



# Warm Season Grass Establishment



Warm season grasses (WSG's), also referred to as prairie grasses, are native clump forming grasses that grow during the warm summer months. These grasses, usually occurring with native wildflowers, once covered two million acres of Indiana. The high fertility of the soil, created in part from thousands of years of grass decomposition, made these acres in demand for agricultural use. Today less than 1,000 acres of virgin prairie remain. Examples of WSG's include Indiangrass, big bluestem, little bluestem and switchgrass.

Although known to be especially beneficial to species of song birds, game birds and small mammals, many of Indiana's birds, mammals, reptiles and insects require grasslands at some point in their life cycle. In general, wildlife prefer open grasslands with a high concentration of forbs, especially legumes. Forbs and legumes produce seeds and high protein forage providing a food source. These open grasslands provide loafing, foraging, dusting and brood rearing cover. Dense grass stands can provide escape cover from predators. Rather than being flattened by snow cover, warm season grasses tend to bow over (forming tunnels) and return to an erect stature with snow melt. Two-thirds of a WSG's biomass is located in it's

root system. This extensive network, sometimes more than 12 feet long, provides excellent soil stability, organic matter/nutrient build-up, and mineral translocation.

## Seed Selection

Since warm season grass seed can often be expensive, careful consideration should be given to select the appropriate species. The species of grass and wildflowers selected will depend upon your local site conditions. Although soil fertility is less important when establishing native WSG's than exotic cool season species, soil type is still important. Many WSG species are adapted to drier soil (e.g. little bluestem, side oats grama) while some others thrive in moist soils (e.g. switch grass). Species such as big bluestem and Indiangrass can be established in a range of soil types. Grass and wildflower seed should be obtained from local "parent stock" to ensure suitability for Indiana's growing conditions. Plant species should be selected, and mixes of grass and forbs developed, that have similar maintenance needs. For this reason it is unadvisable to mix native WSG species with cool season grass species such as fescue, orchard grass and timothy.

## Field Layout

The use of prescribed fire, grazing, mowing and/or herbicides to maintain warm season grass/forb plots necessitate considering the layout of a field before planting. The establishment of firebreaks or consideration of local land characteristics before establishment can prevent future management problems. See the *Prescribed Fire* Fact Sheet for detailed information.

## Seed Bed Preparation

A firm, clean seed bed is the best medium for all methods of planting. If a field has a high content of surface debris, it should be disked or cultivated to incorporate the debris into the soil. The field should then be culti-packed or rolled to make the surface firm. Do not apply fertilizer to the WSG unit. Fertilizers encourage vigorous growth from annual weeds and cool season grasses, increasing the competition for sunlight.

## Herbicide

If you will be planting following an agricultural crop, precede the installation with a crop of "Roundup® ready" soybeans, corn or wheat which hasn't been treated with an atrazine-based herbicide. If the WSGs are to be planted in established grasses or fallow ground, a glyphosate herbicide (Roundup®) should be applied prior to or at the time of planting to reduce plant competition. Herbicide application will be most effective if the deposition of previous years growth is removed by burning, mowing and/or baling before treatment. Established stands of tall fescue will also require the addition of an imazapic herbicide (Journey or Plateau®) herbicide to the glyphosate mix. See the *Fescue Eradication* Fact Sheet for further information. If you have not received training in herbicide application, hire the services of a licensed herbicide applicator. All herbicides should be applied according to the registered label.

## Herbicide Selections

**Glyphosate** – (Ex. RoundUp® and many other label names). This product is easily available. It is a non-selective post-emergent herbicide (non-selective means it will affect or kill and plant whose foliage it contacts). The herbicide is absorbed through the plant's foliage and

translocated to the root system resulting in a complete kill. In WSG establishment it is normally used for a fall and springtime (pre-plant) burn down on existing cool season grasses; or, in some established plantings it is utilized to control noxious weeds via a wick applicator or spot treatment.

