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#### EASTERN GAMAGRASS

The enclosed information will be used to support the Standard and Specification, Pasture and Hayland Planting (512). Information is also included that should promote the proper management of this species.



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## **EASTERN GAMAGRASS**

*(Tripsacum dactyloides)*

### **GENERAL INFORMATION:**

Eastern gamagrass is a native, perennial, tall, warm-season, bunch grass, with short, thick rhizomes. It is palatable and highly preferred by livestock.

Seed is produced from June through September. Seed heads vary from 6-10 inches in length and consist of one or more spikes. The female flowers and fertile seed occur on the lower part of the spike. The seed is surrounded by a capsulate fruitcase that becomes very hard at maturity. The upper portion of the spike is the male flower, which closely resembles a corn tassel.

This grass has shown excellent potential to produce large quantities of high quality forage during the summer months. It begins growth earlier than most other native warm-season grasses, being similar to switchgrass in this trait. Comparable to indiangrass, it also grows later into the season.

Eastern gamagrass regrows rapidly following haying or grazing. This surge of regrowth is activated from a large carbohydrate reserve stored in its crown and large fleshy rhizomes. Its broad leaves and their orientation to the sun provide ideal surfaces for the conversion of solar energy to carbohydrates. Total annual production has been recorded to exceed 10 tons per acre under a high level of management.

### **AREA OF ADAPTION:**

Eastern gamagrass is best suited to moist, well-drained soils but will adapt well to a variety of soils, provided there is adequate available moisture. The primary area of adaptation includes the eastern one-third of Nebraska, the eastern one-half of Kansas and Oklahoma, and adjacent areas of Iowa, Missouri, and Arkansas. It can be grown farther west on irrigated or subirrigated sites. Successful stands have been established as far east as New York and Florida.

In Nebraska, it is best adapted and recommended for the eastern one-half of MLRA 73 and MLRA's 75, 106, and 107S. It may, however, be used as a pasture and hayland planting in Vegetative Zones III and IV south of Nebraska Highway 20.

## ESTABLISHMENT:

Widespread acceptance of eastern gamagrass has been limited by problems associated with seed dormancy. The results were an uncertainty of obtaining a suitable stand in a timely manner. Much of the more recent research has focused on solving the seed dormancy problem. Two major methods of plantings have been developed and are now being recommended to overcome this problem.

### Dormant Seeding Procedure:

- 1) Prepare a firm seedbed in the fall or no-till plant into clean crop residue or killed sod. Corn and milo residue in tilled fields or no-tilled as an interim crop into killed sod may be especially desirable. This is primarily due to the weed control as a result of the residual effect of previously applied herbicides. Eastern gamagrass has shown resistance to herbicides normally used with corn and milo production.
- 2) Dormant plantings should be seeded between November 1st and March 15th. Planting during this period allows adequate time for natural stratification (weathering) to break dormancy in dormant seed. Earlier plantings increase seed mortality while later plantings result in spotty stands due to less seed breaking dormancy.
- 3) Eight (8) pounds of pure live seed (PLS) per acre is the minimum recommended seeding rate. This is equivalent to approximately 58,000 - 60,000 seeds per acre. To calculate pure live seed for eastern gamagrass use:  $(PLS) = \% \text{ purity} \times (\% \text{ germination} + \% \text{ dormant seed})$ .
- 4) Seeds should be placed about 1 inch deep on clayey soils and up to 1 1/2 inches on sandy soils. The best seeding equipment has capabilities to firm the soil around the seed ensuring good soil to seed contact. Corn planters and grain drills are both capable of properly metering, placing and firming the soil around the seed.
- 5) Row spacings can be up to 40 inches on level sites. A general rule is as the slope increases the row spacing should be decreased. Minimum row spacing is 10 inches at 8 PLS#/Ac seeding rate. This provides about 1 live seed for each .75 square foot.
- 6) Deficiencies in soil fertility should be amended to meet the recommendations of the soil test.
- 7) Good weed control is essential for rapid establishment of a suitable stand of eastern gamagrass. Weeds can be controlled by spraying, clipping or grazing.

Spraying: Use only approved herbicides at recommended rates as shown in the current Nebraska Herbicide Guide of the FOTG. It is not recommended to use a surfactant when spraying new seedlings.

