W-802 (Revised)

Identification and Control of Field Bindweed

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Field bindweed (creeping jenny), a deep-rooted perennial weed that is well adapted to North Dakota climate and environment, is a native of Europe and western Asia and was introduced to this country during colonial days. Field bindweed is found across the United States, except in a few southwestern states where the climate is not favorable for growth. It is a problem primarily in the dryland farming areas of the Great Plains and Western states. Field bindweed has been declared a noxious weed according to both the North Dakota Seed Law and the North Dakota Noxious Weed Law.

Field bindweed can be spread by seed, root fragments, farm implements, infested soil adhering to the roots of nursery stock, root growth from infested areas, and by animals. Field bindweed has a deep root system that competes with crop plants for water and nutrients. Vines climb on plants and shade crops, cause lodging of small grains, and make harvesting difficult by clogging machinery. Dense field bindweed infestations may reduce crop yields by 50 to 60 percent. Land infested with field bindweed is reduced in value.

Identification

Field bindweed is a long-lived perennial which produces a dense ground cover. The twining stems vary from 1.5 to 6 feet or more in length. Leaf size and shape are variable, but generally the leaves are 1 to 2 inches long, smooth and shaped like an arrowhead (Figure 1). Flowers are funnel-shaped, about 1 inch diameter, and white or pink in color. The flower stalk has two small bracts located ½ to 2 inches below the flower. The bracts, along with leaf shape and smaller flower size, distinguish field bindweed from hedge bindweed.

Field bindweed may also be confused with wild buckwheat because of similarities in leaf shape and vining habit. However, wild buckwheat is an annual rather than a perennial and has a very small (about 1/8 inch diameter) greenish white flower.

Seeds of field bindweed are dark, brownish gray, and about 1/8 inch long. They are borne in two-celled, egg-shaped capsules which contain two seeds per cell. Field bindweed produces numerous seed in growing seasons with high temperatures and low rainfall and humidity. Seeds can remain dormant in the soil for many years. Field bindweed seed germinated after 28 years in soil from a cultivated field at the Fort Hayes Branch Experiment Station in Kansas.

Field bindweed can develop extensive above and below ground growth soon after germination. A single plant six months after germination produced 197 vertical roots, each at least 4 feet long for a total of 788 feet, while growing in a large container. Plants had 34 horizontal underground roots coming from the tap root, which averaged 4 feet in length and gave the plant 136 additional feet of growth. These 34 roots produced 141 new shoots which established as individual plants.

Roots of established field bindweed plants may extend 20 to 30 feet laterally while depth of rooting depends on soil type and rainfall. In areas of high rainfall, roots of established plants have been excavated as deep as 30 feet below the surface. Buds along the root system can send up shoots that start new plants. The root system contains a large quantity of carbohydrates that provide energy for both above and below ground plant growth.

Control Practices

Established field bindweed is difficult to control. An effective control program should prevent seed production, kill roots and root buds, and prevent infestation by seedlings. This plant is very persistent and a successful control program must be more persistent.

The **best control** of field bindweed is obtained with a **combination** of cultivation, selective herbicides, and competitive crops.

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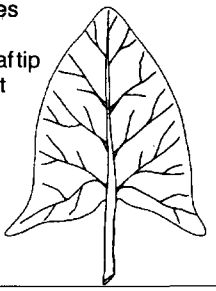
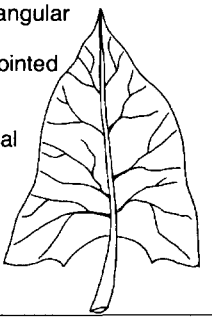
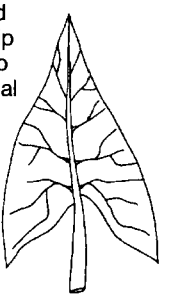
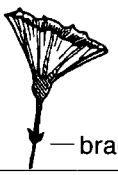
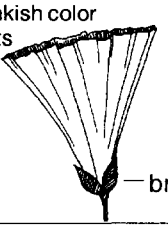
Mechanical: Intensive cultivation controls newly emerged seedlings, may kill young field bindweed infestations, and contributes to control of established stands. Timely cultivations deplete the root reserves of established plants and stimulate dormant seeds to germinate.

