

## **Pollinator Habitat Site Preparation and Planting Guidelines**

### **Introduction:**

A successful pollinator mix can be planted in either spring or fall. The time of year that works best often varies with site conditions and latitude. A fall planting is sometimes considered the best time to establish a diverse native forb community that is attractive to monarch butterflies, bees, and other pollinating species, since many of these native plant species need to go through a period of cold (stratification) before they will germinate. That said, if your site and seedbed aren't fully prepared by fall or is located in an area that has warmer or wetter winter temperatures, a spring planting might be ideal. Spring plantings can also be successful if the purchased seed has been stratified by the supplier and its dormancy has already been broken. Proper site and seedbed preparation is a crucial step that is often overlooked, but is necessary to creating successful pollinator habitat and can require a couple seasons of planning and treatment. These guidelines will help walk you through site preparation, seeding, and maintenance techniques for both spring and fall to help ensure a successful monarch planting.

Before any site preparation, it is essential to recognize the specific needs of your site. Common sites will be pasture, idle fields, or brushy fields, lawn grass, and soybean or corn stubble. Sites with existing vegetation (especially cool season perennial grasses, such as fescue) should have a minimum of two growing seasons of site preparation. When describing the process for establishing prairie into each of these areas, there is going to be overlap with the steps at certain points, but it is important to follow site-specific steps to ensure a properly established prairie system.

### ***Pasture, Idle Fields, or Brushy Fields:***

*Pasture and idle field sites are usually dominated by cool season perennial grasses, and are often subject to an accumulated seed bed from previous years. As a result, proper site preparation is key to removing both existing vegetation and seeds awaiting germination. Ideally, one should have at least two herbicide applications on the seeding area; one in the spring and one in the fall. This method targets the undesirable cool-season vegetation that typically competes with desirable native species during establishment. Brushy field site preparations are similar to pasture and idle fields, except steps describing the removal of woody vegetation will require herbicides that are effective on brush, rather than those used exclusively on herbaceous plants.*

### **Dormant Planting:**

- **September – November:** Remove existing vegetation and begin the process of exhausting the existing seedbed. These steps are vital to ensuring a successful stand of native plants and should take place around September to November in the year prior to planting. However, action may not be necessary depending on the site.

Mow the site well in advance of the first killing frost. After 1-2 weeks of re-growth, apply a broad-spectrum herbicide (e.g., glyphosate) at the rate recommended on the herbicide label (~2 qt./acre). Be sure to follow label instructions and for specific questions regarding proper herbicide application, consult with a local co-op or extension agent. If fields contain woody vegetation, especially invasive species such as autumn olive or callery pear, herbicide treatments should be made either to the cut stump (immediately following mowing), or to re-sprouts (either within a few weeks or the following spring). Site sprayings may begin during the spring in the year prior to planting, if the site is extremely overgrown with undesired plants and has a historical accumulation of these species in the seedbed.

**Note:** While broad spectrum herbicides such as glyphosate can be effective in many situations, site conditions may require the use of selective herbicides which target specific plants (e.g. broadleaf 2,4-D, imazapic, or graminoid/grass-specific herbicides) which can be used as needed and as directed. For specific questions regarding proper herbicide application, consult with a local co-op or extension agent.

