

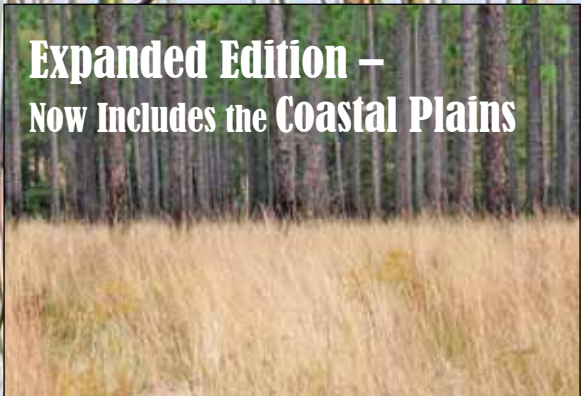


SIX BASIC ELEMENTS

For a Successful Native Grass and Forb Establishment

Randy Seymour, John Seymour
and Chris Blackford

**Expanded Edition –
Now Includes the Coastal Plains**



*Six Basic Elements for a Successful Native Grass
and Forb Establishment – Third Edition*

By Randy Seymour, John Seymour and Chris Blackford

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Six Basic Elements for a Successful Native Grass and Forb Establishment

1. Understand How Native Warm Season Grasses and Forbs Grow

Native Warm Season Grasses (NWSG) are clump grasses, not turf grasses, as are most of the forage grasses we are familiar with. **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 expect 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 some NWSG for forage. Such forage plantings may require a seeding rate as high as 12 PLS pounds of seed per acre. A primary goal for CRP plantings, however, is wildlife habitat and forage plantings are often too dense to provide ideal habitat. For this reason CRP plantings use low seeding rates that may add to the difficulty of establishment. The CRP CP-25 practices often use a rate as low as 3 PLS pounds per acre of NWSG seed and other wildlife plantings. At this extremely low rate it is imperative that every single seed possible germinate and survive to insure a viable stand.

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 the first growing season can be a good stand. If in doubt, ask your DC, a Fish & Wildlife-Resources biologist, or your seed producer.



Forage planting at 90 days



CRP planting at 45 days

2. 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 and the forbs used in CRP plantings 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, forbs, and legumes have a high degree of dormancy and many seeds will not germinate the first year. Many native seeds, especially the forbs and legumes, 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, Bermuda Grass, Bahia Grass and many others are not effectively controlled by Roundup® alone. Other herbicides, such as Crossbow®, may be necessary for such hard to kill species. Imazapyr-based herbicide may be effective for Bermuda Grass and Bahia Grass. 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. Ahead in this booklet you will find 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 weeds 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 and forbs. While you can effectively kill most growing warm season weeds and 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.

Weed Control & Site Preparation – Important!

Not properly controlling weeds and not preparing the site will almost guarantee establishment failure.



Land cultivated after the first herbicide treatment, bringing a new crop of weed seeds to the surface.



A single early burndown without a pre-emergent burndown has given the competition so much of a head-start that it will smother out the seedlings.



An example where only a single burndown was made, but too late to get a kill, leaving too much vegetation to effectively drill through.

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

Most CRP producers will not have the opportunity to follow this set of guidelines in its entirety. Given the time of year and the extent of cost share available you should apply as much of this recommendation as possible to ensure competition control.

1. Herbicide treat warm season weeds and grasses such as Johnson Grass, Giant Foxtail, Crabgrass, Texas Panicum, Pigweed, 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 with Imazapic as the active ingredient will suppress germination of these warm season weed seeds until after your native plants have had a chance to get started. Imazapic may impede growth in weak seedlings. In the Deep South, where Bermuda Grass or Bahia Grass can be a major problem, a herbicide containing Imazypryr can be used in late summer or fall. Check with your supplier or NRCS for recommended rates.

2. 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 due to time or program restrictions in the fall, 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.
3. 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, corn, or other 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 that will prevent native seeds from germinating. The oats will need to be killed back in April.
4. 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 plants surviving the early spring burndown and any warm season plants that have emerged prior to seeding. In addition, this treatment, as needed, should include 2 to 4 ounces of an Imazapic-based herbicide to suppress the germination of many warm season weed seeds.



CRP Planting in a pasture field following effective competition control practices. Practices included bush-hogging in the fall, a spring burndown, and a pre-emergent Roundup® burndown with an Imazapic-based herbicide included to suppress warm season seed germination.