Field bindweed can be controlled when tilled eight to 12 days after each emergence throughout the growing season. In the central Great Plains, 16 to 18 tillage operations over more than two years, at two- to three-week intervals were needed to eliminate established stands of field bindweed. In South Dakota, cultivation with sweeps at two-week intervals during June and July and at three-week intervals during August and September eliminated more than 95 percent of the established stands in one year. Intensive cultivation alone usually is not practical because crops cannot be grown during the tillage period, and repeated tillage exposes the soil to erosion. Where alternate wheat-fallow rotation is practiced, field bindweed may be controlled in three years by tilling at two- to three-week intervals during the 18 months between wheat harvest and seeding.

Chemical: Successful control of field bindweed requires a long-term management program. A herbicide applied once will never eliminate established stands; rather, several retreatments are required to control field bindweed and keep it suppressed. Because of long seed viability and tremendous food reserves stored in the roots, repeated chemical and/or mechanical control measures must be used.

For successful control, herbicides should be applied when field bindweed is **actively growing** and stems are at least 12 inches long. Herbicide performance can vary greatly due to adverse environmental conditions. Plants growing under moisture or heat stress usually have smaller leaves with a thicker cuticle and slower biological processes than plants growing in more favorable conditions. As plant stress increases, herbicide uptake and translocation decreases, which in turn decreases herbicide performance. That is why field bindweed is harder to control in the more semiarid area of central and western North Dakota than in the eastern region.

Figure 1.

Plant Characteristic	Field bindweed	Hedge bindweed	Wild Buckwheat
Leaves	■ Arrowhead shaped with nearly parallel sides ■ Somewhat rounded leaf tip ■ Single point basal lobe of leaf 	■ Generally triangular shaped ■ Somewhat pointed leaf tip ■ Double point (square) basal lobe of leaf 	■ Heart shaped ■ Pointed leaf tip ■ Single point to triangular basal lobe of leaf 
Flowers	■ ¾ to 1 inch wide and ¾ to 1½ inches long ■ White or pink color ■ Flower stalk has two bracts ½ to 2 inches below flower  —bract	■ 1½ to 2 inches wide and 1 to 2 inches long ■ White or pinkish color ■ Large bracts at base of petals  —bract	■ Small and inconspicuous ■ Greenish-white color 
Roots	Deep perennial taproot	Perennial taproot	Shallow annual taproot
Seeds	Dark brownish-gray, roughened, 1/3 to 3/16 inch long, with 1 rounded and 2 flattened sides 	Reddish-brown to black, with one rounded and two flattened sides, about 1/4 inch long 	■ Distinctly triangular with sharp corners ■ Shiny black, about 1/8 inch long 

Control in Cropland

Long-term control of field bindweed in cropland is unlikely because few herbicides are effective, high herbicides rates cannot be used because crops will be injured, and field bindweed plants will regrow if no other chemical control strategies are used. Crop tolerance to herbicides is the most important consideration in selecting a herbicide and use rate.

The use of Paramount (quinclorac) after the harvest of any crop to land that will be planted the following year to wheat, including durum, is the most successful control program available in cropland with the least restrictions. Use in a three year program by applying Paramount. Always add a methylated seed oil type adjuvant at 1.5 to 2 pints per acre. Ammonium sulfate or urea ammonium nitrate can also be added. Wheat and sorghum can be seeded immediately after application but crop and treated areas cannot be grazed. Apply Paramount to field bindweed runners at least four inches long. Use in a three year program by applying Paramount at 0.33 pound per acre the first year and at 0.17 to 0.33 pounds per acre in following years. Paramount should be applied in the fall after harvest but prior to a killing frost. Paramount is a slow-acting auxin-type herbicide. Visual symptoms may take seven to 14 days to appear but it provides excellent long-term field bindweed control. Refer to the Paramount label for rotational crop restrictions.

