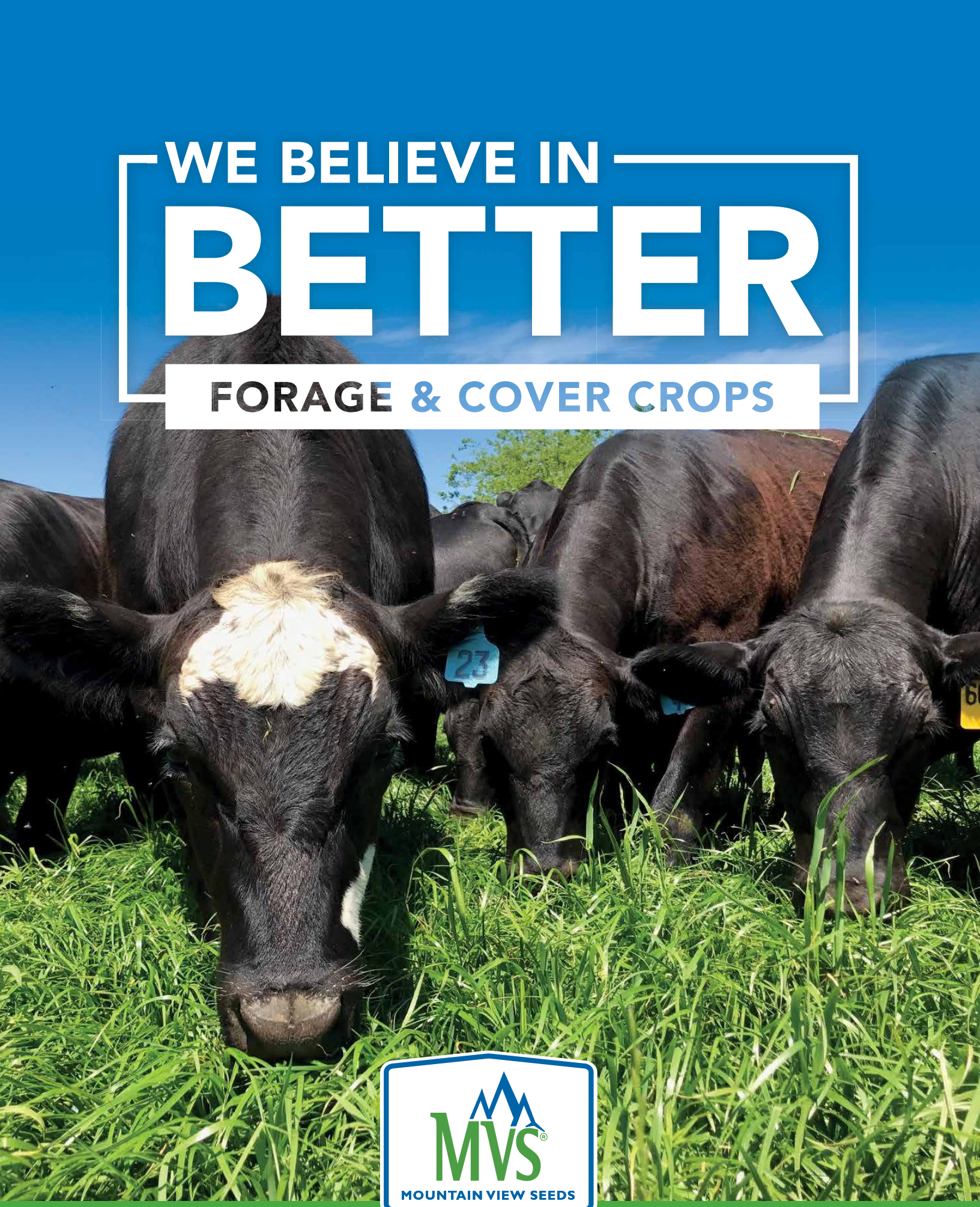
WE BELIEVE IN BETTER

FORAGE & COVER CROPS



MVS®
MOUNTAIN VIEW SEEDS

Yield: Tons/Acre (Unless Stated Otherwise)

Seedling Vigor: Score Based on a Scale of 1 to 5 with 5 Being the Most Vigorous Seedling Growth

Maturity Rating Scale: 37=Flag Leaf Emergence, 45=Boot Swollen, 50=Beginning of Inflorescence Emergence, 58=Complete Emergence of Inflorescence, 62=Beginning of Pollen Shed

Disease Resistance: Score Based on a Scale of 1 to 9 with 9 Being Almost all Leaves Affected

Winter Injury: Score Based on a Scale of 0 to 9 with 9 Being the Most Winter Injury

Forage & Cover Crop Guide, 2nd Edition

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AN AMERICAN SEED COMPANY

FARMER OWNED

MVS

OUR MISSION STATEMENT

An agricultrual cooperative dedicated to innovative solutions, excellent service and long-term relationships.






Mountain View Seeds

WE MAKE BUYING SEED EASY

Sheltered by Mt. Hood, the Willamette Valley enjoys mellow sunshine, gentle rain, and mild winters. It's the grass seed production capital of the world.

In 1946, farmers in Pratum, just east of Salem, founded a co-op to handle the prime seed that grows in our fertile soils. More than 75 years later, Mountain View Seeds still reaps the benefits of the unique Willamette Valley climate, consistent grower base, and state-of-the-art cleaning facilities.

The grain elevator at Pratum Co-op has been a Willamette Valley landmark since 1946. For 35 years, the co-op handled public grass seed varieties, adding private varieties in the 1980s. In 1998 Mountain View Seeds, Ltd., a subsidiary of Pratum Co-op, was created to manage mounting demand of grass seed production.

At Mountain View Seeds, we rely on experience and people. We know grass seed research, production, and processing — after all, we have more than 75 years of experience. Mountain View Seeds brings Oregon's best to you.

RESEARCH & DEVELOPMENT

We're devoted to developing and acquiring forage varieties of the highest genetic quality. Bringing to market products that persist in a range of growing conditions to combine the best yield, quality, disease and pest resistance. We work closely with universities and other private organizations. With a full spectrum of forage solutions, we can fulfill your seed needs.

BLENDING & PACKAGING

Our blending and packaging lines can handle 500,000 pounds a day, blending and, if needed, treated seed can be provided. Whether you need 1, 15 or 50-lb. units or 1,000 lb. totes, we create packages that look good on the shelf with seed that performs in the field.

PRODUCTION & CONDITIONING

Our growers rotate the full spectrum of grasses with more than 50 other crops to preserve soil fertility and produce the clean, high-quality seed the Willamette Valley is famous for. Need 100 tons of forage seed in a hurry? No problem, our state-of-the-art conditioning facility cleans up to 200,000 pounds a day.

SERVICE & DELIVERY

You'll always talk to a real person when you call Mountain View Seeds, someone who will be happy to answer any questions you may have. And we always deliver the right seed in the right package to the right place — on time!

PREMIUM BRANDS

TOP CHOICE® is a specialty line of retail-ready packaged products for the forage and turf sectors. The Top Choice® product line offers best-in-class products and packaging to match. Only top-rated varieties are used in our Top Choice® forage products. Top Choice® forage products are developed in conjunction with recommendations from university and regional experts. The Top Choice® line stands for the best quality products available to the retail industry in attractive packaging.

PURE-FORMANCE® Mountain View Seeds PURE-FORMANCE® Cover Crop products are produced to the highest genetic purity standards and are a healthy, sustainable choice when it comes to maintaining a balanced natural ecosystem. PURE-FORMANCE® Cover Crop products increase soil fertility and quality. They also control weeds, improve water infiltration and reduce erosion. Unlike other cover crop products, only PURE-FORMANCE® products contain the genetic ability to give you uniform growth and the consistent, dependable performance you paid for.

OUR TEAM

AARON KUENZI

Executive Vice President/Division Manager

Aaron grew up on a seed farm near Pratum Co-op. After getting his BS in Agriculture Business Management at Oregon State he started his career in the Seed industry at Ampac Seed. In 2010 he started working for Mountain View Seed and in 2016 took over the role of managing the company.

MARK THOMAS

Director of Forage Development

Mark has over 30 years of experience in the seed industry. He has experience in regional wholesale distribution, national sales, and marketing of forages. He recently served as the President of the Southern Seed Association and currently serves on the board of the American Forage Grassland Council and Alliance for Grassland Renewal. Mark and his wife, own and operate a beef cattle farm in Oklahoma, where they raise forages, cover crops and practice regenerative agriculture.

DON MILLER

Technical Forage Adviser

Don was formerly the Director of Product Development for Alforex Seeds from 2008-2022. During his 40 year career in the public and private industry, Dr. Miller has authored or co-authored numerous agricultural publications and conducted training seminars for Universities and Grower organizations. He has developed or co-developed 100 alfalfa varieties, 6 red clover and one Teff grass variety during his plant breeding career. Most recent efforts have been to assist in the development and marketing of saline and drought tolerant varieties for improved forage production in marginal growing environments.

STEVE JOHNSON

President of Peak Plant Genetics

Steve and his team develop our portfolio of high performing forage, cover crop and turfgrass varieties. Since its founding in 2008 Peak has released over 160 new varieties. He has been active in the industry as President of the Turfgrass Breeders Association, Chairmain of the Oregon Seed Association Research Committee and as a guest lecturer at Oregon State. After earning a BA in Biololgy from Carleton College and a MS in Botany from Iowa State, Steve returned to the Willamette Valley where he grew up working on local farms. He now resides with his family near Corvallis, OR where he enjoys raising cattle, hunting, fishing, hiking and watching grass grow.

DR. GREGG MUNSHAW

Director of Agronomy, PARC

Gregg and his team at Pinnacle Ag Research Center (PARC) conduct forage, turf, cover crop and ornamental research in the heart of the transition zone climate in Missouri. He has been in the industry for nearly 30 years and worked as a university professor for over half that time. Dr. Munshaw is the author of numerous scientific and extension articles and has educated around the world. He is passionate about reducing inputs, improving soils and assisting land managers through testing of the latest genetics, chemicals and fertilizers.

SEED COATING & TREATMENT

WATERGARD NP® (the NP stands for Nutrient Package) is a unique ploymer coating for grass seed that is completely biodegradable, nontoxic, odorless and pet-friendly. WaterGard NP® captures and slowly releases just the right amount of moisture to the seed as needed during the germination period. The Nutrient Package includes iron, zinc, and manganese. It improves seedling growth by providing plants small amounts of important nutrients right after germination—before the plant can easily access soil nutrients on its own. Growers will see the benefit in crop establishment, early season vigor and the ability to withstand challenging growing conditions.

ESTANCIA
Endophyte Enhanced Tall Fescue

ESTANCIA
FORAGE TALL FESCUE

- SMART ENDOPHYTE PROTECTION
- EXCEPTIONALLY HIGH-YIELDING
- EXCELLENT SEEDLING VIGOR
- PERSISTENT VARIETY
- MEDIUM MATURITY
- UNIVERSITY TESTED AND PROVEN
- HIMAG TALL FESCUE BASE GENETICS IN TANDEM WITH ARKSHIELD ENDOPHYTE

WITH ARKSHIELD® PROTECTION!

Estancia tall fescue produces tons of nutritious, palatable, high-quality forage that results in healthier cows, heavier weaning calves and improved steer and heifer weight gains. It is the result of years of laboratory and field research by the University of Arkansas in cooperation with the University of Missouri. Estancia is a medium-maturing, high-yielding tall fescue with excellent seedling vigor.

ArkShield® is a patented smart endophytic fungus that lives inside Estancia seed and plants in a mutually-beneficial relationship protecting the grass from disease, insects and environmental stresses. ArkShield® is natural and desirable in forage grasses and has no known negative effects on livestock. The ArkShield® endophyte makes Estancia a more productive and persistent perennial forage grass.

Estancia is unique in the non-toxic tall fescue marketplace. It not only contains a superb non-toxic endophyte, but is the combination of ArkShield® with base genetics of HiMag tall fescue, developed for higher magnesium levels to minimize grass tetany potential in cattle and sheep.

ArkShield Technology is protected by U.S. Patent Nos. 7,456,855 / 7,553,654 / 7,977,550

PUT YOUR PASTURE TO WORK!

Two factors that dramatically impact the profitability of a cow-calf operation are calving rate and weaning weight. Improvement to these production factors will increase the pounds of calf that can be marketed within a given calving season or year. Lower pregnancy rates, calving rates and calf weaning weights have been observed in many research studies in cows and heifers grazing tall fescue.

2012 MISSISSIPPI STATE DATA

VARIETY	HOLLY SPINGS	STARKVILLE
ESTANCIA ARKSHIELD	**3.11**	**5.41**
KY-31	3.05	5.12
BAROPTIMA PLUS E34	2.76	4.77
JESUP MAXQ	2.71	4.28

Mississippi State University Trial Total Dry Matter Yield at Two Locations.

2014 UNIVERSITY OF KENTUCKY DATA

VARIETY	SEEDLING VIGOR	2-YEAR YIELD TOTAL
ESTANCIA ARKSHIELD	**3.4**	**11.47**
KY-31	3.5	10.59
BAROPTIMA PLUS E34	2.4	12.24
JESUP MAXQ	1.8	11.19

University of Kentucky Tall Fescue Trial. Lexington, Kentucky.

