTAUR

A high yielding tetraploid variety that has balanced productivity. Kentaur has excellent winter and summer hardiness, making it a very durable tetraploid variety. Kentaur has some summer headiness.
Also available in organic.

PAYDAY NEW

A tetraploid perennial ryegrass variety with improved rust resistance, later maturity, sweet taste and high forage yields that can build more beef, make more milk, and put more money in your wallet! Excellent cold tolerance, meaning long lasting and fewer replants.

REMINGTON

A high-yielding, high-quality tetraploid ryegrass that shares many attributes of a diploid type. Selected for sward density, high yields, excellent disease resistance and winter hardiness. Well suited to grazing and high-moisture cutting systems.


KF Allegro

TALL FESCUE deserves more recognition as a stored forage. Over the lifetime of a stand, tall fescue will typically out yield orchardgrass by about one ton of dry matter per year. If you are grazing tall fescue, use more palatable varieties and do not allow the plant to get too tall. It is also ideal for fall stockpiling and out-wintering. Many older varieties have given tall fescue a bad name as they have poor palatability and may contain a toxic endophyte. **Our varieties do not contain toxic endophytes and have improved palatability. Varieties that do contain endophytes use novel endophytes that are beneficial to the plant and non harmful to the animal.** ***Seed 35 to 40 lbs/acre.***

BAROPTIMA PLUS E34

BarOptima is a soft leaf variety and E34 is a beneficial endophyte that improves the agronomics of the grass, but does not cause negative health effects of the harmful endophyte that is typically found in Kentucky 31 and many other older tall fescues. This product is ideal for long term grazing and hay swards in southern Pennsylvania and south. Best in zones 7A and higher.

CAJUN II

An endophyte free, earlier, very high yielding, hay type tall fescue with improved digestibility. Excellent for stockpiling for fall grazing. Adapted to both the south and the north, zones 4 to 8. A strong contender in our Lancaster grazing trial.

KORA

A late, very high yielding tall fescue with improved digestibility. Great on less than ideal soils. Kora works well mixed with alfalfa and helps it dry easier. Best adapted to zones 4 to 7a.
Also available in organic.

LIPALMA

Top in sward density and rust resistance. This tall fescue variety shows a good yield distribution over all cuts. Lipalma is suited for growing under extensive use and dry areas and variable soils. Best adapted to zones 4 to 7a.
Also available in organic.

MARTIN II PROTEK

A novel endophyte fescue, combining the proven genetics of Martin II with the innovative Protek endophyte. Expect increased longevity and animal performance. Best adapted to zones 7a and higher.

STF-43 BLEND

A blend of Barenbrug soft leaf, late heading varieties. Produces impressive dry matter yields with exceptional levels of digestible fiber. The varieties used have improved palatability for grazing and are also good for mixing with alfalfa or utilizing straight stands for stored forage. Best adapted to zones 4 to 7a.

TRIUMPHANT NEW

A new early, high yielding, durable, endophyte free tall fescue variety that has excellent disease tolerance. Triumphant has proven itself to be a top perfomer in our grazing trial in Lancaster. Excellent regrowth that livestock can graze again and again. Best adapted to zones 4 to 8.


Martin II

TIMOTHY is a very palatable grass and well adapted to heavy soils. Timothy usually has huge production in spring, but drops off in summer and fall. Sow in fall or very early spring. Plant shallow, no deeper than 1/4" in a firm seedbed.
Seed 10 to 15 lbs/acre.

CLIMAX

The old standard variety.

COMTAL

An improved variety that is good for both hay and grazing. Similar maturity as climax.

DOLINA

A high yielding, persistent hay type European variety.
Only available in organic.
Seed10 to 15 lbs/acre.

RICHMOND NEW

An early maturing, high yielding timothy, chosen for its outstanding performance in the field.

ZENYATTA

Zenyatta was bred in the U.S. and is an improved Clair-type timothy. It has both early production and regrowth.

TURF AND INTER-ROW GRASS MIXTURES

COMPANION MIX

A slow growing mix for orchards, vineyards or around buildings that requires less mowing.
Seed 50 lbs/acre.

SUN & SHADE MIX

A multi purpose lawn grass for both sunny and shady areas.
Yellow Jacket Coated.
Seed 175 lbs/acre.

TURF STAR

Turf Star® is the best quality three way perennial ryegrass blend available. Fast to germinate & quick to establish, Turf Star® is ideal for full sun & light shade.
Seed 300lbs/acre.

WATER SAVER PRO

Turf-type tall fescue blend. Excellent for durability and low maintenance.
Seed 300 lbs/acre.

MISCELLANEOUS

REED CANARYGRASS

Reed canarygrass is slow to establish. Once established, it is very productive in a wide range of conditions, including very wet soils to very droughty or low pH soils. It is suitable for silage, hay and grazing, but requires good management to get high quality. We only sell low alkaloid varieties.
Seed 12 to 18 lbs/acre.


Low growing grasses can prevent erosion between plastic rows.

COOL SEASON ANNUAL FORAGES

CARGO

A mixture of crimson clover, annual ryegrass, and oats, CARGO makes a high quality, high sugar forage for grazing and baleage. It is a superb cover crop for southern Pennsylvania (south of I-78) and further south (6a and higher). The benefit of crimson clover is that it flowers early and will fix nitrogen earlier in the spring compared with other legumes. Annual ryegrass has very extensive root growth and improves soil structure better than cereal grains.
Pre Inoculated.
Seed 110 to 130 lbs/acre.

DART

DART is designed for a one cut system and features a mixture of triticale, annual ryegrass and daikon radish. The added daikon radish stores available nutrients in the fall, which will then be slowly released to the triticale and ryegrass in the spring after the daikon radish winter kills.
Seed 150 lbs/acre.

- 1 cut system
- Better balance than triticale alone
- Great forage for double cropping

DOUBLE PLAY

A mixture of forage oats, triticale and annual ryegrass. This mix is designed to be planted late summer and harvested in both the fall and spring. Oats and annual ryegrass provide strong fall yields. The over wintered triticale and annual ryegrasses will provide good spring yields.
Seed 150 to 200 lbs/acre.

- High fall and spring yields
- Higher sugars and digestibility than small grains alone
- Excellent nutrient usage

RAY'S CRAZY FALL

A versatile 8-way cool season mix made up of grasses, legumes, and brassicas that can be used as a short-term cover crop, a soil-building transition crop to renovate depleted soils, a grazing mix or some combination of all. The Ray's Crazy Family of Mixtures includes a Spring, Summer and Fall versions.
Seed 40 to 60 lbs/acre.

SMALL BOX BOOSTER

This Booster mix is designed to be planted with the small grain of your choice. It features hairy vetch, clovers, timothy and daikon radish. This soil building mix can also be used in a forage setting. For drills with both a large and small box.
Seed 10lbs of booster for every 50-100lbs of small grain.

SOIL BUILDER PLUS

A mix of triticale, crimson clover, hairy vetch, ryegrass and daikon radish. An excellent spring forage and/or cover crop. Clovers and vetch provide protein in a forage application, and triticale and ryegrass contribute effective fiber and bulk. Plant in late summer for a late fall grazing.
Seed 120 to 140 lbs/acre.

TRITICAL PLUS

A mixture of triticale and annual ryegrass. Designed for two spring cuts of haylage. This mixture will have excellent NDFd when harvested prior to boot stage. Even more tonnage than triticale alone. Triticale adds bulk to the forage for easier silo unloading.
Seed 90 to 140 lbs/acre.

- Great forage for double cropping
- 2 Cut System
- Great for baleage or grazing
- More energy than triticale

FOR COVER CROP FOCUSED MIXTURES, SEE PAGE 48.


DART

KING'S PEA OAT

50/50 mixture of peas and oats. Excellent as a straight forage or a nurse crop.
Seed 100 lbs/acre.

OATS PLUS

A mixture of a true forage oat (60%) and annual ryegrass (40%). This mix combines the strength of each product and can be planted in early spring and late summer. It will work well for machine harvest and grazing. Oats and annual ryegrass are quick growing annuals that will make high quality forage. Harvest prior to boot stage of both products for super quality. Harvest oats in fall and get two cuttings of annual ryegrass in spring.
Seed 75 to 90 lbs/acre.

RAY'S CRAZY SPRING

This new mixture is designed with the same goals as the summer and fall formulations - a dual purpose soil improving cover crop and high quality forage. This mix provides quick spring nitrogen for the following crop, recycles nutrients, builds soil health. This balanced mix contains a total of 8 species: grasses, legumes and brassicas.
Seed 120lb/acre.


Ray's Crazy Fall

ANNUAL RYEGRASS

King's varieties have a high winter hardiness. Vigorous, extensive growth, both above and below ground. Scavenges and recycles soil nitrates, contributes fine root organic matter at deep soil levels. Can be seeded with crimson clover and with the winter annual small grains.
Seed 35 to 40 lbs/acre.

KODIAK

A diploid ryegrass. Kodiak showed very strong performance in the Penn State trials over the past few years.

LOWBOY

A low growing ryegrass that is easier to terminate. It's aggressive root structure make it ideal for cover crop use, not for forage.

MCKINLEY

Another outstanding diploid from DLF. McKinley did very well in the Penn State trials. It's a high energy, winter hardy variety.

ITALIAN RYEGRASS

is quite similar to annual ryegrass except it is an annual or biennial, depending on climate and/or length of growing season.
Seed 35 to 45 lbs/acre.

KF ALLEGRO BLEND

A blend of European bred Italian Ryegrasses. If seeded in the spring in cooler climates it will make several cuttings per year of very high quality forage. Avoid droughty and/or low fertility soils.
Also available in organic.

SPRING BARLEY

Seed 95 to 200 lbs/acre depending on use.

MASSY SPRING BARLEY NEW

A new release, feed type, 6 row spring barley that is high yielding , and has excellent disease tolerance. Developed in eastern Canada. Best uses, forage, straw, grain for feeding.

TRITICALE

is a cross between wheat and rye. There are many difference among varieties in both appearances and digestibility. We are offering triticale varieties that have been bred for fiber digestibility. In addition to excellent forage quality, the heading date, typically between rye and wheat.
Seed 100 to 150 lbs/acre.

GAINER 154

A highly-yielding variety that is very responsive to good fertility and crop management. With its early maturity (compared to some other triticales), early spring management is important. Apply spring fertilizer earlier to push the crop out of dormancy for maximum yield and protein. Fall plant.
Also available in organic

KF HYTON NEW

A new KingFisher variety with strong seedling vigor, high yields, & excellent quality. Very strong prostrate fall & winter growth suppresses weeds & gives superior soil coverage. Wide seeding window and medium height. Fall plant.
Available in organic

NITROUS NEW

Nitrous delivers outstanding forage yield with a greater leaf to stem ratio. It's late maturity and leafiness creates a wider harvest window than most varieties. High eye appeal backed by strong yield and quality data will impress you. Fall plant.

SURGE

This high sugar awnless variety is facultative. Surge is best seeded in the spring but can also be seeded in the fall. Avoid early fall plantings.
Also available in organic.

ASK US ABOUT ADDITIONAL ORGANIC VARIETIES!

OATS are fast starting, and can be used as a grain or a forage. For forage, they can be planted in the spring or late summer. Oats can also be used as a nurse crop.
Seed 95 to 125 lbs/acre.

BADGER *(GRAIN)*

Badger is our earliest heading variety and our top grain oat. Badger is a yellow oat that has a very good groat percentage, high grain yield, good grain quality and excellent test weight.
Also available in organic.

CANMORE *(DUAL PURPOSE)*

Canmore is a tall growing medium maturing oat with very good standability. Its grain yield should be very competitive in cooler climates. It is also an excellent straw producer along with a high forage yielder.

EVERLEAF 126 *(FORAGE)*

A true forage oat with delayed heading (about 2 weeks later). Everleaf is bushy and leafier and has a softer stem. Our samples of Everleaf Oats have extremely high forage quality.

NIAGARA *(FORAGE)*

Niagara is a medium maturity Canadian forage oat with improved rust resistance. At boot stage, Niagara is high in crude protein and in percent digestible fiber.

REEVES *(DUAL PURPOSE)*

A medium-early maturity, high yielding oat variety. Excellent dual purpose. For forage it is best suited for late summer to early fall seeding as it gives fast fall forage growth.
Also available in organic.

SPELT is emerging as a solid option for high quality forages, as well as grain. In our trials, spelt averages three tons DM with great digestibility and protein values.
Seed 125 lbs/acre.

SONIC

Primarily a forage variety, but can also be used for grain. It has a vigorous growth habit and improved disease resistance and strong yield.

SUNGOLD

A food grade spelt with excellent baking qualities. Strong standability and winter survival. Medium brown chaff. Sungold can also be used for forage.

WHEAT often does not get as leafy or tiller as much as barley or triticale, but the quality, digestibility and effective fiber are quite high. Later harvest than rye or triticale.
Seed 100-150 lbs/acre.

ERISMAN WHEAT

Erisman certified organic wheat is a bearded, early maturing soft red winter wheat variety developed for organic and low input cropping systems.
Only available in organic.

MALABAR

A mid-season, awnless soft winter wheat, with consistent yields and excellent disease resistance. Slightly shorter stature than other wheat; good standability.

Winter Annual Plots

With nitrogen prices going up recently, interest in Cool Season annual legumes has increased dramatically. Significant amounts of nitrogen can be produced for the following crops by the time these nitrogen fixing crops bloom. Maximum nitrogen is produced if the crop is left until flowering stage.

CLOVERS are an important part of crop rotations and cover cropping. Nitrogen fixation and quick cover are just a few of the many benefits they offer.

DIXIE CRIMSON CLOVER

A high quality cool season annual that can be used for both forage (usually mixed with a small grain or annual ryegrass) or as a nitrogen fixing cover crop. Ready to plow down 2 to 3 weeks earlier in spring than hairy vetch.
Available in CT/UT. Seed 15 to 25 lbs/acre.

VIPER BALANSA

Quick to establish and early to bloom, Viper provides early nutrients and feed for both soil and animal health. Viper may be cut for stored forage or grazed. It is highly digestible and adapted to rotational grazing. Ideal for pollinators too!

BERSEEM CLOVER is a cool season annual clover that resembles alfalfa. It is capable of producing 100-200lbs N.
Seed 15 to 20 lbs/acre.

BALADY-1 BERSEEM OC

Quick growth, single cut variety. Best used as a cover crop. Not winter hardy.

FROSTY BERSEEM CLOVER OC

An improved late maturing berseem clover that was bred for cold tolerance and multi-cut systems.

FORAGE PEAS produce extremely high forage quality and very high crude protein. They make a good companion crop with oats and triticale.
Seed 60 to 100 lbs/acre.

4010 SPRING

A purple flower pea that can be planted in spring or fall. High-protein forage for grazing, haylage or baleage.
Also available in organic.

KEYSTONE WINTER

Keystone has excellent early vigor and more spring growth than other winter peas King's has tested. As a white flowered pea, it does not contain anthocyanin found in non-white flowered peas, which means that Keystone has better palatability and better digestibility than Austrian Winter Pea. Can also be spring planted.

HAIRY VETCH is a thick, vining winter annual legume that is very productive, produces nitrogen and offers quick cover that supports pollinators and wildlife. Ideal for forage and cover crops.
Seed 25 to 30 lbs/acre.

AU MERIT

AU Merit is a high yielding early variety that was developed in Alabama. Tolerates cold well.

PATAGONIA

High-yielding hairy vetch bred in southern Argentina for early growth and better cold tolerance.

Clovers planted with a nurse crop of oats

WARM SEASON ANNUALS

RAY'S CRAZY SUMMER

This diverse mixture was created for dual purpose grazing and soil health improvement. It contains 7 species including grasses, legumes and forbs. There is also a cool season/winter version of this mix available. p.50. Seeding rate varies depending on use and goals.
Seed 40 to 60 lbs/acre.

SUMMER FEAST

This summer annual mix of Leafy T Millet and forage brassica will give your herds and flock lots of summer feasting. As with Leafy T, there is no worry about prussic acid.
Seed 10 to 20 lbs/acre.

SUMMER SOLAR

A summer cover and forage crop that consists of cowpeas, sunnhemp, sunflower, buckwheat, and a touch of male sterile sorghum sudangrass.
Seed 35-60 lbs/acre

YIELDMAX

A unique and innovative alternative forage mixture that utilizes both cool season and warm season annuals. This mixture provides multiple cuts throughout the growing season in which components of this mix will express themselves in different ways. The first two cuts will be heavy with the sorghum sudan, while subsequent cuts will express more ryegrass and legume. Best suited to USDA hardiness zones 4&5.
Seed 30 to 40 lbs/acre.

FOR COVER CROP FOCUSED MIXTURES, SEE PAGE 48.

KEEP IT COVERED ALL YEAR!

Whether you are farming conventionally, organically, or aiming for a no-till system, each field should have a living crop for as many months of the year as possible.

We have developed a variety of mixtures designed and tested to improve soil health. Multi species blends are far more beneficial at improving the life of your soil than monocultures. Cover crops are proven to help optimize your soil's long term productivity and profitability.

FORAGE SORGHUM is a warm season annual that is an excellent choice for one direct cut systems (like corn silage) on marginal corn ground or after double crops. Uses 30 to 50% less water than corn and less nitrogen too. The BMR trait has improved the digestibility of forage sorghums dramatically, and they are now considered an excellent dairy feed. Energy levels are comparable to corn, and protein level is around 6 to 9%. Sugar levels are also very high.
Seed 80 to 100K seeds/acre for soft dough harvest.
Seed 25 to 30 lbs/acre for boot stage harvest.

KF FIBER PRO 50

A dwarf BMR variety that is the shortest maturity in the lineup: 85-89 days. Can be direct chopped in soft dough OR harvested in a cut and wilt system following frost. The dwarf characteristic helps reduces lodging and improves the leaf:stem ratio.

AF7201

A shorter season, taller hybrid that is ideal for boot stage harvest.

ADV F7232

105-110 days to soft dough stage. A medium maturity brachytic dwarf hybrid.

AF7401

A full season brachytic dwarf forage sorghum with superior standability and great nutrition. As a later hybrid, it is best used for south of the Mason-Dixon line. 110 to 115 days to soft dough stage.

AF8301

A non-BMR forage sorghum that works very well on dry soils for the producer that needs a high starch, high tonnage silage for less than ideal soils. It has a very leafy, dwarf type plant structure with a tremendous grain head (white), providing a very high grain to stover silage. Approximately 100 days to soft dough stage.

ADV 8484IG

A new brachytic dwarf, non-BMR forage sorghum that is short in stature but very high yielding. Features IGrowth technology. Stewardship agreement required. Non-GMO.

GRAIN SORGHUM is a starch source for dry areas. It is a very low water use crop, but the starch is very vitreous. For livestock feeding, it should be taken as high moisture grain and fermented 6 months before feeding to ensure the starch is readily available.
Seed 80 to 100K seeds/acre.

ADV G1120IG NEW

Adapted across all environments, this short season, non GMO red grain variety with Imi herbicide tolerance featuring iGrowth technology contains the highest yield potential and stable maturity. Stewardship agreement required.

ADV G1142IG

A short season, non-GMO red grain variety with Imi herbicide tolerance featuring iGrowth technology that is a consistent yielder and can mitigate servere drought. Stewardship agreement required.

ADV G2106

A highly adaptable 66 to mid bloom hybrid with Bronze color grain.

