

SEVEN BASIC ELEMENTS FOR A SUCCESSFUL NATIVE WARM SEASON GRASS ESTABLISHMENT FOR FORAGE PRODUCTION

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THE LOGIC SUPPORTING USE OF NATIVE WARM SEASON GRASSES FOR FORAGE

First, let's make it clear from the start, there is **NO** justification for plowing up all of your cool season forages and replacing them with warm season forages.

We strongly believe, and can support our belief with practical evidence, that warm season native grasses, produced in **DESIGNED AMOUNTS** to complement cool season forages, will make money for the beef and dairy producer.

There are two basic components to being a livestock producer. One is livestock management, which encompasses breeding and care of the animals, and the other is forage management, which encompasses the economic and efficient conversion of forages into a marketable product. The goal is to produce the greatest volume of market desired product at the least possible cost. Granted, there are a few folks that just enjoy cattle farming, but for most of us, we have chosen cattle farming as a way to make a living. And to make a living we need to make a profit.

To make a profit you have to minimize your costs, and for the Kentucky livestock producer, without getting into the details, it is safe to say that the vast majority of your controllable costs are in your forage production. Given your fixed acreage, it is not how much sustainable volume of forage you can produce, it is how many pounds of market desired product you can obtain with your sustainable forage production and still stay below that cost per unit of forage produced that will allow you to make a profit.

We are convinced that incorporating designed amounts of native warm season grasses into your forage production planning process will add substantially to the convertible units of forage you can produce on a fixed acreage without adding to the cost per unit of convertible forage produced. Said another way, you can increase the carrying capacity of your farm without an increase in the cost of forage production. We encourage you to consider the following native warm season grass attributes when doing your forage production planning.

1. NWSG produce all their growth during the hot summer months when the cool season grasses are semi-dormant and not producing.
2. NWSG pastures produce weight gains during the hot summer months equal to weight gains on cool season grasses at their peak quality in the spring.
3. NWSG produces as much, or exceeds, cool season grass hay production in quantity and quality at less cost (fewer cuttings) and without the weather related harvest problems of spring and fall cuttings.
4. NWSG better utilize soil nutrients than cool season grasses and require less fertilizer costs to maintain soil nutrients.
5. NWSG evolved here in Kentucky and have few insect pests and diseases to cut production and do not require the expensive chemicals required for many cool season grasses.
6. NWSG can very play a roll in mitigating the endophyte fungus problems with fescue with only minor adjustments in breeding management. See your agronomist for details on the endophyte fungus problem.
7. NWSG plantings allow summer rest of cool season pastures, greatly increasing vigor, quality, and volume production on cool season grasses in the fall.
8. NWSG plantings will persist for 15 to 20 years or longer with proper maintenance, reducing long term reestablishment costs.
9. NWSG use in the summer months will extend the fall grazing period due to the increased vigor and growth provided from summer rest.
10. NWSG offers other advantages such as soil erosion prevention and drought resistance due to their deep roots, wildlife habitat creation due to clump growth and height, and adaptation to a wide variety of soil conditions.

So, if native warm season grasses are so great, why isn't everyone growing them? There are two principal disadvantages to NWSG production. First, NWSG stands require management and cannot withstand the abuse that fescue can withstand. You can achieve a substantial return on your investment in time and labor to manage your NWSG stand, **but without a willingness to manage these grasses, it would be a mistake to incorporate them into your forage plan.**

The second problem is the common belief that these grasses are extremely difficult to establish, that it takes up to three years to establish a stand, and that it is very

expensive to establish a stand. These things can be true, but they certainly don't have to be. This is why we have been invited to talk to you.

We have years of experience and have established thousands and thousands of acres of NWSG stands for forage plantings, farm bill programs, wildlife habitat, prairie restoration projects, etc. We have devoted a lot of time, money, and effort to developing protocols for establishment of NWSG that work. Using these protocols you can achieve harvestable stands of some NWSG species in the establishment year and harvestable stands of all other species in the year following establishment. We are pleased to have the opportunity to share what we have learned about the establishment of NWSG stands with you.