- **December – March:** Remove dead plant material. Brown and dead vegetation can be removed by burnings, mowing, or raking. This facilitates the germination of existing weed seeds and encourages growth in spring, when the second herbicide application should be applied.
- **March - May:** Apply a second round of herbicide in late April or May to kill newly germinated seeds or plants missed during the initial spraying. A pre-emergent herbicide (e.g., imazapic) can also be utilized in late March to early April to prevent germination of cool season grasses. After the second herbicide application, summer cover crops (e.g. oats or annual rye) may be planted on steeper sites or where soil erosion is a concern.
- **May – August:** If you see undesirable plants beginning to bloom, mow or spray the site within a week of initial bloom to prevent additional weed seeds from contaminating the site. Remember to follow the herbicide label instructions carefully. If large amounts of plant matter persist on the ground, it may be necessary to remove the plant residue by burning, raking, or mowing. Light disking can also be utilized to clear the thatch and prepare the site for good seed-to-soil contact if burning, raking, or mowing either aren't possible or sufficient for the site. However, if disking is utilized, an additional round of herbicide treatment will be needed to eliminate weeds that germinate as a result of the soil disturbance. If soil is too loose after disking, cultipacking should be completed before seeding.
- **November - Early January:** Late November to early January is a good time to plant the native seed, when there is relatively bare soil, a light dusting of snow, and temperatures are below freezing. Broadcasting the seed over the area followed by lightly raking, harrowing, or rolling the area with a cultipacker works well to achieve desired seed-to-soil contact. Many of the native plant species produce very small seed and it is imperative they are not planted too deep, or they will not grow. Additionally, a broadcast seeding on top of existing snow works well, because the freeze-thaw action in the following spring naturally works the seed into the soil. Further, broadcasting over snow allows the applicator the ability to see where the seed has been applied and achieve an adequate coverage of the area. If broadcasting onto bare soil, the technique of mixing sand or other carrier with the seed can be used to the same effect. Alternatively, a no-till native seed drill can be used to plant the seed into light amounts of dead sod where tillage is not feasible or desirable. However, if there is a heavy layer of dead plant material, removal is recommended. While a no-till drill can effectively deposit seeds into the dead sod, a thick layer of dead plant material can reduce the success of the planting by blocking sunlight to your seed mix, causing reduced germination.

### **Spring Planting:**

- **September – November:** Remove existing vegetation and begin the process of exhausting the existing seedbed. These steps are vital to ensuring a successful stand of native plants and should take place around September to November in the year prior to planting.

Mow the site well in advance of the first killing frost. After 1-2 weeks of re-growth, apply a broad-spectrum herbicide (e.g., glyphosate) at the rate recommended on the herbicide label (~2 qt./acre). Be sure to follow label instructions and for specific questions regarding proper herbicide application, consult with a local co-op or extension agent. If fields contain woody vegetation, especially invasive

species such as autumn olive or callery pear, herbicide treatments should be made either to the cut stump (immediately following mowing), or to re-sprouts (either within a few weeks or the following spring). Site sprayings may begin during the spring in the year prior to planting, if the site is extremely overgrown with undesired plants and has a historical accumulation of these species in the seedbed.

Note: While broad spectrum herbicides such as glyphosate can be effective in many situations, site conditions may require the use of selective herbicides which target specific plants (e.g. broadleaf 2,4-D, imazapic, or graminoid/grass-specific herbicides) which can be used as needed and as directed. For specific questions regarding proper herbicide application, consult with a local co-op or extension agent.

- **December – March:** Remove dead plant material. Brown and dead vegetation can be removed by burnings, mowing, or raking. This facilitates the germination of existing weed seeds and encourages growth in spring, when the second herbicide application should be applied. Light disking can also be utilized to clear the thatch and prepare the site for good seed-to-soil contact if burning, raking, or mowing either aren't possible or sufficient for the site. However, if disking is utilized, an additional round of herbicide treatment will be needed to eliminate weeds that germinate as a result of the soil disturbance. If soil is too loose after disking, cultipacking should be completed before seeding.
- **April - May:** Apply a second round of herbicide in late April or May to kill newly germinated seeds or plants missed during the initial spraying. After this herbicide application, summer cover crops (i.e. oats or annual rye) may be planted on steeper sites or where soil erosion is a concern.
- **May - June 15<sup>th</sup>:** A spring planting can be completed with a no-till drill designed for native seed or utilizing dragging and broadcasting. It is critical to control weeds during the summer and fall prior to a spring planting, and continuing that control into the spring, before the planting. Most of the problems associated with spring plantings are a result of annual grasses and weeds overtaking the planting site during the summer. Spring plantings should be done before June 15<sup>th</sup> to avoid hot temperatures and lack of rainfall.