SP 30A30DT NEW

Early maturing bronze hybrid with herbicide tolerance featuring Double Team Technology. Non-GMO.

SP45A45DT NEW

A medium maturing bronze hybrid with herbicide tolerance featuring Double Team Technology. Sugar Cane Aphid Resistant. Non-GMO.

Grain Sorghum Plots on King's Research Farm

SUDANGRASS has finer stalks, more tillers, and produces more leaves than forage sorghum. It has excellent regrowth potential and high yields. Can be harvested for dry hay, fermented forages or grazed. ***Seed 3/4" deep at 25 to 30 lbs/acre.***

KING'S 200PS BMR

A widely adapted photoperiod sensitive BMR sudangrass hybrid, with fine stalks. Best palatablity.

AS9301

A very exciting gene 6 BMR sudangrass that has great vigor and extremely high quality. Because of the dry stalk characteristic, AS9301 dries easier than sorghum sudangrass. Top yielding.
Also available in organic.

AS9302

A gene 6 BMR medium maturity sudangrass. It has the Brachytic dwarf trait which keeps it from getting too tall, above your herd. Less agressive growth.

SORGHUM SUDANS have smaller stalks than forage sorghum and strong tillering. They have good re-growth potential but less than sudangrass. Should be harvested as haylage or baleage, or grazed. ***Seed 35 to 70 lbs/acre.***

KF SUGAR PRO 55

This BMR KingFisher hybrid is very quick growing and high yielding with a dry stalk for ease of dry down. Stems are finer and sweeter than many sorghum-sudans. The higher leaf to stem ratio ensures quality grazing or feed.

KING'S 150 SS BMR

A fast starting BMR Sorghum Sudan. Has very good leaf to stem ratio that provides good quality feed with proper management. Consistently one of our top yielding, BMR sorghum sudans.

KING'S 185 PS BMR SSX NEW

A photoperiod sensitive BMR Sorghum Sudan. 185 has a good leaf to stem ratio that provides quality feed. The photoperiod sensitivity allows for an extended harvest window as it does not head out. The ideal choice for one large cut. For a one cut system, seed at 35lbs/acre.

AS6201

An easy-to-manage medium maturing sorghum-sudangrass product featuring the BMR-6 characteristics.
Only available in organic.

AS6401

AS6401 has improved disease resistance and better regrowth. We have observed occasional fields of other hybrids where regrowth was a problem due to disease pressure (fusarium). This usually manifests only when cutting while soil conditions are moist and humidity is high. AS6401 has been developed with disease resistant tropical parentage, and our observations have been very positive.

S275 WITH APHIDAXE

An Aphid resistant non-BMR Sorghum sudan that is also Male Sterile. This variety can still produces quality forage with timely harvest. The Male Sterile attribute prevents grain/seed formation. Our top choice for cover crop and total yield.

SOYBEANS *(GRAIN)*

360 SB

3.6 Maturity. High end conventional soybean with great agronomics and overall yield. Great performance throughout PA.
Only available in organic.

SOYBEANS *(FORAGE)*

Are selected for late maturity and leafy tendancys.
Seed 140 to 170K seeds/acre

DERRY FORAGE *(UNTREATED)*

Group 6 forage soybean for wildlife.

TITAN FORAGE RR

Group 7 Roundup Ready forage soybean for wildlife.

MILLET is a warm season annual, similar to sorghum sudans, with no prussic acid danger. Millet needs a soil temperature of 65ºF or more to germinate, and growth slows down when cool weather comes. When frost damaged, it can still be grazed with no fear of prussic acid. Will tolerate wetter years better than sudan. Like sorghum sudans, it can use lots of nitrogen. Safe for grazing horses and mules.
Seed 10 to 20 lbs/acre.

Start grazing at 12 inches, but make sure the roots are not being pulled up. It should not be allowed to grow taller than 3 feet (or it will lose palatability), nor grazed lower than 6 inches.

KF PRIME 180M BMR

A compact and digestible forage for grazing, hay or silage. Improved staygreen for later harvests. As a dwarf, it has a high leaf-to-stem ratio, and its short stature means improved standability. More leafiness means better dry down and the BMR background improves digestibility and feed intake.

KF PRIME 360M BMR

A taller, leafy, digestible forage hybrid for grazing, hay, or silage. Improved staygreen for later harvests. As a dwarf, its short stature makes for excellent standability, but at maturity it is a little taller and leafier than Prime 180.

LEAFY T

Leafy T is a pearl millet known for its wide leaf characteristics. This dwarf variety has good disease resistance and seedling vigor.

JAPANESE

A millet that can be used for forage or summer cover crop. It does better in wet soils than many of the other summer annuals. Fast growth and a fibrous root system makes it an excellent cover crop. It has a finer stem than pearl millet and sorghum and makes high quality forage for grazing or hay.

CRABGRASS is a versatile summer forage that tolerates a variety of soil conditions. Positioned appropriately it can provide good grazing or hay throughout the dry summer months. Crabgrass can reseed if allowed to mature.
Seed 5 to 8 lbs/acre.

MOJO

An improved later maturing crabgrass blend, coated for improved germination.
Available in OC.

RED RIVER CT

An improved crabgrass variety, coated for improved germination.

TEFF is a very small seeded warm season grass that has fine leaves and stems. This product is native to northern Africa (Ethiopia) and tolerates many soil conditions. Will make very palatable dry hay that livestock and horses love.
NOTE: Dries a little slower.
Seed 4 to 8 lbs/acre.

MOXIE

A blend of high yielding teff varieties that is coated with Yellow Jacket for improved germination and seedling vigor.
Available in OC and Yellow Jacket.

KingFisher Prime 360 BMR Millet

Summer annual **LEGUMES** provide a high protein source for grazing and are rapid nitrogen producers as cover crops.

IRON CLAY COWPEAS

A summer annual bean that is highly productive for forage. It can be seeded with a variety of summer annual grasses or seeded alone.
Seed 40 to 60 lbs/acre.

SUNN HEMP

Summer annual legume that is best for summer cover crop use. Can also be grazed but the stems are normally refused due to their lignification.
Seed 20 to 40 lbs/acre.

Ray's Crazy Summer Mix

BRASSICAS are used to extend the grazing season into late fall/ early winter, or to provide very high quality summer or fall grazing, as they will not lignify in hot weather. They can be seeded in a variety of mixtures, and the seeding rate is quite low in both straight stands and mixtures, because their leafy growth habit, they can be very competitive in a stand. Brassicas' high forage quality helps cows pick up in milk. Sometimes cattle won't eat it the first day or two. Introduce them slowly and make sure to supplement with adequate effective fiber to slow the rate of passage. Brassicas are low in fiber. Typical forage analysis: 25% protein, 215 RFV.
Seed 4 to 5 lbs/acre.

BARKANT TURNIP

Barkant is a vigorous summer/autumn turnip from Holland. It is extremely high yielding and bred specifically for increased leaf growth. The highest concentration of protein and yield is in the leaf. The tankard shaped bulb offers good accessibility. It's suitable for milking, lamb fattening, ewe flushing or hog rearing. It can be grazed about 2 times.

BARSICA RAPE

A fast maturing, single or multiple-graze forage crop that can be sown for summer, autumn or winter feed. It has a higher protein content than typical turnips, and a greater degree of winter hardiness. This variety is intended to overwinter.

T-RAPTOR

A turnip like hybrid that is super for multiple grazings. No bulb! Improved regrowth after grazing.

Diverse root structures to benefit the soil in numerous ways.

FEEDING TYPE HYBRID CORN

KingFisher Corn

EXPENSIVE FEED INPUTS ARE MAKING IT EVEN HARDER FOR LIVESTOCK FARMERS TO MAKE A PROFIT.

Feeding our highly digestible KingFisher & Red Tail silage corn lowers feed costs while increasing energy and profitability.

- **Are you spending too much on feed inputs?** Feeding highly digestible silage corn lowers feed costs while increasing dry matter intake and energy levels.
- **Is undigested corn ending up in the manure?** The high fiber and starch digestibility of KingFisher corn mean that more of your forage (and your dollars) is going to work inside the rumen—and less is passing through as waste.
- **Could you use help in your farming operation?** Our forage specialists want to partner with you to make your farming operation a success.

The KingFisher Advantage

KingFisher corn is first and foremost about digestibility. Digestibility drives energy. High digestibility is key to success with livestock. Higher energy results in healthier cows. Healthier cows produce—and reproduce—more efficiently. That means higher profits for you. Research by our corn team, in collaboration with farmers and industry professionals, focuses on selecting varieties that excel in fiber digestibility and starch availability.

KingFisher corn is a complete corn lineup—conventional, organic, traited, and BMR varieties. Our corn not only delivers the best in fiber and starch digestibility, but also supports tonnages and agronomics that are top shelf for silage. It consistently performs year after year, boosting herd performance on farms across America.

KingFisher corn is brought to you by three major forage companies: Byron Seeds, King's AgriSeeds, and Southeast AgriSeeds. Our network includes over 400 dealers—most of whom are farmers themselves—as well as nutritionists, agronomists, and other forage specialists.

Our dealers are trained to develop silage corn cropping plans, as well as entire cropping systems, tailored to your farm, to help you maximize digestible crops per acre. Together, we want to develop a forage plan that will boost your herd's performance and your bottom line.

Call your local KingFisher dealer today. With your local dealer as your guide, you will increase the energy of your feed and the success of your farming operation.

DIGESTIBLE ENERGY

KingFisher®

Exceptional Silage Corn

VERIFIED

KingFisher Corn— has an excellent history of success at the Forage Analysis Superbowl, including the **GRAND CHAMPION** for the 4th time in the past 5 years in the Standard Corn Silage Category, along with **GRAND CHAMPION** in the BMR Corn Silage Category for 2022.

What makes KingFisher exceptional?

- SofStarch—Highly-digestible starch, excellent rumen retention and digestibility
- FiberGest—High sugar and stalk density means high quality corn silage

DIGESTIBLE ENERGY

KingFisher®

Hybrid	Relative Maturity	GDUs 50% Silking	GDUs to Black Layer	Conventional (CV), Organic (OR), High Oil (HO), BMR	Red Tail Hybrid (if any)	Irrigated/ Productive Soil	Average/ Variable Soil	Less Productive/ Stress Prone Soil	Heavy Soils with Poor Drainage	Seedling Vigor	Plant Height	Ear Height	Ear Flex	Cob Color	Stalk Strength	Root Strength
KF 34C30	84	1145	2145	CV, OR		9	9	9	9	8	Med.-Tall	Medium	8	Light Red	7	8
KF 37C60	87	1150	2230	CV, OR		8	9	8	7	8	Medium	Medium	8	Red	8	8
KF 38C80	88	1220	2260	CV	38T89	9	9	9	9	9	Med.-Tall	Medium	7	Red	9	8
KF 40C30	90	1210	2250	OR		9	8	7	7	8	Med.-Tall	Medium	7	Red	8	8
KF 42C20	92	1200	2280	CV, OR		9	9	7	8	9	Med.-Tall	Med.-High	9	Pink	7	7
KF 43C40	93	1210	2300	CV	43T48, 43T49	9	8	8	9	8	Med.-Tall	Medium	9	Pink	8	8
KF 44C20	94	1235	2320	CV, OR		8	9	8	8	8	Med.-Tall	Medium	8	Red	8	7
KF 45C30	95	1235	2370	CV		9	9	9	8	8	Med.-Tall	Medium	8	Red	8	8
KF 48C90	98	1250	2300	CV, OR		9	7	7	7	9	Medium	Medium	8	Red	8	9
KF 51C50	101	1220	2300	CV	51T51, 51T57	9	9	8	9	9	Med.-Tall	Med.-High	8	Light Red	8	9
KF 52C20	102	1298	2418	CV		9	9	7	7	8	Tall	Medium	9	White	8	9
KF 54C10	104	1390	2575	CV	54T11, 54T13, 54T14	9	9	9	9	8	Tall	Medium	9	Pink	8	8
KF 54C50	104	1270	2600	OR		9	7	7	7	9	Med.-Tall	Medium	8	Pink	7	8
KF 56C30	106	1300	2420	OR		8	8	8	8	8	Med.-Tall	Med.-High	7	Pink	9	9
KF 57C80	107	1310	2460	CV	57T81, 57T85	9	9	9	8	9	Tall	Medium	9	Red	8	9
KF 60C30	110	1340	2765	OR		9	9	8	8	9	Med.-Tall	Medium	7	Red	9	9
KF 60C50	110	1300	2690	CV		9	9	8	7	8	Med.-Tall	Medium	7	Red	7	8
KF 63C10	113	1320	2790	CV	63T11	9	9	8	8	8	Med.-Tall	Med.-High	9	Pink	8	8
KF 64C40	114	1360	2855	OR		9	9	9	8	9	Med.-Tall	Med.-High	8	Red	8	8
KF 65C00	115	1435	2630	CV	65T09	9	9	8	7	9	Med.-Tall	Med.-High	7	Pink	8	8
KF 65C90	115	1355	2790	CV		7	8	9	7	8	Tall	Medium	9	Light Red	7	9
KF 67C20	117	1480	2700	CV	67T21, 67T23	9	9	9	8	8	Tall	Med.-High	9	Light Red	8	7

Specialty Hybrid	Relative Maturity	GDUs 50% Silking	GDUs to Black Layer	Conventional (CV), Organic (OR), High Oil (HO), BMR	Red Tail Hybrid (if any)	Irrigated/ Productive Soil	Average/ Variable Soil	Less Productive/ Stress Prone Soil	Heavy Soils with Poor Drainage	Seedling Vigor	Plant Height	Ear Height	Ear Flex	Cob Color	Stalk Strength	Root Strength
KF 57H50	107	1300	2450	HO		9	7	7	7	8	Med.-Tall	Medium	8	Pink	8	8
KF 59B70	109	N/A	N/A	BMR		9	8	7	7	8	Tall	Medium	9	Red	8	8
KF 60S60	110	N/A	N/A	MS		9	9	8	7	8	Tall	Medium	n/a	Pink	8	7
KF 66B80	116	N/A	N/A	BMR		9	8	7	7	7	Med.-Tall	High	8	Red	8	8

KINGFISHER CORN

Rating Scale: Poor 1-2 | Fair 3-4 | Good 5-6 | Very Good 7-8 | Excellent 9-10

Stay Green	Dry Down	Test Weight	High Population Tolerance	Continuous Corn	Drought Tolerance	Gray Leaf Spot Tolerance	Northern Leaf Blight Tolerance	Goss's Wilt Tolerance	Common Rust Tolerance	Tar Spot	FiberGest (30-hr. NDFD)	SofStarch (IVSD7)	Milk per Ton	Digestible Fiber Per Acre	Hand Husking	Fungicide Response
8	8	8	7	5	8	7	7	6	6	5	7	8	8	8	8	8
9	8	8	8	8	8	7	7	7	8	7	7	7	8	8	7	7
9	8	7	8	9	8	8	9	9	8	7	9	9	9	9	8	8
9	8	8	8	8	8	8	8	9	8	7	7	7	7	7	8	8
7	7	8	9	6	9	7	7	5	7	4	8	7	8	9	7	7
8	7	7	8	8	8	8	9	7	8	7	8	8	8	8	8	8
9	8	8	9	7	8	8	7	7	8	5	8	8	8	8	8	8
8	8	8	8	8	9	9	6	9	8	6	8	8	7	9	7	7
8	9	9	8	8	8	8	8	8	8	5	7	7	7	9	8	8
9	8	7	8	8	9	8	8	7	8	7	8	8	8	9	7	7
8	7	7	7	7	8	8	8	7	8	5	9	9	9	9	9	9
8	8	8	9	9	9	8	8	7	8	7	8	8	9	9	8	9
7	8	8	8	8	7	7	7	8	7	5	8	8	7	9	8	8
8	7	7	7	8	8	8	7	7	8	7	8	7	8	8	8	8
9	8	8	8	7	8	8	8	6	8	7	9	8	8	9	7	7
9	8	8	9	8	8	8	8	7	8	5	8	8	8	8	7	7
8	4	4	8	7	8	9	7	6	7	7	9	9	7	7	7	8
8	8	7	8	8	8	9	7	9	7	8	8	8	9	9	8	8
9	7	7	8	8	9	8	7	9	7	5	8	8	8	8	8	8
8	7	7	9	8	9	8	8	8	9	5	8	8	7	8	7	7
8	7	7	5	7	8	8	8	8	8	6	9	9	8	9	9	9
8	7	8	8	8	8	8	8	7	8	7	8	7	8	9	7	7

Stay Green	Dry Down	Test Weight	High Population Tolerance	Continuous Corn	Drought Tolerance	Gray Leaf Spot Tolerance	Northern Leaf Blight Tolerance	Goss's Wilt Tolerance	Common Rust Tolerance	Tar Spot	FiberGest (30-hr. NDFD)	SofStarch (IVSD7)	Milk per Ton	Digestible Fiber Per Acre	Hand Husking	Fungicide Response
8	8	8	7	8	8	8	7	7	8	5	9	9	8	7	7	7
9	n/a	n/a	6	7	8	8	8	7	8	5	10	9	9	8	n/a	9
9	n/a	n/a	9	8	8	8	8	8	8	7	8	n/a	9	7	n/a	n/a
9	n/a	n/a	7	7	8	7	8	7	8	5	10	9	9	9	n/a	9

Hybrid	Relative Maturity	Trait	GDUs 50% Silking	GDUs to Black Layer	Also Available As	Irrigated/ Productive Soil	Average/ Variable Soil	Less Productive/ Stress Prone Soil	Heavy Soils with Poor Drainage	Seedling Vigor	Plant Height	Ear Height	Ear Flex	Cob Color	Stalk Strength
RT 35T11	*85*	*GT*	*1180*	*2150*		*8*	*9*	*7*	*7*	*8*	*Medium-Tall*	*Medium-High*	*7*	*Pink*	*8*
RT 38T89-D1	*88*	*5122 EZ*	*1220*	*2260*		*9*	*9*	*9*	*9*	*9*	*Medium-Tall*	*Medium*	*7*	*Red*	*9*
RT 41T19-D2	*91*	*5222 EZ*	*1210*	*2350*		*9*	*9*	*9*	*9*	*9*	*Medium-Tall*	*Medium-High*	*8*	*Red*	*9*
RT 43T49-D2	*93*	*5222 EZ*	*1210*	*2320*	*43T48*	*9*	*8*	*8*	*9*	*8*	*Medium-Tall*	*Medium*	*9*	*Pink*	*8*
RT 45T09-D2	*95*	*5222 EZ*	*1250*	*2310*		*9*	*9*	*8*	*8*	*9*	*Tall*	*Medium-High*	*5*	*Red*	*8*
RT 51T57	*101*	*3122 EZ*	*1335*	*2460*	*51T51*	*9*	*9*	*8*	*8*	*8*	*Medium-Tall*	*Medium-High*	*8*	*Pink*	*8*
RT 53T49-D1	*103*	*5122 EZ*	*1250*	*2390*		*8*	*9*	*9*	*8*	*9*	*Tall*	*Medium-High*	*8*	*Pink*	*9*
RT 54T14	*104*	*VIP 3110*	*1390*	*2575*	*54T13, 54T11*	*9*	*9*	*9*	*9*	*8*	*Tall*	*Medium*	*8*	*Pink*	*9*
RT 57T85	*107*	*VIP 3111*	*1375*	*2570*	*57T81*	*9*	*9*	*9*	*8*	*8*	*Tall*	*Medium-High*	*8*	*Pink*	*9*
RT 62T83	*112*	*3000 GT*	*1421*	*2460*		*9*	*8*	*7*	*7*	*9*	*Tall*	*Medium*	*9*	*Pink*	*8*
RT 63T11	*113*	*GT*	*1320*	*2790*		*9*	*9*	*8*	*8*	*9*	*Medium-Tall*	*Medium-High*	*9*	*Pink*	*9*
RT 64T39-D1	*114*	*5122 EZ*	*1365*	*2602*		*9*	*9*	*8*	*8*	*9*	*Medium-Tall*	*Medium-High*	*8*	*Red*	*9*
RT 65T09-D1	*115*	*5122 EZ*	*1435*	*2630*		*9*	*9*	*8*	*7*	*9*	*Medium-Tall*	*Medium-High*	*7*	*Pink*	*8*
RT 67T23	*117*	*3000 GT*	*1480*	*2700*	*67T11*	*9*	*9*	*9*	*8*	*9*	*Tall*	*Medium-High*	*9*	*Light Red*	*8*

