

INDIANA SEEDING TOOL

(NOVEMBER 2018)

ESTABLISHMENT OF HERBACEOUS VEGETATION GUIDELINES

Species Selection

Select species and rates from the tables in each appropriate practice standard or the appropriate Indiana NRCS Seeding Tool – *Indiana Seeding Calculator* to meet practice criteria (for muck, see Muck Planting Specifications). All seeding rates will be given in pounds or ounces of Pure Live Seed (PLS) per acre. All seed will be tested and/or labeled according to seed labeling requirements of Indiana Seed Law.

- To calculate percent PLS rates, multiply the percent purity by the percent germination.

PLS = % Purity or *pure seed* x % Germination (do not include % dormant or % hard seed for critical sites, forage production or annual cover crop seeding)

- Divide the seeding rate by the % PLS to find the bulk seed needed per acre.

$$\text{Bulk pounds} = \frac{\text{PLS needed}}{\% \text{ Purity} * \% \text{ Germination}}$$

Example: 98% Purity X 60% Germination = 58.8% PLS,

10 pounds PLS seed per acre/.588 PLS = 17 pounds of bulk seed per acre.

Seeding Calculators

Indiana General Seeding Calculator- This general seeding calculator is designed to address several resource concerns requiring the establishment of vegetation. It contains both introduced and native species. It is suitable for all purposes except:

- Planting native vegetation with wildlife or natural communities as a primary resource concern (Fiscal Year 2019 is a transition year, and the General Seeding Calculator is still acceptable for these purposes, however, the Wildlife seeding calculator is highly encouraged.)
- Cover Crops

Indiana Wildlife Seeding Calculator- This *native* seeding calculator is designed for the development and review of seeding mixes that will be used to address wildlife as a PRIMARY resource concern, or when degraded plant condition is negatively impacts other habitat or natural community resources. When wildlife is a secondary resource concern, the appropriate calculator for the primary resource concern will be used (e.g. Cover Crop Calculator, General Seed Calculator). **Cover Crop Seeding Calculator-** To develop suitable cover crop mixes to address specific resource concerns.

Seeding Dates

Table 1: SEEDING WINDOWS for PERENNIAL VEGETATIVE COVER IN INDIANA										
Plant Species	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec-Feb.
Non-Native cool season grasses			1					1		Dormant ²
Forage Legumes										Dormant ²
Native warm season species										Dormant ²
Native cool season species										Dormant ²

¹ Tall Fescue and/or Perennial Ryegrass only, with a mulch cover, Primarily for Critical Areas.

² Dormant/Frost seeding from December thru February. Increase seeding rates by 25% for Non-Native Species only. **Not for Critical Areas or new forage establishment.**

Legend

Suitable seeding dates for all of Indiana

Flood plains and ponded soils

Legumes can be seeded in the fall but Ladino, Alsike, White Dutch and Red Clover germinate best as a spring planting. Alfalfa does not establish well under dormant seeding.

All cool season grasses can be planted either in the fall or spring; however Redtop has the best success when planted in the spring. Dormant seeding cool season grasses for forage is only used to enhance an existing stand and not for a new establishment. Dormant seeding will not be used for Critical Area-type plantings.

Warm season grasses can be seeded in the dormant or spring seeding period except Prairie Dropseed, which should be dormant-seeded within 6 months of its seed harvest. Dormant seeding can improve germination success of many forb species.

Cover crops seeding dates in Table 2 are considered general. The Midwest Cover Crop Council Selector Tool <http://mccc.msu.edu/selectorINTRO.html> is also acceptable for seeding windows.

Companion/Nurse Crops

A companion/nurse crop will be used when erosion control and weed suppression are needed. Companion/nurse crops include Oats, Winter Wheat (after the Hessian Fly-free dates in Table 2), Barley, Cereal Rye or Annual Ryegrass; native Wildryes (*i.e.* – *Elymus sp.* such as Canada, Riverbank, and Virginia Wildrye) are also effective, especially for native seedings and tree plantings.

Companion crops will be clipped after jointing, but before seed head pollination unless otherwise directed (control of Wildrye species is not necessary so that they persist as part of native seedings). A second and subsequent clipping is necessary if re-growth provides competition. Clipping height should be above developing seedlings. Where excessive growth has accumulated, the vegetation will be chopped rather than swathed.