Field bindweed can be treated in corn, wheat, barley, or rye with 2,4-D ester or amine at 1 pint per acre (4 pound per gallon formulation) during the tillering stage of the crop. This low rate will suppress field bindweed but will not give long-term control. Greatest control is obtained when herbicide applications are made to field bindweed at the bud stage, but 2,4-D can only be applied from the 4-leaf until boot stage in small grains. Fall treatments of 2,4-D at 1 to 2 quarts (4 pound per gallon formulation will be less effective than Paramount but the cost will be less.

Dicamba (various) is more expensive but more effective compared to 2,4-D for fall control of field bindweed. Research has shown that fall applied dicamba at 1 to 2 quarts per acre (1 to 2 pounds per acre) gave 87 to 97 percent control of field bindweed (Table 1). Dicamba at 0.5 pint per acre may be applied to corn less than 8 inches tall, or with drop nozzles when corn is 8 to 36 inches tall. Use caution during application to minimize drift onto susceptible crops. Dicamba can applied after frost provided the stems have not been killed by the freezing temperatures. Dicamba residue in the soil can injure sensitive broadleaf crops planted the following spring. Only wheat, corn, or sorghum can be planted the following growing season. However, even these crops can be injured when dicamba at 2 quarts per acre or more is applied in the fall. Therefore, dicamba at high rates should only be used for spot treatment of field bindweed patches. To minimize risk of crop injury, use low rates of dicamba plus 2,4-D in the fall which will give good control after 2 to 3 years of repeated annual fall treatments. The recommended interval between dicamba application and planting most crops is 45 days per pint of product used, not including days when ground is frozen.

Glyphosate (various trade names) is a non-selective herbicide with no soil activity. Any labeled crop can be planted after fall or spring glyphosate application. Glyphosate should be applied when plants are actively growing and are at or beyond full bloom. Poor control will result if plants are under stress, not actively growing, or covered with dust. Glyphosate should be applied at 1 to 2 quarts per acre of a 3 pound acid equivalent per gallon formulation (0.75 to 1.5 pounds per acre) and in the least amount of water recommended on the label. Several formulations of glyphosate are available so, refer to the label for correct surfactant to use. Always add ammonium sulfate at 1 to 2 percent by weight or 8.5 to 17 pounds per 100 gallons of water for increased control. Many areas in North Dakota have water high in sodium bicarbonate, calcium or other salts that reduce the effectiveness of glyphosate. Ammonium sulfate can help overcome antagonistic effects of salts in the spray carrier water and enhance herbicide control in water without salts.

Roundup Ready (glyphosate resistant) Crops

Glyphosate can be used in Roundup Ready soybean, corn, and canola to **suppress** field bindweed. Apply glyphosate at a maximum single in-crop application at 1 quart per acre of a 3 pound acid equivalent per gallon formulation or a maximum total in-crop use of 2 quarts per acre in Roundup Ready corn and soybean. Apply glyphosate at a maximum single in-crop application at 1.5 pints per acre or a maximum total in-crop use of 1 quart per acre in Roundup Ready canola. Refer to the glyphosate label for correct application window for each crop, amount of time between applications, adjuvant and fertilizer use, preharvest intervals, and additional information.

Table 1. Field bindweed control from summer or fallow applications of dicamba. Visual estimates of control were made 10 to 16 months after treatment.

		Control	
Herbicide	Rate	Summer application	Fall application
	Pints/A	-------%	-------
Dicamba	1	10	60
Dicamba	2	30	85
Dicamba	4	55	95
Dicamba plus glyphosate	1 + 3	45	90

Glyphosate Preharvest in Crops

Glyphosate can be used preharvest in wheat, barley (feed only), corn, dry edible beans, field pea, chickpea, lentil, and flax to suppress field bindweed and aid in harvest. Apply glyphosate at 1 to 2 quarts per acre of a 3 pound acid equivalent per gallon formulation. Refer to the glyphosate label for the rate, correct application window for each crop, adjuvant and fertilizer use, preharvest intervals, and additional information.

Sunflower and Other Broadleaf Crops

Herbicides are not available to selectively control field bindweed in sunflower, soybean (conventional), dry bean, field pea, chickpea, lentils, canola (conventional), sugarbeet, potato, or forage legumes. Cultural methods and crop rotation should be used if these crops will be planted.