2016 KANSAS STATE UNIVERSITY DATA

VARIETY	2015	2016	2-YEAR TOTAL
ESTANCIA ARKSHIELD	**6.94**	**8.35**	**15.29**
BAROPTIMA PLUS E34	6.49	7.47	13.96
TOWER PROTEK	7.02	7.80	14.82
MARTIN 2 PROTEK	5.81	7.97	13.78
KY-31 HE	6.84	7.63	14.47

Kansas State University Tall Fescue Trial. Mound Valley, Kansas.

Combining cow and calf performance data, year-round grazing of toxic fescue could be costing cattle producers more than $250 per head in lost revenue based on the Arkansas Beef Improvement Program's reported annual direct costs of maintaining beef cows.

IMPROVED WEANING WEIGHTS AND SPRING CALVING RATES!

Calf performance while grazing tall fescue pastures containing either the wild-type toxic endophyte (E+) or a non-toxic novel endophyte (Estancia).*

*Arkansas Animal Science Department Report 2007

PLANTING GUIDE

- Closely graze or harvest existing toxic fescue
- Spray stubble with a non-selective herbicide; i.e. glyphosate
- Take a soil test, begin to correct any deficits in soil maintenance levels on pH, phosphorus, potassium, etc.
- Plant a cover-crop
- Graze/harvest break-crop (don't transfer toxic fescue seeds in manure to break-crop forage)
- After useful life of the break-crop, spray out with a non-selective herbicide
- No-till Estancia in September to November in the Southern states and August to September or March to May in the Midwestern and Northeastern states
- Plant Estancia at 20-25 lbs/acre
- Apply nitrogen as needed to boost establishment and outpace weeds, apply a broadleaf herbicide as needed after tall fescue has 3-4 tillers
- Estancia can be planted with other species such as white or red clover, alfalfa, or other cool-season grasses
- Don't graze or harvest seedling pasture the first winter
- Be sure not to feed toxic fescue hay in newly established Estancia pasture (or transfer toxic seed via manure)
- Apply nitrogen as needed during growing season based on stocking rate, yield goals, etc.

TETON II
Tall Fescue

TETON II
FORAGE TALL FESCUE

- EXCEPTIONALLY HIGH-YIELDING
- EXCELLENT SEEDLING VIGOR
- PERSISTENT VARIETY
- HEAT AND DROUGHT TOLERANT
- ENDOPHYTE FREE
- MEDIUM MATURITY

PRODUCES A MOUNTAIN OF FORAGE

Teton II is a new generation, top-yielding, non-toxic endophyte-free tall fescue variety. Teton II has excellent seedling vigor, establishing quickly to create a healthy, high-yielding and permanent pasture. Teton II is a deep-rooted, medium-maturing variety with heat and drought tolerance. Teton II rated #1 in the 2012-2014 University of Kentucky and Mississippi State University tall fescue forage and persistence trials, and over 30 years of university yield trial data, making it an industry leader in reliable, durable, endophyte-free tall fescues.

HIGH-YIELDING, HIGH-QUALITY

Teton II is best suited to high fertility and heavy soils, but can withstand acid, alkaline as well as poorly-drained soils. Highest growth is achieved during spring and fall seasons, with moderate growth during the summer season. Most endophyte free and novel endophyte varieties should not be over-grazed or harvested (closer than 5 inches) during the summer.

First harvest of hay should be cut in the late boot stage for high quality. Subsequent harvests can be made as growth permits. Teton II can also be fall stockpiled for late feed.

Teton II is highly-palatable, unlike Kentucky 31, so avoid over grazing. Graze at approximately 10-12 inches and remove animals when at 4-5 inches. As with any forage, management practices dictate the final yield and quality of the forage. With proper management practices, Teton II should provide high-yielding, high-quality forage that will result in improved producer profitability.

2014 UK TALL FESCUE DATA

VARIETY	SEEDLING VIGOR	2012 YIELD	2013 YIELD	2014 YIELD	3-YEAR YIELD TOTAL
TETON II	**4.5**	**3.09**	**5.32**	**3.27**	**11.69**
BAROPTIMA +E34	4.8	3.03	5.65	3.00	11.69
JESUP MAXQ	4.6	3.21	5.20	2.79	11.20
BRONSON	4.6	3.10	4.98	2.98	11.07
CAJUN II	4.6	2.73	4.88	2.98	10.58
ENHANCE	4.0	2.95	4.75	2.44	10.14
KY-31	5.0	2.75	4.80	2.58	10.13
LSD VALUE	0.5	0.54	0.67	0.54	1.42

2014 Tall Fescue and Bromegrass Report University of Kentucky

2016 KANSAS STATE UNIVERSITY DATA

VARIETY	2015 YIELD	2016 YIELD	2-YEAR YIELD TOTAL
TETON II	**6.51**	**8.44**	**14.95**
BAROPTIMA PLUS E34	6.49	7.47	13.96
TOWER PROTEK	7.02	7.80	14.82
MARTIN 2 PROTEK	5.81	7.97	13.78
KY-31 HE	6.84	7.63	14.47

2014 Kansas State University Tall Fescue Trial. Mound Valley, Kansas.

PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 20-25 lbs/acre. Proper seed bed preparation is essential. A soil sample will identify necessary inputs to achieve proper pH, P, K and other macronutrient levels (extension service or agronomy supplier can advise). No-till seeding is generally very effective. Use of a non-selective herbicide will reduce weed competition; spray per label recommendation when crop is mature enough. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Apply timely broadleaf herbicide if needed. Be careful not to overgraze, especially during dry periods.

PALATINE
Soft Leaf Tall Fescue

PALATINE
SOFT LEAF TALL FESCUE

- EXCEPTIONAL PALATABILITY
- EXCELLENT FORAGE QUALITY
- ENDOPHYTE FREE
- IDEAL FOR GRAZING
- USE IN THINNING ALFALFA STANDS
- HIGHLY PERSISTENT
- DENSE FOLIAGE SHADES YIELD AND QUALITY-ROBBING WEEDS

HIGH QUALITY SOFT LEAF TALL FESCUE

Palatine is a dense, soft, fine-leafed tall fescue with excellent forage quality. Palatine is free of toxic endophytes that cause animal health issues often associated with KY-31. The lack of toxic alkaloids, forage quality, and finer leaf makes it an ideal choice for grazing cattle, sheep and horses. Palatine's forage quality also makes it an excellent choice for grass-based dairy operations. Palatine can be sown as a monoculture grass or used in mixtures with other grasses, legumes and forbs. The high Relative Feed Quality (RFQ) of Palatine makes it a suitable selection for thinning alfalfa stands.

GRAZING MANAGEMENT

Palatine is best-suited to high fertility and heavy soils, but can withstand acid, alkaline as well as poorly-drained soils. Best growth is achieved during spring and fall seasons, with moderate growth during the summer season. Most endophyte free and novel endophyte varieties should not be over-grazed or harvested (closer than 5 inches) during the summer.

First harvest of hay should be cut in the late boot stage for high quality. Subsequent harvests can be made as growth permits. Palatine can also be fall stockpiled for late feed.

Palatine is highly-palatable, unlike KY-31, so avoid over grazing. Graze at approximately 10-12 inches and remove animals when at 4-5 inches. As with any forage, management practices dictate the final yield and quality of the forage. With proper management practices, Palatine should provide high-yielding, high-quality forage that will result in improved producer profitability.

2019 CORNELL UNIVERSITY DATA

VARIETY	2018 YIELD	2018 % STAND	2019 YIELD	HEADING DATE ('19)	2-YEAR YIELD TOTAL
PALATINE	**6.43**	**68**	**4.38**	**MAY 27**	**10.81**
SWAJ	5.77	53	4.86	MAY 30	10.64
SOFTANE	6.23	70	4.00	MAY 27	10.24
KY-31+	5.52	63	4.40	MAY 27	9.92

Cornell University Forage Trial. Sown May 18, 2017.

FORAGE QUALITY DATA

VARIETY	CP	ADF %	aNDF%	NDFD48	RFQ	LBS OF MILK/TON
PALATINE	**17.2**	**27.9**	**45.3**	**77.5**	**209.6**	**3,681**
ESTANCIA	17.2	27.6	46.8	72.7	192.2	3,636
CAJUN II	15.9	28.0	47.3	71.9	188.5	3,605
FAWN	15.9	30.6	49.7	75.4	187.4	3,516

2019 Peak Plant Genetics

PLANTING GUIDE

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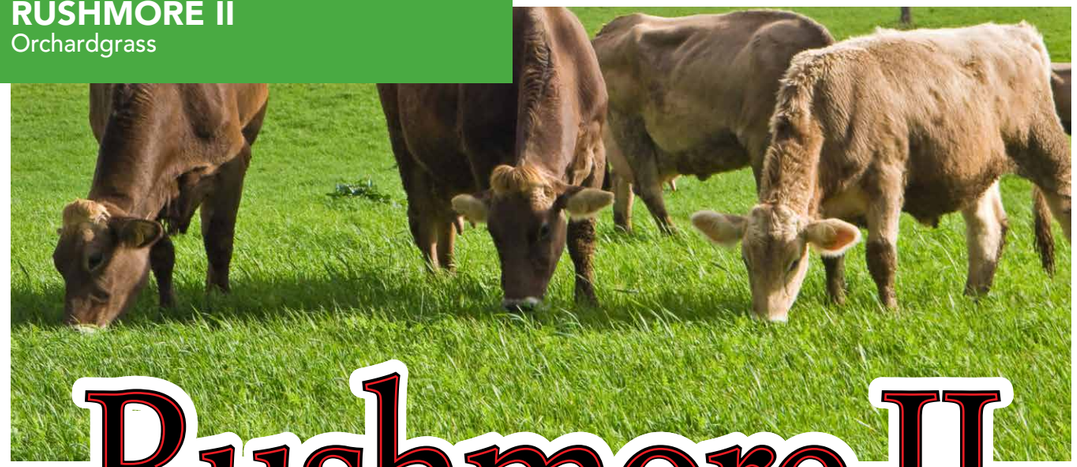
RUSHMORE II
Orchardgrass



Rushmore II
early maturity orchardgrass

- EARLY MATURITY
- EXCELLENT WINTER HARDINESS
- SUPERB FORAGE YIELDER
- ENHANCED DISEASE RESISTANCE
- HIGH FEED QUALITY

EARLY MATURING FOR HIGH QUALITY

Rushmore II is an early-maturing orchardgrass ideal for use in grazing and hay operations. An ideal fit for colder northern climates, Rushmore II exhibits excellent winter hardiness, but also performs well in further South locations as seen in University of Kentucky forage variety trials. Rushmore II produces tons of forage that is very high in protein, perfect for dairy cows or beef cattle. With improved disease resistance, Rushmore II can withstand grazing pressure as well. With over 25 years in university variety trials, Rushmore II continues to persist as a variety that performs in a wide geography, has great seedling vigor and establishes quickly.

2016 UK TRIAL DATA

VARIETY	SEEDLING VIGOR	MATURITY 2015	DISEASE RESISTANCE	3-YEAR YIELD TOTAL
RUSHMORE II	**3.8**	**52.3**	**5.0**	**10.11***
PRAIRIE	4.1	56.0	4.5	10.64
PERSIST	3.4	56.0	5.0	9.95
PROFIT	4.0	52.8	4.3	9.63
BENCHMARK PLUS	3.1	56.5	5.8	9.14
POTOMAC	4.3	56.5	4.8	9.06
LSD VALUE	1.4	4.5	0.9	2.33

University of Kentucky Forage Trial Sown September 7, 2012 at Lexington, Kentucky.
*Not Significantly Different from the Highest Numerical Value in the Column, Based on the 0.05 LSD.

2019 CORNELL TRIAL DATA

VARIETY	2017 YIELD	2018 YIELD	2019 YIELD	3-YEAR YIELD TOTAL
RUSHMORE II	**7.90**	**5.77**	**4.29**	**17.95**
ECHELON	8.17	5.30	4.35	17.82
INAVALE	8.20	5.23	4.19	17.62
POTOMAC	7.71	5.61	4.22	17.53
PENNLATE	7.39	5.59	4.35	17.33
TRAIL BURST	8.12	4.77	4.29	17.18
TREPONSO	7.00	4.68	3.93	15.61
LYRA	6.62	4.13	3.74	14.49

Cornell University Forage Trial at Ithaca, New York.

PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 15-20 lbs/acre. Proper seed bed preparation is essential. A soil sample will identify necessary inputs to achieve proper pH, P, K and other macronutrient levels (extension service or agronomy supplier can advise). Use of a non-selective herbicide will reduce weed competition; spray per label recommendation when crop is mature enough. No-till seeding is generally very effective. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

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BIGHORN
Orchardgrass

- MEDIUM MATURITY
- VERY HIGH-YIELDING
- EXCELLENT RUST RESISTANCE
- GOOD SEEDLING VIGOR
- PERSISTENT VARIETY

MEDIUM MATURITY, BIG ON YIELD

Bighorn Orchardgrass is a medium maturity variety simply bred for big yields. Bighorn has been widely-tested in university variety trials in Kentucky, New York and Pennsylvania, and more than exceeds expectations on yield and persistence. Bighorn shows industry-leading seedling vigor and quick establishment for great first year yields, as well as excellent disease resistance that adds to the variety's great persistence. One of Mountain View Seeds newest releases, Bighorn's maturity fits a wide range of geographics, management types and is a workhorse in our orchardgrass lineup.