Temporary Cover

A temporary cover crop will be established according to the IN FOTG Standard (340) Cover Crop for erosion control and weed suppression when either of the following occurs:

- (a) The normal planting period for the species has passed.
- (b) Chemical residues will not allow establishment of cover.
- (c) Other limiting situations are present.

If herbicide-carryover potential exists, select species that are compatible with the previously-used herbicide. See Purdue University *Weed Control Guide* WS-16, and refer to the manufacture's label.

Temporary cover crops will be clipped prior to seed maturity unless otherwise directed in the plan.

Table 2: SEEDING WINDOWS FOR COVER CROPS IN INDIANA

NOTE: Northern and southern Indiana seeding dates for the tables below are divided on a general line along US 36 from Illinois to Indianapolis and US 40 from Indianapolis to Ohio

Best window of opportunity and greatest benefit for various cropping scenarios

■ After harvest
■ Aerial or interseed

■ After corn
■ After soybean
■ After seed corn
■ After corn silage
■ After vegetable crop

■ After wheat
■ After early veg. crops

Plant Species	March	April	May	June	July	August	Sept.	Oct.	Nov.	De.-Feb.
Annual Ryegrass	■	■	■	■	■	■	■	■	■	■
Cereal Rye						■	■	■	■	■
Winter Wheat							1	1	■	■
Spring Oats	■	■	■	■	■	■	■	■	■	■
Winter Triticale						■	■	■	■	■
Hairy Vetch					■	■	■	■	■	■
Field/Winter Peas						■	■	■	■	■
Cow Peas					■	■	■	■	■	■
Non-dormant Alfalfa					■	■	■	■	■	■
Berseem Clover					■	■	■	■	■	■
Crimson Clover					■	■	■	4	■	■
Red Clover ²	■	■	■	■	■	■	■	■	■	Dormant ²
Brassicas (Rape, Canola, Turnips)						■	■	■	■	■
Oil Seed Radish (daikon)						■	■	■	■	■
Sorghum Sudangrass ³			■	■	■	■	■	■	■	■
Millet(Japanese, Pearl)			■	■	■	■	■	■	■	■
Buckwheat				■	■	■	■	■	■	■

SEEDING WINDOWS FOR SUPPLEMENTAL LIVESTOCK FORAGE IN INDIANA

Plant Species	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec-Feb.
Annual Ryegrass	■	■	■	■	■	■	■	■	■	■
Perennial Ryegrass	■	■	■	■	■	■	■	■	■	■
Cereal Rye						■	■	■	■	■
Winter Wheat							1	1	■	■
Spring Oats	■	■	■	■	■	■	■	■	■	■
Winter Triticale						■	■	■	■	■
Crabgrass (Forage Type)			■	■	■	■	■	■	■	■
Field/Winter Peas						■	■	■	■	■
Cow Peas						■	■	■	■	■
Red Clover ²	■	■	■	■	■	■	■	■	■	Dormant ²
Brassicas (Rape, Swedes)						4	4	■	■	■
Brassicas (Turnips)	■	■	■	■	■	■	■	■	■	■
Sorghum Sudangrass ³			■	■	■	■	■	■	■	■
Millet(Japanese, Pearl)			■	■	■	■	■	■	■	■

Legend

■	Suitable seeding dates for all of Indiana	(seeding should be planned within these dates)
■	Additional suitable seeding dates for Southern IN increased freeze risk for Northern IN	
■	Increased Freeze Risk for Southern IN	
■	Additional suitable seeding dates for Northern IN	
■	When adequate moisture is present for germination	

¹ FFD--Not to be planted prior to Fly-Free Date
² Dormant/Frost seeding from December thru February. Increase seeding rates by 25%.
³ Also Sudangrass
⁴ Depends on variety

Annual “Filler” Species

Annual “filler” species may be added to perennial species plantings to provide early-blooming opportunities. **All of the following** apply to meet NRCS standards:

- Only cosmos (*Cosmos bipinnatis* and *Cosmos sulphureus* only), and corn flower (*Centaurea cyanus* and *Centaurea montana* only) are authorized;
- Needed maintenance will not be limited because of these flowering plants (in other words, annual fillers in bloom may need to be mowed for the benefit of the perennial species)
- If these species spread they will be terminated, and
- All seed sources will be tested and verified to be free of invasive species.

Site Preparation

It is very important to plant the vegetation into a weed-free seedbed. Use herbicides, prescribed burning and/or tillage to eliminate competing vegetation. Weed control efforts should begin as early as 12 months prior to planting, and may require multiple applications or operations in both the fall and spring prior to planting.