### ***Existing Lawn/Turfgrass:***

*Prior to planting on existing lawn, weedy vegetation may require additional spraying. If weeds, particularly clovers, have been controlled in the past, two herbicide sprayings may be sufficient, but ideally a third spray should take place.*

### **Dormant Planting:**

- **September – November:** Remove existing vegetation and begin the process of exhausting the existing seedbed. These steps are vital to ensuring a successful stand of native plants and should take place around September to November in the year prior to planting. However, action may not be necessary depending on the site.

Mow the site well in advance of the first killing frost. After 1-2 weeks of re-growth, apply a broad-spectrum herbicide (e.g., glyphosate) at the rate recommended on the herbicide label (~2 qt./acre). Be sure to follow label instructions and for specific questions regarding proper herbicide application, consult with a local co-op or extension agent. Ideally, one will want to have at least two herbicide applications on the seeding area; one in the spring and one in the fall. This method targets the undesirable cool-season vegetation that typically competes with the desirable native species during establishment. Site sprayings may begin during the spring in the year prior to planting, if the site is

extremely overgrown with undesired plants and has a historical accumulation of these species in the seedbed.

Note: While broad spectrum herbicides such as glyphosate can be effective in many situations, site conditions may require the use of selective herbicides which target specific plants (e.g. broadleaf 2,4-D, imazapic, or graminoid/grass-specific herbicides) which can be used as needed and as directed. For specific questions regarding proper herbicide application, consult with a local co-op or extension agent.

- **March - May:** Apply a second round of herbicide in late April or May to kill newly germinated seeds or plants missed during the initial spraying. A pre-emergent herbicide (e.g., imazapic) can also be utilized in late March to early April to prevent germination of cool season grasses. After the second herbicide application, summer cover crops (e.g. oats or annual rye) may be planted on steeper sites or where soil erosion is a concern. If broadleaf weeds, such as clovers, have not been controlled in the past, a third spraying is recommended.
- **May – August:** If you see undesirable plants beginning to bloom, mow or spray the site within a week of initial bloom to prevent additional weed seeds from contaminating the site. Remember to follow the herbicide label instructions carefully. If large amounts of plant matter persist on the ground, it may be necessary to remove the plant residue by burning, raking, or mowing. Light disking can also be utilized to clear the thatch and prepare the site for good seed-to-soil contact if burning, raking, or mowing either aren't possible or sufficient for the site. However, if disking is utilized, an additional round of herbicide treatment will be needed to eliminate weeds that germinate as a result of the soil disturbance. If soil is too loose after disking, cultipacking should be completed before seeding.
- **Late November - Early January:** Late November to early January is a good time to plant the native seed, when there is relatively bare soil, a light dusting of snow, and temperatures are below freezing. Broadcasting the seed over the area followed by lightly raking, harrowing, or rolling the area with a cultipacker works well to achieve desired seed-to-soil contact. Many of the native plant species produce very small seed and it is imperative they are not planted too deep, or they will not grow. Additionally, a broadcast seeding on top of existing snow works well, because the freeze-thaw action in the following spring naturally works the seed into the soil. Further, broadcasting over snow allows the applicator the ability to see where the seed has been applied and achieve an adequate coverage of the area. If broadcasting onto bare soil, the technique of mixing sand or other carrier with the seed can be used to the same effect. Alternatively, a no-till native seed drill can be used to plant the seed into light amounts of dead sod where tillage is not feasible or desirable. However, if there is a heavy layer of dead plant material, removal is recommended. While a no-till drill can effectively deposit seeds into the dead sod, a thick layer of dead plant material can reduce the success of the planting by blocking sunlight to your seed mix, causing reduced germination.

### **Spring Planting:**

- **September – November:** Remove existing vegetation and begin the process of exhausting the weedy seedbed. These steps are vital to ensuring a successful stand of native plants and should take place around September to November in the year prior to planting.

Mow the site well in advance of the first killing frost. After 1-2 weeks of re-growth, apply a broad-spectrum herbicide (e.g., glyphosate) at the rate recommended on the herbicide label (~2 qt./acre). Be sure to follow label instructions and for specific questions regarding proper herbicide application, consult with a local co-op or extension agent. Site sprayings may begin during the

spring in the year prior to planting, if the site is extremely overgrown with undesired plants and has a historical accumulation of these species in the seedbed.