2015 UK TRIAL DATA

VARIETY	SEEDLING VIGOR OCT 2015	MATURITY MAY 2015	PERCENT STAND OCT 2015	3-YEAR YIELD TOTAL
BIGHORN	**4.1**	**47.5**	**74**	**11.00**
PRAIRIE	3.4	54.0	64	10.69
PROFIT	5.0	48.8	59	10.50
PERSIST	3.6	56.0	66	10.48
POTOMAC	4.1	56.5	59	10.03
TEKAPO	2.9	52.3	58	8.41

University of Kentucky Forage Trial 2013-2015 at Princeton, Kentucky.

2019 PSU TRIAL DATA

VARIETY	2-YEAR YIELD TOTAL
BIGHORN	**7.22**
OLATHE	7.04
INAVALE	6.54
TRAILBURST	6.36
ALDEBARAN	5.39

Penn State University Forage Trial 2017-2019 at Rock Springs, Pennsylvania.

PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 15-20 lbs/acre. Proper seed bed preparation is essential. A soil sample will identify necessary inputs to achieve proper pH, P, K and other macronutrient levels (extension service or agronomy supplier can advise). Use of a non-selective herbicide will reduce weed competition; spray per label recommendation when crop is mature enough. No-till seeding is generally very effective. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

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ALPINE II

LATE-MATURING ORCHARDGRASS

- LATE-MATURITY
- EXCELLENT FORAGE QUALITY
- HIGH YIELDING
- IMPROVED DISEASE RESISTANCE
- GOOD SEEDLING VIGOR
- USE FOR HAY OR GRAZING

THE LATEST OF LATE-MATURING ORCHARDGRASSES

Alpine II Orchardgrass is a top-rated, very late-maturing orchardgrass. Late-maturing orchardgrasses can quickly become disease susceptible with lower yield potential. This isn't the case with Alpine II! It's able to produce high-quality, disease-free forage later in the season, making it the industry's go-to for very late orchardgrass, especially as a companion crop with alfalfa, red clover or other legumes. Alpine II performs well in university variety trials in Kentucky and Wisconsin, as well as New York and Pennsylvania. Alpine II Orchardgrass exhibits superb agronomic traits such as strong seedling vigor, quick establishment, and high winterhardiness.

2019 UK TRIAL DATA

VARIETY	SEEDLING VIGOR	MATURITY MAY 2019	3-YEAR YIELD TOTAL
ALPINE II	**3.6**	**47.5**	**10.45**
OLATHE	2.8	56.0	10.31
ENDURANCE	3.3	56.0	10.05
ECHELON	2.9	47.5	9.79
ALBERT	3.0	51.5	9.75
PERSIST	3.3	58.0	9.68
PRODIGY	4.3	56.5	9.63
INIVALE	3.1	50.0	9.30
POTOMAC	4.3	58.0	9.25

2017 University of Kentucky Forage Trial at Lexington, Kentucky.

2015 UK TRIAL DATA

VARIETY	MATURITY MAY 2015	PERCENT STAND OCT 2015	3-YEAR YIELD TOTAL
ALPINE II	**45.0**	**68**	**11.11**
PROFIT	48.8	59	10.50
PERSIST	56.0	66	10.48
ELISE	46.3	39	10.03
TEKAPO	52.3	58	8.41
LSD VALUE	4.4	26	1.15

2012 University of Kentucky Forage Trial at Princeton, Kentucky.

PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 15-20 lbs/acre. Proper seed bed preparation is essential. A soil sample will identify necessary inputs to achieve proper pH, P, K and other macronutrient levels (extension service or agronomy supplier can advise). Use of a non-selective herbicide will reduce weed competition; spray per label recommendation when crop is mature enough. No-till seeding is generally very effective. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider amount of organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Control broadleaf weeds as necessary.

DEVOUR
orchardgrass

- HIGHLY-PERSISTENT, WITHSTANDS GRAZING PRESSURE
- VERY PALATABLE
- LATE-MATURING, CAN BE SEEDED WITH CLOVER OR ALFALFA
- EXCEPTIONAL YIELD
- GOOD SEEDLING VIGOR

GRAZE AWAY ON DEVOUR

Devour is a dual purpose orchardgrass variety. Devour was bred to withstand the stress of intensive grazing systems which can be detrimental to more erect hay-type varieties. The lower growing pattern and lower leaves on Devour, enables it to persist under grazing and mechanical harvesting. Devour is quick to establish and recovers quickly after harvesting, outcompeting weeds for higher-quality, higher-yielding pasture for your livestock, Devour is a late-maturing variety, with great disease resistance that can be used in combination with alfalfa or other forages.

2020 UK GRAZING TRIAL DATA

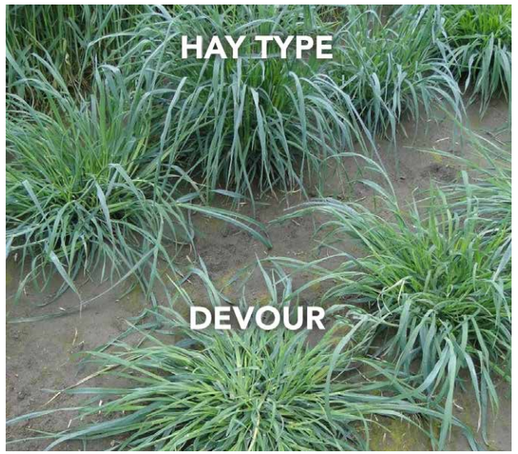
VARIETY	SEEDLING VIGOR OCT 2016	GRAZING PREFERENCE			PERCENT STAND		
		APR 2017	MAY 2018	MAY 2020	OCT 2018	NOV 2019	OCT 2020
DEVOUR	**3.4**	**4.8**	**6.3**	**4.5**	**92**	**85**	**65**
PERSIST	4.1	3.2	1.2	2.7	82	74	59
PRAIRIE	4.1	2.8	2.0	4.3	78	72	48
POTOMAC	4.2	2.8	1.7	4.8	76	70	37
PRODIGY	4.2	3.5	2.7	4.0	72	67	42
HARVESTAR	3.7	4.3	6.7	6.2	63	55	27
ELISE	3.4	5.3	6.3	5.3	60	50	28
LSD (0.05)	0.6	1.0	1.1	1.8	14	13	14

University of Kentucky Forage Trial 2015-2020 at Lexington Kentucky.

2015 PSU TRIAL DATA

VARIETY	2014 YIELD	2015 YIELD
DEVOUR	**8.54**	**5.43**
OLATHE	8.46	5.43
PAWNEE	8.47	5.37
EXTEND	8.53	5.22
PENNLATE	8.41	5.22
BOUNTY	8.65	4.82
INAVALE	8.63	4.74
MEAN	8.52	5.22
LSD VALUE	ns	0.8

2013 Penn State University Cool-Season Grass Variety Trial. Rock Springs, Centre County, Russell E. Larson Agricultural Research Center.



PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 15-20 lbs/acre. Proper seed bed preparation is essential. A soil sample will identify necessary inputs to achieve proper pH, P, K and other macronutrient levels (extension service or agronomy supplier can advise). Use of a non-selective herbicide will reduce weed competition; spray per label recommendation when crop is mature enough. No-till seeding is generally very effective. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

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TETRASWEET
Perennial Ryegrass

tetra sweet
FORAGE TETRAPLOID PERENNIAL RYEGRASS

- LATE-MATURING
- HIGHLY-DIGESTIBLE
- EXCEPTIONAL YIELD ALL SEASON LONG
- EXCELLENT WINTER HARDINESS
- HIGH ENERGY GRASS
- STRONG REGROWTH
- FOLIAR DISEASE RESISTANT

THE HIGH-ENERGY FORAGE

Tetrasweet is a highly-adaptable, fast establishing, tetraploid perennial ryegrass. Tetrasweet tillers extensively and recovers rapidly making it an excellent choice for all types of forage production. Tetrasweet is very disease tolerant, late-maturing, with superb fiber digestibility, producing a versatile forage used in monoculture or in combo with other legumes or comparable cool-season grasses for grazing, hay, greenchop or silage. Tetrasweet has also shown the ability to persist and perform under tough heat and drought conditions that dampened production of other competitive perennial ryegrasses.

2019 UK TRIAL DATA

VARIETY	SEEDLING VIGOR	MATURITY MAY 2018	2017 YIELD	2018 YIELD	2019 YIELD	3-YEAR YIELD TOTAL
TETRASWEET	**4.78**	**51.8**	**4.16**	**2.10**	**1.30**	**7.56**
TETRAMAG	4.4	53.5	5.77	2.07	1.46	9.30
ELENA	4.0	53.0	5.14	1.67	1.19	8.00
REMINGTON	4.3	44.8	4.83	1.84	1.25	7.92
CALIBRA	4.0	53.0	4.31	1.54	1.29	7.14
PAYDAY	4.3	53.0	3.87	1.49	1.02	6.38
LINN	4.4	62.0	3.26	1.79	1.01	6.06
MELPETRA	3.1	39.0	3.93	1.21	0.88	6.03
LSD VALUE	0.9	3.7	1.11	0.58	0.45	1.55

University of Kentucky Forage Trial Sown September 7, 2016 at Lexington, KY.

2019 PSU TRIAL DATA

VARIETY	2019 YIELD	2018 YIELD	2-YEAR AVG YIELD	% STAND 10/29	CP	ADF	aNDF	NDFD30
TETRASWEET	**4.73**	**7.21**	**5.97**	**97**	**12.2**	**29.6**	**48.7**	**57**
TETRAMAG	5.27	8.03	6.65	95	14.2	26.7	44.7	58
REMINGTON	4.70	7.89	6.30	97	11.7	30.1	49.9	58
ELENA	4.94	7.46	6.20	94	13.9	27.7	45.2	57
KENTAUR	5.01	6.66	5.83	97	11.7	26.0	45.6	60
POLIM	4.39	6.82	5.60	95	14.5	23.8	41.6	62
QUARTERMASTER	4.58	6.53	5.56	96	12.9	27.8	46.0	56
BAREXTRA	4.86	6.13	5.50	86	12.6	25.6	44.0	55
GARBOR	4.81	6.10	5.46	96	11.6	26.6	46.3	57
DEXTER 1	5.11	5.73	5.42	98	12.9	26.2	45.5	60
MELPETRA	4.00	6.53	5.26	95	14.6	25.7	43.8	61
PREMIUM	3.39	5.44	4.41	97	13.8	26.5	44.8	60
LSD VALUE	0.85	0.34	0.44	0.29	1.00	0.51	0.62	5.37

PSU Forage Trial Sown August 22, 2017 at Rock Springs, PA.

PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 15-20 lbs/acre. Proper seed bed preparation is essential. No-till seeding is generally very effective. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

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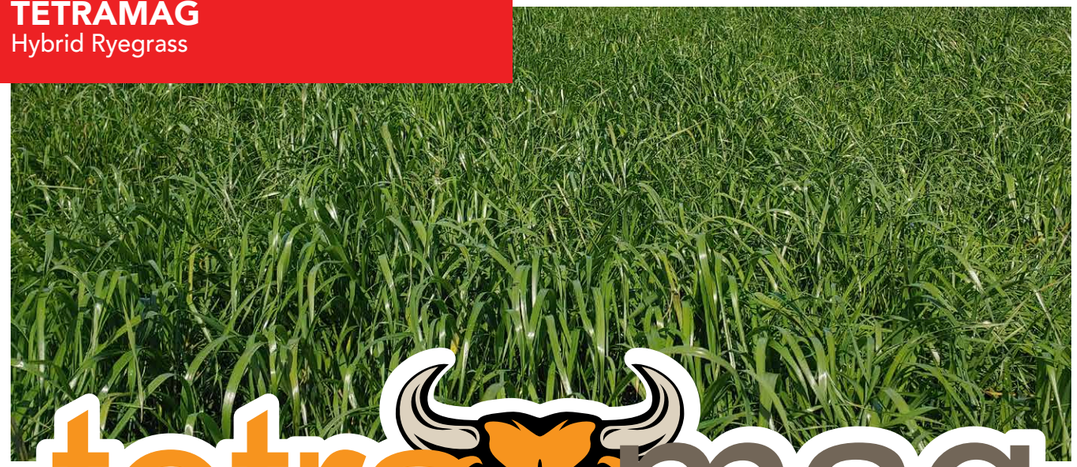
TETRAMAG
Hybrid Ryegrass



EXCEPTIONAL YIELD

20 TRIAL YEARS OF UNIVERSITY DATA – 17.4% HIGHER YIELD THAN THE AVERAGE TRIAL MEAN!

SUPERB FORAGE QUALITY

EXCELLENT SEEDLING VIGOR

PERSISTENT

COLD TOLERANT

A MAGNUM FORAGE YIELDER

Tetramag is a true dually-beneficial hybrid; carrying the superior forage yield and feed value of an Italian ryegrass with the persistence and durability of a perennial ryegrass in one, very impressive package. No matter the trial location, Tetramag is turning heads on overall yield, seedling vigor, establishment and regrowth. It really stands out in forage quality, especially on fiber digestibility compared to other competitive perennial ryegrasses. Whether you're considering a perennial ryegrass, or a shorter-term ryegrass as part of a grazing/haying operation, or extending an alfalfa or red clover stand, or in a pasture/hay mix, Tetramag needs to be a part of your plan.