There are seven basic elements for a successful native grass establishment.

1. **UNDERSTAND HOW NATIVE WARM SEASON GRASSES GROW**

Please do not make the common mistake of evaluating and managing your NWSG planting based on your experience with cool season turf grasses that form dense mats.

NWSG plantings are slow to establish, devoting most of their energy the first year to developing a root system. Do not be disappointed and plow your field up to start over if you fail to see a lush green carpet and full ground cover the first year. Keep in mind that these are clump grasses that spread by rhizomes and a single plant may be one to two feet in diameter when mature. A single plant every square foot will, in time, produce a very good stand.

Using developed protocols for establishment, it is possible to produce harvestable first year stands of NWSG for forage. Such forage plantings may require a seeding rate as high as 12 PLS pounds of seed per acre depending on specie. Many of you are familiar with CRP and other Farm Bill program NWSG plantings, which use much lighter seeding rates, however, the primary goal for these plantings is wildlife habitat and forage plantings are often too dense to provide ideal habitat, at least initially. Young stands of NWSG are susceptible to loss or thinning due to livestock trampling and higher seeding rates compensate for this loss as well as aid in competition control as I will explain later.

Be patient, it takes much longer to establish a stand of NWSG than it takes to establish a stand of cool season grasses. What may look like a weed patch in early summer can be a good stand. If in doubt about whether you have a stand, ask your DC, your extension agent, a KDFWR biologist, or your seed producer before you plow up the field.

2. SITE AND SPECIES SELECTION

Time does not permit me to get into the details of your planning process that you should go through to help you in choosing the specific species you will wish to plant to fit your particular operation, however, the choice of species should take into consideration such things as hay or pasture production, site availability, probable competition, soil moisture, length of warm season grazing desired, species recovery time, species peak production time, minimal acceptable production volume and quality, and length of growing season. Due to the considerable differences in growing seasons and tolerance levels to needed establishment herbicides, NWSG stands for forage should be planted in pure stands and not in mixes.

As an aid to establishment, we do need to take a quick look at site selection. NWSG stands for pasture require managed or rotational grazing. For this reason site selection should consider water, fencing, and shade availability to permit managed grazing.

NWSG stands are slow to establish and erosion potential is high in newly planted fields. We would recommend that sites with steep slopes be avoided. Conventional tilling should be avoided except on flat sites. Even on flat sites we recommend no-till drilling. On gently sloping sites the erosion potential can be mitigated with no-till seeding and cover crop techniques.

NWSG will perform better on marginal soils than most cool season grasses, however, the better the soil quality the better each specie will perform. The principal NWSG species ranked according to the anticipated productivity decline due to reduced soil fertility would be 1. Eastern Gamma Grass, 2. Big Bluestem, 3. Switchgrass, 4. Indian Grass, and 5. Little Bluestem.

Soil hydrology more than soil type determine the optimal conditions for each specie. Species preference for moisture conditions ranked from hydric to xeric are 1. Eastern Gamma Grass (hydric to mesic), 2. Switchgrass (hydric to mesic), 3. Big Bluestem (sub-hydric to mesic), 4. Indian Grass (sub-hydric to xeric), and 5. Little Bluestem (mesic to xeric). In a naturally evolved landscape Eastern Gamma Grass and Switchgrass would be found along streams and in poorly drained areas. Big Bluestem would be in the damper, better drained soils. Indian Grass would have by far the greatest range of suitable habitat and Little Bluestem would be found on the hill tops and really dry sites. We would be wise to mimic nature and try to match the specie to the site.

Prior year crop fields are ideally suited for establishment sites due to the presence of bare ground, stubble for erosion control, and prior herbicide suppression of competition. Volunteer beans, however, can be a problem in

Round-up Ready bean fields and will require special timing and herbicides to control.