Clipping: Clip low enough to remove the weedy canopy. Leave at least 4 inches of grass stubble. This will provide sufficient leaf area for photosynthesis and for regrowth to continue in the eastern gamagrass seedlings. More than one clipping during the growing season is usually required for adequate weed control.

Grazing: If weeds are controlled by grazing, stock at a level to remove the desired amount of weedy vegetation within a 3 day grazing period. Graze weeds only when readily utilized by livestock. Do not graze when soils are excessively wet if soil compaction could be a problem on heavier textured soils.

Stratified "Treated" Seed, Seeding Procedures:

1) Place seed in poly-weave or burlap sacks and soak in a 1% solution of Captan (fungicide) or its equivalent. Two and one-half (2.5) pounds of Captan to 35 gallons of water gives a 1% solution. Soak for 8-10 hours.

2) Drain excess water, place in plastic bag, seal, and place in cold storage (34-40 degrees F) for 6 to 8 weeks. Check to make certain that the seed is not heating and stir if necessary.

3) Seed should be planted soon after removal from cold storage, within 24 hours if possible. If the seed is too wet to feed correctly through the drill, it can be air dried for 1/2 to 1 hour to facilitate planting. Stratified or treated seed is also available from some established seed dealers at an additional cost. Orders for stratified seed need to be placed at least 3 months in advance of planting. If stratified seed is purchased, proper and timely handling from dealer to planting is essential.

4) Recommended seeding dates for stratified seed are from April 15th to June 1st, or when soil temperatures reach 65 degrees F at the planned seeding depth. Earlier plantings run the risk of rotting seed if the weather remains cool and wet and are often subjected to greater weed competition. Later seedings are at risk of being vulnerable to hot, dry weather before establishing adequate root systems.

5) Prepare a firm seedbed as close to planting time as possible, or no-till plant into killed sod or clean crop residue. When no-tilling into killed sod, an interim crop allows time for the sod to break down, providing a mellower seedbed. Corn and milo residues are ideally suited for this

purpose since eastern gamagrass has shown resistance to herbicides normally used with these crops.

6) The minimum seeding rate for stratified seed will be the same as that used when planting unstratified seed in dormancy plantings (8 dry PLS#/Ac.). PLS = % purity x (% germination + dormant seed).

7) Stratified seed should be placed about 1 inch deep on clayey soils, and up to 1 1/2 inch deep on sandy soils. It is important that the seed be planted into damp soil since stratified seed can dry out and return to a dormant state if placed in dry soil.

8) For stratified "treated" seed, seeding procedures; row spacing, seeding equipment, fertilizer and weed control recommendations are the same as previously discussed for dormant seedings.

#### MANAGEMENT:

Eastern gamagrass was recognized as a promising forage species as early as the 1800s. On August 20, 1826 John Hardeman of Franklin, Missouri wrote a letter to the American Farmer, stating; *"Sir,- Enclosed are a few seeds of a grass, native of this state, and one which, in my estimation, will more effectually remunerate the cultivator than any other grass now reared in our meadows"*.

Mr. Hardeman estimated production potential to be 100,000 pounds of dry hay per acre. A yield of 10 tons per acre is probably a more realistic and achievable goal using good management.

#### Forage:

Eastern gamagrass is noted for its palatability. Livestock prefer it. By selective over-utilization it has been grazed out or greatly reduced over much of its former range. Eastern gamagrass requires a good forage management system, for optimum production. It is best managed when established as a single species planting.

Under continuous grazing management, delay grazing until plants have reached 16 inches in height. If stubble height is reduced to 8 inches or less, grazing should be discontinued and a rest period provided until regrowth reaches 16 inches. A rest period should be provided 45 days prior to frost so that carbohydrate reserves are replenished.

The best grazing management systems have rest periods built in throughout the grazing season. Rest periods of 30 days

should be used when growth is rapid. Increase the rest period to 45 days when growth becomes slow. These should be considered as starting points only; actual periods will need to be adjusted based on actual rate of regrowth.

Eastern gamagrass responds favorably to fertile soils. Soils should be tested and amended to meet the demand of planned production. Production can be increased by applying nitrogen fertilizer. During the first year (1991) of a study conducted by the University of Missouri, N was applied at the rates of; 0, 50, 100, 150 and 200 pounds per acre. Production peaked at the 100# rate. Split nitrogen applications at the higher rates did not increase production over a single application of 100# N/acre in the first year of this study.

