Identification and Control of

Field Bindweed

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Richard K. Zollinger, Weed Science Extension Specialist
Rodney G. Lym, Research Scientist

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 □ to 2 inches below the flower. The bracts, along with leaf shape and smaller flower size, distinguish field bindweed from hedge bindweed.

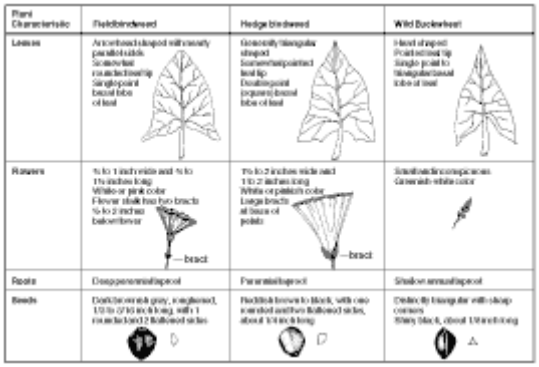

Figure 1. Field bindweed identification.
(Click here for a larger version of this graphic. 19KB b&w chart)

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.

The root system of field bindweed is extensive. Roots of established plants may extend 20 to 30 feet laterally and develop an extensive underground network. 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.

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: Long-term control of field bindweed from herbicides depends on movement of a sufficient amount of herbicide through the root system to kill the roots and root buds. This requires use of systemic (movement throughout the plant) herbicides. Examples of systemic herbicides include 2,4-D, dicamba (Banvel/Clarity), picloram (Tordon) and glyphosate (Roundup or equivalent). Contact herbicides such as paraquat kill only the tissue directly contacted by the herbicide, which results in only short-term control of topgrowth.

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 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. This is why field bindweed is harder to control in the more semiarid area of central and western North Dakota than in the eastern region.

Control in Cropland

Crop tolerance to herbicides is the most important consideration in selecting the herbicide and rate. Herbicide rate is also influenced by climate, herbicide formulation, method of application, and timing and frequency of treatment. In drier regions, ester formulations of 2,4-D have given more effective weed control than amine formulations. In areas where 2,4-D susceptible crops are grown, the amine formulation of 2,4-D is recommended because amines are less volatile and move primarily as particle drift. Esters are volatile and can drift both as particles and vapor.

Field bindweed can be treated in corn, wheat, barley, or rye with 2,4-D ester or amine at 0.5 pound per acre (1 pint per acre of a 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 application should correspond to the period of greatest crop tolerance. Fall treatments of 2,4-D at 1 to 2 pounds per acre (1 to 2 quarts of a 4 pound per gallon formulation) should be applied when soil moisture is plentiful and after field bindweed has 12 inches of growth. Herbicides can be applied until a killing frost has occurred.

Dicamba (Banvel/Clarity) 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 pounds per acre (1 to 2 quarts per acre of Banvel/Clarity) gave 87 to 97 percent control of field bindweed (Table 1). Dicamba can be 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 pounds 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 two to three years of repeated annual fall treatments. The recommended interval between dicamba application and planting wheat, corn, or sorghum is 45 days per pint of product used, not including days when ground is frozen.

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	
		Summer	Fall
Herbicide	Rate	application	application
	lb/A	- - - - % - - - -	
Dicamba (Banvel/Clarity)	0.5	10	60
Dicamba (Banvel/Clarity)	1	30	85
Dicamba (Banvel/Clarity)	2	55	95
Dicamba plus glyphosate (Fallowmaster)	0.5 + 1.5	45	90

Glyphosate (Roundup, Touchdown, or equivalent) 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 3 to 3.75 pounds per acre (4 to 5 quarts per acre of a 3 pound acid equivalent per gallon formulation) and in the least amount of water recommended on the label. However, refer to label for rate when used in a glyphosate resistant crop or for use in conventional crops as a crop desiccant or spot treatment. Several

formulations of glyphosate are available, so refer to the label for correct surfactant to use. Always add ammonium sulfate at 2 percent by weight or 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.

A tank mix of dicamba at 0.5 pound per acre (1 pint per acre Banvel/Clarity) plus glyphosate at 1.5 pounds per acre (2 quarts per acre of a 3 pound acid equivalent per gallon formulation) gives better and more consistent control of field bindweed than glyphosate applied alone (Table 1). This treatment has less potential for soil carryover of dicamba than using higher dicamba rates of 1 to 2 pounds per acre.

Landmaster BW is a premix of glyphosate and 2,4-D and should be applied at 54 fluid ounces of product per acre (0.38 pounds per acre of glyphosate plus 0.68 pounds per acre of 2,4-D). Application should be made when vines are 6 to 18 inches long. This treatment is more cost-effective than other treatments commonly used for field bindweed control. Addition of ammonium sulfate at 17 pounds per 100 gallons of water may improve herbicide performance under some situations. Research has shown improved field bindweed control when picloram (Tordon) at 0.06 to 0.12 pounds per acre (1 to 2 fluid ounces) was added to Landmaster BW. Allow 7 days after Landmaster BW application before tillage is performed.