Eastern Gamma Grass has been successfully planted with corn by seeding between the rows. This grass is a close relative of corn and the same herbicides used on corn can be used. This process suppresses the growth of the grass in the establishment year, but it is unlikely that you can produce harvestable stands of this grass in the establishment year and this method of establishment allows establishment without missing a crop year.

Legume pasture and hay fields that are playing out, such as alfalfa and red clover, are adequate sites and provide more bare soil for good seed contact, but due to root depth will require either conventional tilling or additional herbicide treatments to kill the existing crop.

Grass pasture and hay fields are adequate sites, but due to mat growth and close grazing these sites may conceal heavy dormant weed crops.

Sites with heavy concentrations of undesirable warm season grasses and weeds, such as johnsongrass, foxtail, crabgrass, fall panicum, broomsage, love grass or barnyard grass should be avoided if possible.

Pasture fields and fallow fields with concentrations of woody stemmed plants such as sericea lespedeza, multiflora rose, indian hemp, sumac, or black locust should be avoided unless you are willing to take the additional time to obtain the necessary weed control prior to planting.

Avoid prior year crop fields, especially tobacco, that may have residual herbicides that can prevent germination of NWSG seeds. Also, avoid wheat and rye production fields or cover crops as these plants may produce an allelopathy that will prohibit germination of NWSG seeds.

3. COMPETITION CONTROL

No single factor, with the possible exception of seeding depth, is as important to a successful establishment of NWSG as control of competition. NWSG are slow to establish and cannot withstand shading or competition for moisture. These plants mostly devote their energy to putting down a root system the first year and if the minimal leaf area produced cannot get sunlight the plant will simply wither and die.

Don't, however, give up on your stand if you lose some plants due to shading, moisture competition, or drought. Most NWSG seeds have a high degree of

dormancy and many seeds will not germinate the first year. Many native seeds need a cold-moist stratification, as is naturally provided by winter weather, to break dormancy. Additional seeds will germinate the next spring giving you a second chance to manage the competition.

Know what weeds you are going to try to kill before you start

The first and perhaps most important step in controlling competition is to take a botanical inventory of the establishment site. Determine what weed species are most likely to be present throughout the growing season before you start planning your competition control. When you know what weed species are going to be a problem you can choose a herbicide or combination of herbicides tailored to the specific competition. For example, weed species such as dogbane, sumac, multiflora rose, and many others are not effectively controlled by Round-up alone. Other herbicides, such as Crossbow, may be necessary for such hard to kill species. See your herbicide dealer for specific recommendations for your list of weed problems.

Control of cool season weeds

Control of cool season weeds and unwanted grasses is fairly simple. It is just a matter of choosing the right site preparation method, the right herbicide, and the right time of application. You will find below a recommended set of weed control practices. You will want as little remaining dead plant material on the establishment site at the time of seeding as is possible.

Control of warm season weeds

Control of warm season weeds and unwanted grasses is not so simple and is paramount to a successful establishment. The problem with the warm season plants is that they do not emerge and their seeds do not germinate until about the same time or later than you will want to seed your NWSG. While you can effectively kill most growing warm season weeds and unwanted grasses, it is the unsprouted seeds of these competitors that will be your primary problem. The goal is to select and time your herbicide treatment for maximum killing effect and to include an effective pre-emergent herbicide that will suppress germination of these warm season competitor seeds.

Recommended process of weed control for a native warm season grass planting

Producers that are determined to start production of NWSG forage will not have the opportunity to follow this set of guidelines in its entirety. Given the time of year you should apply as much of this recommendation as possible to insure competition control.

- a. Herbicide treat warm season weeds and grasses such as Johnsongrass, Giant Foxtail, Crabgrass, Fall Panicum, etc. prior to

seed formation in the year prior to establishment to prevent a weed seed crop from infesting your site after seeding of the natives. If this is not possible, the use of a pre-emergent herbicide such as Plateau will suppress germination of these warm season plant seeds until after your native plants have had a chance to get started.