3. SEEDING METHOD

Most native warm season grass and most CRP recommended forbs and legumes **will not** emerge if planted below $\frac{1}{4}$ " in depth. This needs repeating. They simply won't sprout if planted too deep. The seeding method and equipment chosen must ensure really good seed to soil contact and prevent burying the seed too deep. For very sandy soils that quickly lose surface moisture, especially in the coastal plain, a compromise of seeding depth should be made to ensure moisture availability, especially late in the year.

Native warm season grass species such as Big Bluestem, Little Bluestem, Wiregrass, 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, which compensates for the light fluffy seed and trash with picker wheels for seed pickup 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 later in this booklet. A possible exception to this is Little Bluestem, which can rarely be debarbed completely without damaging the seed. Mixes with minor percentages of debarbed Little Bluestem should be okay to run in a conventional drill with careful monitoring. 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. With the extremely low CRP seeding rates it is critical that every seed possible be placed to maximize germination.



Drilling warm season grass seed using warm-season specialty drills.

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

- 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 inaccurate seed depth placement. This can be especially important when drilling across rows in crop residue fields.

- Excessive drilling speed should be avoided when using trash plows to prevent throwing dirt into the excavation made by the adjacent plows.



Agitator Screw & Picker Wheels

To ensure a dependable constant measurement of seed delivery.

- 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.

Trash Plows

To level planting area for depth control and to scalp the site to insure seed to soil contact.



Depth Bands

to prevent burying seed too deeply. Seed buried deeper than 1/4" will not survive.

- Caution is urged to ensure 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.
- Caution is urged to ensure 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.
- When drilling a mix of grasses and forbs where the seed has been debarbed, there is no problem in mixing the grass and forb seed together and drilling all of it through the same box. It is recommended, however, that the seed

Gear Reduction Assembly

To allow quick change and exact seed delivery calibrations.



box only be filled to $\frac{2}{3}$ capacity to compensate for any separation that might occur. When the seed is not debarbed and the trash has not been cleaned out, it is recommended that the small smooth seed in the mix be run through the legume box and the larger smooth forb seed be run in the cool season box. Otherwise the smooth seed will settle to the bottom resulting in areas with no grass seed and areas with no forb seed.

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 CRP contract, here are a few suggestions that will help ensure a successful establishment:

- Carefully calibrate the seeding rate on your drill and test the calibration over a large known area to ensure you do not exhaust your seed prior to seeding the contract area. Additional reduction gears will allow calibration with very close tolerances on most native warm season grass drills.
- Check your seeding depth often and choose to err on the side of too shallow rather than too deep.
- Inspect your seed delivery hoses often to keep them from clogging, especially if Little Bluestem or Side Oats Grama is included in the seed mix.
- 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.
- When broadcasting, a carrier may be needed to evenly distribute the light grass seed, especially Little Bluestem and Side Oats Grama, as well as the heavier forb seed. It is best to broadcast at a half rate and seed over the area twice with the second pass at a right angle to the first pass.
- 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.

4. TIMING AND RATE OF SEEDING

Most native warm season grass seed and many of the forbs included in CRP mixtures will not germinate until the soil temperature is above 55°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°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 the southeastern United States is mid-May to mid-June. In the Deep South, seeding may begin as early as March 15.** Two weeks earlier is okay 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.



A wildlife habitat planting 12 months after seeding. This field was seeded on June 21 in a dry year.

Fall or dormant seeding of NWSG should be avoided, especially with the very low seeding rates provided in the CRP practices. 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. Seeds germinating late in the fall risk being killed before sufficient root systems are established to withstand freezing. At 3 PLS pounds of seed per acre rates, you cannot expect a stand if you lose any seed.

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 Fish & Wildlife Resources drill or renting one from a dealer, have the Dept. of Fish & Wildlife Resources personnel or the dealer calibrate the drill for your contract mix. Running out of seed prior to weeding the contract area and having to go back to the seed vendor for more seed is an expensive—and all-too-common—problem.

Late winter (January-March) dormant seedings can be successful when prior-year competition has been carefully implemented. Dormant seeding in corn, bean, cotton or cereal crop fields that have been herbicide treated in anticipation of a dormant seeding can be very effective. Seeding rates for late winter dormant seedings should be increased by 25% to compensate for seed lost to rot, predators and frost heaving. Late winter dormant seedings have the advantage of subjecting the seed to a natural cold/moist stratification, and especially increases forb density in the first year.