Red Tail corn plots

RED TAIL CORN

Rating Scale: Poor 1-2 | Fair 3-4 | Good 5-6 | Very Good 7-8 | Excellent 9-10

Root Strength	Stay Green	Dry Down	Test Weight	High Population Tolerance	Continuous Corn	Drought Tolerance	Gray Leaf Spot Tolerance	Northern Leaf Blight Tolerance	Goss's Wilt Tolerance	Common Rust Tolerance	Tar Spot	FiberGest (30-hr. NDFD)	SofStarch (IVSD7)	Milk per Ton	Digestible Fiber Per Acre	Hand Husking	Fungicide Response
8	7	7	7	8	8	8	8	7	5	7	7	7	7	7	7	8	8
8	9	8	7	8	9	8	8	9	9	8	7	9	9	9	9	8	9
7	8	7	7	8	8	9	8	9	9	8	7	8	8	8	9	7	9
8	8	7	7	8	8	8	8	9	7	8	7	8	8	8	9	8	8
7	8	9	7	9	9	7	7	7	9	7	7	8	8	9	9	7	8
8	8	8	7	8	8	8	8	8	7	8	7	8	8	8	9	7	8
9	8	9	9	9	8	8	7	8	8	8	6	7	8	9	9	7	8
9	8	8	8	9	9	9	8	8	7	8	7	8	8	9	9	9	9
9	8	8	8	8	8	8	8	9	7	8	7	8	9	8	9	7	9
8	8	8	6	9	8	9	9	7	8	7	8	8	8	9	9	7	9
8	7	7	7	7	8	8	8	7	9	7	5	8	8	9	9	8	7
8	9	8	8	8	8	8	8	8	6	9	7	9	9	9	9	7	8
8	8	7	7	9	8	9	8	8	9	9	5	8	8	8	8	7	9
7	8	7	8	8	8	8	8	8	8	8	7	8	7	8	9	7	8

King's AgriSeeds is committed to bringing you organic products that perform exceptionally well in the Northeast and Mid Atlantic. Our organic lineup is not an afterthought, but is made of carefully selected products that have been tested throughout our region and proven to perform on the farm. Whether you are growing organic grains and looking for an organic cover crop, grass finishing organic beef or marketing organic milk, we have high energy organic forage and cover crop seed available.

Our partnerships with industry leading suppliers allow us to offer a lineup of the top performing certified organic products in the world.

- **Certified Organic Perennial Mixtures**
- **Certified Organic Grasses**
- **Certified Organic Alfalfas/Legumes**
- **Certified Organic Summer Annual Forages**
- **Certified Organic Winter Annual Forages**
- **Certified Organic Cover Crops**

We offer a full line of organic products that are selected for quality. These are the same genetics as conventional versions, just produced organically.

	Seed Rate	Comment
King's Certified Organic Mixtures	***Custom mixes are available but arrangements must be made in advance.***	
Dairy Green	25 to 35	A mix that will thrive on good to moist soil.
Hayboss	25	An alfalfa/grass hay mixture
Partner	20 to 30	Grass hay blend to seed with alfalfa or alone. Use lower seeding rate with legumes (3 to 8lbs).
Star	25 to 30	For dairy quality pasture on varying soil types.
Alfalfa		
KF409 AP 2 Alfalfa	18 to 22	A very high-yielding, persistent, branch rooted alfalfa that has excellent plant health & strong disease resistance.
KF 435HD Alfalfa	18 to 22	High-yielding, highly digestible, branch root. DRI:35/35 WH:1/7, FD: 4.6
40LR Alfalfa	18 to 22	An improved leaf hopper resistant alfalfa with a solid disease package. Taproot for drought tolerance.
Clovers	Best for grazing & silage. For better establishment & more productive stands, inoculate before seeding.	
Red Clover VNS	4 to 8	VNS red clover.
Harmonie Red Clover	4 to 8	A European red clover.
Klondike Ladino Clover	2 to 4	A quick growing, large leaf clover. Include with pasture seeding or overseed into pastures.
Rivendel White Clover	2 to 5	A very persistent, small leaf white clover.
Premium Clover Mix	4 to 6	A mixture of our best perennial clovers, hardy and long lived.
Festulolium		
Fojtan	30 to 40	A long lived heat tolerant tall fescue type with good nutrition.
Meadow Fescue		
Liherold	50	A top performing variety with strong early growth.

Orchardgrass		
Echelon	20	A very late heading and high yielding orchardgrass variety.
Lidacta	20	A leafy, medium-late European orchardgrass variety.
Ryegrass- Annual		
VNS Annual Ryegrass	40 to 150	A fast starting grass for patching up abuse areas.
Ryegrass - Italian & Intermediate		
Kingfisher Allegro Blend	35 to 45	A Kingfisher tetraploid, diploid Italian ryegrass blend.
Astoncrusader	35 to 45	A high-yielding intermediate ryegrass.
Ryegrass - Perennial	***Highest energy grass. Great spring and fall production. Needs high fertility and moisture.***	
Kingfisher TD Blend	35 to 45	A Kingfisher blend of European tetraploid and diploid varieties.
Kentaur	35 to 45	High yeilding tetraploid variety with balanced productivity and good hardiness.
Premium	35 to 45	An intermediate maturing diploid variety that does well under lower nitrogen fertility.
Tall Fescue	***Tolerates drought, heat, wet soil and traffic. Very long lived.***	
Kora Tall Fescue	35 to 45	Extremely productive, hay type, very digestible.
Lipalma	35 to 40	Very high yielding hay type with late maturity. Improved digestiblity and no endophyte.
Timothy	***A very palatable grass.***	
Climax	10 to 15	The old standard variety.
Dolina Timothy	10 to 15	A high yielding, persistent hay type European variety.
Spring & Summer Seasonal		
Badger Oats	100	An early high-yielding grain oat with high test weight. For short season forage sow 150 lbs/acre.
Deon Oats	100	A high-yielding early to medium oat with high test weight. Can also be used for forage at 130 lbs/acre.
Reeves Oats	95 to 130	An early, dual-purpose oat that is 1-2 days later than Badger.
Erisman Wheat	100 to 150	A bearded early maturing, soft red winter wheat developed for low input cropping systems.
AC Morgan Oats	100	A high-yielding early to medium oat with high test weight. Can also be used for forage at 130 lbs/acre.
Surge Spring Triticale	125-150	Forage spring triticale. Tall-awned, forage type. Medium maturity.
40-10 Spring Peas +	80 to 100	A high quality purple flower forage pea. Can be planted Spring or Fall. Small seed size.
Buckwheat 'VNS'	50 to 70	Cool season or summer quick soil cover, weed suppressor, nectar for pollinators, loosens topsoil.
Lifago Buckwheat	25 to 35	Small seeded buckwheat for cover crop programs. Not for grain or attracting pollinators.
360 SB Soybeans +	150 to 180	Organic 3.6 maturity.
AS 9301 **BMR** Sudangrass	25 to 30	Exciting sudangrass that dries down quickly with superb quality & yield.
AS 6201 **BMR** SSX	40 to 50	A fast starting variety.
KF Sugar-Pro 55 **BMR** SSX	40 to 50	A high-yielding dry-stalk BMR sorghum sudan. Dries easier than other sorghum sudans.

See KingFisher Hybrid Guides for complete listings of Organic Corn Hybrids.

FORAGE INOCULANTS are used to improve fermentation in stored feeds, which can both protect and enhance the quality. These high quality inoculates pair with the high quality forages from King's AgriSeeds.

MAGNIVA PLATINUM

Combines three strains of elite lactic acid bacteria with high activity enzymes to lower pH, reducing dry matter losses and improving nutrient retention for enhanced feedout value. MAGNIVA Platinum combines the patented *Lentilactobacillus hilgardii* CNCM I-4785 with research backed *Lactobacillus buchneri* NCIMB 40788 to achieve aerobically stable silage in 15 days.

MAGNIVA TITANIUM

Combines an elite lactic acid producing bacteria with high activity enzymes to drive a fast, efficient ensiling fermentation and improve feed digestibility. Titanium also contains the high dose rate of Lactobacillus buchneri for maximum feedout stability and minimum spoilage.
OMRI Formulation available.

MAGNIVA SILVER

Combines two specifically selected strains of bacteria and high activity enzymes to drive the fermentation for a quick pH drop, reducing up-front losses, along with producing some acetic acid which reduces heating when exposed to oxygen during feedout.
OMRI Formulation available.

MAGNIVA HAY

A non-corrosive biological inoculant. Allows hay to be baled at a high moister and retains more nutrients and protein.

SEED INOCULANTS/ TREATMENTS help to ensure your seed gets off to a great start.

KF BIOTRIGGER CORN

BioTrigger for corn stimulates root growth, enhances nutrient utilization and increases stress tolerances in corn by introducing specific strains of Trichoderma along with a nutrient package.

KF BIOTRIGGER ANNUAL GRASSES / CEREALS

A Trichoderma fungi and micro nutrient package that encourages additional tillering, larger yields and efficient use of nutrients in the soil.

GRAPHEX ALFALFA/CLOVER

Comprised of a specifically formulated blend of Alfalfa/Clover Root Innoculant formulated in talc graphite carrier. Graphex SA delivers the growth stimulant benefits of the trichoderma plus the nitrogen benefits of our unique proprietary strain of yield-enhancing rhizobia bacteria specifically formulated for Alfalfa and Clover crops.

GRAPHEX COVER CROP

Increase nitrogen levels in the soil with a legume crop, including peas, lentils, vetches, and beans. Graph-Ex SA has you covered when it come to nitrogen management. The use of biologicals in accomplishing nitrogen fixation and production has become commonplace. Now, with the introduction of Graphex-EX SA for Cover Crops, farmers can expect more out of both their soil and cover crops.

GROWPAK SB

Uniquely formulated soybean inoculant and seed lubricant that contains both rhizobia and trichoerma.

MYCO SEED TREATMENT

MST provides mycorrhizal fungi, which helps the plants develop greater rooting systems, and assists release nutrients. Excellent for perennial stands.

SABREX CORN

Start out on the right foot with Sabrex Corn. Create more robust root systems and increase yields with Sabrex Corn. Stronger root systems will result in more drought tolerant crops. The results speak for themselves. Omri approved!

TRICHODERMA BIOLOGICALS
– HIGHER YIELDS BEYOND GENETICS

By Joe Schmidlen, Regional Sales Manager, Agrauxine – North America

I have been blessed to have worked in agriculture sales management since 1996. I have worked in row crop seed sales management as well as in the forage seed industry. Working with numerous accounts across the U.S. and Canada, over the years there has been an explosion of interest and an ever-increasing demand for biological seed treatments. The reason: biologicals help the plant mitigate weather stress, improve overall plant health, are safe for the environment, and ultimately, they increase yields offering a strong "Return on Investment" for growers.

Positive plant responses to trichoderma fungi have been realized for years in the laboratory and in the field. Today, commercialization of these biologicals has resulted in extensive field research showing substantial returns for growers. Although positive responses to trichoderma have been observed for over 30 years, in recent years, advances in genetic technologies have allowed researchers to identify and better understand specific modes of action down to the cellular level.

Positive benefits of trichoderma include increased yields, enhanced genetic expression, stress mitigation, and even improved harvest quality. It has been estimated that over 50% of yield losses are the result of plant stress due to unfavorable weather conditions. Certainly, we cannot control the weather but when utilizing specific strains of trichoderma fungi, we influence how the plant responds to adverse weather conditions. This is a great tool to have in the agricultural toolbox for growers! Utilizing selected strains of the biological trichoderma, plants withstand adverse weather conditions better and maximize production in more favorable weather conditions as well.

Our selected trichoderma strains result from more than three decades of study at Cornell University and other international biological research programs, as well as an exhaustive screening/selection/discovery process and scores of independent field trials conducted around the globe.

Our biological products offer unique benefits and provide numerous advantages for growers, seed companies, seed consultants, and seed dealers. Perhaps one of the most exciting benefits of our biological seed treatments in addition to their ability to increase yields and mitigate abiotic stress is their positive impact on the environment. Today, "Best Management Practices" and a strong emphasis on the environment coupled with the necessity for higher yields and maximum returns in a competitive farm economy make "biologicals" not only a sensible option for today's growers but an obvious option.

King's AgriSeeds is proud to offer KingFisher Biotrigger planter box seed treatments.

- Biotrigger for Corn
- Biotrigger for Wheat, Cereals and Annual Grasses

These products contain crop specific strains of beneficial trichoderma microbials that colonize the root system and enhance gene expression, maximizing the plant's genetic potential. These products are formulated in a graphite/talc carrier for practical use as a planter box application. They also contain a nutrient pack for improved seedling establishment.

KingFisher Biotrigger:
- Creates larger root systems and enhances plant growth
- Induces resistance to plant stresses such as disease, drought, and more
- Increases fertilizer and water use efficiency
- Increases yields and improves forage quality
- Provides a strong ROI

BioTrigger helps the plant create a more aggressive rooting system.

INDUSTRIAL HEMP

Hemp is a promising crop for agriculture, adding new farm income opportunities and a unique crop rotation that promotes soil health. The language is becoming more distinct to describe the types of hemp. Industrial Hemp now refers to Cannabis grown for grain or fiber purposes. CBD Hemp refers only to Cannabis grown for CBD oil or flowers.

Since 2020, we grew test plots of hemp on our research farm in Lancaster County. The goal of all our trials is to observe variety performance and determine best cultivation practices, all with dealers and farmers in mind. This is especially important with an unfamiliar crop like hemp. The varieties we carry grow well in our large region, from Virginia to Maine. Since few pesticides are approved for use on hemp, we are continuing to evaluate planting techniques and find effective ways to control weeds -- a huge risk for any hemp crop.

Take advantage of our experience. If you would like advice for better quality or are curious about growing this crop, feel free to contact King's AgriSeeds.

INDUSTRIAL HEMP

In addition to selecting the proper field, preparing a good seedbed, and applying fertilizer before planting, choosing the correct variety for your end purpose is equally critical to a successful crop. The variety list offered is appropriate for our entire growing region. The seed has been produced according to strict guidelines set by Association of Official Seed Certifying Agencies, or AOSCA. Our two breeding partners, Verve Seeds Solutions and International Hemp, supply only certified seed produced in North America. The blue tag with the AOSCA logo is your assurance that the seed in the bag is the genetically pure variety you requested.

Grain Hemp is a nutritious oilseed crop, much different from CBD oil. High in protein and antioxidants, hemp grain can be consumed as hemp hearts, hemp seed oil, and protein powder.

Fiber Hemp is used for seemingly limitless industrial purposes, from fabric and non-woven textiles, construction materials, bioplastics, even biofuels and computer chips. Many vertically integrated customers are processing their hemp on the farm for animal bedding. Hemp is highly absorbent and reduces odors.

Our varieties are all dual purpose, meaning they can be used for grain or fiber. However, some have more valuable grain qualities, while others' best characteristics align with fiber and/ or hurd. Our varieties are either monoecious (male and female plant parts are on the same stalk) or dioecious (female plants are distinct from male plants). In monoecious varieties, all plants grow through the season and contribute to total yield of grain and / or fiber. Dioecious varieties are typically focused on high grain quality and volume. Once the male plants have shed pollen, they senesce (die), allowing female plants more sunlight, water and nutrients. Only the female plants contribute to yield in dioecious varieties.

Seeding rates are also determined by the ultimate purpose for industrial hemp. Lower seeding rates are typically used for grain production to allow seed heads to develop fully, and even produce branches for higher yield. Higher plant population is preferred when growing hemp for long bast fiber. Since plants grow taller and thinner with more competition, bast fiber will be a higher percentage of the stalk. Lower plant populations allow stalks to grow wider with a higher proportion of hurd (the inner, woody stem) compared to bast fiber.

CFX-2

Medium seed size with nutty flavor, CFX-2 is a favorite for grain and oil production. Dioecious. Easy to combine at 4 to 5 feet tall. Fast crop at about 100 days.
Seeding rate is 25 to 30 lbs. per acre.

JOEY

Monoecious. Large seed size reduces processing waste, while thin, 5- to 6-foot stalks bale easily. Fast crop at about 100 days.
Seeding rate for grain is 25 to 30 lbs. per acre.
Fiber seeding rate is 40 to 45 lbs. per acre.

HENOLA

This monoecious variety delivers impressively high yields of small size grain on a 5- to 8-foot-tall plant. Vigorous variety with big seed heads. Crop time about 115 days.
Seeding rate for grain is 20 to 25 lbs. per acre.

BIALOBRZESKIE

Affectionately known as B-Lab, this monoecious variety adds height to our industrial hemp portfolio. Best suited for fiber production with 9- to 13-foot-tall plants. Crop time about 135 days.
Seeding rate for fiber is 40 to 50 lbs. per acre.
Grain seeding rate 25 to 30 lbs. per acre.

CBD HEMP is grown for its flowers. CBD oil, which is extracted from the flowers, is reputed to have beneficial health effects including reduced inflammation, improved mental clarity, lessened anxiety and more. CBD is non-psychoactive and cannot cause a "high."

For three years, we have partnered with Phylos Biosciences in Oregon to offer both day-neutral and photoperiod CBD varieties. In 2020, King's AgriSeeds screened 15 varieties for best performance prior to introduction. Phylos considered our research results and launched AutoCBD™ Alpha Explorer and PhotoCBD Quik Spectrum in 2021.

AutoCBD™ is the most efficient way to produce CBD for extraction or smokeable flower. Small plants deliver about 86% harvestable biomass so there is little waste. Yields can be 8000 lbs. per acre, depending on variety, plant population, and crop culture. With tight row spacing, AutoCBD™ can out-compete weeds in about four weeks. AutoCBD™ should be sown directly in a well-prepared seed bed using a precision planter or by hand with a jab planter. At only about 3 feet tall, AutoCBD™ can be harvested mechanically or easily cut by hand. Best of all, the approximately 10-week crop cycle offers multiple crops per season so growers can mitigate risks of drought, disease and insects. Harvest field crops from July through October, depending on frost date.

AutoCBD™ is also great for high tunnel or greenhouse production, which extends the growing season. Contact King's for crop schedules and cultural advice.