**Imazapic** – (Ex. Plateau®) Plateau is a selective herbicide in that, some plants are tolerant of a pre- and/or post-emergent application (most WSGs and some forbs/wildflowers). Some forbs/wildflowers seed sources will refer to species as “Plateau tolerant,” in fact, that truly indicates that they are tolerant of the imazapic. This is a restricted product and it is not freely available to the public; Plateau herbicide is available ONLY to government agencies and not-for-profit organizations,

**Glyphosate + Imazapic** – (Ex. Journey®) This is an unrestricted product available to the public. Basically it is both a pre- and post-emergent herbicide. The glyphosate ingredient gives a post-emergent kill to existing vegetation. And, the imazapic ingredient also gives a post-emergent kill; plus, it will provide a pre-emergent control of competing plants during the first few weeks after planting WSGs (excepting those species tolerant of imazapic, or “Plateau tolerant”). In WSG establishment it is typically applied (in the spring) at the time of planting WSGs. It should NOT be applied after the desired seeds (WSGs and forbs) have germinated and emerged from the soil.

### Calculating Per Live Seed

Warm season grasses are purchased in Pure Live Seed (PLS) amounts. PLS is the seed that grows minus the other plant parts that inherently come with the seed. The % PLS of any particular lot of seed is calculated by the following formula: % PLS = % Pure Seed X ( % Germination + % Dormant Seed). The PLS percentage times the bulk weight of the sack will give the pounds of PLS. Figures for percent purity, percent germination and firm seed are furnished by the seed dealer and usually are listed on the individual seed sacks.

**Example:** The tag from a 25 lb. bag of seed lists the following information.

% Pure Seed	99.00	% Germination	75.00
% Other Crop	.10	% Dormant (Hard)	10.00
% Inert Matter	.50	% Total Germ.	85.00
% Weed Seed	.40	Noxious Weeds	432

The % PLS for this bag of seed would be: 84%

$$\% \text{ PLS} = .99 \times (.75 + .10)$$

$$\% \text{ PLS} = .99 \times .85 = \mathbf{84\%}$$

The pounds of PLS in this bag would be 25 lbs. X 0.84 = **21 lbs. PLS**

### Incorporating Forbs and Legumes

Whether planting WSG’s for wildlife or a forage crop, certain legumes and/or forbs (wildflowers) should be added at the time of planting to fix nitrogen and provide food for wildlife. Wildlife biologists generally recommend adding ½ to 1 pound of wildflowers per acre. If Journey® or Plateau® herbicide is being used to establish the planting, care should be taken to select wildflowers and legumes that are pre-emergent tolerant to the herbicide. Below is a list of wildflowers that are tolerant to various rates of Journey® and Plateau®.

Wildflowers Tolerant To Pre-Emergent Application Of Journey® Herbicide				
10.7 Oz./Acre		16 Oz./Acre	21.3 Oz./Acre	32 Oz./Acre
Illinois Bundleflower	Clasping Coneflower	Illinois Bundleflower	Illinois Bundleflower	Illinois Bundleflower
Partridge Pea	Plains Coreopsis	Partridge Pea	Partridge Pea	Partridge Pea
Black-eyed Susan	Dwarf Red Coreopsis	Black-eyed Susan	Black-eyed Susan	
Purple Coneflower	Lanceleaf Coreopsis	Purple Coneflower	Purple Coneflower	
Red Mexican Hat	Cosmos	Red Mexican Hat		
Upright Coneflower	Yellow Cosmos	Upright Coneflower		
Perennial Lupine	Shasta Daisy	Perennial Lupine		
Red Corn Poppy	Drummond Phlox			
Corn Poppy	Purple Prairie Clover			

Wildflowers Tolerant To Pre- or Post- Emergent Application Of Plateau® Herbicide				
4 Oz./Acre		6 Oz./Acre	8 Oz./Acre	12 Oz./Acre
Illinois Bundleflower	Clasping Coneflower	Illinois Bundleflower	Illinois Bundleflower	Illinois Bundleflower
Partridge Pea	Plains Coreopsis	Partridge Pea	Partridge Pea	Partridge Pea
Black-eyed Susan	Dwarf Red Coreopsis	Black-eyed Susan	Black-eyed Susan	
Purple Coneflower	Lanceleaf Coreopsis	Purple Coneflower	Purple Coneflower	
Red Mexican Hat	Cosmos	Red Mexican Hat		
Upright Coneflower	Yellow Cosmos	Upright Coneflower		
Perennial Lupine	Shasta Daisy	Perennial Lupine		
Red Corn Poppy	Drummond Phlox			
Corn Poppy	Purple Prairie Clover			

## Planting

Any method which promotes good seed to soil contact will likely be successful. **Care must be taken to plant the seed at a depth not to exceed 1/4 inch.** Planting should occur in the Fall when soil temperatures are below 55 degrees, or in the Spring when soil temperatures are above 65 degrees. Warm season grasses should be seeded at a rate of 3 to 6 pounds per acre of pure live seed. Fields enrolled in any NRCS conservation programs must be planted according to their conservation practice standards.