- b. In the fall prior to the establishment year remove as much vegetation and thatch as possible from the site by burning, haying, grazing, or mowing. Mowing is the least desirable method because of the residue left on the ground. If this is not possible, then removal of thatch should be done in the Spring. On steep slopes it may be advisable to not remove existing thatch until Spring due to the potential for erosion. Mowing should not be used in the Spring due to the difficulty the seed drill will have in cutting through the horizontal vegetation. Drills will do a better job of getting the seed in the soil in standing vegetation than in newly mowed vegetation and will avoid pressing thatch into the ground to wick moisture away from the seed and preventing good seed to soil contact.
- c. In the fall or spring following at least 6" of regrowth or new growth of the dominant cool season plants, especially fescue, a **selected** herbicide should be used for a complete burndown. Spring is preferred for this burndown due to the need for vernal weed control, however, a fall burndown may be best due to the difficulty of timely getting into wet fields in the spring to make the herbicide treatment. If the site is a reasonably clean bean or corn crop field, a spring or fall herbicide burndown is probably not needed. Where a crop field needs a cover crop to prevent erosion, oats should be used instead of wheat or rye, which produce an allopathy. The oats will need to be killed back in April.
- d. Seven to ten days prior to seeding, a combination herbicide treatment should be applied. This herbicide treatment should include a **selected** burndown herbicide to kill any remaining cool season weeds surviving the early spring burndown and any warm season plants that have emerged prior to seeding. In addition, this treatment should include 6 to 8 ounces of Plateau to suppress the germination of many warm season weed seeds. Plateau should not be used as a pre-emergent if planting Switchgrass or Eastern Gamma Grass.

4. SEEDING METHOD

Most native warm season grasses **will not** emerge if planted below 1/4" in depth. This needs repeating. They simply won't sprout if planted too deep. The seeding method and equipment chosen must insure really good seed to soil contact and prevent burying the seed too deep.

Native warm season grass species such as Big Bluestem, Little Bluestem, and Indian Grass have long awns and hairy appendages that make the seed extremely light and fluffy. In addition, most of the seed on the market has been combined with a traditional combine and contains typically 20 to 40 percent chaff (stems and leaves). Seed that has not been debarbed (had the awns and hairs removed) or that contains high percentages of inert matter (stems and leaves) **MUST** be planted with a specialty warm season no-till grass drill, such as those manufactured by Truax, Great Plains, and Sukup, which compensates for the light fluffy seed and trash with picker wheels for seed pick-up and oversized tubes to reduce clogging. Even with the specialty drills, non-debarbed seed and seed with a high chaff content will clog seed delivery tubes and will require constant monitoring

Debarbed seed with the chaff cleaned out can be run through a conventional drill or can be broadcast when special care is taken as will be explained below. A possible exception to this is Little Bluestem, which can rarely be debarbed completely without damaging the seed.

We recommend the use of specialty warm season no-till drills even for debarbed seed due to other features normally included that aid in accurate seed placement.

The following drill features and operation suggestions will aid correct seed placement.

- a. No-till drills need trash plows to provide a flat seed bed in exposed soil. Trash plows cut through crowns of existing vegetation to allow placement of the seed in soil rather than on top of roots and dead vegetation. In addition, the trash plows level the soil in front of the double disc openers to aid in accurate seed depth placement. This can be especially important when drilling across rows in crop residue fields.
- b. Excessive drilling speed should be avoided when using trash plows to prevent throwing dirt into the excavation made by the adjacent plows.
- c. Drills with depth bands on the double disc openers to prevent placing seed too deep are highly recommended. A good rule of thumb for

accurate seed depth placement is to expect to see about 1/3 of the seed exposed on top of the ground.

- d. Caution is urged to insure alignment of trash plows, discs, and packer wheels. The discs should ride in the center of the trough cut by the trash plows and the packer wheels must align with the groove cut by the coulters to effectively press the seed into the soil.
- e. Caution is urged to insure proper pressure settings for trash plows and packer wheels. Do not cut with the trash plows any deeper than is absolutely necessary to expose soil consistently. Make sure the packer wheels have pressure on them.