AUTOCBD™ (NBS CBD-1)

The flagship variety introduced in 2020, NBS CBD-1 should be sown into standard 30-inch rows about 8 to 10 inches apart. Yield per plant is about 4 ounces, delivering up to 5,000 lbs. biomass per acre.

- Post-harvest, flower CBD Yield 11% (+/- 2%)
- Harvest index, flower 61% (=/- 5%)
- Post-harvest, biomass CBD 7% (+/- 1%)
- Recommended plant population 20,000 to 30,000 per acre
- Seeds available in small volume packages

AUTOCBD™ ALPHA EXPLORER, F1 HYBRID (AT30013FLE)

A much stockier version of its predecessor, Alpha Explorer delivers higher CBD in tighter colas. Overall yield nearly double NBS CBD-1. Sow directly into standard 30 inch rows, spaced 10 to 15 inches apart.

- Post-harvest, flower CBD Yield 13% (+/- 2%)
- Harvest index, flower 61% (=/- 5%)
- Post-harvest, biomass CBD 8% (+/- 1%)
- Recommended plant population 15,000 to 20,000 per acre
- Seeds available in small volume packages

PHOTOCBD™ QUIK SPECTRUM

An F1 hybrid between day neutral and photo sensitive varieties, suitable for biomass or smokable flower. The parentage is easy to see, as PhotoCBD is short and stocky, like AutoCBD™, and delivers higher CBD content on larger colas. Seeds are started in a trays, then transplanted in 4-foot by 4-foot grids. Harvest about 2 lbs. per plant in September.

- Post-harvest, flower CBD Yield 17.6% (+/- 2.5%)
- Harvest index, flower 40% to 50%
- Post-harvest, biomass CBD 12.5% (+/- 2.5%)
- Recommended plant population 4,000 to 5,000 per acre
- Seeds available in one-acre and larger volume packages

FORECROPS DELIVER MORE VALUE THAN COVER CROPS

by Sarah Mitchell

King's AgriSeeds hemp research has shown that fall planted cover crops can have positive, neutral or even negative influence on hemp. At a minimum, cover crops conserve soil moisture and enhance soil health. With proper planning, they can do so much more. Tim Fritz, President of King's AgriSeeds, has coined the term Forecrop, a cover crop with a bonus. A forecrop is designed to significantly boost yield of the economic crop that follows.

Take cereal rye, for example. It is the "go to" cover crop with plenty of attributes. It suppresses weeds, builds soil microbes, is inexpensive with a wide fall planting window. In King's research, cereal rye accomplished the soil conservation goals but helped the hemp crop only slightly or not at all compared to leaving the field fallow or unplanted. Consider King's Soil Builder Plus, a mixture of species that has similar qualities to rye. It also fixes nitrogen, penetrates compacted soil. As a forecrop, it increased yield of the hemp crop more than other cover crops.

One product will not improve all crops

Creating appropriate mixtures is not as simple as adding clover and radish to a small grain. A forecrop must be tailored for the economic crop through testing. To illustrate, King's recommends TerraLife® Maize Pro DT to precede corn and Construct to be planted ahead of tobacco. Both are complex mixtures, each unique in the composition. One might expect that since these two economic crops have similar nutrient demands as hemp, Maize Pro DT and Construct would boost hemp yield. Surprisingly, our trials showed that neither forecrop pushed hemp as much as expected.

In our 2022 trials with cover crops and hemp, differences were evident within a few weeks of planting. At 26 days, hemp that followed cereal rye was smaller overall, about 9 inches tall. By contrast, King's Soil Builder Plus (right) acted like fertilizer right from the start. Hemp grew to twice the size compared to cereal rye, about 18 inches tall. When it comes to hemp, King's Soil Builder Plus functions as a forecrop.

One variety of industrial hemp seedlings, 26 days old, following fall-planted cereal rye (left) and King's Soil Builder Plus (right). Tim Fritz indicated the width of the cover crop strip. King's Soil Builder Plus clearly promoted early hemp growth, a strong advantage that paid off in final yield. King's Soil Builder Plus is a forecrop for hemp, delivering more value than cereal rye.

Tailoring forecrops requires planning and testing

By planning two years or more in advance, farmers can achieve soil conservation goals and grow better hemp. Especially in a young industry, it's smart for growers to visit private and university trials. Incorporating some of the strong concepts can save commercial hemp producers time and money.

Building on three years of data, King's AgriSeeds can recommend several forecrops tailored for hemp.

COVER CROPS

Ask about our
cover crop manual.

COOL SEASON MIXTURES

Our cover crop mixes build soil health and biodiversity in the field, and can also be grazed or harvested for feed (higher seeding rates needed).

3-WAY CLOVER

A red, ladino, and yellow blossom sweet clover mix that can be frost seeded, spring seeded, fall seeded, aerial seeded, or broadcast after last cultivation of corn or seeded just before soybean leaf drop. With its diversity, it will grow in long cool springs and in the fall, and grows well in the summer or during drier spells.

Seed 10 to 15 lbs/acre.

BETA MAXX

BetaMaxx is a balanced blend that was carefully selected for vegetable and sugar beet cultivation. Common vetch contained in the mix has a beneficial effect on soil bacteria, which protects plants from pathogens. BetaMaxx enables vegetables and beets to be grown the following year because it does not contain cruciferous plants. This mixture will mostly winterkill. See tech sheet for full species listing.

Seed 30 to 40 lbs/acre.

BROADCASTER

For broadcasting in late summer with moisture. Will improve soils in many ways, including nitrogen fixation, soil tilth and drainage. Can be broadcasted with hand seeders, ATV seeders, highboy seeders and by airplane or helicopter. Great for seeding into a living corn crop and open fields in late summer. This cover crop mixes Annual Ryegrass, crimson clover, Common Medium Red Clover, Daikon radish, and yellow blossom sweet clover.

Seed 25-30 lbs/acre.

CARGO

A mixture of crimson clover, annual ryegrass, and oats. It is a superb cover crop for USDA Zones 6A and higher. The benefit of crimson clover is that it flowers early and will fix nitrogen earlier in the spring compared with other legumes. Annual ryegrass has very extensive root growth and improves soil structure better than cereal grains.

Pre Inoculated.

Seed 60 lbs/acre.

CLEAN & GREEN

A perennial mixture designed for conservation. Contains durable endophyte free tall fescues and annual ryegrass that provides quick cover while the fescue establishes. Great for waterways, filter strips, around farm structures, etc.

Seed 30 to 70 lbs/acre.

CLOVER POLLINATOR MIX

This mixture of clovers is purposefully designed to attract pollinators. The variable maturity/flowering within the mixture allows for a full season attractant. Best suited to fall plantings.

Seed 5 to 12 lbs/acre.

CONSTRUCT NEW

A tailored cover crop mix for the tobacco grower. Rapidly builds soil structure. Made up of Lowboy Annual Ryegrass, Spring Oats, Lifeago Buckwheat, Balady Berseem Clover, Flax, Persian Clover, Sorghum Sudan, Phacelia, Sunflower, and Daikon Radish. Seed during late summer recommended alfalfa seeding dates.

Seed 20 lbs/acre

GREEN N LOW

A simple 2 species cover crop mix, featuring Lowboy growing annual ryegrass and crimson clover. These two species combined are a great combo for improving soil health and fertility. Works well for planting green, traditional burndown or full till program.

Seed 20 to 25 lbs/acre.

Get a tap root in your mix!

LARGE BOX BOOSTER

Our Booster mixes are designed to help you add diversity to your small grain cover crop program. A three species mix (add the small grain of your choice to make it 4 species) featuring Keystone Winter Peas, which has excellent early vigor in the fall, and strong growth in the spring. Peas and crimson contribute to Nitrogen production, and daikon radish helps break up compaction. Mix the Booster with your small grain of choice in the large box of your drill, layering it in.

Seed 20 lbs booster per 50-100 lbs small grain.

MAIZE PRO DT

Maize Pro DT is the ideal mix for corn crop rotations. It selectively supports the formation of mycorrhiza in corn rotations, and as a result, improves the soil structure. The soils become more water stable, have an improved bearing capacity and are easier to work. The rooting channels with help the corn particularly during periods of drought.

Seed 35 to 40 lbs/acre.

MULCH MASTER RD NEW

Are you growing pumpkins or melons? This mix is for you! An excellent forecrop that is planted in the fall and rolled down after flowering to terminate prior to planting in the spring. This mix builds soil, and the rolldown mat suppresses weeds and keeps the melons and pumpkins off the soil to help prevent disease.

Seed 100 lbs/acre

RAY'S CRAZY FALL

The Fall Formulation of Ray's Crazy mix, designed to build soil healthy by incorporating extreme diversity. Featuring winter peas, spring and winter small grains, vetch, clovers, annual ryegrass and brassicas. Can be used for both cover and forage.

Seed 50 lbs/acre.

RAY'S CRAZY SPRING

This new mixture is designed with the same goals as the summer and fall formulations - a dual purpose soil improving cover crop and high quality forage. This mix provides quick spring nitrogen for the following crop, recycles nutrients, builds soil health. This balanced mix contains a total of 8 species: grasses, legumes and brassicas.

Seed 120lb/acre.

RIGOL DT

This cover crop mix is extremely effective in penetrating compacted soils as the plant types in the mix demonstrate intensive rooting activity. Numerous root channels are formed, which are used by following crop to rapidly reach rooting depth.

Seed 18 to 20 lbs/acre.

SMALL BOX BOOSTER

Our Booster mixes are designed to help you add diversity to your small grain cover crop program. This fives species mix (plus the small grain of your choice makes it 6) features. The legumes in this mix contribute to nitrogen production, the timothy to soil tilth and the daikon radish to compaction. For drills with large and small boxes.

Seed 10 lbs booster per 50-100 lbs small grain.

SOIL BUILDER PLUS

A mix of triticale, crimson clover, hairy vetch, annual ryegrass and daikon radish. This mixtures diverse rooting structure builds soil organic matter and feeds soil microbes, contributing to long-term soil health and fertility.

Seed 60 to 90 lbs/acre.

Small Box Booster planted without small grain, one month after planting.

WARM SEASON MIXTURES

RAY'S CRAZY SUMMER

This diverse mixture was created for dual purpose grazing and soil health improvement. It contains 7-10 species including grasses, legumes and brassicas. There is also a spring and fall version of this mix available. Seeding rate varies depending on use and goals.

Seed 40 to 60 lbs/acre.

SUMMER SOLAR

A diverse legume-forb-grass cover crop mix of aggressively growing summer annuals, with possible dual use for wildlife food plots. The mix includes five very different components - buckwheat, cowpeas, sunflower, male sterile sorghum sudan, and sun hemp. Both conventional and organic growers will find this a useful break crop in between spring and fall crops that builds soil nitrogen levels and attracts pollinators and other beneficial insects. It can also be used in farmscaping strips to draw beneficials throughout the season.

Seed 35 to 60 lbs/acre.

Summer Solar contains four species that bloom during the summer months. Great mixture to "Bring in the bees"!

PERENNIALS

BIRDSFOOT TREFOIL

A legume that reseeds itself and tolerates low pH and wet soils.
Seed 20 to 25 lbs/acre.

RED CLOVERS

Red clovers are perennial clovers that can be interseeded, used in mixes or straight stands. Flexible fit in the rotation, from over-wintering cover crop to 1-2 year conservation and soil builder.
Seed 4 to 20 lbs/acre.

WHITE CLOVERS

White clover is a shorter growing legume that tolerates wetter soils and spreads by stolons.
Seed 2 to 4 lbs/acre.

COOL SEASON ANNUALS

BALANSA CLOVER

A cool season annual legume with similar winter hardiness to winter peas and crimson clover.
Seed 3 to 8 lbs/acre.

BERSEEM CLOVER

An annual clover that resembles alfalfa. Summer annual in North. A high yielding summer annual clover that makes a great winter-killed cover crop. Under the right conditions it can produce 100-200 lbs of Nitrogen as a stand alone crop. Works great in mixtures as well and can produce a very high protein forage for grazing or hay. ***Now available in OC coated. Seed 15 to 20 lbs/acre.***

CRIMSON CLOVER

Winter annual clover, in early spring faster biomass and nitrogen production than other clovers, beautiful deep crimson bloom. Flowers attract many beneficial insects. Works well in combination with a small grain or with annual ryegrass as a cover crop or high quality nutritious forage mix.
Seed 15 to 25 lbs/acre.

SWEET CLOVER

Both white and yellow blossom sweet clover provide a strong nectar flow following vernalization. White blooming is typically 2 weeks after yellow blossom.
Seed 15 lbs/acre.

WARM SEASON ANNUALS

COW PEAS

Productive heat tolerant vining summer-annual legume, excellent drought resistance combined with good tolerance of heat, low fertility and a range of soils. If left to bloom it attracts many beneficial insects that prey on other pests. Slow to start, it does well in mixes with other quicker growing species, especially those that are erect-growing that can serve as a trellis to support its growth. Works well as a forage, especially in a mix.
Plant early summer, seed 40 to 60 lbs/acre.

HAIRY VETCH

A thick, vining winter annual legume that is very productive, produces nitrogen and offers quick cover.
Seed 25 to 30 lbs/acre.

SUNN HEMP

Tall-growing summer annual legume, tolerates drier conditions, high biomass producer, and good smother crop. Use as a green manure/cover crop to provide both organic matter and to fix nitrogen during the period between summer and the winter cash crop. Produces significant biomass in 6-7 weeks. Good in mixes to add varying heights to the cover, but keep seeding rate low. Low self seed risk.
Plant early to mid summer, seed 20 to 40 lbs/acre.


Sunn Hemp

WARM SEASON

BROWN TOP MILLET

A fast starting/growing millet with a fibrous root system that makes for a great summer cover crop. Brown Top works well for a smother crop or added to a summer cover crop mixture. ***Seed 10 to 20 lbs/acre.***

BUCKWHEAT

True "smother crop" since it grows a thick canopy quickly and out-competes summer weeds. Good quick fill-in rotation between spring and summer or early fall crop, reseeds itself, but easy to kill. Good addition of broadleaves, especially in a mostly grass-based rotation. Fibrous root system, soil conditioner loosens up soil, makes organic phosphorous available. If left through bloom, it will attract pollinators. ***Note: Plant late spring and anytime throughout summer. Seed 50 to 70 lbs/acre.***

LIFAGO BUCKWHEAT

A small seeded buckwheat with larger leaves and later bloom than VNS buckwheat. Not good for attracting pollinators. Excellent smother crop with great root development. Very quick summer growth for brief planting windows in rotation. ***Note: Seed 25 to 35 lbs/acre. Also available in organic.***

NON BMR SORGHUM SUDAN

Adds organic matter to worn-out soils. It is fast growing and loves heat along with having a strong ability to smother weeds, suppress nematodes and penetrate compacted soil. ***Note: Plant early to mid summer; late summer as a winter-killed soil-covering mulch. Beware of prussic acid. Seed 40 to 60 lbs/acre.***

PEREDOVIK SUNFLOWERS

Sunflowers have many soil benefits that include: strong taproots penetrating vertically downward, widely spreading branch roots; enlarged taproot eventually grows many laterals. High biomass producer, tall growth and beautiful large blooms that attract pollinators and beneficial insects.
Note: Plant early summer. Seed 40 lbs/acre.

COOL SEASON

ANNUAL RYEGRASS

High winter hardiness. Vigorous, extensive growth, both above and below ground. Scavenges and recycles soil nitrates, contributes fine root organic matter at deep soil levels. ***Seed 35 to 40 lbs/acre.***

COSAQUE BLACK OAT

Technically a winter oat, but can be planted in spring, late summer and fall with good cover crop benefits. This oat has strong alleopathic affects for weed and nematode suppresson. Best overwintering in zone 7 and south, when planted in barley/wheat dates.

PHACELIA

Excellent for beneficial insect and works well as a cool season soil builder. Planted in spring it will bloom in late spring. Planted in late summer it will bloom in the fall. 60 days to bloom. 4-6 weeks of bloom.

SPRING OATS

Grows quickly in the cool weather, excellent pre-summer weed-suppressing cover. Oats can be planted in the spring or in late summer as a universal nurse crop in mixes with slower growing perennial legumes (clovers or alfalfas) or brassicas. They are a quick scavenger of soil nitrogen, will recycle soil nitrates quickly in late summer, allowing slower growing winter annual companions to get started. If fall planted, they winterkill in northern regions, leaving a soil-covering mulch that leaves the soil ready for an early spring no-till planting. ***Plant early spring and late summer. Seed 100 to 125 lbs/acre. For cover crop, 50 to 100lbs/acre.***

WINTER SMALL GRAINS

Wheat, Triticale and Rye are all small grains that are often used as overwintering cover crops. These fast starting grasses have fibrous roots for soil aggregation.

WARM OR COOL SEASON

DAIKON RADISH

Deep tap root growth, penetrates soil, improves tilth, scavenges and bio-accumulates nitrogen, calcium, sulfur and magnesium, from lower soil levels and moves them up to upper soil profile. Plant early spring as a quick weed suppressor or break crop. Great for mixing with small grains! ***Plant mid August to mid September for maximum root growth, nutrient recycling and soil benefit for compacted soils. Seed 12 to 15 lbs/acre.***

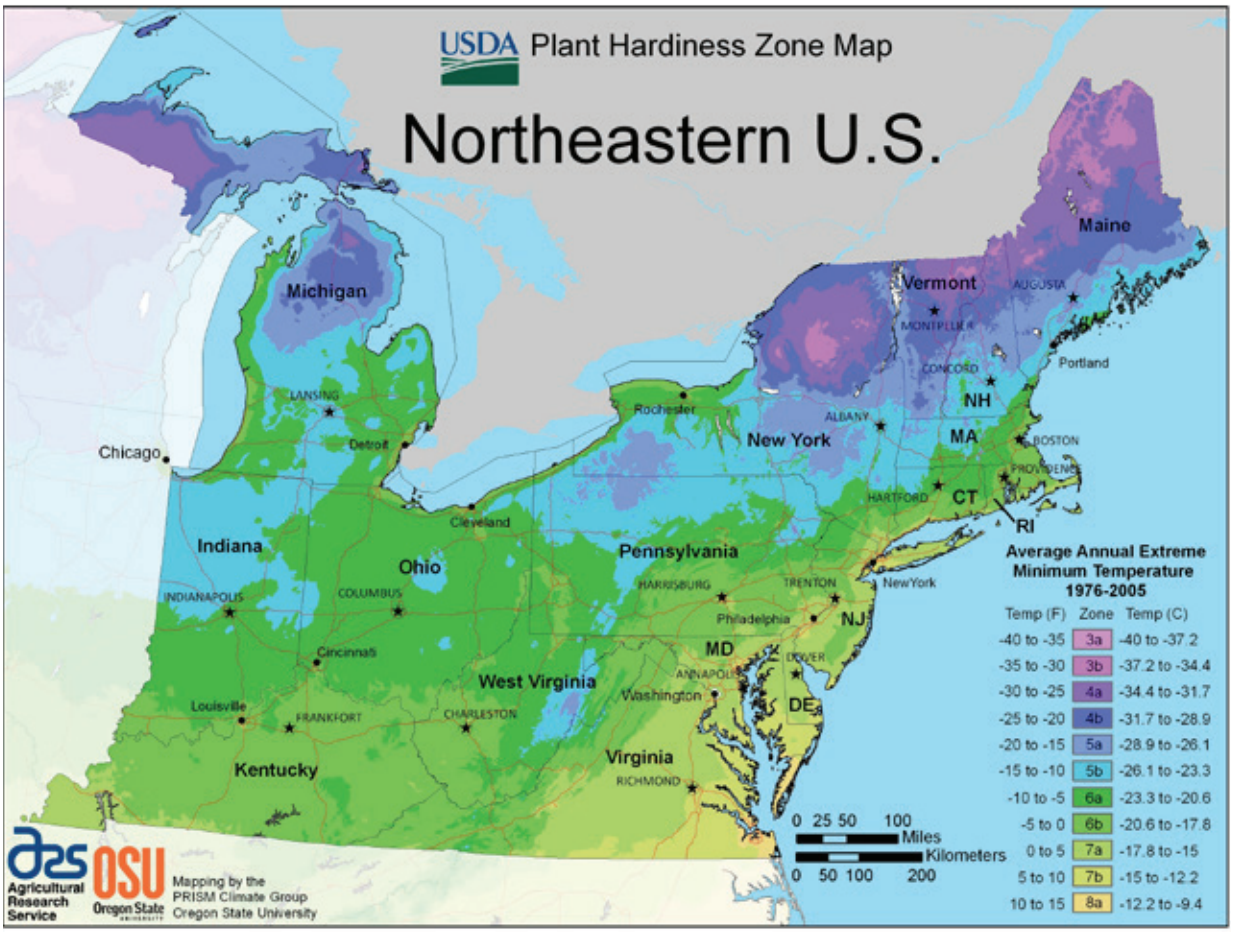
PURPLE TOP TURNIPS

A fast growing brassica for cover crops that helps in reducing compaction and soil crusting.