2016 UK TRIAL DATA

VARIETY	2014 SEEDLING VIGOR	2015 YIELD	2016 YIELD	2-YEAR YIELD TOTAL
TETRAMAG	**4.6**	**5.45**	**3.76**	**9.21***
REMINGTON (NEA2)	3.8	4.60	3.46	8.05
GRAND DADDY	2.6	4.52	2.75	7.27
ALBION	2.3	4.40	2.72	7.13
POWER	4.0	4.09	2.72	6.81
REMINGTON	2.6	3.97	2.48	6.44
CALIBRA	4.3	3.59	2.30	5.89
BG34	3.8	3.44	2.28	5.73
LINN	3.5	3.49	2.14	5.63

University of Kentucky Forage Trial Sown September 5, 2014 at Lexington, Kentucky.

2019 PSU TRIAL DATA

VARIETY	2018 YIELD	2019 YIELD	2-YEAR YIELD TOTAL	CRUDE PROTEIN (%)	30-HR NDFD
TETRAMAG	**8.03**	**5.27**	**13.30**	**14.19**	**57.89**
REMINGTON	7.89	4.70	12.59	11.69	57.55
ELENA	7.46	4.94	12.40	13.91	57.30
KENTAUR	6.66	5.01	11.67	11.69	60.08
POLIM	6.82	4.39	11.21	14.47	61.53
QUARTERMASTER	6.53	4.58	11.11	12.92	56.29
GARBOR	6.10	4.81	10.91	11.57	57.45
DEXTER 1	5.73	5.11	10.84	12.91	60.32

Penn State University Forage Trial at Rock Springs, Pennsylvania.

PLANTING GUIDE

ESTABLISHMENT Tetramag readily establishes on loosened bare soil or in close cut harvested fields for interseeding or cover crop use. For typical new seeding applications apply at a rate of 25-35 lbs/acre and 5-10 lbs/acre into thinning alfalfa stands. Use a Brillion seeder, a no-till drill or broadcast followed by a culti-packer. Seed to soil contact is critical to successful germination and establishment. For highest quality hay harvest at first boot stage.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Control broadleaf weeds as necessary.

TETRAPRIME II
Italian Ryegrass

tetra prime II
TETRAPLOID ITALIAN RYEGRASS

- IMPROVED WINTER HARDINESS
- EXCELLENT DROUGHT TOLERANCE
- SUPERB FORAGE QUALITY
- SELECTED FOR GRAZING TOLERANCE
- HIGH FORAGE YIELD
- IMPRESSIVE VIGOR & DISEASE TOLERANCE

IMPROVED YEAR-ROUND PERFORMANCE

Tetraprime II Italian ryegrass is a tetraploid having four sets of chromosomes. Between certified production and ploidy testing every lot we can ensure the genetic purity. Tetraprime II has the same forage quality and winter hardiness as the original Tetraprime with significantly greater forage yields and seedling vigor. Italian ryegrass is a native of Southern Europe and is not a true annual. Italian ryegrasses provide high yields of quality forage and show quick regrowth. If planted in the spring little or no seedheads will grow that summer (vernalization is required). Spring planting of Italian ryegrass is common in northern states for summer grazing, green chop or silage. Italian ryegrass can also be planted in late summer or early fall like true annual ryegrass or Westerwold types. The Italian ryegrass advantage is the extended forage production season of a month or more into the summer.

FORAGE TRIAL DATA

VARIETY	SEEDLING VIGOR	YIELD (TONS/ACRE) DEC 2021	APR 2022	MAY 2022	JUN 2022	TOTAL
TETRAPRIME II	**4.5**	**0.81**	**1.70**	**1.16**	**0.87**	**4.53**
TETRAPRIME	3.5	0.49	1.32	1.14	0.84	3.79
JACKSON	3.8	0.64	1.55	1.02	0.93	4.14
DEXTER	4.4	0.65	1.46	1.06	1.06	4.24
FEAST II	4.1	0.62	0.71	0.98	0.87	3.17
GULF	5.0	0.80	0.63	0.91	0.79	3.13
LSD VALUE	0.6	0.21	0.33	0.16	0.23	0.70

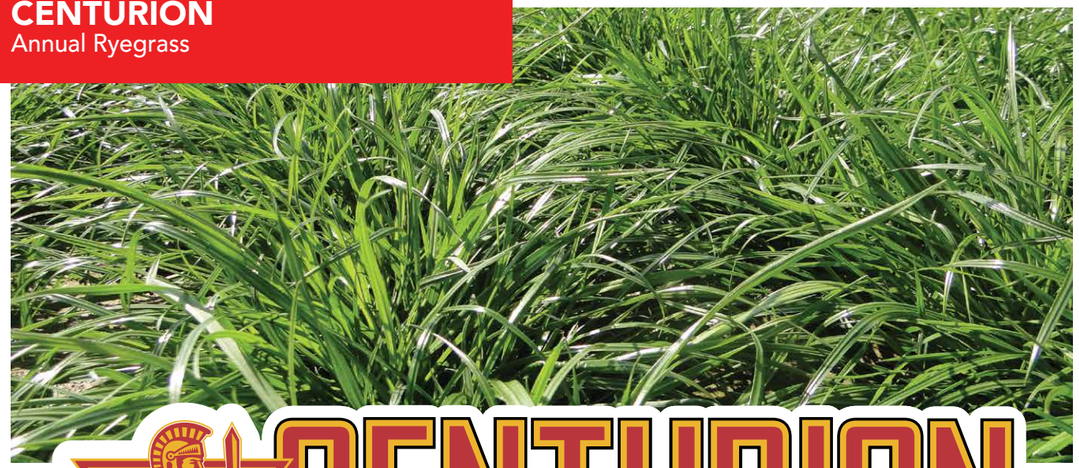
Sown September 10, 2021 at Lexington, Kentucky; Vigor score 1-5 with 5 being most vigorous

PLANTING GUIDE

ESTABLISHMENT Tetraprime II readily establishes on loosened bare soil or in close cut harvested fields for interseeding or cover crop use. For typical new seeding applications apply at a rate of 25-35 lbs/acre and 5-10 lbs/acre into thinning alfalfa stands. Use a Brillion seeder, a no-till drill or broadcast followed by a culti-packer. Seed to soil contact is critical to successful germination and establishment. For highest quality hay harvest at first boot stage.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Control broadleaf weeds as necessary.

CENTURION
Annual Ryegrass



- PROVEN WINTER HARDINESS
- FORAGE YIELD LEADER
- SUPERIOR DISEASE RESISTANCE
- SELECTED FOR COVER CROP USE
- SUPERB FORAGE QUALITY
- DEEP ROOTS
- QUICK AND VIGOROUS ESTABLISHER

THE WINTERHARDY ANNUAL RYEGRASS LEADER

Centurion is an ideal choice for dairies, beef, and hay operations that need an annual ryegrass that can perform in multiples roles, as well as for growers looking for a strong cover crop. Centurion sets the bar in university testing across the U.S. with a 109% average of the trial means in 15 locations and 29 trials over 8 years versus competing varieties. Centurion establishes quickly, outcompeting and suppressing weeds, capturing residual nitrogen and helping build organic matter. A proven winterhardy annual with agronomic traits that growers trust for forage or cover crop.

2015 PSU TRIAL DATA

VARIETY	DM T/A TOTAL	CP%	CP/A (LBS.)	NDF%	NDFD30
CENTURION	**5.06**	**12.5**	**1265**	**55.7**	**77**
MARSHALL	4.30	12.6	1085	54.8	73
JACKSON	4.21	13.4	1129	56.9	72
BARMULTRA II	3.83	14.7	1126	49.2	73
NELSON	3.80	14.1	1073	52.9	72
MEAN*	4.01	13.5	1079	53.9	73

2015 Penn State University Forage Trial. *Mean of all 10 Trial Entries.

2014 UK TRIAL DATA

VARIETY	DM T/A TOTAL	% OF MEAN	WINTER INJURY
CENTURION	**3.74**	**150**	**0.5**
WINTERHAWK	3.39	136	1.5
MARSHALL	2.84	114	0.5
JACKSON	2.84	114	1.0
GULF	1.95	78	6.3
MEAN*	2.49	-	2.8

2014 University of Kentucky, Lexington Forage Trial.
*Mean of all 29 Trial Entries.

2011 MSU TRIAL DATA

VARIETY	TOTAL YIELD	% OF MEAN
CENTURION	**3.86**	**123**
MARSHALL	3.8	121
WINTERHAWK	3.37	107
LONESTAR	3.36	107
JACKSON	2.72	87
MEAN*	3.14	-

2011 Mississippi State University Forage Trial. Poplarville, MS. *Mean of all 36 Trial Entries.

2019 MISS STATE UNIVERSITY COVER CROP SUMMARY

		MARCH 15			APRIL 15		
VARIETY	ENTRIES	WEED SUPPRESSION	TOTAL N AVAILABILITY	DM YIELD LBS/ACRE	WEED SUPPRESSION	TOTAL N AVAILABILITY	DM YIELD LBS/ACRE
CENTURION	-	**10**	**44**	**1,400**	**10**	**65**	**4,266**
AERIFI RADISH	-	8	37	1,532	8	53	2,363
JACKPOT TURNIP	-	9	33	977	8	74	2,766
VIVANT BRASSICA	-	8	48	1,033	6	56	1,727
ANNUAL RYEGRASS	2	9	44	1,027	10	59	3,457
RADISH	4	7	32	1,125	8	47	2,371
TURNIP	1	8	41	1,005	7	65	2,245
CEREAL RYE	6	9	36	2,354	10	8	4,856

PLANTING GUIDE

ESTABLISHMENT Centurion readily establishes on loosened bare soil or in close-cut harvested fields. For typical new seeding, plant at a rate of 30-35 lbs/acre. For overseeding and cover crop use seed at a rate of 25-35 lbs/acre for pastures. Use a Brillion seeder, a no-till drill, or broadcast followed by a cultipacker. Seed to soil contact is critical to successful germination and establishment. For highest hay quality harvest at initial boot stage.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Control broadleaf weeds as necessary.

RANAHAN
Tetraploid Ryegrass

RANAHAN
TETRAPLOID ANNUAL RYEGRASS

FULL SEASON PRODUCTION

LATE MATURITY

EXCELLENT YIELDS

DISEASE RESISTANT

GUARANTEED TETRAPLOID

A FORAGE AS IMPORTANT AS YOUR TOP RANCH HAND

Ranahan is an ideal choice for beef and dairy cattle providing season long production. The higher intake and more digestible fiber of tetraploid ryegrass can mean greater animal performance. Ranahan, with its erect growth, is suitable for green chop, baleage, silage or hay. Late maturity or delayed heading allows for extended grazing for a greater harvest window. The more open sward of a tetraploid ryegrass allows for more diversity of plant species which contribute to soil health, nitrogen fixation, and rumen fill. Ranahan was developed by utilizing the highest-yielding and disease resistant Southern ryegrass cultivars crossed with Peak Plant Genetics private plant collection.

QUALITY ASSURANCE: To ensure the highest level of quality, every 55,000 lb. lot of Ranahan is tested for mechanical purity, germination and ploidy levels.

LSU & MSU TRIAL DATA

	2019 FORAGE YIELD AT LSU LOCATIONS				2018 FORAGE YIELD AT MSU LOCATIONS				
VARIETY	FRANKLINTON	JEANERETTE	WINNSBORO	MEAN	HOLLY SPRINGS	STARKVILLE	NEWTON	POPLARVILLE	MEAN
RANAHAN	**10,898**	**4,235**	**5,267**	**6,800**	**5,305**	**6,922**	**6,098**	**6,277**	**6,150**
NELSON	10,460	3,904	5,641	6,668	3,611	6,002	6,231	7,864	5,927
BIG BOSS	10,588	3,924	5,692	6,735	5,680	6,771	5,812	6,031	6,074
TAMTBO	12,299	3,879	4,891	7,023	5,666	4,855	6,033	7,095	5,912
TETRASTAR	9,388	3,874	5,409	6,224	5,389	5,584	5,605	6,915	5,873

2019 Louisiana State University and 2018 Mississippi State University Forage Trial. Yield from Multiple Locations. Lbs/Acre.

2020 TEXAS A&M TRIAL DATA

VARIETY	FEB 25 LBS DM/ACRE	MAR 26 LBS DM/ACRE	MAY 11 LBS DM/ACRE	TOTAL LBS DM/ACRE
RANAHAN	**2,230**	**2,839**	**1,815**	**6,884**
TAMTBO	2,073	2,847	1,496	6,417
MAXIMUS	1,995	2,929	1,487	6,411
NELSON	1,838	3,097	1,392	6,327
PRINE	1,905	2,589	1,722	6,217
WAX MARSHALL	1,699	2,789	1,241	5,730
JUMBO	1,322	2,723	1,626	5,672
GULF	1,650	2,737	1,238.	5,626
JACKSON	1,722	2,775	1,052	5,550
PASSEREL PLUS	1,812	2,641	1,015	5,469

2019-2020 Texas A&M Forage Yield Trial.