5. 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 contract, how hard you work to prepare your 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 out directly to consumers evades any quality inspection by state regulatory services or any other agency designated to protect consumer interests. Such practices create 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.



Quality seed is free of chaff and weed seed, and has a current seed test showing Purity and Germination.

Recommended considerations when purchasing seed for your CRP contract

- **Buy ecotype (locally adapted) seed if available.** Ecotype seed evolved in your soils, climate, rainfall, geology, and pests. It will simply perform much better.
- **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.
- **Demand to know the origin of seed purchased and the year produced.** Buy only current year production if available.
- **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.

- **Examine the seed you purchased for weed and crop seed** regardless of what is printed on the tag.
- **Buy seed that has been stored under temperature and humidity control.** Avoid seed that has been stored in grain bins through the hot summer.
- **Buy only debarbed seed if available.** Only debarbed seed can be cleaned effectively. Debarbed seed aids in seed to soil contact, won't clog drills, and provides approximately 15% more numbers of seed per PLS pound of seed purchased.
- **If in doubt about the quality of the seed you have purchased, send a sample of the seed to your state regulatory services to be tested.**
- **Be sure to keep a sample for your records.** In case of failure, a test can quickly determine if the seed is at fault. Some programs will partially cost-share replanting if an act of nature is the cause of failure rather than seed quality.



Using high quality cleaned and conditioned seed pays.

6. Stand Maintenance

Experience has shown that for many CRP 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; care must be taken, however, to ensure that mowing height is above emerging native grasses and forbs. Some of the forbs and legumes such as Partridge Pea and Blackeyed Susan in the CRP mixes are annuals or short lived biennials and are dependent on first-year seed production to maintain their presence. Mowing too late in the season to allow regrowth and seed production can destroy these plants from your stand. 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.

In areas where weeds or undesirables tower above the native plants, wicking has proven to be an effective and relatively inexpensive treatment. A rope wick applicator functions like a sponge mop, absorbing and holding the herbicide. The chemical is then wiped directly onto the weed. Rope wick applicators are available in hand-held, 4-wheeler-mounted and tractor-mounted models.

NRCS personnel in some states* had the forethought to develop CRP mixes designed to be Imazapic herbicide tolerant, at least to some degree. Imazapic herbicides may burn some of the forbs and legumes rather badly but will not kill them except at very high rates. Applications of Imazapic will control most problems weeds and unwanted grasses, however, it is a selective herbicide and will not kill problem plants. The following are tips for using Imazapic herbicide based on our experience; you should, however, confirm with the manufacturer to make sure they will stand behind the products when following these tips:

- **Never** apply Imazapic herbicide until all seedlings have 6" to 8" tall.
- The use of Imazapic in early summer of the second year will take care of most weed problems where seed mixes were designed to be tolerant; most programs, however, are not designed to reimburse for this second treatment.
- Do not use a surfactant in post-emergent applications or in first-year stands.
- Post-emergent applications should be at 6 ounces per acre or less.

Avoid using direct applications of broadleaf herbicides such as 2-4D to prevent killing of forbs and legumes in your CRP mix. Herbicide applications, even using broadleaf herbicides, have been effective using a wick applicator above emerging native grasses and forbs. Long-term maintenance of your CRP contract may include

**This may not have been done in your state. Check the Plateau® label before using on the specific forbs in your mix.*



If possible, fire should be a part of your long-term maintenance planning.

mowing, strip discing, and/or burning. Remember, these plants evolved dependent on fire and any effective management plan should include, if possible, periodic use of prescribed burns. You should discuss this maintenance option with your DC or Fish & Wildlife Resources representative.

If you plan to use fire as a maintenance method, you should plan for a fire lane around your fields at the time of establishment. Fire lanes should be planted in a specific mix of species that will be green and resist burning in April when most controlled burns are performed. Planting fire lanes in White Clover or Winter Wheat are good options. Fire lanes can also be very effective wildlife food plots when managed.