**No-till drilling:** Some conventional drills come with a prairie grass box. This is a special box that contains seed rate metering wheels and an auger style agitator to facilitate even planting of the light fluffy seed. The drill should be calibrated to determine pounds per acre actually applied. **Warning:** WSG seed is very light and fluffy and unless the planter box is kept full and/or manually agitated, planting rates may be below the target level. The coulters should be set for the shallowest depth and the press wheels for the lightest weight. After planting, up to 30% of the seed should be visible on the ground surface. Many local Soil and Water Conservation Districts, Quail Unlimited and Pheasant Forever chapters have the specially adapted no-till drills available for rent. Your District Wildlife Biologist can assist in locating those in your vicinity.

**Broadcasting:** Following disking and packing, the seed can be spread by hand, with a broadcast seeder or with a fertilizer cart. A carrier such as pelletized lime or saw dust is suggested to evenly spread the seed. Do not use fertilizer as a carrier! Fertilizer

encourages vigorous competition from annual weeds and grasses. After seeding, it is beneficial to culti-pack or roll the seed bed again.

**Air seeding:** Available for hire from some custom farm service providers, air seeders use forced air to shoot the seed into the prepared seed bed. Air seeding can be used following conventional tillage and cultipacking. If planting large acres, this method can be fast and cost-effective.

Field Conditions, Equipment, and Methods for Planting Warm Season Grasses			
Seed Bed	Equipment	Method	Comments
Grass or wheat sod prepared by herbicide application	Native grass drill	Place seed in the special WSG box (this box is specially adapted with agitators and picker wheels to carry the fluffy seed down the drop tubes). Place any additional forbs being added to your seeding in the legume box, or add periodically to fluffy seed box. <b>Keep seed box at least half full at all times.</b> Make adjustments according to speed and soil type.	This is the easiest and quickest method to insure even distribution, soil contact, and proper planting depth.  When set right, a fair amount (30%) of the seed should be visible in the drill rows.
Bare, seed bed - <b>rolled or culti-packed, or previous year's crop stubble.</b>	Native grass drill	Same as above.  Crop fields with annual weeds may need to be sprayed prior to planting with 1 pint to 1 quart Roundup® and 4 oz. Plateau®, tank mixed, or 4 oz. Plateau® immediately after planting.	Surface should be firm but not crusted over. If surface is crusted over, harrow lightly.  Ideal seed bed should barely show footprints.  When set right, a fair amount (30%) of the seed should be visible in the drill rows.
Same as Above.	Custom Service - Truck Broadcast  or  Conventional Cyclone Seeder	Mix seed using a carrier of: -- lime at the rate of 200 lbs. / acre, or -- wheat at the rate of 40 lbs. / acre, or -- oats at the rate of 32 lbs./acre, or -- fertilizer ( <b>No Nitrogen fertilizers</b> ).  <b>Make sure to overlap passes.</b>  <b>Follow up by rolling or culti-packing.</b>	<b>Increase amount of seed by 25%.</b>  WSG will not broadcast as far as the carriers. <b>It is important to overlap rows to insure even coverage.</b>  <b>Mow prior to oat or wheat seed head formation if these grains are used as a carrier.</b>
Same as Above.	Air Seeder	Mix seed using a carrier of: -- 100 lbs. of potash/acre, or -- 60 - 100 lbs. of pelletized lime /acre.  <b>Follow up by rolling or culti-packing.</b>	No need to overlap rows.  Large amount of acreage can be planted in a relatively short time.
Same as Above.	WSG Hand Broadcaster	This type of broadcaster is specially equipped with picker wheels at the base of the box to pull the seed out.  <b>Follow up by rolling or culti-packing.</b>	<b>Increase amount of seed by 25%.</b>  Not recommended for areas greater than one acre.