PLANTING GUIDE

ESTABLISHMENT Ranahan readily establishes on loosened bare soil or in close-cut harvested fields. For typical new seeding, applications apply at a rate of 40-45 lbs/acre. For overseeding and cover crop use seed at a rate of 25-35 lbs/acre for pastures and 3-5 lbs/acre into thinning alfalfa stands. Use a Brillion seeder, a no-till drill, or broadcast followed by a cultipacker. Seed to soil contact is critical to successful germination and establishment. For highest hay quality harvest at initial boot stage.

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MVS 4220Q
Alfalfa

HIGH-YIELDING AND HIGH-QUALITY

FALL DORMANCY: 4

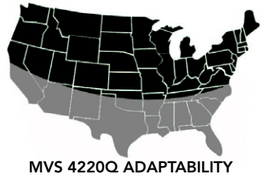
WINTER HARDINESS: 2

DISEASE RESISTANCE INDEX (DRI): 35/35

HIGHLY RESISTANT (HR) TO STEM NEMATODE

THE NEXT STEP IN ALFALFA DEVELOPMENT

Bred for maximum performance thanks to its high yield, persistence and quality, our new proprietary alfalfa variety, MVS 4220Q promises to be a major improvement for growers across the country. MVS 4220Q is an FD4 variety that packs a big punch against alfalfa diseases with a DRI of 35/35, backed by high resistance (HR) to stem nematode and spotted alfalfa aphid, as well as resistance (R) to pea aphid. MVS 4220Q is a variety built to excel in a wide range of environments, geographies, and management systems.



MVS 4220Q ADAPTABILITY

AGRONOMIC & PEST RESISTANCE TRAITS

Fall Dormancy	4	Phytopthora Root Rot	HR
Winter Hardiness	2	Aphanomyces Root Rot (Race 1)	HR
Disease Resistance Index	35/35	Aphanomyces Root Rot (Race 2)	HR
Anthracnose	HR	Pea Aphid	R
Bacterial Wilt	HR	Spotted Alfalfa Aphid	HR
Fusarium Wilt	HR	Stem Nematode	HR
Verticillium Wilt	HR		

COMPETITOR	PLATFORM	MVS 4220Q YIELD % CHECK	COMPETITOR YIELD % CHECK	ADV %	LOCATIONS
AFX 457	ALFOREX SEEDS	104.7	89.8	15.0	2
REBOUND 6.0	CROPLAN	104.7	95.5	9.2	2
55V12	PIONEER	106.5	97.4	9.1	6
HI-GEST 360	DAIRYLAND	104.7	97.2	7.5	2
54Q14	PIONEER	103.7	98.2	5.5	16
GRANDSTAND II	DYNA-GRO	104.7	99.6	5.1	2
WL 363HQ	W-L RESEARCH	103.7	99.4	4.3	16
HYBRIFORCE-3400	DAIRYLAND	103.6	99.8	3.8	14
WL 354HQ	W-L RESEARCH	103.7	100.0	3.7	16
LEGENDAIRY XHD	CROPLAN	104.7	101.4	3.3	2
FSG 524	ALLIED SEED	104.7	102.0	2.7	2
55Q28	PIONEER	103.7	101.2	2.6	16
HYBRIFORCE-3420WET	DAIRYLAND	104.7	102.3	2.4	2
LIGHTNING BOLT	PREFERRED SEED	104.7	102.8	1.9	2
54Q29	PIONEER	104.7	104.2	0.5	2
AFX 579	ALFOREX SEEDS	104.7	104.4	0.3	2
54VQ52	PIONEER	103.7	103.5	0.3	16
55V50	PIONEER	104.5	104.2	0.3	22
REBOUND 6.0XT	CROPLAN	104.7	105.5	-0.8	2
PGI 529	ALFOREX SEEDS	103.6	104.8	-1.2	14
55Q27	PIONEER	104.4	105.8	-1.3	20
FSG 426	ALLIED SEED	104.7	107.2	-2.5	2
AFX 469	ALFOREX SEEDS	104.7	108.3	-3.6	2

PLANTING GUIDE

- Alfalfa is a very "foundational" crop; start with adequate fertility levels; pH 6.7-7.0; p ≥ 50 lbs/acre; K ≥ 220-250 lbs/acre
- Plant into well-drained soil type, firm seedbed, seeding depth 0.25"
- Planting rate, regardless of nurse or campanion crop is 17-22 lbs/acre; if broadcast or no-till seeded, consider increasing seeding rate 10-20%
- Keep nurse crop < 1 bu; companion crop < 2 lbs
- Imperative to plant into moist soils where irrigation not available, not in dry soils anticipating rainfall
- GOAL: maximum amount of alfalfa seedlings per sq ft (20-30 plants per sq ft in seeding seed)

MAJESTIC
Alfalfa

EXCEPTIONALLY HIGH FORAGE YIELD

OUTSTANDING FORAGE QUALITY

SUNKEN CROWN
Shown in Image 1
Improves winter survival
Reduces traffic injury to crown and stem buds

BRANCH ROOT TRAIT
Shown in Image 2
Advantage in problem soil: high water table, hard pan or plow pan, heavy soils that don't drain well
Resistance to "frost heaving"

THE NEXT STEP IN ALFALFA DEVELOPMENT

Majestic makes the Mountain View Seeds' A-TEAM! It is a high forage yielding and very high forage quality alfalfa variety. It expresses branch root trait to be productive in areas of hard pan and high water table. Its sunken crown reduces traffic injury to the crown and stem buds while improving winter survival. Majestic is protected by a broad base of disease resistance with high resistance to Aphanomyces Races 1 and 2.

IMAGE 1

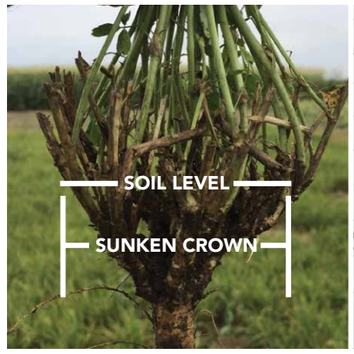


IMAGE 2

HEAD-TO-HEAD FORAGE YIELD SUMMARY

VARIETY	S CENTRAL WI	N CENTRAL WI-1	N CENTRAL WI-2	SOUTHWEST WI	TOTAL TONS	% ADV	EXTRA TONS/YR	PER YR X $200/TON
MAJESTIC	**-**	**-**	**7.34**	**7.89**	**15.23**	**105.69**	**0.41**	**$82.00**
54Q14	-	-	6.72	7.69	14.41			
MAJESTIC	**8.46**	**9.26**	**7.34**	**7.89**	**32.95**	**103.71**	**0.29**	**$59.00**
REBOUND AA	8.12	9.01	7.05	7.59	31.77			
MAJESTIC	**8.46**	**9.26**	**16.21***	**-**	**33.93**	**103.04**	**0.25**	**$50.00**
AFX 460	8.44	8.87	15.62*	-	32.93			
MAJESTIC	**8.46**	**9.26**	**7.34**	**7.89**	**32.95**	**103.52**	**0.28**	**$56.00**
HYBRIFORCE 4400	8.12	8.99	7.09	7.63	31.83			
MAJESTIC	**8.46**	**9.26**	**7.34**	**7.89**	**32.95**	**109.91**	**0.74**	**$148.50**
MEGATRON HARVXTRA	7.70	8.62	6.55	7.11	29.98			

*2-Year Yield Total

AGRONOMIC & PEST RESISTANCE TRAITS

Bacterial Wilt	HR	Aphanomyces Root Rot (Race 1)	HR
Fusarium Wilt	HR	Aphanomyces Root Rot (Race 2)	HR
Verticillium Wilt	HR	Fall Dormancy	3.9
Anthracnose Race 1	HR	Winter Survival Index Rating	1.5
Anthracnose Race 5 (New)	HR	Recovery After Cutter	Good
Phytophthora Root Rot	HR	Forage Yield Potential	Excellent
Disease Resistance Index	40/40	Forage Quality	Excellent
Salt Tolerance (Germ)	T	Root	Branch/Tap
Traffic Tolerance	T	Crown	Sunken

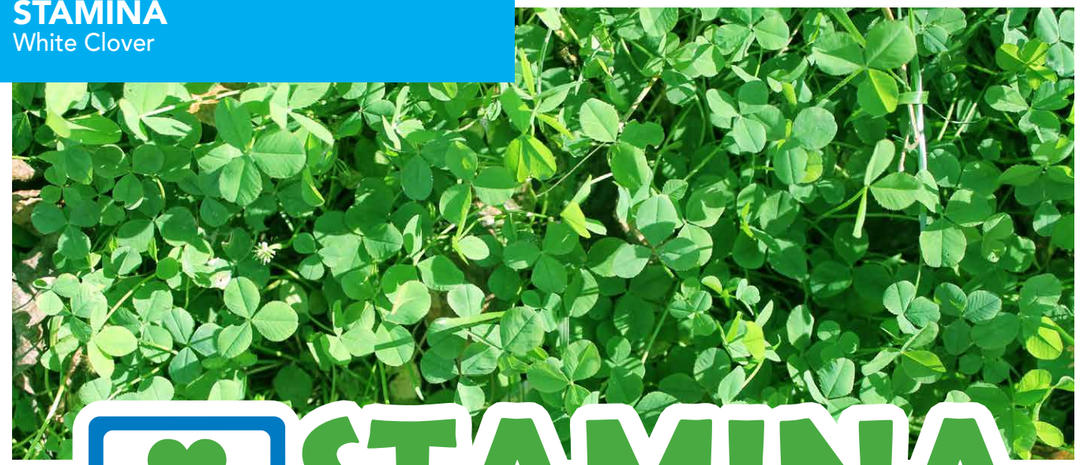
THE A-TEAM
Alfalfa with Tolerance Evolved Abiotic Mitigation

These varieties are the result of conventional breeding and selection (meaning non-modified) for additional stress tolerance in a changing climate.

PLANTING GUIDE

- Alfalfa is a very "foundational" crop; start with adequate fertility levels; pH 6.7-7.0; p ≥ 50 lbs/acre; K ≥ 220-250 lbs/acre
- Plant into well-drained soil type, firm seedbed, seeding depth 0.25"
- Planting rate, regardless of nurse or companion crop is 17-22 lbs/acre; if broadcast or no-till seeded, consider increasing seeding rate 10-20%
- Keep nurse crop < 1 bu; companion crop < 2 lbs
- Imperative to plant into moist soils where irrigation not available, not in dry soils anticipating rainfall
- GOAL: maximum amount of alfalfa seedlings per sq ft (20-30 plants per sq ft in seeding seed)

STAMINA
White Clover



- INTERMEDIATE TYPE
- HIGH-YIELDING
- EXCELLENT PERSISTENCE
- AGGRESSIVE GROWTH PATTERN AND STOLON DENSITY
- USE IN GRAZING SYSTEMS, WILDLIFE HABITAT OR EROSION CONTROL

A LONG-LASTING, HIGH YIELDING CLOVER

Stamina White clover is a new intermediate-type selected for higher forage yield and persistence under extreme grazing pressure. As an intermediate, Stamina's aggressive growth pattern has high stolon density and rooting, allowing it to persist well under hoof and grazing pressure. In yield and persistence testing across Midwest, Northeast and Mid-South universities, Stamina has firmly established itself as an elite high-yield, very persistent, durable white clover. Choose Stamina if you want a white clover for the long haul.

2018 UK GRAZING TRIAL DATA

VARIETY	PERCENT STAND NOV 3 2014	APR 6 2015	OCT 30 2015	MAR 24 2016	OCT 17 2016	MAR 22 2017	OCT 19 2017	MAR 20 2018	SEP 26 2018
STAMINA	**72**	**88**	**88**	**89**	**68**	**45**	**66**	**58**	**65**
DURANA	83	91	91	86	69	48	64	59	65
PATRIOT	87	93	93	90	78	53	62	53	55
ALICE	91	92	92	85	53	35	53	47	52
LSD VALUE	9	8	8	10	16	17	16	17	13

University of Kentucky Forage Trial Planted September 9, 2014 at Lexington, Kentucky.

2018 MSU YIELD TRIAL DATA

VARIETY	2018 YIELD ALL LOCATIONS	2018 % OF YIELD MEAN
STAMINA	**4.34**	**110**
RENOVATION	4.17	106
COMPANION	4.01	102
REDHAWK	3.92	100
ROMANO	3.78	96
COBRA	3.67	93
RAMPART	3.65	93

Mississippi State University Forage Trial Planted October 17 2017 at Holly Springs, Newton and Starkville, Mississippi

2019 PSU YIELD TRIAL DATA

VARIETY	2 YEAR AVERAGE	% OF MEAN
STAMINA	**3.18**	**108**
SCLO-16KA	2.90	104
LEGACY	2.68	97
RENOVATION	2.40	95

Penn State University Forage Trial Planted August 15, 2017 at Rock Springs, Pennsylvania.

PLANTING GUIDE

ESTABLISHMENT The standard seeding rate is 2-5 lbs/acre. For pasture establishment, seeds are drilled into a well-prepared seedbed that has been plowed, harrowed, and compacted to produce a firm seedbed. Stamina White Clover can also be established successfully by no-tilling or broadcast while grasses are not rapidly growing. Avoid overapplying nitrogen during establishment of Stamina White Clover. The seeds are inoculated before seeding. The proper time of seeding is determined by seasonal and moisture conditions. This may vary from April to May. Late summer and fall seedings should be conducted while adequate moisture is still in the soil to assure establishment before freezing.