Individual species cover crop options are very extensive. Contact your King's dealer if you are wondering what other options are available to you.

RESOURCE MANAGEMENT GUIDE

Gainer 154 Triticale



THE IMPORTANCE OF SOIL HEALTH FOR A PROFITABLE FARM

By Harold Schrock

Worm in healthy soil.

There is a documented direct correlation between soil health, particulate organic matter concentrations and field/farm profitability as explained in a university level study recently completed by Claire LaCanne and Jon Lundgren. This study, “Regenerative agriculture: merging farming and natural resource conservation profitably”, is now in the peer review process and lends some scientific documentation to observations that have been widely observed and discussed among my regenerative farming friends. This published paper documents several interesting observations on soil health, the organic matter accumulation characteristic of regenerative agriculture, and the absence of insect pests in spite of no insecticide applications.

PARTICULATE ORGANIC MATTER & SOIL HEALTH

Particulate organic matter, as I understand it from their references, refers to the portion of organic matter that is biologically alive and cycling relatively rapidly between plants and soil. This is separate from the total organic matter in any given soil.

Although more organic matter is typically better than less, organic matter by itself does not equate to soil health. Total organic matter correlates fairly well with the soil’s water holding capacity and nutrient holding capacity, but does not directly correlate with a soil’s ability to feed plants.

The particulate organic matter does directly correspond with soil’s ability to host healthy plant production. The laboratory test to document these levels is not available at most agricultural laboratories but I doubt if that is a practical concern, because these soil conditions are fairly easy to observe in the field and the path to achieve higher levels is well understood.

THE VALUE OF SOIL AGGREGATION

Soil aggregation is the visible indicator of higher levels of particulate organic matter. It’s easy to observe the crumb structure of a soil and it is also easy to do a slake test, (place a clump of soil in a transparent container of water and watch how long it takes to dissolve; the longer time it takes to turn into sludge in the bottom of the container, typically the better the soil aggregation).

The real question is, what is the value of this soil aggregation and how do we achieve more of it?

The value of soil aggregation and particulate organic matter can hardly be over estimated. Soil gas exchange is one of the most important functions of soil and is largely dependent on soil aggregation. Contrary to the expectations of many farmers, nitrogen is not the number one plant nutrient needed.

By a huge margin, the number one plant nutrient needed by volume is carbon. The great majority of the carbon used by plants in their growth comes from atmospheric CO2 (carbon dioxide). While atmospheric CO2 levels have been increasing in recent history and are now high enough to cause concern in some scientific communities, the concentration in the atmosphere at large is not nearly high enough to maximize plant growth. The CO2 concentration in the first couple of feet above healthy soil can be 10 times or more normal atmospheric levels. CO2 level variation is the primary reason we can often observe a growth response immediately following row cultivation. It is also a good portion of the growth response observed from a soil nitrogen application.

Nitrogen interacts with soil carbon, releasing higher levels of carbon dioxide and causing additional plant growth. This is one reason why side-dress nitrogen is typically much more efficient than pre-plant applications.

HOW TO ACHIEVE HIGHER LEVELS OF SOIL AGGREGATION

So how do we achieve higher levels of soil aggregation and particulate matter? There are some chemical interactions that have a small effect. Perhaps the strongest of these is the calcium/magnesium balance. Calcium tends to flocculate clays, spreading the layers for a looser chemical bond. Magnesium has the opposite chemical action, relaxing chemical soil structure and causing a tightening effect. These chemical effects in soil are real but they pale in significance compared to biological construction. By far the greater portion of healthy soil aggregation comes from the biological life within the system.

Achieving healthy biology in the soil starts with drainage; aggregation is responsible for most of good soil drainage but aggregate-building biology functions very poorly or not at all in saturated conditions. If the field has a naturally high water table, tile and/or ditch drainage is the only way forward. If this is not done it is nearly impossible to achieve profitability with high-value crops. Fields that are impossible to drain are likely best utilized for Reeds Canary or similar perennial bedding/biomass production. Some soils are waterlogged because they are tight but do not have a high water table. These can often be worked with from the top down, feeding the biology and strategically ripping to overcome compaction issues.

MINERALS & SOIL HEALTH

Minerals, whether naturally occurring or provided by fertilizer, are an important part of building soil biology. Both plants and biological life are very dependent on sufficient quantities of mineral nutrition in the soil profile. This is well known and understood but sometimes the fact is missed that any mineral essential for plant production can be a limiting factor in the overall system.

Ordinary soil tests certainly have value but they do a very poor job at measuring metallic element availability for plant growth. If our soils are less than optimally healthy, measuring nutrient levels in the crops themselves is very important for understanding weak links. A forage test including wet chemistry micronutrient analysis is of at least equal value to soil tests for understanding where fertilizer dollars are best spent. Foliar feeding, based on forage analysis, is often the most cost effective way to supply needed plant nutrients for optimal sugar production.

SUGAR PRODUCTION & SOIL AGGREGATION

Sugar production is easily the most important factor of all in building biological aggregation. Sugar is the food for microbes that produce glomalin and other glue-like substances that bind the particles together. Microbes also mine soil minerals to complete their diet requirements, creating additional plant-available minerals.

Sugar-laden root exudates coming from a corn plant.

Excessive tillage, as well as some herbicide and fertilizer formulations, are known to disrupt soil biology and aggregation, but most soil destruction happening all across North America today is a direct result of low sugar production. This is either from lack of plants or from lack of plant health and photosynthesis production.

We get the first situation in the case of summer cropping with no corresponding winter cover/cash crop. A healthy corn crop in the height of the growing season will push as much as 70% of its sugar production into the soil in the form of root exudates. This can be a very significant amount of sugar, as much as 8-9000 pounds per acre, but is in itself not enough to keep robust biology functional all year around. Biological feast and famine will not build stable soil structures.

Great sugar production is equally dependent on the health of the crops growing. Plants struggling from environmental stress such as flooding or drought will not produce significant levels of root exudates. Neither will plants limited by mineral nutrition needs.

To summarize: Keeping the soil covered as much as possible with green growing plants and fertilizing for optimal photosynthesis and sugar production are the primary keys for building soil aggregation. Interestingly, these same two factors are primary keys to farm profitability on multiple fronts. Producing more and better quality crops not only improves cash flow; it should ultimately also produce healthier soil and reduce input requirements, leading to higher profits.

SOIL INDICATORS

Soil productivity, usually measured in terms of crop yield, is influenced by physical, biological, and chemical components that all interact.

Visual indicators include exposure of the subsoil, change in soil color, gullies, ponding, runoff, plant condition, blowing soil and deposition.

Physical indicators involve the arrangement of the soil particles and pores; we can understand these factors by observing topsoil depth, bulk density, porosity, aggregate stability, texture, crusting and compaction. Physical indicators affect root growth, seedling emergence, water infiltration and movement within the soil profile.

Chemical Indicators
A soil test will be needed to give you a chemical profile of your soil. Critical chemical soil characteristics to look for are pH, major nutrients (nitrogen, phosphorus, potassium), secondary nutrients (sulfur, calcium, magnesium), and micronutrients (especially boron, copper, manganese, zinc; but also iron, molybdenum, chlorine, selenium, and cobalt). PH is important to know because it influences the availability of most nutrients.

Biological indicators of soil health include the effects of the micro and macro-organisms, their activity and/or their byproducts, which contribute to the formation and stability of the organic matter portion of the soil. Many are also critical to supplying nutrients to the living plants, as their population is greatly concentrated in the rhizosphere (or growing root zone of the living plants).

Several important soil indicators include:

- **Aggregate Stability** - the ability of soil aggregates to resist disruption when outside forces (usually associated with water) are applied.
- **Infiltration** - Water movement in the soil as a result of soil texture, crusts, compaction, aggregation and structure, water content, frozen surfaces, organic matter, and pores.
- **Bulk Density** - The ratio of dry soil mass to bulk soil volume (including pore spaces). This can be measured and expressed in grams per cubic centimeter, and is largely a function of relative pore space and organic matter content. Bulk density influences water infiltration and plant root health, and reflects the degree of soil compaction.
- **pH** - Negative logarithmic scale that measures the “Potential of Hydrogen” concentrations in aqueous solutions. Soil pH influences the solubility, andtherefore the availability, of several plant nutrients. It also affects the activity of microorganisms responsible for breaking down organic matter, as well as chemical transformations in the soil. The type and population densities of soil microorganisms change with pH. A pH of 6.6 to 7.3 is favorable for microbial activities that contribute to the availability of nitrogen, sulfur, and phosphorus in soils.
- **Soil Crusts** - Created by the breakdown of soil structural units by flowing water or raindrops, or through freeze-thaw action, crusts reduce water infiltration and increase runoff, restrict seedling emergence, reduce surface water evaporation, and increase wind erosion in sandy soils. Heavier clay soils and surface-applied manure are particularly prone to crusting.
- **Organic Matter** - Soil organic matter is the fraction of the soil composed of anything that once lived. Organic matter gives soil a sponge-like quality that allows it to soak up about twelve times its weight in moisture, which helps prevent nutrients from leaching out and makes your system less “leaky.” Soil food web organisms derive their energy from organic matter inputs.
- **Available Water Capacity** - Available water near the surface is especially important at the seedling and transplant stage when the roots are very shallow and not yet fully developed.
- **Soil Biodiversity** - The mix of living organisms in the soil that comprise the “soil food web,” such as insects, worms, and microorganisms, whose interaction and biological activity influence many soil processes, such as nutrient cycling, residue decomposition, and the entry and storage of water into the soil and resistance to erosion.

SOIL FERTILITY FOR FORAGE PRODUCTION

Calcium is the foundation of the whole fertility program. If this is not in balance, many of the nutrients and minerals may not be available for the plant to use. Once in balance, your pH will be in the correct range also. This increases nitrogen utilization, which in turn increases the protein content of the forage.

Nitrogen is directly linked to increasing the protein level in forages. Lack of nitrogen affects chlorophyll production and results in lower energy absorption from the sun. Plants low in nitrogen mature earlier. Nitrogen is also essential for the production of vitamins and energy systems in the forage. It is an essential component of amino acids, which form plant proteins.

Phosphorus plays an important role in photosynthesis and respiration, influencing energy storage and transfer, cell division and cell enlargement. Phosphorus improves the overall quality of the forage by building a store house for the plant's energy, protein, minerals and nutrients.

Potassium is essential for protein synthesis. It is important in breaking down carbohydrates, a process which provides energy for plant growth. It aids the plant in overcoming the effects of diseases. Potassium is involved in the activation of more than 60 enzyme systems which regulate the rates of major plant reactions. Legumes utilize more potassium than grasses. When potassium is too high, it can affect palatability and digestibility of the forage.

Sulfur increases forage quality and affects the quantity and quality of protein. It releases energy in the cells and is part of Vitamin B1 and biotin. (Since air quality has been improved, we need more sulfur.)

Zinc builds chlorophyll, helps enzymes function correctly, affects growth hormones in the plant, and affects elongation of internodes.

Boron is needed in only small amounts, but most soils are low as boron is not easily stored in soil. It is very important in the plant's nutrient intake of calcium and other minerals. It aids in cell wall formation, sugar transfer, energy release in cells, protein production and improves overall forage quality.

Copper helps control molds and fungi, aids in chlorophyll production and photosynthesis, helps enzymes function properly, and helps with the immune system of the plants.

In summary, we need to build adequate, balanced levels of nutrients and minerals in the soil to produce high-energy, high-quality pastures and forages. In grazing dairies, cows will have a higher dry matter intake if the pastures have adequate levels of calcium, phosphorus, sulfur and trace minerals. These same forages will have higher sugar levels, which help to improve their digestibility, since this energy is readily available energy for rumen microbes. With higher sugars, less starch is needed and fiber levels are maintained for rumen functions.

Points to Remember

- Every time grasses are cut or grazed, roots will slough off. This fast cycle of root growth and die off is why grass has the capability to build organic matter.
- Clover and other legumes have the ability to produce lots of nitrogen, improving soil fertility.
- Fertility has tremendous influence on tillering and persistence.
- Having lots of tillering going into summer will extend grazing longer into a drought due to the fact of the aggressive new life in the tillers.
- Fertility is a big factor in a stand's ability to thrive under various pressures.
- It is much cheaper to stay ahead with fertility than to try playing catch-up, and yield will improve dramatically.

FOR IDEAL RANGES FOR VARIOUS AMENDMENTS VISIT

kingsagriseeds.com > Resources > Forage Technical Reference Encyclopeda > Soil Soil Fertility Management for Forage Crops: Maintenance (Penn State)

OR request a copy of Penn State's article Soil Fertility Management for Forage Crops; Maintenance

SOIL STEWARDSHIP WITH INTER-SEEDING IN THE NORTH

By Leland Miller

Over the past decade there's been renewed interest in interseeding a crop into standing corn to facilitate a more robust, diverse cover crop, especially in northern geographies (growing zones 6a and lower). As well as on dairy farms where there is often a simple silage-alfalfa rotation.

WHY INTERSEED? WHY COVER CROP?

#1. With a monoculture crop of corn, the soil can remain uncovered from mid-September through mid-May. Thus the Sun is hitting bare soil for 2/3 of the year or more, harming soil microbial life as well as long-term farm productivity.

#2. The government has yet to figure out how to charge a farmer for the sun's energy. It shines for free every day of the year. Interseeding offers one way to collect more of this tax free energy for more of the growing season.

#3. Other benefits are, erosion protection, nutrients for future crops, food for soil microbes, and potential for winter grazing.

Challenges of Interseeding/Diverse Cover Cropping This opens a can of worms. Yep, a whole lot of ‘em. I have divided the challenges/objections into two different categories, those practical, spoken reasons and those that tend to be buried deep within the heart.

The practical list.

1. My June workload is too busy already.
2. Fertilizer and pest control are lower costs, than managing a cover crop.
3. I’ll destroy my interseeding at harvest.
4. The interseeded crop will steal nutrients and water from my corn.
5. I can’t afford another piece of equipment.
6. I’ll have to spread manure on a growing cover crop.
7. I’m afraid I’ll lose my shirt.

Before skipping down to the next 7 beliefs, ponder these “practical” reasons for not interseeding a cover crop. Can we agree that there’s a way to overcome each one, most years, if we really believe that soil health is an essential task for every farmer?

Now, let’s rip off the Band-Aid and see what is really believed by not covering the soil year around.

1. The national average of soil loss at 5 ton/ac/yr is a fine way to farm.
2. It’s much easier to spread fertilizer and spray chemicals than promote soil life.
3. I would rather take yield and soil from my children and grandchildren, than plant diverse cover crops.
4. Soil microbial life doesn’t really impact long term farm profitability.
5. Profit here and now, is more important than exemplifying stewardship to my children, and farmers around me.
6. I prefer erosion, dragging steel around, and burning fossil fuels over change.
7. Don’t confuse me with the facts.

Most of us truly want a vibrant, healthy soil, but have been heavily influenced by ag industries interests in researching products that fit their profit targets, and work well in the short term as determined by the vendor. It’s time to take control of how and why we use the practices and products we use, instead of meeting the goals and the convenience offered by companies peddling a plethora of petroleum based products and trait technologies designed to kill. How about a bit more emphasis on life? Soil Life.

RESEARCH

But there is hope, because there's a small voice growing louder on the benefits of cover crops. Here in the Northeast, Penn State and Cornell have both done significant work looking at interseeding species, yield impact to the corn crop, timing, and herbicides that can coexist with both the corn and the cover crop.

In short, they both concluded that there's negligible yield impact to the existing corn crop. They have done a thorough job of outlining the specific practices to be successful with interseeding.

METHODS

While broadcasting is much quicker process than drilling, it's extremely dependent on rainfall at the right time and in the right amounts to be consistently successful. Drilling with a interseeder will give much more consistent results.

Most research has concluded that 3-leaf corn is considered the earliest timing and six leaf is the latest corn growth stage for interseeding. With the right timing and seeding rates, both the corn and cover crop can thrive. This year, KAS had two plots in New York State. Rainfall was below normal in both plots. What stood out most vividly was the timing of the interseeding. The plot seeded at 3-4 leaf resulted in better cover crop establishment and weed control than the plot seeded at 5-6 leaf corn. Yields of the cover crop are to be compared later this fall to see how a lower corn population of impacts the yield of both crops. Preliminary data from this year again indicates no difference in yield between interseeded silage yields compared to no interseeding.

Even in a dry year, the interseeding had no negative impact on corn yields.

Once the interseeded crop has maxed out its fall growth, we'll harvest and test the interseeded crop for determining the nutrient value we have grown for the soil and next year's crop. We'll factor in the increased benefit of cover crop with our current higher priced fertilizers. We've also varied the population of the corn from 24,600-33,000 to see how that will impact the final yield of the corn and cover crop.

One key issue that needs to be addressed before taking serious steps in interseeding is soil drainage. If your fields are often saturated with water, tiling may be needed. It's frustrating to have a beautiful interseeded crop destroyed by harvesting equipment. Cover crops can enhance drainage, but with many of the heavy clay soils in the Northeast, with abundant fall rain, tiling may be essential, not a luxury. However, drainage can change over time as soil biology improves. This can vary depending on crop rotation, tillage practices, and the underlying causes of waterlogged soils.

Next year, we plan to look at how shorter stature hybrids and leaf types can further benefit both crops.

It becomes a bit more challenging to accurately add other soil health benefits such as reduced erosion, incre*ased earthworms, increased soil microbial activity, increased organic matter, and enhanced soil structure. Notwithstanding, these are real dollar benefits.*

SPECIES SELECTION

The specific species is also very important. The Broadcaster mix from King's AgriSeeds, has been researched to perform under different weather conditions. This mix has been formulated due to its shade tolerance. It consists of Annual ryegrass, radish, red clover, crimson clover, and yellow blossom sweetclover. This diverse mix of species, will perform well in various levels of moisture and soils encountered in the Northeast.