If you have purchased debarbed seed with the chaff cleaned out and have elected to use a conventional seed drill or to broadcast seed your forage planting, here are a few suggestions that will help insure a successful establishment.

- a. Carefully calibrate the seeding rate on your drill and test the calibration over a large known area to insure you are planting sufficient seed.
- b. Check your seeding depth often and choose to err on the side of too shallow rather than too deep.
- c. Inspect your seed deliver hoses often to keep them from clogging, especially if planting Little Bluestem.
- d. Do not attempt to broadcast seed on other than conventionally tilled ground. Cultipack the site prior to broadcast seeding and then cultipack again after seeding to firmly press the seed into the soil. Failure to cultipack prior to broadcast seeding will result in a large percentage of the seeds being placed too deep to germinate and has been a cause of numerous establishment failures.
- e. A carrier will be needed to evenly distribute the light grass. It is best to set to broadcast at a half rate and seed over the area twice with the second pass at a right angle to the first pass.
- f. Fertilizer is not recommended as a carrier. Your native grasses will not need the fertilizer in the first year and any addition of fertilizer will only give the competition a boost.

5. TIMING AND RATE OF SEEDING

Most native warm season grass seed will not germinate until the soil temperature is above 55 degrees F. There is therefore little incentive to plant seed early and there are plenty of reasons to delay planting until the appropriate time.

Keep in mind that the biggest cause of establishment failure is a failure to control competition. Often the most critical factor in reducing competition is to control warm season grasses and weeds. Like the natives you are trying to establish, these warm season grasses and weeds won't germinate until the soil temperature is around 55 degrees F. By waiting you will allow these warm season grasses and weeds to emerge so they can be effectively killed with your herbicide application. Planting too early also has the disadvantage of exposing your seed to erosion, predation, and becoming buried too deep for emergence.

The danger in planting late is the increased possibility of reduced soil moisture. **Generally, the optimum time for seeding NWSG seed in Kentucky is between the last week in May and the first week in June.** Two weeks earlier is ok if you are absolutely certain there will be no warm season grass and weed competition. In normal to moderately below normal moisture years successful plantings have consistently been completed as late as the last week in June. At these later dates it is even more important to eliminate competition for soil moisture.

Fall or dormant seeding of NWSG should be avoided. Fall seeding will result in seed too deep due to frost heaving and there will be considerable seed loss due to erosion, predation and rot.

Very careful calibration of the specialty warm season drill is vital for correct seeding rates and is often difficult. Often these drills will not have the needed extra gears or have the adjustment mechanisms necessary to adjust the seed output in less than 1 or 2 pound increments. If borrowing a KDFWR drill or renting one from a dealer, have the KDFWR personnel or the dealer calibrate the drill for your seed. Seeding rates for NWSG is in Pure Live Seed Pounds (PLS) and drills will have to be set to match the PLS of the seed you have purchased. Running out of seed prior to seeding the planned area and having to go back to the seed vendor for more seed is an all too common problem.

Although NWSG are clump grasses that will spread out from the establishment plant significantly over time, heavy seeding rates are recommended for forage production to suppress the following problems:

- a. Higher seeding rates compensate for high seed dormancy
- b. Higher seeding rates help reduce competition by reducing open spaces.
- c. Higher seeding rates help offset harvest damage and loss of young plants.
- d. Higher seeding rates compensate for variances in seeding depth.

Our recommendations for drilled seeding rates for pasture and hay production are as follows:

- a. Indian Grass 10-12 # PLS / acre
- b. Big Bluestem 10-12 # PLS / acre
- c. Little Bluestem 8-10 # PLS / acre
- d. Switchgrass 10-12 # PLS / acre
- e. Eastern Gamma Grass 8-10 # PLS / acre (Treated Seed)

For broadcast seeding in conventional tilled prepared seed beds add approximately 2 # PLS/ acre.