Mention of the trade names, Roundup®, Journey® and Plateau®, does not constitute an endorsement of specific products. Consult your local farm supply store for availability of equivalent herbicides. Always thoroughly read herbicide label instructions and apply according to labeled rates.

## First Year Maintenance

In some cases, follow-up weed control may be necessary during the establishment year to provide WSG's with optimum growing conditions. If weeds are extremely thick or if large infestations of noxious weeds are present, follow-up weed control is warranted. It should be pointed out, however, that many weeds ( primarily annual weeds, such as foxtail and common ragweed, and perennial forbs) are important sources of food for wildlife, especially the Bobwhite quail. **The purpose of weed control is to control weed density during the establishment year, not totally eliminate their presence.** WSG provide wildlife with cover. The annual weed and forbs component within the planting provides the food. Weed control options are listed in the following table.

Post-Seeding Weed Control Options		
Option	Method	Comments
<b>Mowing</b>	Set mower to a 6 - 8 inch height. Start early and mow frequently or rake and remove weed cover. Do not mow after August 1st.	Mowing will drastically reduce the winter food and cover value of the planting during the establishment year.
<b>Plateau® herbicide</b>  <b>Do not exceed 12 oz. per year on any one acre.</b>	<p><b><u>Forbs included in planting:</u></b> Apply Plateau® with a <b>silicone or nonionic</b> surfactant when weeds are actively growing.</p> <p><b><u>Forbs NOT included in planting:</u></b> Apply Plateau with a <b>MSO</b> surfactant when weeds are actively growing.</p>	May be applied directly over WSG and forbs*. <b>Important. Please see footnote below for use on switchgrass and forbs.</b> Best used to treat large Johnsongrass or weed infestations. May be applied anytime weeds or problem grasses are actively growing. However, it is best applied 14 days after planting for control of small emerged weeds and pre-emergent control of later germinating weeds and grasses at a 4 oz. rate with the appropriate surfactant.
<b>Roundup® or Journey® herbicide</b>	Spot spray or wipe RoundUp® mixture according to label depending on weed specie to control.	<b>Use only for spot treatment - not general application. It is not a selective herbicide. It will kill your WSG and forbs.</b>

\* The application of Plateau® to switchgrass seedlings and forbs may cause severe injury or death to these plants at high rates. Please consult the label for further information.

## Long Term Maintenance

The best, easiest, fastest, method to maintain your WSG is with a prescribed burn. Burning removes harmful layers of dead debris, suppresses shrub and tree growth, promotes vigorous WSG growth and increases the amount of exposed mineral soil vital to many critters for foraging, dusting, and movement. Only part of a WSG unit should be burned in any year. Dividing the unit into two to four sections, and rotating the units burned, maintains some cover for wildlife at all times. The best months of the year to burn are February, March, and April.

Caution must be taken to establish sufficient fire breaks at least 20 feet wide around the WSG unit. Fire breaks adjacent to homes, county or state roads and other areas of special concern should be 50 feet wide. Exposed mineral soil, cool season grasses, water and roads often make good fire breaks. Disked fire breaks can be planted to annual food plots or herbaceous cover to provide additional food sources. Always adhere to local burning ordinances and advise your local fire department before burning. Have sufficient help and resources available before you burn. Consider wind direction, nearby hazards, communities and your neighbors before you burn. It is better to be too cautious. When in doubt, DON'T BURN! For detailed information see the *Prescribed Burning* Fact sheet.

When burning is not an option, mowing and removing the thatch can mimic the stand-thinning properties of a prescribed burn. Mowing should not occur during the primary wildlife reproductive period of March 1 thru July 15. For further information on WSG management consult the *Warm Season Grass Management* Fact Sheet.

Establishing warm season grasses is not difficult but patience is required when looking for results. During the year of planting, competition from annual weeds is fierce. A concentrated effort by the plant to develop root growth leaves little energy for above ground shoot development. The second year of growth brings a dramatic change to the appearance of a planting, with clumps of grass appearing as if from nowhere. By the fourth year the annual weeds have all but disappeared and a mature stand of grass is present.

For assistance with the establishment or maintenance of native warm season grasses contact your District Wildlife Biologist.

**Related *Habitat Management Fact Sheets*:**

Warm Season Grass Management  
Prescribed Burning  
Wildflowers

Woodland Edge Enhancement  
Fescue Eradication