Pay particular attention to sites where noxious and potentially invasive species are likely. Many of these species are perennials that spread through seed and roots, and many have rhizomatous root systems that will persist and negatively impact the planting.

Cool season weeds (e.g. - Canada thistle, quack grass) are best controlled in the fall (mid September – Early November) with a translocation herbicide. Plants should be actively growing at the time of application. Avoid herbicide application after 3:00 pm if overnight temperatures are expected to drop below 50 degrees (Fahrenheit).

Warm season weeds (e.g. - Johnsongrass) are best controlled just prior to flower with a follow-up application prior to first frost. Plants should be actively growing at the time of application.

Contact your local Purdue University Cooperative Extension Service for specific herbicides to use. **Apply all herbicides according to the label.**

Use a nurse/companion crop to further control potential weed issues and/or a temporary cover for erosion control.

If prescribed burning is used for site preparation, it must follow IN NRCS FOTG Standard 338 - *Prescribed Burning*

Lime and fertilizer

General Conservation Seedings: (Conservation Cover, Field Border, Wildlife and Restoration of Rare and Declining Habitat plantings, etc.).

Lime and fertilizer should be based on a current soil test (less than four years old). In areas with existing vegetation that shows signs of nutrient deficiencies, or if the soil test shows phosphorus (P) and potassium (K) are in the low to very low range, apply enough fertilizer (organic or inorganic) to raise N, P and K to a level needed for a 1 ton/ac yield goal. Do not apply fertilizer to any native warm season grass or forb plantings for wildlife purposes. Use Purdue University recommendations from the *Crop Fertilizer Recommendation Calculator* <http://www.agry.purdue.edu/mmp/webcalc/fertRec.asp>. or the Indiana NRCS Seeding Tool – *Indiana Fertilizer Calculator*.

If the pH is 6.0 or less, apply enough lime per acre to bring pH to meet the tolerance range of the planned plant species prior to seeding, as applicable. Preferably, lime should be applied 6-12 months prior to establishment. Amendments should not be applied to frozen ground. As a minimum, soil amendments will be incorporated during seedbed preparation, or applied before planting if a no-till drill is used. Apply lime according to *Tri-State Fertilizer Recommendations* - PU AY-9-32, PU AY-328, or the Indiana NRCS Seeding Tool – *Indiana Fertilizer Calculator*.

Lime and fertilizer (cont.)

Critical Area Sites:

For all critical area sites:

- Include an inoculated legume (e.g. white clover) to the seeding mix to improve soil health and provide maintenance nitrogen.
- Apply mulch or erosion control blanket for additional moisture retention and erosion protection.
- Lime application should be determined from a soil test as above, or from a portable pH soil tester. In the absence of a test, apply 1 ton of ag lime or 500 lbs. of pelletized lime per acre prior to seeding, as applicable. For soils with inherently high pH, additional lime is not needed.

Incorporation options:

1. On all excavated or disturbed sites and/or where frequent water flow is likely, such as Grassed Waterways and Channels, apply and **incorporate and culti-pack (firm in) or only culti-pack (firm in) all soil amendments to a depth of 0.5-2 inches during seedbed preparation.**
2. On sites where minimal disturbance or seedbed preparation is planned, apply during seedbed preparation, or before planting if a no-till drill is used. Preferably, lime should be applied 6-12 months prior to establishment. Amendments should not be applied to frozen ground.

Options for excavated or disturbed sites (select one of the following):

1. Preferred option on sites with frequent water, such as Grassed Waterways and Channels, apply Nitrogen at 30 lbs./ac., prior to or during seeding. Lime, P, and K should be applied at establishment according to a current (post construction) soil test. Conduct a follow-up evaluation to determine if a 2nd application of 30 lb/ac nitrogen is needed for a vigorous stand.
2. Where soil conditions are unfavorable and where soil tests are not feasible and to significantly reduce off-site loss risk, apply 350 lbs. 12-12-12, or equivalent, at planting. As part of the operation and maintenance, the stand will be evaluated for vigor and signs of fertilizer deficiency within 6-12 months of establishment. 250 lbs. 12-12-12, or similar blend with at least 30 lbs. of Nitrogen/acre, will be added as top dress or as a part of normal crop field maintenance application, within 12 months after establishment to add vigor to the stand when needed.

Critical Area Sites:

Option for non-disturbed sites in existing cropland: Apply nitrogen at 40 lbs./ac. if the previous crop was corn or a cereal small grain and 30 lbs./ac. if the previous crop was soybean or a legume. P and K should be applied at establishment according to a current soil test (less than four years old).