ECONOMIC EVALUATION

In the big picture, our current economic evaluation of farm profitability does not include a host of costs. These costs are reduced by the use of cover crops. Since the long-term impact to the soil and environment are difficult to assess, they are not a part of a grower's cost ledger. These unaccounted costs include; soil erosion, burning of fossil fuels, control of resistant insects, destruction to land from nutrient mining, resistant diseases and insects, both those that are already here and others that are sure to come, the inferior quality of crops grown by petroleum-based fertilizers on human and animal health, and the short and long term health impacts from polluted air and water.

Who is covering these costs? How much do these costs add to every bushel of corn? These are real costs that are audaciously being forwarded to a future generation.

Until these costs are accounted for the economic advantage of soil health first with cover crops will be undervalued.

It's time to treat the soil as a living organism. An organism that is alive, and hungry for plants with healthy root exudates. A soil that is not driven on and compacted when conditions are not suitable for traffic. A soil that won't be washed down the stream or blown away with the wind. A soil viewed as being borrowed from our children and grandchildren.

A healthy farmer, a healthy soil and a healthy crop must all coexist for each other's benefit, both today and into the future.

THE ART AND SCIENCE OF CREATING MIXTURES

By Tim Fritz

There has been a lot attention in the soil health world regarding the benefits of mixtures. There are indeed lots of benefits for mixtures in cover crops, and of course forage crops. King's has been creating and evaluating mixtures for over twenty years. When creating a mix, King's considers factors such as seed size which impacts both planting depth requirements and the amount of seed needed. Other factors include the establishment speed of the species being consider. For example, the brassica and mustard families tend to be small seeded and very quick to establish and become very competitive; therefore, the amount of brassica used must be kept to a minimum. ½ to 1 lb per acre is plenty of brassica. Increasing the amount to 3 lb per acre or higher in a mix will typically result in the brassica outcompeting the other components resulting in a lack of the intended diversity. Another factor to consider is what type of growth habit does the plant exhibit. Daikon radish, although the seed size is not small, grows in a rosette that smothers it neighboring seedlings, hence the percentage needs to be kept low in the mixture. Small grains are mid-size seeds but grow upright and the percentages tend to be higher. Also, species that are slower to establish should have increased percentages. There are way too many species in the cover crop arena to go into all the details, but rest assured that King's not only has lots of experience in creating mixtures but we also evaluate the mixtures on our research farm. We have learned that the species included in your mix planted before the following crop can have a huge impact on the following crop.

Each species and the resulting combination included in a mix can have either a positive, neutral or negative impact on the following crop. We have coined the name forecrop when used for cover cropping. A forecrop is designed to significantly improve the following economic crop. To achieve these positive impacts a forecrop is designed for the specific crop that follows its planting. We have several mixes designed to be planted before corn that increase corn yield and improve soil health. King's has also created a few specialty forecrop programs. These include a mix specific for tobacco and another mix for no-till pumpkins. In addition, we are finetuning a hemp forecrop program. Most of these forecrops take at least 3 years to develop.

UNDERSTANDING ALFALFA

By Kody Umble, CCA

FALL DORMANCY

Very Dormant: 1
Dormant: 2-3
Intermediate Fall Dormancy: 4-6
Non Dormant: 7-9
Very Non-Dormant: 10-11

The lower the dormancy number the sooner the plant will go into dormancy with reduced daylight. June 21 is the longest day of the year. After that the days get shorter. Varieties with low fall dormancy numbers will begin dormancy and slow down in growth sooner in the fall compared to varieties with high fall dormancy numbers. Less dormant varieties (higher number) generally have higher yield potential, earlier maturity and increased rates of recovery after harvest.

WINTER HARDINESS

Score: 1 Superior (No injury)
Score: 2 Very good
Score: 3 Good
Score: 4 Adequate
Score: 5 Low
Score: 6 None (Plant Death)

Winter hardiness is a measure of the plants' ability to survive the winter without injury. Winter-injured plants may survive, but buds formed in the fall for spring regrowth may be killed. Such plants have fewer shoots for first cutting and produce lower yield.

DISEASE RATING

Disease Rating Index is very important, as most quality varieties are resistant to most common alfalfa diseases. There are six major alfalfa diseases, and each disease gets a resistance rating from 1 to 5, with 5 being the most resistant. If a variety has the highest level of resistance to all six diseases, it would have a rating of 30:30. Some of our alfalfa varieties are rated out of a 35 point scale which includes aphanomyces race 2. Also, our alfalfas are now listed with their level of resistance to nematodes (SN- Stem Nematode, NRKN- Northern Root-knot Nematode, SRKN- Southern Root-knot Nematode). They are rated as R-Resistant, HR-Highly Resistant, MR- Mild Resistance, NA- Not Available, NR- Not Rated.

EMPHASIZING WEED CONTROL DURING ALFALFA ESTABLISHMENT

Weed control in alfalfa is more critical during the seedling stage and the first year than any other period of the alfalfa's life cycle. In many cases, alfalfa seedlings establish at a slower rate and can be overtaken by weeds, if they are present. If planting into a field with established weed pressure, alfalfa seedlings are out-competed for nutrients, water and eventually sunlight; resulting in stand reduction. Since alfalfa stands naturally decline with age, it is very important to begin with the strongest stand possible to improve overall productivity and longevity.

KNOW THE WEED HISTORY

The field history and the current weed pressure will determine the time frame in which alfalfa can be seeded. For example, fields infested with perennial weeds may not be well suited for alfalfa without multiple years of crop rotation to eradicate the weed.

UTILIZE CROP ROTATION

It is best to utilize crop rotation for 2 or 3 years after terminating an alfalfa stand to reduce disease, weeds and insect pressure. Planting alfalfa after only 1 year of rotation often results in a shorter stand life and greater expense in managing pest pressures. A 2 year rotation using crops that allow good weed control is best for staging a productive alfalfa stand. In the case of perennial weeds, using crops such as barley and corn to smother the perennial weed for multiple seasons is an effective method of control.

MAKE HAY WHILE THE SUN SHINES - A PRIMER ON HAY PRODUCTION

By David Hunsberger

Dry hay can be a great source of income and a low cost per ton storage option. When the forecast is for a high-pressure system and low humidity the hay mowers need to be rolling. Old timers often recite the adage of "cutting on the tail of a storm" in other words as the previous weather system moves out be ready. Here in the east, we have higher humidity, and we need 3-4 days to get hay dry enough to store without spoilage or fire issues. Weather apps like Weather Underground or NOAA are helpful, weather radios are still a viable option if you are limited in your adaptation of technology.

Sharp cutter bars are the first order of a good cut, next consider if the stand is mixed or pure legume, for overall annual yield with cool season grasses a minimum of 4-inch residual stubble is recommended. Grass keeps all its reserve carbohydrates in the bottom 3-4 inches and will regrow much faster if not forced to regenerate from roots. Keeping the cutting height up allows for tedder, rake, and baler teeth to be set high enough to not hit the soil, this will reduce ash in hay crop and prolong the life of the equipment.

To make dry hay a tedder can be an invaluable piece of equipment especially in heavy yielding hay. A common error in operating a tedder is too rapid ground speed vs. the rotation of the tines. If a tine is being forced to gather more than the optimal volume of hay it will still gather it up but instead of fluffing the hay it will create "tedder balls" or clumps of hay that will resist drying, monitor the hay flying out behind the machine to ensure a fan like cascade of hay without any noticeable bunching, adjust ground speed and PTO speed to find the sweet spot, the material should cascade or flow out behind the machine in a fantail like flow, not forced. One or two rounds with a tedder may be required, ted hay while it is still "tough" or damp, this will keep more of the leaves attached. Some older tedder models have a reduction gearbox for making night windrows, these are light windrows made at dusk to keep the hay from getting extra dew and subsequent bleaching.

It is best to rake the hay only one time, in the forenoon of the day you expect to bale. It is important to do so when there is still some moisture in the crop to retain leaves. Raking should be as gentle as possible and form a light fluffy windrow, my favorite rake style is a rotary opposed to a roller bar or wheel rake, minimal disturbance with the most airflow. I will allow that a wheel rake has faster possible ground speed, but your hay crop will contain more ash as the mode of action of the wheel rake necessitates aggressive ground action to drive the wheels.

Moisture is your enemy for dry hay. Bacteria and mold and fungus cannot grow in a dry environment. All hay will go through a curing or heating as the last vestiges of moisture above 15% will be driven off. Hay mow fires can occur if excess moisture is allowing for large amounts microbial growth and heat. Many products are sold to help mitigate excess moisture at baling ranging from acid based to microbial based systems. Kings offers a product from Lallemand that falls into the biological category called Magniva Hay.

Baling the hay at the correct moisture and density is critical for excellent storage and handling results. Round bales should be formed into uniform shape by traveling back and forth across the windrow to distribute the hay across the pickup head to achieve nice edges. Big square balers and small square balers utilize a stuffer and a plunger mechanism to compress the hay into the flakes. Each baler is different, but you want to get a large number of strokes per minute to keep the flakes "thin" and uniform, if travel speed is too fast the plunger will not have uniform flakes and the bale shape will be less stable and more irregular. This makes stacking of either size package more difficult. We were always taught to stack the bales with the cut side (side where the plunger knife cut the bale) up. I am not certain that the practice has been proven but it certainly is the anecdotal advice I continue to hear. Novices should be using a moisture tester, hone your skill by checking the hay by twisting a wad and testing the moisture, it should snap and pop if it is ready for dry baling, not unwind itself. If you are uncertain of bale moisture and you are concerned you may have made an error and stored hay at too high a moisture level, do not attempt to remove the hay on your own. Call the fire department so they can be on hand as you remove it, spontaneous combustion can occur as you flood the hay with oxygen as you remove the bales, many rural firehouses have temperature probes to assess the likelihood of a combustion event. Try to get hay up at less than 18% certainly below 20% to reduce risks.

You now have a valuable commodity to feed over winter to your stock or to market! **GO GROW!**

FOOD PLOTS

By Kody Umble, CCA

Whether you are an avid hunter or an outdoor enthusiast looking to attract wildlife onto your property, wildlife food plots are a great way to accomplish your goal. Adding a food plot to your property not only attracts wildlife, but also supplies them with beneficial nutrition. The added nutrition from high quality forages can benefit wildlife in many ways including weight gain, winter survival, offspring survival, and antler growth. But what makes up a great food plot?

Location, fertility, and types of forages to be planted are some of the key things to consider when creating a food plot. When choosing a location for your food plot, it is important to take the surrounding terrain into consideration. For example, if you are planning on using heavy equipment, choosing a flat location with easy access is key. Another thing to keep in mind is the surrounding vegetation. Wildlife like to feel safe, so planting a plot near cover would be advised. Finally, when choosing a location, (unless you are looking to attract wildlife for the public to see), keeping your plot in a private location, out of public view is something to keep in mind.

When choosing what type of forage to plant, there is no right or wrong answer. However, there are a few things to consider, such as what the current surrounding food sources are and the growth habit desired. Adding diversity to the current food sources would be very beneficial. For example, if you are located in the heart of farmland, surrounded by acres of corn and soybeans, planting more corn and soybeans would not be the best option. Also, when choosing a forage, the growing season should be considered. Planting a winter annual in late summer will give you good growth early to late fall and possibly into the following spring. Planting a summer annual late spring will give you good growth through the summer and early fall with no winter growth. Perennials are also another option to consider. These are planted in either spring or late summer and if maintained properly, can last many years. Whether you decide to plant an annual or perennial, consider using diversity to increase the nutritional properties and reduce your risk portfolio.

COMMONLY RECOMMENDED FOOD PLOTS

PERENNIAL	ANNUAL
King's Grazing Mix	Ray's Crazy Mix
Browsmaster Mix	Large Box Booster Mix
Forbfeast Chicory	Summer Feast Mix
Premium Clover Mix	Pea-Oat Mix
Alfalfa	Derry & Titan Forage
Soybeans	Buckwheat
Alfalfa/Grass Mixtures	Corn
	Small Grains

And lastly, know that the fertility of your plot is key to getting top production from your forages. A soil test is the best way to learn the fertility needs. Consult your local agronomist on how to properly collect a soil sample and how to interpret the results. Food plots can be a lot of fun, and if done properly can have benefits that will last for years to come.

THE POWER OF CLOVER IN BEEF PASTURES

By Joy Beam Yoder

Clover can be a large benefit to livestock production, specifically in beef cattle pastures for two main reasons. These include forage yield per acre and increased nutritional availability.

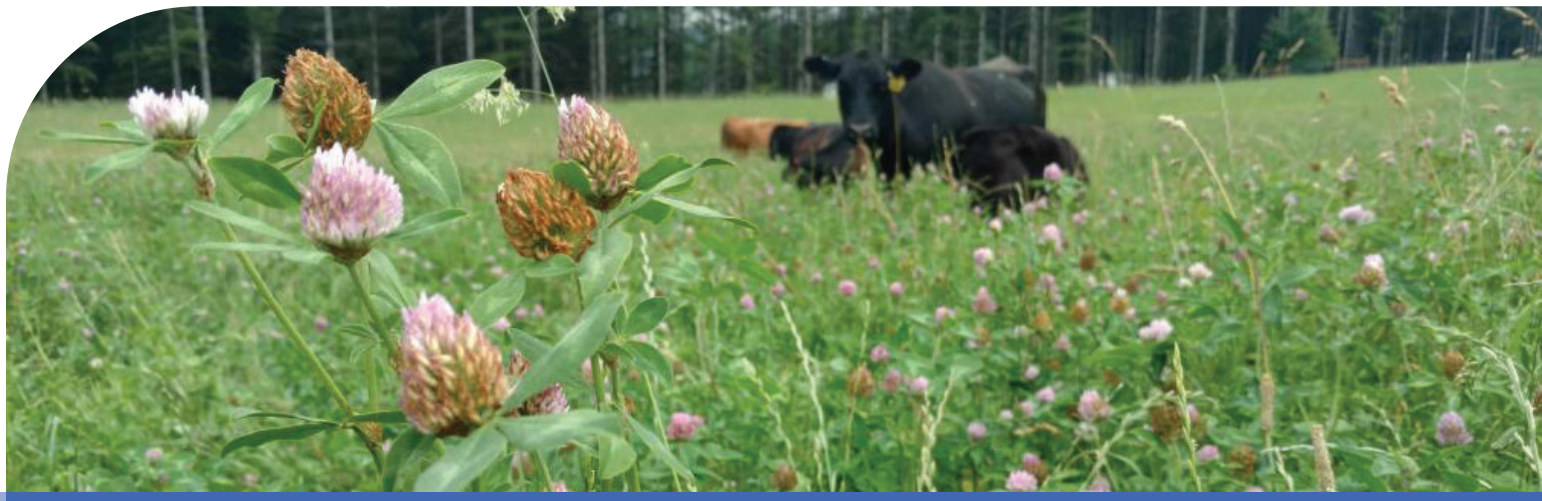
First, let's discuss the ways that clover boosts forage yield per acre. The first benefit most people think of is nitrogen fixation. While it is true that clover produces nitrogen and can decrease the amount of fertilizer needed, it must be noted that most times it is not as much, nor is it as readily available as most people think. Clover adds nitrogen to the pasture through nutrient recycling that happens through feces and urine discretion as well as the natural cycle of plants dying and being decomposed back into the soil. It takes time for protein within the plants to be broken down to its original nitrogen building blocks. Because of this, adding clover to a pasture should be thought of as a long-term investment for increasing nitrogen availability. However, if maximum production is desired, other sources of nitrogen may need to be considered and phosphorous and potassium should be applied as indicated by soil testing. This is true especially in pastures that are harvested for hay once or twice a year.

Beyond its fertility advantage, clover also offers other advantages. White clover spreads by stolons and can fill in gaps between bunch type plants like orchardgrass while persisting high grazing pressure. Red clover offers drought tolerance and can still perform well in soils with low pH and below optimal fertility. Because of these different advantages between red and white clover, it is good to have both in a pasture.

Nutritionally speaking, clover's protein benefit is a large cost savings for beef producers. Most beef cattle protein needs can be acquired with approximately 30% of the pasture stand in clover and therefore minimizes the amount of protein needed to be supplemented through other sources like soybean meal. Clover is also later maturing than most grasses and therefore offers greater palatability and fiber digestibility throughout the spring.

In fact, recent research has shown even more extensive nutritional advantages to clover. In the fescue belt where fescue toxicity is a problem, adding clover to the diet has been found to reverse the effects of blood vessel restriction and as a result increases average daily gain by up to one pound per head per day! It has also been found that red clover can increase protein efficiency by increasing the amount of rumen bypass protein so that any protein consumed is digested to a fuller extent. To read more on this, check out Jim Henning's article in the Progressive Forage magazine titled "The 'Super Powers' of Clover".

With so many benefits to clover, it is important to evaluate your pastures for ideal clover proportions. Thankfully, if more clover is needed, it is easy to introduce to pastures through frost seeding or interseeding with a drill. Check out the Premium Clover Mix for a combination of high quality red and white clovers. King's pasture mixes also include the proper ratio of clover for the associated livestock and can be used when establishing a new pasture.



MAKING FERMENTED FORAGES

Forage quality starts with high quality genetics and ends at feeding. Poor storage management can destroy forage quality. For proper fermentation, oxygen must be removed, usually by means of tight packing and prompt, tight wrapping (if using wrapped bales or an ag bag), and the appropriate bacteria must convert plant sugars into organic acids, which lower the pH to a point of stability. When forage heats, energy is lost. Factors that affect fermentation include:

- Maturity at Harvest
- Sugar Content
- Moisture of Crop
- Length of Chop
- Filling Rate
- Packing Density
- Bacterial Inoculant
- Cover
- Feed Out Rate

For corn silage, it is better to err on the wet side.

For haylage or baleage, it is better to err on the dry side.

HAYLAGE / BALEAGE IN A DAY MAKES MORE MILK!

Wide swath management can get moisture levels low enough to make wet hay in a day. The result is silage that contains more NSC (sugar and starch), which makes around 300 lbs of additional milk per ton of feed. Some are even questioning the need for conditioning when making haylage/baleage. Freshly cut forage exposed to the sun continues to make sugar (photosynthesis) until the plant is wilted to 60%. The faster a crop is dried and harvested, the less sugar and starch is lost in the field due to respiration (cells using energy). Stomata (pores in the leaves) stay open in the sunlight even after cut. Keeping the forage spread out on the field keeps the stomata open for faster drying and increased sugar production. More sugar and starch (NSC) means more milk!

Basic Principles:

- Swath must be at least 80% of cutting width
- Leave 3 to 4” of stubble. Allows air to flow through swath better and helps grass productivity.
- Cutting time: Between late evening and late morning is best.
- Rake or merge before crop is too dry.
- Harvest at appropriate moisture (less than 65%).

More information can be found at this excellent web site:
http://www.hoards.com/E_crops/cf6

NOTES FOR SPECIFIC STORAGES

Baleage
Harvest as soon as crop reaches 50% moisture (40 to 60% is acceptable). Make bale as tight as possible and wrap immediately with plenty of plastic. Store bales in an area that is convenient for feeding. Repair bales when damage occurs. Feed out bales at a rate that will not cause heating. Also try to feed older bales first if practical.