Note: While broad spectrum herbicides such as glyphosate can be effective in many situations, site conditions may require the use of selective herbicides which target specific plants (e.g. broadleaf 2,4-D, imazapic, or graminoid/grass-specific herbicides) which can be used as needed and as directed. For specific questions regarding proper herbicide application, consult with a local co-op or extension agent.

- **April - May:** Apply a second round of herbicide in late April or May to kill newly germinated seeds or plants missed during the initial spraying. If large amounts of plant matter persist on the ground, it may be necessary to remove the plant residue by burning, raking, or mowing. After the second herbicide application, summer cover crops (i.e. oats or annual rye) may be planted on steeper sites or where soil erosion is a concern.
- **May - June 15<sup>th</sup>:** A spring planting can be completed with a no-till drill designed for native seed or utilizing dragging and broadcasting. It is critical to control weeds during the summer and fall prior to a spring planting, and continuing that control into the spring, before the planting. Most of the problems associated with spring plantings are a result of annual grasses and weeds overtaking the planting site during the summer. Spring plantings should be done before June 15<sup>th</sup> to avoid hot temperatures and lack of rainfall.

### ***Crop Field:***

*In crop fields, such as corn and soybean stubble, weeds have often been controlled and tend to be less of an issue than in other sites. Final herbicide applications will remove any remaining vegetation or plantings that may persist and a dormant seeding is strongly recommended the same season crops are harvested.*

### **Dormant Planting:**

- **September – November:** September-November is the last opportunity to kill existing vegetation before planting, provided the site is harvested prior to the first killing frost. The site should be prepared for planting with minimal disturbance following harvest. Ideally, the site will allow for sowed seeds to easily become embedded into the soil
- **November – January:** The initial planting should take place after crops have been harvested, in late November to January. The ideal site would be in harvested soybean stubble, in which case no further site preparation would be required. Broadcasting seeds during this period of cold winter weather allows for stratification, which will increase the germination rate the following spring. A broadcast seeding on top of an existing light snow cover works well, because the freeze-thaw action in the following spring naturally works the seed into the soil. Further, broadcasting over snow allows the applicator the ability to see where the seed has been applied and achieve an adequate coverage of the area.

Before dispersing seeds, a site must have a clean seedbed and adequate bare soil. Planting into stubble is recommended, but in crops such as corn, stalks may need to be cut in order to attain good seed-soil contact and it is recommended to smooth out large humps or furrows that could present future problems when performing maintenance mowing. Sawdust, kitty litter, no-nitrogen fertilizer, or pelletized lime may be mixed with seed to ensure a more even distribution. Special machines such as fertilizer buggies make sowing light, fluffy seeds easier. If no-till drilling is preferred, make sure the drill is designed for

native seed to ensure that the seed isn't buried too deep. Seeds should be covered by no more than 1/8 inch of soil. One can also combine drill and broadcast methods by unhooking some seed tubes so some seed falls to the ground.

### **Spring Planting:**

- **September – November:** If the recommended fall dormant seeding is not possible after crop harvest, weeds will likely need to be controlled in the spring. If the site is soybean stubble, no additional site preparation should be needed prior to spring. If the site is corn stubble, some removal of stalks and crop residue might be required to ensure good seed-to-soil contact.
- **April - May:** Apply a broad-spectrum herbicide (e.g. glyphosate) at the rate recommended on the herbicide label (~2 qu./acre) in late April or May to kill newly germinated weeds. The site should be prepared for planting with minimal disturbance following herbicide application. Ideally, the site will allow for sowed seeds to easily become embedded into the soil.
- **May - June 15<sup>th</sup>:** Spring planting should be completed with a no-till drill designed for native seed. It is critical to control weeds the summer and fall before doing a spring planting, and in the spring before planting. Most of the problems associated with spring plantings are a result of annual grasses and weeds overtaking the planting site during the summer. Spring plantings should be done before June 15th to avoid hot temperatures and lack of rainfall.