Production (pasture/hay/biomass) practices: Lime and fertilizer should be based on a current soil test (less than four years old, preferably within the last 12 months). Application rates and methods will follow Purdue University - AY-328, *Crop Fertilizer Recommendation Calculator* <http://www.agry.purdue.edu/mmp/webcalc/fertRec.asp>, or the Indiana NRCS Seeding Tool – *Indiana Fertilizer Calculator* within \pm 10% of a realistic forage yield goal.

Do not apply any nitrogen (N) for warm season grass.

Preferably, lime should be applied 6-12 months prior to establishment. Amendments should not be applied to frozen ground. As a minimum, apply and incorporate all soil amendments prior to or during seedbed preparation, or before planting if a no-till drill is used.

Seed preparation

Inoculate legume seed before seeding with the proper rhizobia bacteria specific for the species. Re-inoculate seed if it was pre-inoculated more than 60 days prior to seeding or beyond dates specified on the seed / inoculant tag. Inoculant left in the sun, even for a short period of time can significantly reduce the viability and effectiveness. Pre-inoculated seed will have a coating that changes the pure live seed per pound and thus the bulk seeding rate per acre.

Be aware that blending seed of varying size, shape and weight can make calibration of equipment and seeding uniformity difficult.

Some seeding mixtures contain seed that is extremely small and thus have very low seeding rates. This may make it difficult to set seeding equipment to uniformly seed these low rates of very small seed. Under these circumstances, a **carrier** or using coated seed may be desirable to add enough volume to the mix for proper metering. The carrier should be no larger than the largest seed species and have similar shape, density and texture to the majority of the seeds in the mix. The carrier can be an inert material (such as cracked corn) that does not have abrasive properties that may cause damage to the equipment or the seed. Inexpensive seed (unimproved varieties) that will have no significant negative impact on the purpose of the seeding may also be used.

Planting:

No-Till seeding: Use a no-till drill with 7” or less row spacing. Ensure the drill is designed to handle the type of seed being planted (especially important for native grasses). Set the no-till drill to provide good seed-to-soil contact and a planting depth preferred for the desired species (see table 3). Soils that are too wet or too dry can also cause improper seed placement.

Conventional Seeding: Prepare a fine firm seedbed to a depth of 3 to 4 inches. Incorporate lime and fertilizer during seedbed preparation. Use a drill with 7” or less row spacing or a culti-packer seeder designed for the seed to be planted. Seed should be drilled uniformly at a proper seeding depth for the desired species.

groups	Seed Size- (seeds/lb)	optimum	maximum
Brassicas, clovers, small seeded legumes, small seeded grasses, native forbs	150,000-500,000	1/4”	1/2”
Vetches, sorghums, wildryes, trefoils, native legumes, radishes	50,000-150,000	1/2”	3/4”
Cereal grains	12,000-50,000	3/4”	1”
Beans, peas, corn	1500-12,000	1 1/2”	2”

Broadcast Seeding: Seed may be broadcast if completed in a uniform manner. Pre-mix the seed with 200 lbs. per acre of pelletized lime if using an airflow applicator. Seedbeds should be worked to a minimum depth of 3 inches and firmed before seeding. The seedbed should be culti-packed before and after seeding. It is acceptable to see up to 1/3 of the seed on the soil surface. Wind speed should be 15 m.p.h. or less when broadcasting.

Interseeding/ over seeding/ broadcasting:

- 1. Legumes/Forbs (frost seeding):** No-till drill or broadcast as above into existing vegetation or residues. Broadcasting relies on freeze/thaw cycles, rain and/or snow to incorporate the seed. This method does not include a seedbed preparation. This is most commonly used during the dormant seeding period.
- 2. Cover Crops:** No-till drill or broadcast as above into existing vegetation or residues. Broadcasting relies on freeze/thaw cycles, rain and/or snow to incorporate the seed. Interseeding does not include a seedbed preparation. This method can be used to establish

cover crop species or combination mixes into relatively light (such as soybean) and weed free crop residues or to establish vegetation into standing crops.

3. **Grasses:** No-till drill into existing covers only if prior-treated with herbicides or tillage, or if existing cover is diminishing (i.e. – older alfalfa plantings).

Special Muck Plantings Specifications (Applicable to Indiana Standards 342 and 393). Muck plantings for wildlife or habitat restoration should use the Indiana Wildlife Seeding Calculator.