6. SEED QUALITY AND CONDITIONING

If your seed is no good, full of trash, and contains lots of weed seeds, it doesn't matter how much care you take in seeding your land, how hard you work to prepare your site, how much care you take in selecting you site, or how much effort and expense you put into controlling competition. You simply won't get a stand.

Do not let price alone be the determining factor when purchasing your seed. Shop wisely and don't be afraid to ask questions about the seed you are about to purchase. Just because a bag of seed has a tag on it does not insure that what is on the tag is what is in the bag.

Seed shipped into Kentucky direct to consumers evades any quality inspection by Kentucky Regulator Services or any other agency designated to protect consumer interests. This makes Kentucky a dumping ground for old, mislabeled, and poor quality seed. Seed industry analysts are reporting that low demand over the past few years has resulted in large inventories of old seed stored in bins without heat and moisture control.

Recommended considerations when purchasing seed for your forage planting:

- a. **Buy ecotype (locally adapted) seed if available.** Ecotype seed evolved in your soils, climate, rainfall, geology, and pests. It will simply perform much better.
- b. **Buy seed by PLS (pure live seed) weight** and demand a current test. The law requires a current test and any reputable dealer will comply.
- c. **Demand to know the origin of seed purchased and the year produced.** Buy only current year production if available.
- d. **Don't buy seed with high percentages of inert matter** (chaff). Such seed will cause problems when drilling. In addition, if the producer cannot clean the stems and grass out, then they cannot clean out the weed seeds.
- e. **Examine the seed you purchased for weed and crop seed** regardless of what is printed on the tag.
- f. **Buy seed that has been stored under temperature and humidity control.** Avoid seed that has been stored in grain bins through the hot summer.
- g. **Buy only debearded seed if available.** Only debearded seed can be cleaned effectively. Debearded seed aids in seed to soil contact, won't clog drills, and provides more numbers of seed per PLS pound of seed purchased.
- j. **If in doubt about the quality of the seed you have purchased, send a sample of the seed to Kentucky Regulatory Services to be tested.** The test is free.

7. STAND MAINTENANCE

Experience has shown that for many producers that use quality seed, prepare their site, and use effective pre-emergent competition control, there is still the challenge of post-emergent weed control.

Mowing can be an effective method of competition control, however, care must be taken to insure mowing height is above emerging native grasses. A major disadvantage to mowing is that it does not kill plants such as Johnson Grass, leaving the roots to reinfest your stand in the future.

Post emergent weed control can generally be accomplished with herbicides. For Big Bluestem, Indian Grass, and Little Bluestem, applications of Plateau herbicide will control most problem weeds and unwanted grasses, but, **it is a selective herbicide** and will not kill all problem plants. Some tips for using Plateau herbicide.

- a. **Never** apply Plateau herbicide prior to all seedlings reaching 6" to 8" tall.
- b. Do not use a surfactant in post-emergent applications.
- c. Post-emergent applications should be at 6 ounces per acre or less.

Plateau cannot be used over Eastern Gamma Grass, however, the same herbicides used for corn can be used for Eastern Gamma Grass.

With Switchgrass we are limited in the use of herbicides to control unwanted grass competition and with this grass it is even more vital to obtain control of warm season grass competition before planting.

For broadleaf weed problems, 2-4D or similar herbicides will do the job. For some difficult to kill plants we have had good success using Crossbow.

Maintenance of your NWSG stand includes insuring that the plants are not grazed or mowed below 6" to 8" and that time is allowed for fall recovery and storage of nutrients for survival and regrowth the next spring.

Native warm season grasses need a controlled burn about every three years. Remember, these plants evolved dependent on fire and any effective management plan should include, if possible, periodic use of prescribed burns. Burning inhibits invasion of woody plants and suppresses weeds. Burning removes smothering thatch that retards early growth and tiller development. You should discuss this maintenance option with your DC, extension agent, or KDFWR representative.

Properly maintained stands of native warm season grasses may last 15 to 20 years without reseeding.