Control in Fallow Cropland

Paramount (quinclorac) at 0.3 ounces per acre plus methylated seed oil adjuvant at 1.5 to 2 pints per acre or Tordon (picloram) at 1 to 2 pints per acre plus 2,4-D at 1 to 2 pints per acre applied post-harvest in continuous small grain or during the fallow period can provide excellent field bindweed control up to 12 months after application (Table 2). With follow-up treatments for two to three years, established field bindweed stands can be controlled. Frequent monitoring and repeat applications are required to control plants arising from seeds. Apply to actively growing field bindweed with stems 8 to 12 inches long. Delay tillage for one to two weeks following application. Paramount requires a 10 month interval between application and seeding for all crops except flax, chickpea, dry pea, and sugarbeet which require a 24 month interval. Plant only grass, wheat, barley, oat after Tordon application. Do not plant broadleaf crops for 36 months after Tordon application or until residues have dissipated in the soil as indicated by a soil bioassay using the intended crop to be planted.

Table 2. Long-term field bindweed control from herbicides applied once in September.

Herbicide	Rate	Control/months after treatment[a]		
		9	12	22
	Product/A	- - - - -	%	- - - - -
Glyphosate plus 2,4-D	1 pt + 0.5 pt	60	10	0
Dicamba	2 pt	95	50	35
Dicamba	4 pt	95	65	50
Dicamba plus 2,4-D	1 pt + 1 pt	80	40	0
Tordon	1 pt	95	85	75
Tordon plus 2,4-D	0.5 pt + 2 pt	85	70	40
Tordon plus 2,4-D	1 pt + 2 pt	95	90	60
Paramount + MSO[b]	3 oz + 1 qt	95	90	20
Paramount + MSO[b]	6 oz + 1 qt	99	99	90

[a] Compilation of various research reports from North Dakota State University and the Western Society of Weed Science.
[b] Methylated seed oil adjuvant.

Control in Pastures and Non-cropland

Field bindweed growing in pastures may be treated with Tordon (picloram) or dicamba (various). Tordon at 1 to 2 quarts per acre (0.5 to 1 pound per acre) plus 2,4-D at 1 to 2 pints per acre (0.5 to 1 pound per acre) will give long-term control of field bindweed, will not injure most established grasses, and is the most economical treatment in a large area. Apply Tordon plus 2,4-D when field bindweed has at least 12 inches of growth and is actively growing. Use the lower rate or discontinue Tordon use in pasture at least 2 years prior to seeding of small grain crops. Do not plant broadleaf crops until an adequately sensitive bioassay shows that no residue is detectable in the soil. When Tordon has been applied at 1 quart per acre or more, do not cut grass for feed within 2 weeks after treatment. Meat animals grazing within 2 weeks after application should be removed from treated areas 3 days prior to slaughter. Do not graze dairy animals on treated areas within 2 weeks after treatment. Tordon is excreted in the urine, so livestock should not be transferred from treated areas to sensitive broadleaf crops for 12 months after application without first allowing 7 days of grazing on untreated grass.

Dicamba can be used in pastures at 4 to 8 quarts per acre. Apply dicamba when field bindweed has at least 12 inches of regrowth and is actively growing. Do not graze meat animals in treated fields within 30 days of slaughter. The required delay between treatment and grazing of dairy animals or cutting for hay depending on rate varies from 7 to 90 days. Refer to the label for additional information.

Paramount (quinclorac) is labeled for field bindweed control in non-cropland. Paramount should be applied in the fall prior to a killing frost at 8 oz product per acre (0.375 pounds per acre) with a methylated seed oil at 1.5 to 2 pints per acre. Field bindweed control is increased if Paramount is applied with Overdrive at 6 oz product per acre, but is an expensive treatment. Ammonium sulfate or urea ammonium nitrate can also be added. Paramount treated areas cannot be hayed or grazed. Paramount is a slow acting auxin like herbicide and visual injury symptoms may take 7 to 14 days to appear but provides excellent long-term field bindweed control.

For more information on this and other topics, see: **www.ag.ndsu.edu**

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