1. Seeding Specifications for:

- a. Muck without artificial drainage planted into existing row crops
 - i. Seed the following during the Dormant Season (12/1 – 4/1):
 1. Big Bluestem (Great Lakes Genotype) = 2 PLS pound/acre
 2. Switchgrass (Great Lakes Genotype) = 4 PLS pound/acre
 3. Virginia Wildrye (Great Lakes Genotype) = 5 PLS pound/acre
 4. Riverbank Wildrye (Great Lakes Genotype) = 2 PLS pound/acre
 5. Fox Sedge (*Carex vulpinoidea*) = 0.1 PLS pound/acre (or alternatives)

+

 - 6. Nurse Crop = Oat (@ 30 PLS lb/ac) or Virginia Wildrye (@ 4 PLS lb/ac)
- b. Muck with artificial drainage planted into existing row crops
 - i. Treat (herbicide) existing weeds and undesirable vegetation in fall
 - ii. Seed a mix with the species from the Indiana Seeding Calculator at the highest rate.
- c. Muck with or without artificial drainage planted into existing un-suitable cover such as Reed Canarygrass and/or noxious weeds:
 - i. Treat (herbicide) existing vegetation in spring (mow re-growth in summer)
 - ii. Treat (herbicide) existing vegetation in fall
 - iii. Seed the mix above in Section 1-a during the Dormant Season (12/1 – 4/1)

Weed Control during Establishment Period (up to 3 years after planting):

Mow, burn, or apply herbicides as needed to control unwanted vegetation. Mow when competing weeds are taller than the planted vegetation, and at a height above the planted vegetation. Use selective herbicides and/or spot spraying to protect the desired species. Refer to Purdue Extension – *Weed Control Guide WS-16* for herbicide timing and treatment.

Operation and Maintenance

Noxious weeds and any plant species whose presence or overpopulation may jeopardize the practice, or have detrimental effects to the surrounding land, will be controlled.

If prescribed burning is used to manage and maintain the planting, an approved burn plan must be developed.

Inspect the vegetation annually and after storm events and repair any gullies that have formed, remove unevenly deposited sediment and/or crop residues that will disrupt the function or kill desired vegetation, and reseed high mortality and disturbed areas.

Apply supplemental nutrients as needed to maintain the desired species composition and stand density.

If grazing is used to harvest vegetation, the grazing plan must insure that the integrity and function of the practice is not adversely affected.

Native grasses will not be mowed or grazed lower than 8"-12", introduced grasses lower than 4".

Limited use of the vegetated area as an access or crossing area, or as part of the planting, cultivating, scouting or harvesting of a crop is acceptable as long as the vegetation or function are not jeopardized.

Follow additional Operation and Maintenance requirements in each appropriate FOTG Standard.

Variations

The above guidelines were developed with broad input and flexibility so requests for variations should be rare. Variations to the standards and these guidelines will be requested from the producer to the planner. If the planner concurs, an email written request will be sent to the Area Staff, and if concurred, to the State Resource Conservationist, who will communicate the response in writing after consulting with multiple resource experts as needed.

Table 4. Indiana Fly Free Seeding Dates for Winter Wheat

Soft red winter wheat should be planted within the two-week period following the Hessian fly-free date, which ranges from September 22 across the northern tier of counties in Indiana to October 9 in the extreme southern part of the state (Figure 1). There is no genetic resistance in currently available wheat varieties to the Biotype-L Hessian fly. Populations of this biotype have been steadily increasing over the past several years, and it is now a real threat to early-planted wheat. Early planting can also lead to excessive fall growth which could increase susceptibility to winter-kill as well as increased problems with several diseases. (Purdue-AY-244-W)

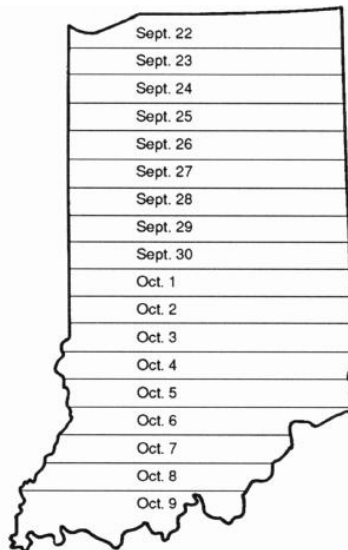


Figure 1. Average Hessian fly-free dates in Indiana.