Commonly Used Native Grasses and Wildflowers



Big bluestem • *Andropogon gerardii*



Eastern gamma grass • *Tripsacum dactyloides*



Indian grass • *Sorghastrum nutans*



Little bluestem • *Schizachyrium scoparius*



Sideoats grama • *Bouteloua curtipendula*



Switchgrass • *Panicum virgatum*



Virginia wild rye • *Elymus virginicus*



Purple top • *Tridens flavus*



Wiregrass • *Aristida stricta*



Pineywoods dropseed • *Sporobolus junceus*



Toothache grass • *Ctenium aromaticum*



Lopsided indian grass • *Sorghastrum secundum*



Blackeyed susan • *Rudbeckia hirta*



False sunflower • *Heliopsis helianthoides*



Greyheaded coneflower • *Ratibida pinnata*



Partridge pea • *Cassia fasciculata*



Purple coneflower • *Echinacea purpurea*



Bergamot • *Monarda fistulosa*



New England Aster • *Aster novae-angliae*



Illinois Bundleflower • *Desmanthus illinoensis*



Roundheaded lespedeza • *Lespedeza capitata*



Butterfly milkweed • *Asclepias tuberosa*



Rigid goldenrod • *Solidago rigida*



Spiked blazing star • *Liatris spicata*



Hairy lespedeza • *Lespedeza hirta*



Sensitive briar • *Mimosa quadrivalvis*



Rattlesnake master • *Eryngium yuccifolium*



Lance leaved coreopsis • *Coreopsis lanceolata*



Wild senna • *Cassia marilandica*



Florida tick trefoil • *Desmodium floridanum*

NATIVE GRASSES

Common Name	Botanical Name	Planting Rates (PLS lbs / acre)	Seeds / lb.	Planting Dates	Flowering Period	Soil Moisture	Height
Big Bluestem	<i>Andropogon gerardii</i>	5 - 8 lbs	144,000	May - June	August - October	med - dry	6 - 8 ft.
Bottlebrush Grass	<i>Elymus hystrix</i>	N/A	75,000	May - June	June - August	med - dry	2.5 - 5 ft.
Broomsedge	<i>Andropogon virginicus</i>	6 - 8 lbs	800,000	May - June	August - October	dry	1.5 - 3 ft.
Canada Wild Rye	<i>Elymus canadensis</i>	8 - 10 lbs	115,000	May - June	June - August	med - dry	3 - 5 ft.
Deer Tongue Grass	<i>Panicum clandestinum</i>	3 - 5 lbs	350,000	May - June	June - July	dry - wet	2 - 3 ft.
Eastern Gamma Grass	<i>Tripsacum dactyloides</i>	10 - 12 lbs	7,200	May - June	Late June	med - wet	8 - 10 ft.
Fall Panicum	<i>Panicum Anceps</i>	8 - 10 lbs	N/A	May - June	July - October	dry - wet	3 - 4 ft.
Indian Grass	<i>Sorghastrum nutans</i>	8 - 10 lbs	170,000	May - June	June - July	med - dry	3 - 5 ft.
Little Bluestem	<i>Schizachyrium scoparium</i>	6 - 8 lbs	250,000	May - June	August - October	med - dry	1.5 - 3 ft.
Purple Top	<i>Trident flavus</i>	15 - 20 lbs	460,000	May - June	August - October	dry	2.5 - 3 ft.
River Bank Wild Rye	<i>Elymus riparius</i>	8 - 10 lbs	125,000	May - June	June - August	wet	3 - 4.5 ft.
Side Oats Gramma	<i>Bouteloua curtipendula</i>	3 - 5 lbs	135,000	May - June	May - June	med - dry	1.5 - 3 ft.
Switchgrass (Alamo)	<i>Panicum virgatum</i>	6 - 8 lbs	N/A	May - June	August - September	med - dry	4 - 7 ft.
Switchgrass (Cave-in-Rock)	<i>Panicum virgatum</i>	8 - 10 lbs	260,000	May - June	July - September	med - dry	4 - 6 ft.
Tall Dropseed	<i>Sporobolus compositus</i>	6 - 8 lbs	760,000	May - June	August	med - dry	2 - 4 ft.
Virginia Wild Rye	<i>Elymus virginicus</i>	8 - 10 lbs	100,000	May - June	May - June	med - wet	2 - 3 ft.