### **Monitoring Growth:**

It is important to remain patient with your planting as native perennial forbs and grasses will usually not appear or be noticeable on your planting site the first year. Some species, like partridge pea and bee balm, may germinate and become visible in the first year, but in most cases, forbs and grasses won't begin appearing until the second and third year of the planting. It is helpful to remember the phrase "Sleep, creep, and leap!" when monitoring the growth and success of your planting. The process appears slow because native grass and forb species allocate the majority of their resources to below ground biomass and very little to above ground growth during establishment. This is why one is not likely to see much more than "weedy" species the first year (hence, "Sleep"). During the second growing season, one may see more native grass and forb species, but the area will likely continue to be dominated by annual grasses and weedy species (hence, "Creep"). It is not until the 3rd or 4th growing season that, given good establishment, the native grasses and forb species will become apparent at the site and dominate (hence, "Leap").

In the first year of your planting, it is advisable to mow your site twice to set back any annual grasses or broadleaf weeds that may appear. Mow at a height of about 6-8" whenever weeds reach 10-12" in height for the first growing season, and ensure that the last mow of the season in late summer or early fall maintains at least 6-8" of vegetation height during winter. Mowing to control weeds during this establishment period should occur even if some of the planted species are beginning to bloom. Mowing high during this early stage will not damage the planted vegetation, and long term will result in a much more diverse and vigorous stand. Do not mow with a riding lawn mower because they cut too close to the ground. Use a tractor-mounted mower or something that can mow at 6-10" in height. Pull weeds like mare's tail by hand or by mowing to stop those from going to seed and re-populating your site and spot spray invasive species such as Canada thistle or teasel. If cool season weed growth is heavy in the spring of the second growing season, mow to 6-8" once in late May, and if necessary, again in late June.

Weed competition and invasive species should be continually monitored for the first several years. Spot mowing or spot spraying should be conducted to control seed production and spread. Usually by the third or fourth year of a planting, enough dead vegetation has built up to conduct a burn. A spring burn will favor prairie grasses where a late summer or fall burn will favor the forbs.

**Enjoy your monarch and pollinator patch!**

## Site Preparation Timeline

### Pasture, Idle Fields, or Brushy Fields

	Fall Yr 1	Winter Yr 1	Spring Yr 1	Summer Yr 1	Fall Yr 2	Winter Yr 2
<b>Dormant Planting</b>	1. (Mow) 2. (Herbicide Application)		1. Mow 2. Herbicide Application		1. Mow 2. Herbicide Application	1. Plant
<b>Spring Planting</b>	1. Mow 2. Herbicide Application		1. Herbicide Application 2. Plant			

### Existing Lawn Grass

	Fall Yr 1	Winter Yr 1	Spring Yr 1	Summer Yr 1	Fall Yr 2	Winter Yr 2
<b>Dormant Planting</b>	1. (Mow) 2. (Herbicide Application)		1. Mow 2. Herbicide Application		1. Mow 2. Herbicide Application	1. Plant
<b>Spring Planting</b>	1. Mow 2. Herbicide Application		1. Herbicide Application 2. Plant			

### Crop Field

	Fall Yr 1	Winter Yr 1	Spring Yr 1	Summer Yr 1	Fall Yr 2	Winter Yr 2
<b>Dormant Planting</b>	1. (Herbicide Application) 2. Plant					
<b>Spring Planting</b>	1. (Herbicide Application)		1. (Herbicide Application) 2. Plant			

\*Items in parentheses indicate the action may or may not be required depending on site condition

This guide is appropriate for the Project Wingspan states of Arkansas, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin and may be applicable to other areas beyond this range. Keep in mind that the growing season varies by latitude even within the states listed above and timing of management needs to be conducted accordingly and in reference to your site's specific needs. If your site is outside of the Project Wingspan region, it is recommended that you reach out to your local Land Grant University Extension Agent, U.S. Fish and Wildlife Service office, or other local natural resources professional to ensure these recommendations are appropriate for your ecoregion and site. This document is the result of collaboration of the U.S. Fish & Wildlife Partners for Fish and Wildlife Program, Illinois Department of Natural Resources, and Pollinator Partnership through the National Fish and Wildlife Foundation funded projects: Monarch Wings Across the Eastern Broadleaf Forest and Project Wingspan