Narrower row spacings are preferred when the primary purpose of the planting is for grazing. Plant canopy and crown will occupy the available space more quickly, reducing weed competition and providing better soil protection.

#### Feed:

Eastern gamagrass has been recognized as a desirable feed for a long time. John Hardeman states in his letter to the American Farmer, dated Aug. 20, 1826; "*...a man, whom myself very well knew, has used this kind of hay for several years, in preference to any other. His reasons for this preference were to me fully satisfactory. First, because his cattle, being mostly work steers at the salt licks, were fonder of this than they were of any other kind of hay, and secondly, because he could in addition to this, procure five times as much of this kind of hay, in one day, as he could procure in the same time, of any other. From this reaction, taken as a fact, and from my own observation and knowledge of the grass, I have concluded that it is good.*"

Eastern gamagrass has excellent potential for hay production. It can be harvested more than once during the growing season at about 6 week intervals. For best quality hay, cutting in the boot stage is recommended. Crude protein content as high as 17% has been reported when harvested in the boot stage. Delaying harvest until flowering dropped the crude protein level to 8.5%. Later, or less frequent cuttings may produce as much or more hay, but quality is reduced.

The boot stage generally occurs from mid to late May. Since weather conditions are often wet at this time an option is to take the first cutting as silage if proper equipment is available. Later cuttings more likely to escape rain damage can be harvested for hay. When cutting eastern gamagrass for hay or silage, a minimum 8 inches of stubble should be left to allow for rapid regrowth.

Where corn or other annual crops are grown for silage, it might be appropriate to consider using eastern gamagrass as a perennial silage crop. Much of the costs associated with the establishment and production of an annual crop would be eliminated or greatly reduced. A perennial silage system would be especially suitable on soils where erosion is currently a problem.

Bunch grass stands, as they get older, cause the ground surface to become rough. Eastern gamagrass, with its large fleshy rhizomes, exhibits this characteristic. Where regular vehicular traffic is anticipated, as with haying or ensiling, wider row spacings are recommended. This provides much less stress on both equipment and the operator. Narrower row spacings and denser stands, however, provide more complete ground cover with smaller crowns.

Researchers anticipate developing eastern gamagrass into a cereal crop. A perennial grain crop would solve many problems associated with the cultivation of annual crops. If this technology reaches the farm production level, concentrate feed for livestock as well as grain for human consumption could be produced with substantial economic and energy savings.

#### Seed:

The acceptance of eastern gamagrass has been slowed by the lack of an economical way to propagate the species. Low seed production, poor seed quality and establishment difficulties have caused seeding cost to remain high. This has led to a reluctance by most producers to include this grass in their forage program.

Seed presently costs approximately \$10.00/PLS pound. Seeding at 8 PLS pounds/acre, translates into a cost of \$80.00/acre for seed alone. The need to establish good stands in the first attempt becomes readily apparent. When calculated over the expected life of the stand (infinite when properly managed), however, these costs are not unreasonable. It remains that initial seeding costs and the uncertainty of establishment is still a deterrent to the widespread use of eastern gamagrass.

Making dormant plantings or the use of stratified seed are two ways of dealing with establishment problems. Dehulling, removing the seed from the encapsulating rachis, is currently being investigated as a means of breaking seed dormancy and reducing seed handling problems.

Increasing seed yields has been one objective of work being conducted at the Manhattan, Kansas Plant Materials Center. Selection and breeding was initiated with plants having a higher proportion of female to male florets. Currently,

average seed production is only 200-300 pounds per acre. If seed production could be doubled, more seed would be available and produced at a more competitive price.

For seed production, soil fertility should be brought up to the recommendations of a current soil test. Adding nitrogen in excess of 50#/acre/year on seed fields can cause lodging. The additional vegetation produced can also make the harvesting of seed more difficult.

Row spacings of 30-40 inches are recommended for seed production fields. The wider row spacings can be used where field slopes are not excessive. If erosion is a hazard the narrower row spacings should be used and residues left on the soil surface.

Prescribed burning is a management practice that can be used to remove excess residue in the spring. This practice will also stimulate growth and improve forage quality. Fields should be burned when approximately 1 inch of new growth has occurred. Cooperators will be cautioned to conduct all burns in accordance with state and local laws and regulations. They must fully understand that they are solely responsible for confining prescribed burns to their own lands and may be held responsible for damages that result to others and/or their property.