NATIVE WILDFLOWERS

Common Name	Botanical Name	Duration	Flowering Period	Color	Height	Soil Moisture	Seeds / lb	Seeding Rate
Bergamot	<i>Monarda fistulosa</i>	perennial	July - August	Lavender	3 - 4 ft.	moist - dry	1,250,000	2.5lbs /ac
Blackeyed Susan	<i>Rudbeckia hirta</i>	perennial	June - September	Yellow	1 - 3 ft.	moist - dry	1,600,000	2.0 lbs/acre
Blue False Indigo	<i>Baptisia australis</i>	perennial	June - July	Blue	3 - 4 ft.	med. - dry	26,000	25.0 lbs/acre
Butterfly Milkweed	<i>Asclepias tuberosa</i>	perennial	June - August	Orange	1 - 3 ft.	moist - med.	56,000	25.0 lbs/acre
False Sunflower	<i>Heliopsis helianthoides</i>	perennial	June - August	Yellow	3 - 7 ft.	moist - dry	105,000	10.0 lbs/acre
Greyheaded Coneflower	<i>Ratibida pinnata</i>	perennial	June - July	Yellow	3 - 4 ft.	moist - dry	450,000	6.0 lbs/acre
Illinois Bundleflower	<i>Desmanthus illinoensis</i>	perennial	July - August	White	3 - 5 ft.	moist - dry	200,000	10.0 lbs/acre
Iron Weed	<i>Veronica altissima</i>	perennial	July - September	Purple	3 - 7 ft.	moist - dry	320,000	8.0 lbs/acre
Joe Pye Weed	<i>Eupatorium fistulosum</i>	perennial	August - September	Pink	4 - 7 ft.	moist - med.	120,000	7.5 lbs/acre
Lance Leaved Coreopsis	<i>Coreopsis lanceolata</i>	perennial	June - July	Yellow	1 - 2 ft.	med. - dry	220,000	5.5 lbs/acre
Maximilian Sunflower	<i>Helianthus maximiliani</i>	perennial	August - September	Yellow	4 - 8 ft.	moist - dry	210,000	4.0 lbs/acre
New England Aster	<i>Aster novae-angliae</i>	perennial	September - October	Purple	2 - 4 ft.	moist - med.	1,200,000	2.0 lbs/acre
Partridge Pea	<i>Cassia fasciculata</i>	annual	July - August	Yellow	2 - 4 ft.	med. - dry	75,000	16.0 lbs/acre
Prairie Dock	<i>Silphium pinnatifidum</i>	perennial	July - September	Yellow	4 - 8 ft.	med. - dry	10,000	22.0 lbs/acre
Purple Coneflower	<i>Echniacea purpurea</i>	perennial	June - July	Lavender	2 - 3 ft.	med. - dry	115,000	12.0 lbs/acre
Purple Prairie Clover	<i>Dalea purpureum</i>	perennial	June - July	Pink	1.5 - 2 ft.	med. - dry	290,000	8.0 lbs/acre
Rattlesnake Master	<i>Eryngium yuccifolium</i>	perennial	July - August	Green	2 - 4 ft.	med. - dry	128,000	10.0 lbs/acre

Rigid Goldenrod	<i>Solidago rigida</i>	perennial	August - October	Yellow	3 - 5 ft.	med. - dry	730,000	3.0 lbs/acre
Roundheaded Lespedeza	<i>Lespedeza capitata</i>	perennial	August - September	White	3 - 4 ft.	med. - dry	160,000	11.0 lbs/acre
Showy Tickseed	<i>Bidens aristosa</i>	annual	August - September	Yellow	2 - 3 ft.	moist - med.	130,000	N/A
Smooth Aster	<i>Aster laevis</i>	perennial	September - October	Blue	2 - 4 ft.	med. - dry	750,000	3.5 lbs/acre
Spiked Blazing Star	<i>Liatris spicata</i>	perennial	July - August	Pink	2 - 4 ft.	moist - med.	100,000	10.0 lbs/acre
Tall Coreopsis	<i>Coreopsis tripteris</i>	perennial	July - September	Yellow	3 - 8 ft.	moist - dry	170,000	5.0 lbs/acre
White Wingstem,	<i>Verbesina virginica</i>	perennial	August - October	White	3 - 7 ft.	moist - med.	N/A	N/A
Wild Quinine	<i>Parthenium integrifolium</i>	perennial	July - August	White	2 - 3.5 ft.	moist - dry	110,000	20.0 lbs/acre
Wild Senna	<i>Cassia marilandica</i>	perennial	July - August	Yellow	3 - 6 ft.	moist - dry	26,000	16.0 lbs/acre



9758 Raider Hollow Road,
Upton, Kentucky 42784
270.531.3034 phone
270.531.3036 fax

Chris@roundstoneseed.com
John@roundstoneseed.com
Randy@roundstoneseed.com

www.roundstoneseed.com

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