MANAGEMENT Management for forage is aimed at maintaining 20% to 30% clover. Close grazing (2 inch stubble height) favors clover, whereas light grazing favors grass. Well-fertilized grass will outgrow clover in fall and winter and could smother the clover. Spring applications of nitrogen will stimulate grass and provide early feed, but excessive rates are detrimental to the clover stand. Maintaining proper potassium and phosphate levels per soil test greatly benefit clovers in grass.

BLAZE
Red Clover

HIGH-YIELDING

EXCELLENT PERSISTENCE

IMPROVED RESISTANCE TO ANTHRACNOSE, POWDERY MILDEW AND BLACK PATCH

FOR USE IN BEEF, DAIRY OR HAY OPERATIONS

THE HOTTEST RED CLOVER ON THE MARKET!

Blaze Red Clover is a multi-purpose red clover that is suitable for hay, grazing, cover crops and pollinators. Blaze Red Clover is widely-adapted from the Upper Midwest and throughout the Transition Zone. Studies have shown that the addition of red clovers, like Blaze Red Clover, can significantly improve animal health and growth rate while fixing nitrogen and creating healthier soils. Blaze Red Clover is coated and preinoculated for planting ease. It can be easily frost seeded with a broadcast seeder or drilled at the same depth as cool season grasses.

2019 UNIV. OF WISC. YIELD TRIAL DATA

VARIETY	1 YEAR TOTAL	% OF TRIAL MEAN
BLAZE	**1.74**	**109.7**
RUBY RED	1.66	104.5
MARATHON	1.65	104.2
BAR TP 11	1.61	101.5
FREEDOM MR	1.60	100.9
BAR TP 9	1.52	96.2
LSD	0.37	-

2019 University Of Wisconsin Forage Trial, Prairie Du Sac, WI.

2019 PSU YIELD TRIAL DATA

VARIETY	CUT 1 JUL 11	CUT 2 AUG 20	2019 TOTAL	% OF TRIAL MEAN
BLAZE	**2.50**	**1.26**	**3.76**	**107**
FREEDOM MR	2.53	1.15	3.69	105
BAR TP 9	2.41	1.03	3.43	98
BAR TP 11	2.30	1.08	3.38	97
FREEDOM!	2.20	1.03	3.23	92

2019 Penn State Clover Trial, Rock Springs, PA.

2017 FFR META ANALYSIS

	YIELD		% STAND		BLACK PATCH RESISTANCE[5]	
VARIETY	KY[1] 2-YR TOTAL	IN[2] 2-YR TOTAL	IN[3] 4TH YR	VA[4] 3RD YR	IN 2010	IN 2011
BLAZE	**8.34**	**7.51**	**30.0**	**86.7**	**3.3**	**1.3**
ARLINGTON	6.59	3.72	1.0	26.7	9.0	7.0
FREEDOM	8.07	6.48	15.0	78.3	5.7	3.7
KENLAND	7.38	5.96	25.0	26.7	5.7	4.3
MARATHON	6.72	5.61	18.3	30.0	6.3	4.0

FFR June 2017 Report. [1]Franklin, KY, [2]Otterbein, IN, [3]Buck Creek, IN, [4]Harrisonburg, VA. [5]Rating: 1 = < 10% Infection; 9 = > 90%

PLANTING GUIDE

ESTABLISHMENT Seeding rates are 6-8 lbs/acre with companion grasses or 10-12 lbs/acre as a stand-alone crop. Blaze Red Clover can also be established successfully by no-tilling or broadcast while grasses aren't rapidly growing. Avoid overapplying nitrogen during establishment of Blaze Red Clover. Blaze Red Clover is preinoculated for seeding. The proper time of seeding is determined by seasonal and moisture conditions. This may vary from late winter to May. Late summer and fall seedings should be planted with adequate moisture to assure establishment before freezing.

MANAGEMENT Management for forage is aimed at maintaining 20% to 30% clover. High nitrogen applications (>50-60 lbs N per acre) of cool-season grass will outgrow clover in fall and winter and could smother the clover. Spring applications of nitrogen will stimulate grass and provide early feed, but excessive rates are detrimental to the clover stand. Maintaining proper pH, potassium, and phosphate levels with a soil test greatly benefit clovers in grass.

AERIFI
Certified Radish

AERIFI RADISH

- VERY LATE MATURING
- LONGER TAP ROOT
- GUARANTEED GENETIC PURITY
- INCREASE SOIL FERTILITY
- IMPROVE SOIL QUALITY
- WEED SUPPRESSION
- REDUCE WATER RUNOFF

CERTIFIED FOR PREDICTABLE RESULTS

Aerifi Radish is a leading forage and cover crop variety in the brassica category, and is certified, guaranteeing that the seed you plant will produce the crop that you paid for. Aerifi is bred for uniform growth, fast establishment and late maturity, and usually flowers 3-4 day later than competitive varieties. Aerifi's late maturity delivers an extra long tap root, which in two years of testing has been shown to be more than 2x longer than the leading competitors brand. This deeper growth allows Aerifi to scavenge lost nutrients deep in the soil profile, and when decomposing, reclaimed nutrients are released back into the topsoil, becoming available for the next crop.

Aerifi is quick to germinate and establish, outpacing weeds with rapid canopy, but also grows well with comparable brassicas, small grains or annual ryegrass. Aerifi's quick growth certainly allows a better shot at establishment before temperatures drop and kill less vigorous varieties. Whether you utilize brassicas for forage or cover crop, Aerifi needs to be part of your plan.

INCREASE CROP PRODUCTION

One of the primary uses of cover crops is to increase soil fertility. These types of cover crops are referred to as "green manure," used to manage a range of soil macronutrients and micronutrients. Of the various nutrients, the impact that cover crops have on nitrogen management has received the most attention, because it is often the most limiting nutrient in crop production.

Often, green manure crops are grown for a specific period, and then plowed under before reaching full maturity in order to improve soil fertility and quality. These crops are commonly legumes, as they are typically high in nitrogen and can often provide the required quantity for increased crop production. This quality of cover crops is called fertilizer replacement value.

ADD VITAL ORGANIC MATTER

Cover crops can also improve soil quality by increasing soil organic matter levels through the input of cover crop biomass over time. This enhances soil structure, as well as the water and nutrient holding and buffering capacity of soil. The principal factors of soil quality are soil salination, pH, microorganism balance and the prevention of soil contamination.

CROWD OUT COMPETITION

Thick cover crop stands often compete well with weeds during the growth period, and can prevent most germinated weed seeds from completing their life cycle and reproducing. If the cover crop is left on the soil surface rather than incorporated into the soil after its growth is terminated, it can form a nearly impenetrable mat. This drastically reduces light transmittance to weed seeds.

In a recent study released by the Agricultural Research Service (ARS) scientists examined how rye seeding rates and planting patterns affected cover crop production. The results show that planting more pounds per acre of rye increased the cover crop's production as well as decreased the amount of weeds. The same was true when scientists tested seeding rates on legumes and oats; a higher density of seeds planted per acre decreased the amount of weeds and increased the yield of legume and oat production.

STOP SOIL EROSION, BETTER UTILIZE WATER

By reducing soil erosion, cover crops often also reduce both the rate and quantity of water that drains off the field. Cover crop biomass acts as a physical barrier between rainfall and the soil surface, allowing raindrops to steadily trickle down through the soil profile. In addition increasing the biomass of the soil helps to retain this moisture.

Just before cover crops are killed they contain a large amount of moisture. When the cover crop is incorporated into the soil, or left on the soil surface, it often increases soil moisture. On farms where water for crop production is in short supply, cover crops can be used as a mulch to conserve water by shading and cooling the soil surface. This reduces evaporation of soil moisture.

UTILIZE LOST NUTRIENTS

Cover Crops are an ideal way to re-capture lost nutrients. Nutrients are often carried down the soil profile never to be utilized. Cover crops can tap into those lost nutrients and bring them to the suffer. Choose species with long root systems.

COVER CROP DATA

Aerifi's ability to hold down weeds, sequester nitrogen, and yield whether utilized early or late season compared to other brassicas make it a go-to product.

AERIFI % OF TRIAL MEAN	MARCH	APRIL
WEED SUPPRESSION	115	100
TOTAL N AVAILABLE	116	113
DM YIELD LBS/AC	136	100

2019 Mississippi State University Cover Crop Trial

2019 MISS STATE UNIVERSITY COVER CROP SUMMARY

		MARCH 15			APRIL 15		
VARIETY	ENTRIES	WEED SUPPRESSION	TOTAL N AVAILABILITY	DM YIELD LBS/ACRE	WEED SUPPRESSION	TOTAL N AVAILABILITY	DM YIELD LBS/ACRE
AERIFI RADISH	-	**8**	**37**	**1,532**	**8**	**53**	**2,363**
CENTURION	-	10	44	1,400	10	65	4,266
JACKPOT TURNIP	-	9	33	977	8	74	2,766
VIVANT BRASSICA	-	8	48	1,033	6	56	1,727
ANNUAL RYEGRASS	2	9	44	1,027	10	59	3,457
RADISH	4	7	32	1,125	8	47	2,371
TURNIP	1	8	41	1,005	7	65	2,245
CEREAL RYE	6	9	36	2,354	10	8	4,856

JACKPOT
Forage Turnip

LOWER-GROWING BULB

IDEAL FOR GRAZING AND COVER CROP

EXCELLENT REGROWTH AFTER GRAZING

HIGH FORAGE YIELD

EXCELLENT PALATABILITY

WINTER HARDINESS

GRAZING AND COVER CROP TURNIP

Jackpot is a new erect-growing forage turnip with multiple crowns and a firmly anchored round bulb suitable for grazing and cover crops. The Jackpot bulb doesn't protrude out of the soil as much as other types, allowing it to regrow and reduce hoof damage. In addition, Jackpot has excellent palatability and digestibility which increases intake and animal performance. Maturity is within 60-90 days of germination with optimum regrowth within 30 days for rotational grazing. Jackpot is also an excellent nitrogen scavenger making it ideal

APPLICATION

Jackpot has broad adaptation and can be used for all classes of livestock, including dairy, beef and sheep. Jackpot can extend the grazing season when cool season pastures slow down in summer and late fall. Jackpot re-grows along with other summer annual grasses for multiple grazings. Plant Jackpot with cereal grains or annual ryegrass in the spring or late-summer to provide excellent tonnage and high quality forage to this mix. Jackpot can also be used as a break-crop in order to renovate older pastures to different species and newer varieties. An annual crop gives a bigger window to eliminate the old undesirable forage through the use of herbicides and tillage.

With the potential to yield 10,000 lbs of dry matter per acre over multiple grazings, Jackpot has very good productivity and shows excellent plant persistence after multiple grazings. It is a fast establishing variety which gives high quality feed, ready for grazing within 42-70 days of sowing.

MANAGEMENT

Allow at least 35-40 days before initial grazing of Jackpot and then expect to re-graze in 25-30 day intervals. Graze no lower than 4 inches if for multiple grazings. Overgrazing can damage the crown and should be avoided. To maximize regrowth potential, graze before the plant bolts. For best results, soil pH should be at least 5.6 and ideally between 5.8 and 6.2. Apply at least between 35-55 lbs of phosphate per acre at planting and a light application of nitrogen after grazing. However, its recommend to avoid high nitration levels in order to reduce nitrate issues in the crop. For best results, retain a soil sample analysis and adjust soils accordingly.

SEEDING RATES

Avoid sowing seeds too deep and too far apart. Ideal depth for most forage seeds is ⅛-¼ inch. Planting seeds deeper than ¼ inch may not allow them to establish. Sufficient seed-to-soil contact is extremely vital. Rolling or packing the soil after seeding can ensure this. If no-tilling, the right seeding depth is ¼ inch deep. Jackpot can be broadcast seeded followed by harrowing, packing or livestock hoofing it in. Jackpot may be aerial seeded in late summer for fall/winter grazing.

Direct Drilling: 3-5 lbs/acre

Broadcasting: 4-6 lbs/acre

Seeding with other species: 2-3 lbs/acre

COVER CROP DATA

The chart below indicates Jackpot's ability to supress weeds mid and late-season. Additionally, Jackpot's late-maturity allows it to scavenge N and yield more, when compared to other well-known turnip varieties. These traits combine to make Jackpot a true multi-purpose turnip.