Top Unloading Silo
Store at highest moisture possible without causing seepage. Higher moisture gives better packing and, with corn silage, makes more milk. In most structures optimum moisture is about 65%.The size of the silo should be matched closely with the feed out rate to prevent heating.

Bunkers
Bunkers can be very efficient for storing a high volume of feed, but losses can be significant. Proper sizing and face management of bunkers are critical. Another critical issue with bunkers is adequate packing. A good goal is 40 to 50 lbs of wet weight per cubic foot. Covering with plastic and weights to keep air out is also critical. Corn silage moisture for best milk production should be around 70%. For haylage, 60 to 65% moisture is a good goal.

Ag Bags
Ag bags can be an effective alternative to bunkers. Ag bags should be put on a workable surface and all holes should be repaired quickly. Forage moisture should be similar to bunkers. Sizing and face management are both important to prevent heating during feed out.

MANAGED GRAZING

When properly managed, grazing can be a very profitable system for livestock farming. While we have seen many successes, we have also seen failures caused by poor management. We recommend that those who wish to be graziers attend pasture walks, grazing seminars and subscribe to Graze Magazine; a monthly publication written by graziers for graziers. (608-455-3311 or http://www.grazeonline.com/).

Our recommendation for farms that are trying to learn grazing is to start with an easy class of animals. For example, on a dairy farm, heifers from 6 months to freshening are very easy to learn on. We recommend starting with about 50,000 lbs of animals per acre per day. For 1,000 lb heifers this would be 50 heifers per acre.

Perennial pasture should be about 8”-15” in height on average when turning the livestock into the paddock. The animals should be removed when around 4”-6” of pasture residue is still in the pasture. Adjust paddock size ideally until you get the time on individual paddock to close to one day.

The biggest mistakes made are not waiting until the pasture has reached 8” and leaving the livestock in the paddock too long. Putting livestock into the paddock too soon drops yield and quality is actually too rich. Leaving the livestock in too long will slow down re-growth substantially, and this will reduce the productivity of the pasture.

The difference between good management and poor management is around 3 tons of dry matter. How much is that worth? The value of pasture is worth at least $150 per ton times 3 tons is equal to $450 per acre loss by poor management. Please take the time to learn managed grazing. We have many forage mixtures designed for managed grazing, but without proper management they will not be productive.

ABC’S OF GRAZING

A) Have plenty of dense high-quality pastures! If you can see bare ground between the grass and clover, you are not getting maximum milk production per acre or per cow.

B) Maintain pasture quality! Graze it when it’s young, from 8”-15” down to 3”-4”. Young grass is 84% digestible, while old grass is only 50% digestible!

C) Do not overgraze! If the cows have it down to three inches, move on to fresh pasture, move to a sacrifice lot, or move into a barn and feed them. A good rule to follow is “Take Half - Leave Half.” Overgrazed pastures will be very slow in growing back. Unlike alfalfa and clover, grass stores its food reserves in the bottom 3 inches of the stem.

D) Question: What about the grass around the manure patties?
- Clip your pastures on a regular basis. This way new grass can grow, which the cows will favor. Clipping also keeps down weeds and unpalatable seedheads and greatly improves the appearance of the farm!
- Make hay or baleage off each paddock once or more per year (cut it young). When the grass grows back, the cows eat it almost like a new seeding.
- Put the horses, goats or other species in after the cows are out, but not for long, or they will graze it too short. They will eat some of the grass that the cows won’t.

E) Fertilize appropriately for your system. Soil test just like a crop as needed.

F) Keep cows off paddocks until you have 8”-10” of regrowth. In springtime under good conditions this may be 12 to16 days. In summer it may take well over 3 weeks. Livestock should only be in a paddock for three days. After about three days, the grass starts to grow back and they start eating that tender regrowth. That is really hard on grass.

G) Feed your cows accordingly. Cut back or eliminate protein and top-dress, as well as grain. It may be necessary to feed hay or corn silage to keep fiber levels adequate. Corn silage works great because it’s high in non-structural carbohydrates (NSC), which is important in working off the excess protein in that rich pasture.

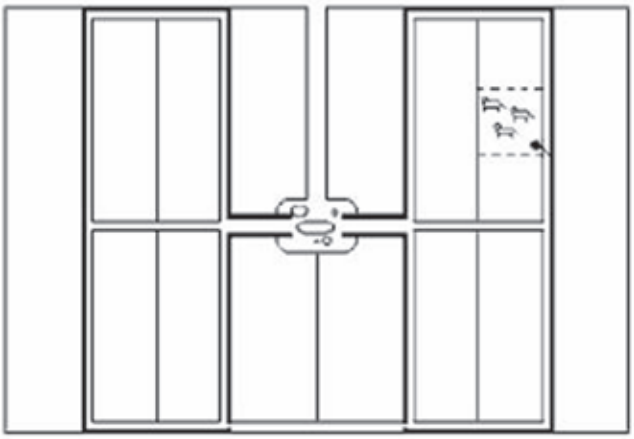
H) Hybrid Farming: You can graze approximately ½ acre or more per cow and still grow your own crops. A couple notes of caution:

#1 It takes a lot of management. Pastures need to be managed with the same care as field crops.

#2 The new farmer just getting started has less investment if he does all grazing and hay instead of buying corn growing equipment.

PASTURE LAYOUT DESIGN

The diagram below is an aerial view of an ideal grazing layout with relatively level land. In reality, this situation is hard to find in our region, but many ideas can be taken from it.



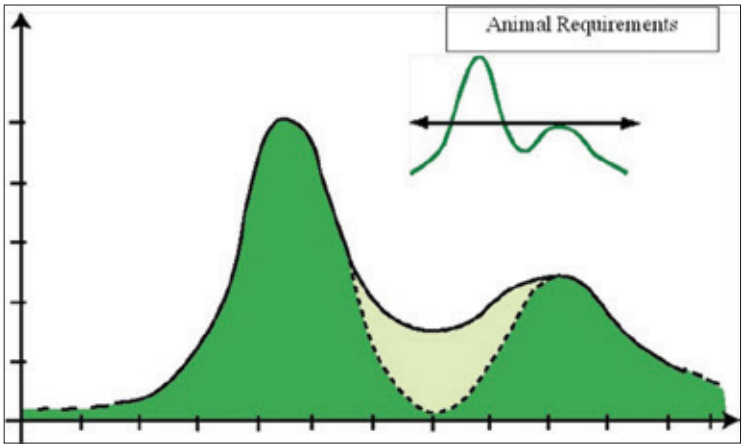
- The farm buildings ideally should be located in the center of the grazing land base, which reduces the amount of walking by the herd and you.
- The lane network creates major paddocks that are rectangular for field work but can easily be subdivided with polywire (dashed lines) to make daily grazing paddocks.
- Either the lane wire can be propped up with a notched PVC pipe to let cows go under, or gates can be installed. Animals should not stay on any paddock longer than 3 days.
- With this system it is possible to keep leap froggingpolywire fences to get animals on and off a section of grass very quickly. The main purpose of the fence is to keep livestock off the paddock until it is ready to be grazed.
- Lanes away from barn should be kept narrow, with improvement made in heavy traffic areas and wetter areas. Design the fence to be dropped easily to move farm equipment in and out of paddocks without using the cow lanes.
- The bold line represents a looped water line that will provide water to the entire farm. Looping allows the water to flow from two directions, reducing the amount of friction. Insert quick couplers and shut off valves in the line as needed. Pipe burial is usually not necessary, but the portable water tank needs to be in with the cows.

HOW MANY ANIMALS PER ACRE?

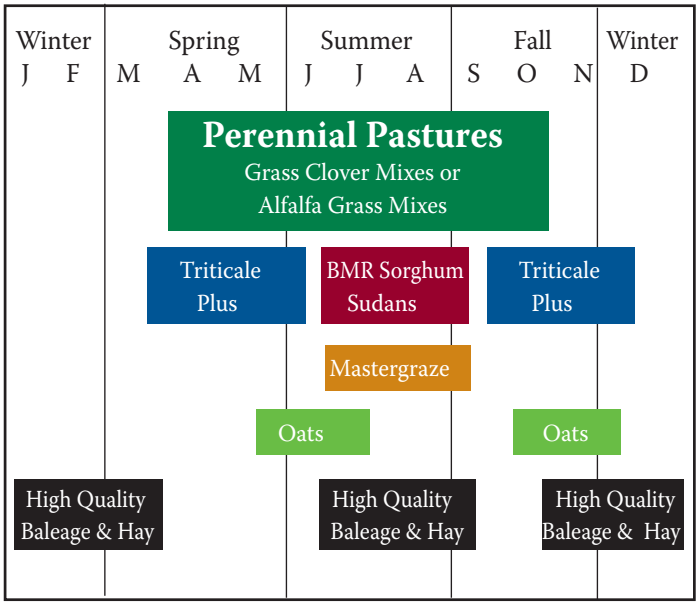
Stocking rate is a critical factor in profitability and depends on many factors. Those factors include:

- How much of the ration will come from pasture?
- Productivity of the pasture?
- Breed and size of the cattle?
- Do you want to make surplus forage in the spring or supplement forage in the summer?
- Manure management details.

A quick rule of thumb is to stock pastures at around 45-50,000 lbs. of animal per acre per day, if most forages are coming from pasture, and make adjustments from that point. Understocked farms tend to have the lowest profit potential, but overstocked farms can run into nutrient balance problems and other issues.



Forage Grazing Rotation Example
Balancing Perennials and Annuals



TOOLS FOR MAKING A PROFITABLE MILK PRODUCING FORAGE SYSTEM FOR YOUR FARM

By Tim Fritz & Doug Hering

Feed costs are a huge financial cost to all dairy farms (and other livestock farms). Forages are the key to making milk. Low quality forages cannot be overcome by grains and feed additives. Soil, climate, planting, harvest and storage systems along with feeding systems, milk production goals, nutrient and soil health management, and risk management factors should all be evaluated to determine what crop rotation and forage system are best for your unique farming operation. In the mid-Atlantic and Northeast, there are incredible differences from region to region and farm to farm. But one factor remains the same, for a cow to produce sustainable profitable milk production it cannot be done without high quality forages that are properly balanced. One of our foundational goals at King's AgriSeeds is to provide the forage tools and know how to create a forage program that works on your soils and your cows. We trust that if you have a balanced high quality forage system that fits your land base, that your nutritionist will use it to your advantage. We have come a long way in making milk.

A little history on cow rations. In the beginning, cows were on pasture and when the pasture was rich in quality so was the relative milk production. When the grass was poor, milk was reduced and the herd lost weight. Before the 1950's, pasture and hay were the predominate ration of the dairy herd. After World War 2, nitrogen and pesticides encouraged corn to be king. Soon corn silage and supplemental grains were added to the ration. Corn silage and starch based grains are low in protein but rich in starch energy. To increase protein in the ration, alfalfa became the queen of the dairy forage program as it is a great source of protein and maintains a good harvest window. In addition, alfalfa is a reliable drought tolerant crop with excellent yield and fixes large amount of nitrogen which dramatically lower nitrogen needs when the crop is taken out. The problem: both corn silage and alfalfa have higher levels of undigestible fiber that limit the cows ration intake and can lack effective long fiber for the rumen mat. Since, NDFd and now uNDFd 240 became understood and now can be modeled with confidence into rations many well managed farms with the support of their nutritionist are now including more vegetative grasses back into the ration.

Vegetative grasses whether annual or perennial species when harvested properly create higher NDFd's and can be used in balancing the ration to create a proper level of uNDFd. This combination enables forage dry matter intake to increase creating both a healthier rumen (less starch needed) and a healthy rumen mat both of which increase cow longevity. Another benefit of using vegetative grasses is that they have medium protein levels using proper fertility management. When examining the financial impact of including vegetative grasses into the ration, ration costs (including home grown forages) are lowered and quite often the entire forage program will result in healthier soils, less production inputs and increased overall yield. Strong crop rotations that include three or more crops increase land productivity and lower input costs.

As we aspire to higher levels of productivity, we need to create a forage program that brings balance to the ration and the cropping program. King's AgriSeeds has many customers that have developed forage systems that not only make milk but also increase yield per acre across many soils. Each farm is unique on what system is best. Create a crop rotation that will provide high tonnage of digestible fiber, starch (plus sugars and fats), and protein based on soil resources and other farm objectives. It is very rare that a one crop program will meet the big picture goals of a farm over time. Success can be measured in many ways. Increases that can be measured are yield per acre, milk per cow and milk per farm over time. Decreases that can be measured are reduced forage costs, reduced ration costs and culling costs (longer cow longevity through healthier rations can be very large and quite often overlooked).

The modeling of various forage system alternatives can be done but it should include a forage agronomist, a nutritionist, and a financial advisor to pull it all together.

FORAGE QUALITY BY FORAGE TYPE.

Below are the results of our testing program. Samples include both higher grazing heights and aggressive cutting heights. Most were sampled in mid to late spring and mid-summer. Most products have average, maximums and minimums. Remember, a lot of these samples were aggressively managed. We advise you to look at the data in terms of trends and potentials. Always test your own forage. The samples were wet chemistry for NDF and 24 hr NDFd. Protein, ADF, lignin and mineral were NIR. Kd rate is a calculated number that evaluates how fast a forage is digested in the rumen fluid. The higher the number the more digestible the fiber. The numbers listed are averages.

	Crop	DM Tons	Crude Protein	aNDfom	Traditional NDFd as % of NDF-30HR	uNDF240	TTNDFD	Starch	in situ Rumen Starch D, % of Starch - 7hr	Dynamic Starch Kd (using 3,7 hr) (%/hr)
Direct Harvest High Starch Forages	Corn Silage Non-BMR	7.68	7.53	34.47	59.51	10.03	42.62	38.39	74.99	19.31
	Corn Silage BMR	7.28	7.89	37.11	61.89	10.08	44.01	34.03	70.66	17.08
	BMR Forage Sorghum	8.67	8.20	41.04	48.80	10.38	38.95	22.67	N/A	N/A
Cut and Wilt Harvest Vegetative Forages Higher Proteign Grasses can increase rumen health	Alfalfa*	6 to 8	21.26	38.21	44.88	18.26	42.42			
	Perennial Grasses**	3 to 6***	14.51	57.21	51.68	18.92	46.59			
	Sorghum Sudan	2.95	15.33	53.11	59.38	10.60	57.70			
	Sudangrass	2.66	17.74	51.18	60.24	8.90	59.46			
	Millet	2.80	15.38	54.34	61.06	8.57	61.68			
	Triticale	4.56	15.24	41.24	60.09	10.62	61.60			
	Annual Rye. First cut.	2.75	14.54	34.57	64.89	3.4	72.13			

* Alfalfa Quality data from across all alfalfa samples in Rock River Labs (east) (Not King's AgriSeeds)

** First cut data. Large variations between species

A NOTE ABOUT FORAGE MIXTURES

By Tim Fritz

Forage mixtures can increase yields and total farm productivity. Soils, climate, harvest methods and goals of the farm are essential to understand what mixture options are appropriate for each individual operation. One of the main benefits for using mixtures is reducing risk from the time the crop is planted until it is terminated. Each species and variety have strengths and weaknesses that can be used across different soil types. It is also very difficult to know what individual product will perform best in the upcoming growing seasons. What I have observed over the last 20 years, is that the individual components of a mixture will be dominant at certain times. This can even vary across soil types within the same field. That same species that was dominant a week or two earlier may become less dominate or even go dormant while other components take their turn being dominate. This synergy between products is the primary reason for productivity increases. Mixtures also tend to have less pest pressures. For example, if a disease comes into a field, it may only impact one or two of the components. Consequently, little production is lost.

Balancing yield performance and nutritional quality is certainly a primary goal as we develop our mixtures. Quite often different species bring a nutritional benefit to the feed bunk, but it is not always practical to grow, harvest, store and mix these separate components into the ration on the farm. This is why it is crucial to actually plant it in the field as a mixture, so it can be harvested and stored in its own bunk, bag, or silo. For example, Performance Max, a less diverse mixture by species contains alfalfa and tall fescue (designed for growing zones 6 to 8). Within this mix, we typically have two varieties of alfalfa and 3 varieties of tall fescue. Because of how it is formulated, this mix does not require ideal alfalfa soils as at least one of the alfalfas included in the mix will have branched roots and the tall fescue will perform well across drier to wetter soils better than most other grasses. Nutritionally, the alfalfa provides primarily protein and the tall fescue provides digestible effective fiber with mid-protein levels. Our NutraMax Mix, designed by a dairy nutritionist, is a great example of a complex mixture of alfalfa, clovers, & grasses that is ideal for growing zones 4 and 5. The red clover in this mix helps reduces protein storage losses, therefore improving protein utilization. These mixture concepts also apply to annual mixtures such as the Ray's Crazy Mix series (in zones 4-8), & Yield Max (in zones 4-5). Mixtures offer excellent soil health benefits as well!

At King's AgriSeeds, we offer a wide range of mixtures for various soils, growing zones and nutritional needs. We encourage you to explore the many forage options for your farm. Every situation is different. Always forage test and feed appropriately in a balanced ration.

Nutramax Hay Mix

A NOTE ABOUT BMR CORN SILAGE

By Tim Fritz & Leland Miller

BMR corn silage has been gaining popularity in certain regions. Why? It's a proven milk making forage! The BMR corn hybrids have a higher NDFd compared to conventional non-BMR corn silage hybrids. This in turn can increase the dry matter intake of the herd and milk production. Today, many farms are able to fine tune diets to target different groups of cows, consequently the efficiency of the higher priced BMR can be increased. Cow groups that get the most cost-effective response are high producing cows; cows early in the lactation from 2 weeks pre-fresh to 3 weeks post-fresh. Feeding BMR to transition cows can improve DMI just before and after calving. This increase in DMI and resulting milk increase can carry on into the lactation, even after being switched back to non BMR silage.

From an agronomic perspective, BMR hybrids yield less than conventional corn hybrids and tend to be more disease susceptible and have standability issues. The best use of BMR hybrids is on dairies that have a strong land base that consists of mostly productive soil. BMR hybrids respond very well to crop rotation. The costs not often talked about in utilizing BMR hybrid corn is reduced land productivity due to lower genetic yield potential, higher input costs, and higher purchased protein costs usually in the form of soybean meal assuming a high percentage of the ration is corn silage.

There are two BMR genes used in commercial hybrids: BM1 and BM3. Of the two genes, BM3 hybrids consistently have the highest NDFd which are best differentiated using wet chemistry. King's AgriSeeds currently has two KingFisher BM3 gene hybrids that are very exciting! They have both good agronomics and the added benefit of having higher starch content and starch digestibility. If you currently use BMR and can utilize non-traited hybrids, we encourage you to give our products a try! KF 59B70 performed exceptionally well in the Forage Superbowl at the World Dairy Expo (2 of the 3 top winners in 2022). Also, if you are using competitor BMR products- do a double check to find out which BMR gene is being used. If they skirt the issue, it is most likely a BM1 gene hybrid.