JACKPOT % OF TRIAL MEAN	MARCH	APRIL
WEED SUPPRESSION	125	103
TOTAL N AVAILABLE	94	139
DM YIELD LBS/AC	90	119

2019 Mississippi State University Cover Crop Trial

2019 MISS STATE UNIVERSITY COVER CROP SUMMARY

		MARCH 15			APRIL 15		
VARIETY	ENTRIES	WEED SUPPRESSION	TOTAL N AVAILABILITY	DM YIELD LBS/ACRE	WEED SUPPRESSION	TOTAL N AVAILABILITY	DM YIELD LBS/ACRE
JACKPOT TURNIP	-	**9**	**33**	**977**	**8**	**74**	**2,766**
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ANNUAL RYEGRASS	2	9	44	1,027	10	59	3,457
RADISH	4	7	32	1,125	8	47	2,371
TURNIP	1	8	41	1,005	7	65	2,245
CEREAL RYE	6	9	36	2,354	10	8	4,856

TWISTER
Hybrid Brassica

- HIGHLY PALATABLE
- FAST ESTABLISHING
- EXCELLENT PRODUCTION
- BIOLOGICALLY BENEFICAL
- RAPID BREAKDOWN

DEVELOPED FOR FORAGE AND COVER CROPS

Twister is the latest brassica release from Peak Plant Genetics, the breeders of Aerifi radish and Jackpot turnips. Twister is a hybrid rape x turnip cross species developed for forage and cover crops. These hybrid plants produce a highly palatable green top which is why they are often referred to as a leafy turnip. When used for forage they work excellent in grazing mixes with winter annual small grains or spring planted oats and Italian ryegrass. Twister can also be combined with other brassica species providing earlier forage than turnips or radishes. Twister is a great addition in wildlife food plots, whitetail deer prefer them earlier in the season since they don't require a hard freeze. In cover crop mixtures Twister can be planted fall, spring and summer providing diversity and nutrient scavenging. Twister residue will break down rapidly once terminated.

MANAGEMENT

Allow at least 35-40 days before initial grazing of Twister and then expect to re-graze in 25-30 day intervals. Graze no lower than 4 inches if for multiple grazings. Overgrazing can damage the crown and should be avoided. To maximize regrowth potential, graze before the plant bolts. For best results, soil pH should be at least 5.6 and ideally between 5.8 and 6.2. Apply at least between 35-55 lbs of phosphate per acre at planting and a light application of nitrogen after grazing. However, its recommend to avoid high nitration levels in order to reduce nitrate issues in the crop. For best results, retain a soil sample analysis and adjust soils accordingly.

SEEDING RATES

Avoid sowing seeds too deep and too far apart. Ideal depth for most forage seeds is ⅛-¼ inch. Planting seeds deeper than ¼ inch may not allow them to establish. Sufficient seed-to-soil contact is extremely vital. Rolling or packing the soil after seeding can ensure this. If no-tilling, the right seeding depth is ¼ inche deep. Vivant can be broadcast seeded followed by harrowing, packing or livestock hoofing it in. Vivant may be aerial seeded in late summer for fall/winter grazing.

Direct Drilling: 3-5 lbs/acre

Broadcasting: 4-6 lbs/acre

Seeding with other species: 2-3 lbs/acre

BONUS
Forage Teff Grass

bonus
FORAGE TEFF GRASS

- EXCELLENT FORAGE QUALITY
- FAST-GROWING
- HIGH-YIELDING
- EXCELLENT ROOT STRUCTURE FOR DROUGHT TOLERANCE
- FOLIAR DISEASE RESISTANCE
- EXCELLENT FOR HAY

BONUS TEFF FOR BONUS SUMMER FORAGE

BONUS is a fine-stemmed warm season annual grass that produces multiple crops of high quality forage in a short growing season. BONUS has performed very well for growers across the country and in limited university tests for this new variety. BONUS can be used for all classes of livestock and gives growers the option of a warm season annual without concern for issues with prussic acid. Overall forage quality of Bonus teff is above average compared to many warm season grasses whether considering crude protein, digestible fiber or relative forage quality. Bonus is a very fine-textured hay, comparable to timothy, and nicely fills the gap in summer forage production for all classes of livestock.

FIGURE 1.

TEFF SECOND CUT CRUDE PROTEIN

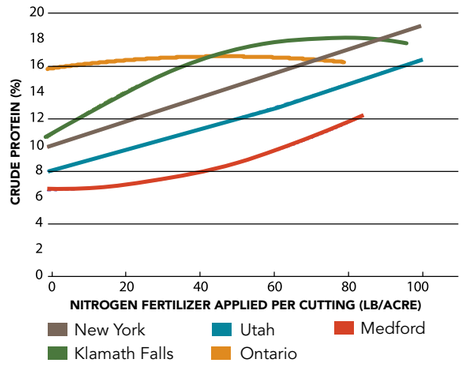
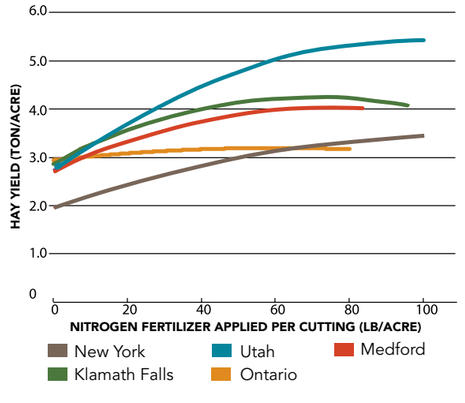


FIGURE 2.

TEFF TOTAL YIELD, TWO CUTS



Data from Hunter et al., 2009; Creech et al., 2012; Roseberg et al., 2006

TEFF GRASS NITROGEN RESPONSE

With adequate moisture and fertility teff produces high yields of quality forage in a short period. Analysis of the data illustrated in Figure 1. suggest that 40-60 units of N will result in very suitable crude protein levels for most types of livestock. Figure 2. suggest that the same rate of 40-60 units of N results in yields from 3-5 tons of forage in two harvests. Splitting applications of nitrogen will reduce the issues with elevated nitrate levels.

2011 MSU TRIAL DATA

	DRY MATTER YIELDS (% OF TRIAL MEAN)		
VARIETY	PLANTING 1	PLANTING 2	TOTAL
BONUS	**103**	**106**	**104**
CW604	101	104	102
TIFFANY	97	98	98
DESSIE	99	92	96

2011, Starkville, Mississippi

PLANTING GUIDE

ESTABLISHMENT New seeding: 8-12 (coated) lbs or 4-6 (raw) lbs/acre. Into existing alfalfa: 4-5 lbs/acre. Any establishment technique should requires a frost-free growing season. Planting must prioritize seeding depth and if possible, a firm seedbed. Ideal depth for most forage seeds is ⅛-¼ inch. Planting seeds deeper than ¼ inch may not allow them to germinate and establish well. Sufficient seed-to-soil contact is extremely vital. Rolling or packing the soil after seeding can ensure this. If no-tilling, the right seeding depth is ¼ inch deep. Bonus can be broadcast seeded followed by very shallow harrowing or packing.

MANAGEMENT A soil test is highly recommended as teff needs adequate phosphorous, potassium and sulfur for optimum growth. Applying 50 lbs of nitrogen per acre at planting will be sufficient for good forage production. For optimum forage quality, teff should be harvested in the pre-boot to early boot stage, approximately 50 days after planting at a cutting height of 3 to 4 inches. Harvest regrowth in 35 to 45 days depending on environmental conditions.

CARSON
Timothy

- EARLY-MATURING, WITH HEAD EMERGENCE BETWEEN CLAIR AND CLIMAX
- SUPERB SPRING VIGOR AND YIELD
- IMPRESSIVE DURABILITY AND REGROWTH FOR SUMMER CUTTINGS
- TALLER GROWTH HABIT BUT NOT STEMMY; SUPERIOR FORAGE QUALITY
- GREAT FOLIAR DISEASE RESISTANCE
- DARK GREEN, SOFT FOLIAGE IN HAY

TIMOTHY AT A WHOLE NEW LEVEL

Carson is an impressive new release, and really sets itself apart from other marketed timothys with its solid yield and quality in independent testing across the U.S. as well as university testing thus far. Carson establishes well, has great Spring vigor and canopies quickly, outpacing Spring weeds. Carson reaches 50% head emergence slightly later than Clair and earlier than Climax. Carson maintains good quality with a taller growth habit, with seedhead expression on multiple cuts. Summer growth is more aggressive than many competitive timothys and thus multiple cuts with seedhead expression can be achieved with Carson. Needless to say, if you're in the timothy hay business or utilize timothy in mixed stands of hay or pasture, Carson needs to be on your list!

2019 UK TRIAL DATA

VARIETY	OCT 2017 SEEDLING VIGOR	2018 YIELD	2019 YIELD	2-YEAR YIELD TOTAL
CARSON	**4.9**	**3.96**	**2.14**	**6.10**
DAWN	5.0	3.53	1.99	5.53
BARPENTA	4.0	3.61	1.77	5.38
BARFLEO	4.8	3.60	1.76	5.36
CLAIR	4.5	3.52	1.61	5.13
CLIMAX	4.8	4.34	1.78	5.12

University of Kentucky Forage Trial Sown September 8, 2017 at Lexington, Kentucky.

2019 NEW YORK TRIAL DATA

VARIETY	2019 YIELD	2018 YIELD	2-YEAR YIELD TOTAL
CARSON	**4.62**	**5.26**	**9.88**
RAKEL	3.84	4.90	8.74
CLIMAX	3.85	4.76	8.61

New York Forage Trial Sown May 18, 2017 Ithaca, NY.

ABOVE This photo shows the regrowth after the second cutting of Carson versus Climax. Carson regrows faster and provides more forage than Climax.

PLANTING GUIDE

ESTABLISHMENT Timothy is a very small seed, so seeding depth is of utmost importance. Timothy is best established in a very firm seedbed via Brillion seeder or conventional drill or broadcast followed by a cultipacker or roller for good seed-soil contact, without pushing deeper than ¼ inch. Per acre seeding rate is 8-10 lbs. It's critical with timothy to have some seed on top of the ground post planting.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Control broadleaf weeds as necessary.

ENDURE
Chicory

- EXCELLENT FORAGE QUALITY
- HIGH-YIELDING VARIETY
- INCREASED SUMMER PERFORMANCE
- DROUGHT TOLERANT
- IMPROVED PERSISTENCE IN WET SOILS
- PERFECT FOR WILDLIFE

PERSISTENCE EVEN IN WET SOILS

Endure is the newest chicory variety available from the Mountain View Seeds forage program. Bred to withstand wetter soils, Endure excels where other chicory varieties fail. Endure is a very high-yielding variety that produces tons of high-quality forage. Drought tolerant with superb summer production, Endure can extend and enhance available grazing days throughout summer. Endure is surprisingly versatile, durable, persistent and provides a high protein diet for livestock or wildlife.

SEEDING RATES FOR CHICORY ALONE OR IN MIXTURES

SEEDING MIXTURE	SEEDING RATES (LBS/ACRE) CHICORY	LEGUME	GRASS
CHICORY ALONE	4 TO 5		
CHICORY WITH RED CLOVER	4 TO 5	6 TO 8	
CHICORY WITH WHITE CLOVER	4 TO 5	3 TO 4	
CHICORY WITH RED CLOVER & ORCHARDGRASS	2 TO 3	3 TO 4	4 TO 6
CHICORY WITH WHITE CLOVER & ORCHARDGRASS	2 TO 3	1 TO 2	4 TO 6
CHICORY WITH RED CLOVER & TALL FESCUE	2 TO 3	3 TO 4	8 TO 10
CHICORY WITH WHITE CLOVER & TALL FESCUE	2 TO 3	1 TO 2	8 TO 10

Adapted from Penn State Publication Agronomy Facts Publication No. 45, Forage Chicory

Yield and Quality Trials established in Fall 2020 at Mississippi State University and University of Kentucky versus competitive checks and varieties (data pending).

PLANTING GUIDE

ESTABLISHMENT Chicory prefers well to moderately drained soil of medium to high fertility. Flooding, particularly during the summer months, can injure chicory stands so low-lying ground should be avoided.

Chicory establishes best on a moist firm seedbed. The seedbed should be cultipacked before and after broadcast seeding to ensure good seed-to-soil contact and correct planting depth. If using a drill, set the planting depth to no more than ¼ inch.

If no-till seeding clear the area of all standing forage by close grazing, haymaking, or clipping close with a bush-hog. Then spray glyphosate (41% a.i. at 2.5 pts/acre plus surfactant), to kill the existing stand of forage. After applying the glyphosate, wait seven days before planting to ensure no herbicide residue remains.

Lime, Phosphorus and Potassium should be applied according to soil test recommendations with alfalfa as the specified crop. Soil pH should be at least 5.5. Nitrogen fertilizer should be applied at planting at a rate of 35 pounds per acre to stimulate chicory establishment. Subsequent nitrogen applications (30-50 lbs/acre) can be made after each grazing in the spring and fall up to 200 lbs/acre/year.

GRAZING MANAGEMENT Do not allow newly established chicory stands to be grazed until the chicory is at least 8 inches tall. This will generally occur 60 to 80 days after seeding, depending on climatic conditions. Chicory can be grazed to a stubble height of three inches. Chicory should be allowed to accumulate growth of four to six inches before going dormant in the fall.

Chicory will become dormant after the first frost of the year. Grazing may resume in the spring when the plant is at least ten inches tall.

We do not recommend continuously grazing chicory. Chicory production and animal performance is optimized under rotational stocking (rotational grazing) management. Depending on time of year and climatic conditions (and thus the rate of re-growth), a rest period of 14 to 25 days between grazing periods is best for chicory persistence and performance. A stubble height of three inches should remain after grazing. Caution should be taken to not over graze in August as chicory growth slows in August during periods of high temperatures.