FORAGE YIELD PROJECTIONS ON 120 ACRE LAND BASE

(Based on productive soils, adjust accordingly)

Corn Silage (Dense Energy Forage)
8 tons of Dry Matter (24 tons @ 67% moisture)
X 40 acres
320 Tons of Dry Matter (480 tons @ 67% moisture)

Legume Grass Mixture
(Protein & vegetative grass Fiber Energy)
6 tons of Dry Matter (18 tons @ 67% moisture)
X 60 acres
160 Tons of Dry Matter (540 tons @ 67% moisture)

Annual Grass Forage (Fiber Energy and Protein)
10 tons of Dry Matter (30 tons @ 67% moisture
X 20 acres
200 Tons of Dry Matter (300 tons @ 67% moisture)

Forage needs for a 120 cow dairy on 120 acres

104 Milk Cows	28 Large Heifers
764 tons corn silage	76 tons corn silage
570 tons haylage	140 tons haylage
284 tons annuals	140tons annuals
76 tons dry hay	10 tons dry hay

16 Dry Cows	28 Small Heifers
62 tons corn silage	4 ton hay
32 tons annuals	14-18 tons annuals
12 tons dry hay	No to little corn silage

Total forage needs for all livestock

Total corn silage	814 tons
Total haylage	570-710 tons (depending large heifer ration)
Total annuals	332-472 tons (depending large heifer ration)
Total dry hay	102 tons (246ton wet hay equivalent)

Note: Heifer replacements based on a 23% cull rate, which is very achievable when feeding a high forage ration. Using the above rotation and yield assumptions there would be surplus forage to sell to purchase grains. An alternative would be to alter the rotation to grow some grain instead of forage.

CROP ROTATION

When used properly, crop rotation results in increased yields, better soil health, and fewer pests. A good crop rotation is planned in advanced and includes more than just two species (ex. corn and alfalfa). Below is a productive six year forage rotation. This rotation can include grains as well.

Example Rotation:

Year 1-3: legume/grass mixture that is adapted to your area

Year 4: KingFisher corn for silage

Year 4 (late summer/early fall): seed a winter annual such as Triticale Plus

Year 5 (spring): harvest winter annuals
(mid spring): plant summer annuals
(mid summer): plant oats (if timing does not allow, substitute a winter annual)

Year 6: KingFisher Corn for silage

Year 7-12: repeat previous 6 year rotation

To further illustrate this rotation, imagine a 120 acre tract with six 20 acre fields (ideal scenario). Each year there would be 60 acres of legume grass mix, 40 acres of corn silage and 20 acres of intensely managed annual grasses.

Perennial Forage (Legume grass mixtures)
Three 20 acre tracts will be in a legume grass mixture.
One field will be 1st year production (Year 1)
One field will be 2nd year production (Year 2)
One field will be 3rd year production to go into corn the following year. (Year 3)

Corn for Silage
Two 20 acre tracts
One field after legume grass mixture (Year 4)
One field after oats or winter annual (Year 6)

Vegetative Grass Annual Forages
One 20 acre field that is double or triple cropped (Year 5)

INSTRUCTIONS AND REFERENCE INFORMATION

1. Begin by assessing the current ration. (Each feeding group can be done separately.)
2. Dry Matter (DM) or "as fed" (AF)
   To figure pounds as fed from DM lbs. (Divide lbs. DM by % DM as decimal.)
   (eg. 25 lbs. / .35 DM = 71.43 lbs.)
   To figure DM lbs. from "as fed" lbs. (Multiply lbs. "as fed" by the %DM as a decimal.)
   (eg. 25 lbs. x .35 DM = 8.75 lbs.)
3. To figure the % forage in the diet, divide total lbs. (DM) forage by the total lbs. fed (DM).
4. Where would the producer like to be compared to what he's feeding now?
5. Begin to fill in the desired ration and figure the number of acres of each crop needed.
   Acres needed = total lbs. fed / day x # days fed / 2,000 / yield / acre
   (eg: 1,000 lbs fed / day x 240 days fed / 2,000 lbs. / 9 tons / acre yield = 13.3 acres needed)

Typical Dry Matter Needs BF 4.0, Pro 3.3, BW=1400	
Lbs of milk	**DM needs**
100	54-56
90	52-53
80	49-51
70	46-48
60	43-45
50	40-42
40	37-39
dry cows	25-28
heifers	15-23

Typical Dry Matter Values	
Crop	**% DM**
Corn Silage	28-35 %
Baleage	40-60 %
Haylage	35-40 %
BMR S/S	33-38 %
Dry Hay	82-88 %
Forage Sorghum	28-32 %
Triticale Forage	30-38 %
Corn Grain	84.5 %
Protein Mix	90 %
Energy Mix	90 %

Note: A high forage ration starts when 60% of diet comes from forage. Limit each type of forage to less than 2/3 of forage fed (DM basis). Include vegetative grasses in the system. (Annuals or perennial grasses).

BASIC RECOMMENDATIONS & RELATIVE COMPARISON OF KING'S AGRISEEDS FORAGES

Product	Life Span	Best Uses	Maturity	Full Seeding Rate	Seed Box	Seeding Depth
Perennial Grasses						
Bluegrass, Ky	6+ years	G	Early	10 to 15 lbs	Small	up to 1/4"
Brome, Meadow	6+ years	G, WH, H	Early	25 to 35 lbs	Large	1/4" to 1/2"
Brome, Smooth	6+ years	H	Late	25 to 35 lbs	Large	1/4" to 1/2"
Fescue, Meadow	3+ years	G, WH, H	Medium	30 to 40 lbs	Large	1/8" to 3/8"
Fescue, Tall	3+ years	WH, H	Variety Dependent	30 to 40 lbs	Large	1/8" to 3/8"
Festolium, Perun	1 to 3 years	G, WH	Medium	30 to 40 lbs	Large	1/4" to 1/2"
Orchardgrass	3 to 6 years	G, WH, H	Variety Dependent	20 lbs	Large	up to 1/4"
Reed Canary Grass	6+ years	H, WH	Medium	12 to 18 lbs	Small	1/8" to 1/4"
Ryegrass, Perennial	2 to 6 years	G, WH	Variety Dependent	30 to 50 lbs	Large	1/8" to 3/8"
Timothy	1 to 6 years	WH, H	Late	8 to 12 lbs	Small	up to 1/4"
Perennial Mixtures						
Nutramax Hay	3 to 4 years	WH, H, G	Late	25 lbs	Large	1/8" to 3/8"
Organic Hayboss	3 to 4 years	H, WH, G	Late	25 lbs	Large	Surface to 1/4"
Organic Star	2 to 3 years	WH, G	Medium	25 to 30 lbs	Large	1/8" to 3/8"
Organic Dairy Green	2 to 3 years	WH, G	Late	25 to 35 lbs	Large	Surface to 1/4"
Organic Partner	3+ years	H, WH	Medium	20 to 30 lbs	Large	Surface to 1/4"
Balancer	3 to 6 years	WH, G	Early	25 to 30 lbs	Large	1/8" to 3/8"
Beefmaster	5 to 10 years	H, WH, G	Late	30 to 35 lbs	Large	Surface to 1/4"
Browsemaster	2 to 3 years	G	Late	20 to 25 lbs	Large	Surface to 1/4"
Equinemaster Paddock	3 to 10 years	G	Medium	100 lbs	Large	Surface to 1/4"
Equiflex Forage	3 to 5 years	H, WH, G	Early	25 to 30 lbs	Large	1/8" to 3/8"
Grass Maxx	5 to 10 years	WH, G	Early	20 to 30 lbs	Large	1/8" to 3/8"
Milkway	5 to 10 years	H, WH	Late	35 to 40 lbs	Large	Surface to 1/4"
Southern Brawn	5 to 10 years	H, WH, G	Early	20 to 30 lbs	Large	1/8" to 3/8"
E-Z Dry Hay	3 to 6 years	H, WH	Medium	20 to 30 lbs	Large	1/8" to 3/8"
Creekside	4 to 7 years	G, WH	Late	25 lbs	Large	1/8" to 3/8"
GrassPro	4 to 7 years	WH, H	Late	25 lbs	Large	1/8" to 3/8"
Greenfast	2 to 4 years	G, WH	Medium Late	30 to 40 lbs	Large	1/8" to 3/8"
King's Hay Pro	3 to 6 years	H, WH, G	Medium	20 to 30 lbs	Large	1/8" to 3/8"
King's Grazing	3 to 5 years	G, WH	Late	25 to 35 lbs	Large	1/8" to 3/8"
Hillside	3 to 6 years	G, WH	Mixed	25 lbs	Large	1/8" to 3/8"
Horse Supreme	4 to 7 years	G	Mixed	25 lbs	Large	1/8" to 3/8"
Lowland Hay	4 to 7 years	WH, H	Late	20 to 25 lbs	Large	1/8" to 3/8"
North Star	3 to 4 years	WH, H	Mixed	18 to 25 lbs	Large	1/8" to 3/8"
Performance Max	3 to 5 years	WH, H	Late	20 to 25 lbs	Large	1/8" to 3/8"
Sale Topper	3 to 5 years	H	Late	15 lbs	Large	1/8" to 3/8"
Versa	4 to 7 years	WH, H	Mixed	15 to 30 lbs	Large	1/8" to 3/8"
Perennial Legume						
Alfafa	3 to 5 years	WH,H		12 to 20 lbs	Small	up to 1/4"
Red Clover	2 years	G, WH		12 to 20 lbs	Small	up to 1/4"
White Clover	3 to 5 years	G, WH		4 lbs	Small	up to 1/4"
Product	Seeding Dates	Best Uses	Normal Harvest Dates	Full Seeding Rate	Seed Box	Seeding Depth
Winter Annuals						
Cereal Rye	Fall	G, WH	Early small grain	170lbs	Large	1" to 1 1/2"
Ryegrass	Late Summer	G, WH	Earlier than wheat	30 to 50 lbs	Large	1/8" to 3/8"
Spelt	Wheat dates	G, WH, H	Later than wheat	125 lbs	Large	1" to 1 1/2"
Triticale	Wheat dates	G, WH	Earlier than wheat	125- 150lbs	Large	3/4" to 1 1/2"
Triticale Plus	Barley & Early dates	G, WH	Earlier than wheat	80 to 100 lbs	Large	1/2" to 3/4"
Crimson Clover	Late Summer	G, WH	Earlier than wheat	20 lbs	Small	1/8" to 3/8"
Hairy Vetch	Up to Barley Planting	G, WH	Later than wheat	20 to 30 lbs	Large	1/4" to 3/4"
Winter Peas	Up to Early Wheat	WH	Earlier than wheat	35 to 50 lbs	Large	3/4" to 1"
DART	Barley & Early Wheat planting dates	WH	Earlier than wheat	125 lbs	Large	1/2" to 3/4"
Summer Annuals						
BMR Sudangrass	After Soils >60° and Rising	G, WH, H	30 to 40 days	30 to 40 lbs	Large	1/2" to 3/4"
BMR Sorghum Sudans	After Soils >60° and Rising	G, WH	30 to 40 days	50 to 60 lbs	Large	3/4" to 1 1/2"
BMR Forage Sorghums	After Soils >60° and Rising	S, WH	90 to 110 days	80-100K lbs	Planter	1" to 1 1/2"
Grain Sorghum	After Soils >60° and Rising	N/A	70 to 110 days	80-100K lbs	Planter	2" to 1 1/2"
Corn, Vegetative Harvest	After Soils >50° and Rising	G, WH	50 to 60 days	40,000 lbs	Planter	1 1/2" to 2 1/2"
Corn, Silage Harvest	After Soils >50° and Rising	S	80 to 110 days	25 to 30,000 lbs	Planter	1 1/2" to 2 1/2"
Millet	After Soils >65° and Rising	G, WH	35 to 45 days	10 to 20 lbs	Large	1/2" to 3/4"
Teff	After Soils >60° and Rising	WH, H	45 to 55 days	4 to 5 lbs	Small	0 to 1/4"
Other Annuals						
Brassicas, Turnips & Hybrid	E. Spring through Summer	G	30 to 70 days	3 to 5lbs	Small	1/8" to 3/8"
Oats, Everleaf	E. Spring or Summer	G, WH	55 to 65 days	80 to 100 lbs	Large	1" to 1 1/2"

Key: G= Grazing WH= Wet Hay, Baleage or Haylage H= Dry Hay S= Direct Cut Silage

This overview of basic is our best estimate of product guidelines and comparisons. Variations will occur due to location and year. Consult your local dealer for more local recommendations and local experience.

Product	Residual Height	Spring Productivity	Summer Productivity	Fall Productivity	Wetter Soils	Drier Soils	Winter Hardiness	Heat Tolerance	Thicken Alfalfa	Thicken Grass	Grazing Palatability	Traffic Tolerant
Perennial Grasses												
Bluegrass, Ky	2"	4	2	3	4	2	5	2	1	1	3	5
Brome, Meadow	3" to 4"	3	4	4	2	4	5	4	1		5	4
Brome, Smooth	3" to 4"	5	2	3	2	4	5	2	1	1	3	5
Fescue, Meadow	3" to 4"	4	3	4	4	3	5	3	2	2	4	5
Fescue, Tall	3" to 4"	5	4	5	4	4	4	5	4	4	2	5
Festolium, Perun	3" to 4"	5	3	4	4	2	3	3	5	5	5	3
Orchardgrass	4"	5	3	3	2	4	4	4	4	5	3	3
Reed Canary Grass	2" to 4"	5	4	2	5	5	5	3	1	1	2	5
Ryegrass, Perennial	2" to 3"	5	1	4	4	1	3	2	3	5	5	3
Timothy	3"	5	1	2	4	1	5	2	2	1	5	3
Perennial Mixtures												
Nutramax Hay	3" to 4"	5	4	4	3	4	4	4	1	2	3	3
Organic Hayboss	3" to 4"	5	5	4	2	5	4	5	1	2	3	3
Organic Star	3" to 4"	4	3	3	3	3	4	3	3	3	4	4
Organic Dairy Green	3" to 4"	4	3	3	4	3	4	3	4	3	5	4
Organic Partner	3" to 4"	5	4	4	4	4	4	4	4	4	2	4
Balancer	3" to 4"	5	4	5	4	4	4	4	4	4	2	5
Beefmaster	3" to 4"	5	4	4	4	4	4	4	4	4	2	5
Browsemaster	3" to 4"	5	4	3	2	5	3	5	1	1	3	3
Equinemaster Paddock	3" to 4"	4	3	4	4	3	4	3	2	3	3	5
Equiflex Forage	3" to 4"	5	3	3	3	4	5	4	3	3	4	3
Grass Maxx	3" to 4"	5	4	5	4	4	4	4	4	4	2	5
Milkway	3" to 4"	4	3	4	4	4	5	3	4	3	3	5
Southern Brawn	3" to 4"	5	4	4	4	4	4	4	4	4	2	4
E-Z Dry Hay	4"	5	4	3	2	4	4	4	1	2	4	3
Creekside	3"	4	4	4	4	3	5	3	2	2	5	5
GrassPro	3" to 4"	4	4	4	4	4	4	4	4	3	2	4
Greenfast	3" to 4"	5	3	4	4	2	3	2	5	5	4	3
King's Hay Pro	4"	5	4	4	3	4	4	4	1	2	2	3
King's Grazing	3"	5	3	4	3	3	3	2	3	3	5	4
Hillside	3" to 4"	4	4	4	1	4	4	4	3	3	4	3
Horse Supreme	3"	4	3	4	3	3	3	3	1	3	5	4
Lowland Hay	3" to 4"	5	4	5	5	3	5	4	4	3	2	5
North Star	3" to 4"	5	4	4	2	5	4	5	1	1	3	4
Performance Max	3" to 4"	5	5	4	2	5	4	5	1	1	3	4
Sale Topper	3" to 4"	5	3	3	3	3	4	3	3	2	3	3
Versa	3" to 4"	5	3	4	3	3	3	4	5	3	3	4
Perennial Legume												
Alfafa	3"	5	5	4	2	5	3	5	1	1	3	2
Red Clover	3"	5	3	4	3	3	5	4	5	5	4	3
White Clover	2" to 3"	4	3	3	4	3	4	4	3	5	5	5
Product	Residual Height											
Winter Annuals												
Cereal Rye	2" to 4"	5	N/A	3	4	3	5	N/A	1	1	5	3
Ryegrass	3" to 4"	5	1	4	4	3	3	1	3	4	5	3
Spelt	2" to 4"	5	N/A	3	3	3	4	N/A	4	3	5	3
Triticale	2" to 4"	5	N/A	2	3	5	5	N/A	5	3	5	3
Triticale Plus	3" to 4"	5	1	3	4	4	4	N/A	5	4	5	3
Crimson Clover	N/A	5	N/A	3	3	3	3	N/A	3	1	4	N/A
Hairy Vetch	N/A	5	N/A	1	3	3	4	N/A	2	1	4	N/A
Winter Peas	N/A	5	N/A	1	3	3	4	N/A	1	1	5	N/A
DART	2" to 4"	5	N/A	3	4	5	5	N/A	5	3	5	N/A
Summer Annuals												
BMR Sudangrass	5" to 6"	3	5	N/A	1	5	N/A	5	5	1	5	3
BMR Sorghum Sudans	5" to 6"	3	5	N/A	1	5	N/A	5	5	1	5	2
BMR Forage Sorghums	N/A	2	5	N/A	1	5	N/A	5	2	1	3	N/A
Grain Sorghum	N/A	2	5	N/A	1	5	N/A	5	1	1	1	1
Corn, Vegetative Harvest	N/A	3	5	N/A	3	3	N/A	4	N/A	N/A	5	N/A
Corn, Silage Harvest	N/A	N/A	5	N/A	3	3	N/A	4	N/A	N/A	N/A	N/A
Millet	4" to 6"	1	4	N/A	3	4	N/A	5	2	1	3	3
Teff	4" to 5"	2	5	N/A	4	5	N/A	5	4		4	4
Other Annuals												
Brassicas, Turnips & Hybrid	3" to 4"	4	4	5	1	3	N/A	4	1	1	3	3
Oats, Everleaf	3" to 4"	5	3	4	3	3	N/A	3	3	2	3	3

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FIELD NOTES:

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*Vander Groef Family Farm — Sussex — (862) 266-5843

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*Wild Acres Family Farm — Great Valley — (716) 969-4386

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*Mill Hill Farm Supply — Williamsburg — (814) 832-3458

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Stanley Stahl — Granville Summit — (570) 274-3650

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Kevin Colteryahn — Prospect — (724) 822-2493

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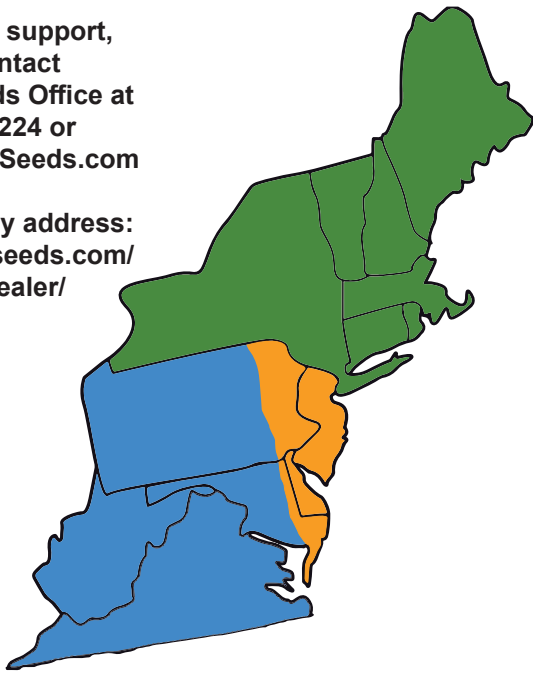

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