SUGARCREST
Festulolium

MEADOW FESCUE X PERENNIAL RYEGRASS TYPE

HIGH FORAGE QUALITY

EXCELLENT PERSISTENCE

HIGH-YIELDING

FAST ESTABLISHMENT

HIGH QUALITY AND PERSISTENT

Sugarcrest is a new perennial ryegrass X meadow fescue hybrid, better known as a festulolium. Festulolium is a term used to describe a number of ryegrass X fescue combinations. Festulolium parents can be Italian ryegrass or perennial ryegrass crossed with tall fescue or meadow fescue. Meadow fescue has long been accepted as a superior quality forage species compared to tall fescue, and although Italian ryegrass will outyield perennial ryegrass in the short run, Italian is short lived. Sugarcrest is a combination of perennial ryegrass and a U.S.-adapted meadow fescue which produces a winter-hardy hybrid with added drought tolerance, seedling vigor, and a high feed value. With its unique durability and forage quality package, Sugarcrest will be a highly sought after festulolium for some time to come.

2018 CORNELL TRIAL DATA

VARIETY	2016 YIELD % OF MEAN	2017 YIELD % OF MEAN	2018 YIELD % OF MEAN	3-YEAR TOTAL % OF MEAN
SUGARCREST (FEST)	**114**	**100**	**105**	**106**
BARVITRA	125	114	104	115
REMINGTON	103	111	115	110
SPRING GREEN (FEST)	111	102	107	106
LPTNEAROM	86	104	100	97
CALIBRA	89	95	91	92
GO-AXT	85	87	92	88
LINN	86	87	86	87

Cornell Univ, Ithaca, NY Planted May 1, 2015

PLANTING GUIDE

ESTABLISHMENT Plant at a rate of 15-20 lbs/acre. Proper seed bed preparation is essential. No-till seeding is generally very effective. Avoid planting too deep. Irrigation to supplement seasonal moisture, if available, will insure best establishment and fill-in. Plants should be firmly established before grazing is allowed. Particularly in the first year, overgrazing can seriously reduce stand longevity.

MANAGEMENT Proper management begins with correct fertilization. Soil sampling is a great tool to get baseline soil fertility inventory, especially on pH, organic matter, phosphorus, potassium and other macro and micro elements to best determine application rates based on soil maintenance and nutrient removal. Correct nitrogen application rates should consider organic matter, yield goals, stocking rate, etc. Your local agronomy input supplier or extension service can provide valuable regional information. Control broadleaf weeds as necessary.

ARID
Smooth Bromegrass

- HIGH YIELDING
- SUPERIOR FORAGE QUALITY
- HIGHLY PERSISTENT
- DROUGHT RESISTANCE
- GOOD ESTABLISHMENT
- EXCELLENT PALATABILITY

PERSISTS WHERE OTHERS FAIL

Arid smooth brome is an ideal choice for climates where tall fescue and orchardgrass have problems with persistence. Arid is drought tolerant and is not affected by temperature extremes. Arid has excellent forage yield, producing 5 tons in a 2 year trial at the University of Kentucky. In the same trial, Arid showed excellent establishment and scored highly in persistence, maintaining stand density. Arid can be used for hay or grazed and works as a mono stand or in mixtures with other forage species. Arid also provides excellent erosion control, forming a dense ground cover to protect against wind and rain runoff.

UNIVERSITY OF KENTUCKY TRIAL DATA

VARIETY	STAND AVERAGE	MATURITY[1] MAY 2017	AVERAGE YIELD
ARID	**95.5**	**52**	**2.85**
PEAK	93.5	52	2.62

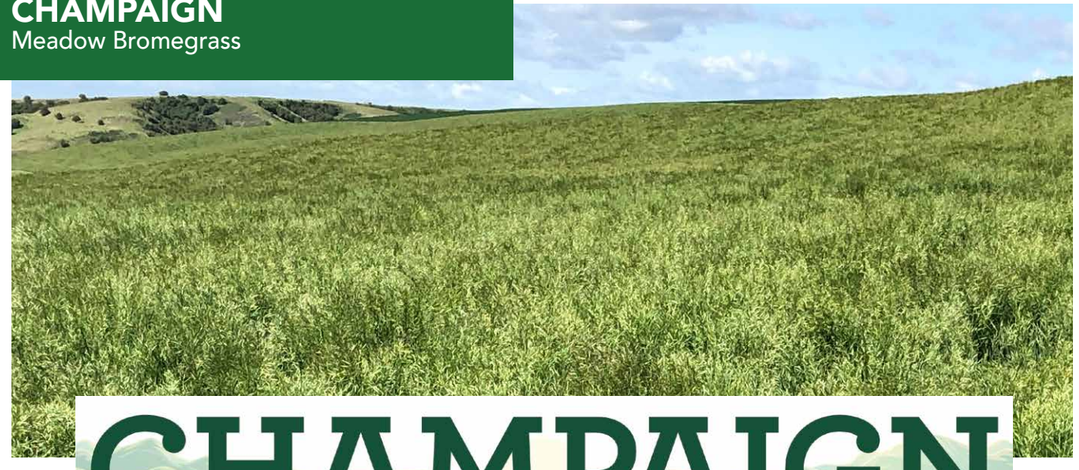
University of Kentucky Forage Trial Sown September 8, 2016 at Lexington, Kentucky. [1]Maturity Rating Scale: 37=Flag Leaf Emergence, 45=Boot Swollen, 50=Beginning of Inflorescence Emergence, 58=Complete Emergence of Inflorescence, 62=Beginning of Pollen Shed.

PLANTING GUIDE

ESTABLISHMENT A clean firm seedbed is needed. Due to the slow germination and establishment of smooth brome, spring seedings are especially preferred in the northern states. In southern areas, late summer seedings are a second option. Fall seedings should be made at least 6 weeks before a killing frost is expected. Seeding rates are typically 5-10 lbs/acre in mixtures, and about 15 lbs/acre when seeded alone. When smooth brome is seeded in a mixture with alfalfa, the alternate row method will give the best results.

MANAGEMENT Smooth brome requires heavy early spring and fall applications of nitrogen to maintain high yields in a pure stand. Mixtures with alfalfa will require less nitrogen but the alfalfa will usually need P205 each year to maintain vigor. Best forage production is obtained from smooth brome when used in a planned cropping system and plowed out after 3 to 4 years. Its heavy sod makes it an excellent soil conditioning crop when included in cropping systems. In deep, well-drained soils it will root to 4 feet.

CHAMPAIGN
Meadow Bromegrass



HIGH YIELDS

DROUGHT TOLERANT

IMPROVED ESTABLISHMENT

COLD TOLERANT

PALATABLE

SUITABLE FOR ALL CLASSES OF LIVESTOCK

Champaign is a newly released meadow brome variety with excellent seedling vigor, high forage yields, drought tolerance and rapid regrowth. Meadow brome can be used for grazing and hay production with excellent quality and palatability suitable for all classes of livestock and wildlife. It is a long lived, cool season perennial with short rhizomes. Champaign can be grown on plains, mountain valleys, mountain brush, aspen, conifer forest and sub alpine sites at about 4,000 feet. It has excellent winter hardiness with moderate tolerance to shade. In areas with significant spring frost and little snow cover meadow brome is a better selection than orchardgrass.

2019 UTAH MEADOW BROME TRIAL DATA

VARIETY	ESTABLISHMENT
CHAMPAIGN	98%
ARMADA	97%
ADMIRAL	89%
CACHE	78%
ARSENAL	72%

Millville & Farmington, UT USDA-ARS

2020 MEADOW BROME YIELD TRIAL DATA

VARIETY	YIELD (LBS/ACRE)
CHAMPAIGN	5,730
ADMIRAL	4,839
CACHE	4,600
ARMADA	4,364
ARSENAL	4,364

Millville, UT USDA-ARS

PLANTING GUIDE

ESTABLISHMENT A clean firm weed free seedbed is recommended. If drilled in a 10-pound PLS per acre is recommended or broadcast at 20-pound PLS per acre. Planting depth should be ¼-½ inch in depth. Can be planted in mixtures with other grasses, alfalfa, clovers, and chicory.

MANAGEMENT Under dryland conditions delay grazing until late summer of the second year. Under irrigation it is recommended to delay grazing until late summer or early fall of the seedling year. Harvesting hay can be done in the establishment year is most beneficial to avoid damage from grazing. In the spring do not graze until plants are 8-12 inches tall and do not graze below 3-4 inches. Rotational multi-paddock grazing allowing 3-4 weeks recovery between grazing is recommended.

DELLS
Forage Meadow Fescue

DELLS
FORAGE MEADOW FESCUE

- SUPERIOR WINTER HARDINESS
- DROUGHT TOLERANT
- DISEASE RESISTANT
- TOLERATES WET FEET
- EXCELLENT FORAGE QUALITY
- FREQUENT HARVEST
- CLOSE GRAZING

NEW GENERATION, DEVELOPED IN THE U.S.A.

Champaign is a newly released meadow brome variety with Dells is the new generation of Forage Meadow Fescue developed in the USA! 2023 Crop Year is the first time for commercial seed to be available. Dells Forage Meadow Fescue exhibits all the usual characteristics found in meadow fescue like high forage quality, superior winter hardiness and tolerance to wet soils.

Dells also can efficiently tolerate and quickly recover from droughts as observed in recent years at Peak Plant Genetics in Western Oregon. The original germ plasm was selected in the Northeastern US to tolerate frequent and close grazing for horse pastures. This germ plasm was then crossed back with other top producing commercially available seed cultivars for improved forage yield. The result is a robust variety with a strong root system that is better equipped to handle flash droughts as well as periods of high rainfall, water logging and disease pressure.

Dells is well adapted to the Upper Midwest and Northeastern US cold winters with ongoing testing for its adaptation in other regions.

OUR FORAGE PARTNERS

Industry & University Partnerships

At Mountain View Seeds we have a long history of supporting industry associations and partnering with universities to promote healthy, sustainable agriculture. Our mission, at Mountain View Seeds Forage and Cover Crop division, is to provide varieties that outperform industry standards. This results in higher yields, more milk production, better weight gains and soil protection. In addition to providing excellent products, we also understand that education and outreach are critical to improving the global farming system. Partnering with these organizations and universities provides the needed education and resources to ensure sustainable agriculture is not just an idea but the path to a better future.

American Forage & Grassland Council (AFGC)

afgc.org

AFGC is an international organization made up of 22 affiliate councils in the United States with over 2,500 members. Their primary objective is to promote the profitable production and sustainable utilization of quality forage and grasslands and are dedicated to advancing the use of forage as a prime feed resource. Our members represent the academic community, producers, private industry, institutes, and foundations. Together, they unite in a common cause to promote and develop the forage industry.

Alliance for Grassland Renewal (AGR)

grasslandrenewal.org

The Alliance for Grassland Renewal is a national organization focused on enhancing the appropriate adoption of novel endophyte tall fescue technology through education, incentives, self-regulation, and promotion.

The Alliance for Grassland Renewal formed in 2012. Participants include partners from the university, government, industry (including producers, seed companies, testing labs) and nonprofit groups.

The goal of the Alliance is to work together in replacing toxic tall fescue grass with a tall fescue that hosts a nontoxic endophyte, sometimes called a "novel" endophyte. They pursue their goal through four main objectives: education, seed quality control, incentives, and promotion.

USDA Natural Resource Conservation Services (NRCS)

nrcs.usda.gov

The Natural Resources Conservation Service (NRCS) draws on a long history of helping people help the land. For more than 80 years, NRCS and its predecessor agencies have worked in close partnerships with farmers and ranchers, local and state governments, and other federal agencies to maintain healthy and productive working landscapes. NRCS conservationists provide technical expertise and conservation planning for farmers, ranchers and forest landowners wanting to make conservation improvements to their land.

National Association of County Agricultural Agents (NACAA)

nacaa.com

The mission of the National Association of County Agricultural Agents (NACAA), an organization of professional extension educators, is to further the professional improvement of its members, communication and cooperation among all extension educators and provide for enhancement of the image of extension and the development of personal growth opportunities for extension professionals.

The NACAA is geared toward Extension educators and other professionals who work in agriculture, horticulture, forestry and natural resources, 4-H youth development, community development, administration, aquaculture and Sea Grant, and related disciplines.

International Grassland Congress (IGC)

internationalgrasslands.org

The IGC is a worldwide gathering of leading scientists, students, industry, extension, and primary producers that meet every 3-5 years to share their research results and their experiences.

The International Grassland Congresses have spanned the globe and have been held on every continent with the last five in Brazil, Ireland, China, Australia, and India and upcoming Congresses in Kenya and the United States. Topics at these Congresses range from grassland production and utilization to grassland policies and social issues. Other topics include livestock production systems, grassland ecology, grassland sustainability, wildlife habitat, and ecosystem services. The impact of IGC Congresses extend long after the actual gathering of people with initiatives such as a study being commissioned on the global future of grasslands.

University Extension & Testing Partners

- University of Kentucky Extension
- Virginia Tech Extension
- NC State Extension
- University of Missouri Extension
- Clemson Extension
- Alabama A&M and Auburn Extension
- Georgia Extension
- Cornell University
- Penn State University
- University of Tennessee
- Mississippi State University
- Louisiana State University
- Texas A&M University

"MVS has taken forages to a new level by finding the balance between maturity, quality, yield, and persistence. I appreciate that there is a cooperative of farmers in Oregon improving and producing quality forages for farmers throughout the United States."

JEREMY SWEETEN
SWEETEN FARMS LLC
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