Corn

Field bindweed growing in corn can be suppressed with dicamba (Banvel/Clarity) or 2,4-D amine. Dicamba at 0.25 pound per acre (0.5 pint per acre Banvel/Clarity) may be applied until corn is 36 inches tall or until 15 days before tassel emergence, whichever comes first. Drop nozzles should be used after corn is 8 inches tall to reduce dicamba drift and risk of corn injury. Dicamba should not be used if susceptible crops are growing nearby. Corn 3 to 8 inches tall may be treated with 2,4-D amine at 0.5 pound per acre (1 pint of a 4 pound per gallon formulation). When corn is more than 8 inches tall, drop nozzles should be used when applying 2,4-D to reduce crop injury by keeping the herbicide off of the upper leaves and whorl.

Soybean and Sunflower

Herbicides are not available to selectivity control field bindweed in soybean or sunflower. Glyphosate at 3 to 3.75 pound per acre (4 to 5 quart per acre Roundup or equivalent) may be used for spot treatment of field bindweed in soybean, but the crop in the treated area will be killed. Timely cultivation may partially control field bindweed in soybeans or sunflowers.

Control in Fallow Cropland

Picloram (Tordon) plus 2,4-D can be applied as a postharvest treatment in continuous small grain or during the fallow period. This treatment has provided good to excellent control up to 12 months after treatment in South Dakota, Montana, and Wyoming (Table 2). With follow-up treatments and close monitoring for two to three years after the original treatment, established stands of field bindweed can be controlled. Frequent inspections must be made to monitor plants arising from seed so control practices can be performed.

Several facts about use of the treatments found in Table 2 should be considered:

1. Picloram at 0.13 to 0.25 pound per acre plus 2,4-D at 0.5 to 1 pound per acre should be applied to field bindweed when plant stems are 8 to 12 inches long, and the bindweed plants are actively growing.
2. Delay tillage until one to two weeks following application. A longer interval is suggested if hot, dry conditions exist.
3. Retreatment will be necessary for long-term field bindweed control. Picloram plus 2,4-D will not provide 100 percent control. Either picloram plus 2,4-D at the lower picloram rates or another method of control should be used the next year to control regrowth.
4. For treatments containing picloram, apply only on land to be used the following year for grass, barley, oat, wheat, or fallow. Do not plant sensitive broadleaf crops for 36 months after treatment or until residues have dissipated in the soil as indicated by a bioassay with the intended crop to be planted.
5. Interval between application and the follow crop is 45 days for picloram rates up to 0.13 pound per acre and 90 days for rates between 0.13 and 0.25 pounds per acre.
6. Quinclorac (Paramount) provides excellent field bindweed control (Table 2) and should be applied with a methylated seed oil at 1.5 to 2 pints per acre. Ammonium sulfate at 2.5 pounds per acre or urea ammonium nitrate may also be added. Quinclorac may also control foxtails, barnyard grass, and volunteer flax.
7. Quinclorac may carryover in soil for one year or more. Most crops may be planted 10 months after quinclorac application except flax, chickpea, dry pea, and sugarbeet which require a 24-month interval between application and seeding. Consult the label for complete rotational restrictions.

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

		Control/months after treatment*		
Herbicide	Rate	9	12	22
	lb/A	- - - % - - -		
Glyphosate plus 2,4-D (Landmaster BW)	0.4 + 0.6	60	10	0
Dicamba (Banvel/Clarity) 1	95	50	35	
Dicamba (Banvel/Clarity) 2	95	65	50	
Dicamba plus 2,4-D	0.5 + 0.5	80	40	0
Picloram (Tordon)	0.25	95	85	75
Picloram plus 2,4-D	0.125 + 1	85	70	40
Picloram plus 2,4-D	0.25 + 1	95	90	60
Quinclorac (Paramount) + MSO**	0.25 + 1 qt	95	90	20
Quinclorac (Paramount) + MSO**	0.5 + 1 qt	99	99	90

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

Adequate soil moisture and soil temperature during the preplant interval is important in reducing the risk of crop injury. In considering the use of picloram on fallowland, growers should weigh the benefit of field bindweed control against the risk of crop damage and treat only if the risk of injury to small grains can be tolerated.

In a spring wheat-fallow rotation, picloram plus 2,4-D can adequately control field bindweed with minimal risk of crop injury. Apply picloram at 0.25 pound per acre plus 2,4-D at 1 pound per acre after small grain harvest, and use the same treatment with lower picloram rates or other effective treatments in the fallow season to control missed plants, regrowth, and seedlings.

Control in Pastures and Non-cropland

Field bindweed growing in pastures may be treated with picloram (Tordon) or dicamba (Banvel/Clarity). Picloram at 0.5 to 1 pound per acre (1 to 2 quarts per acre of Tordon 22K) plus 2,4-D at 0.5 to 1 pound per acre (1 to 2 pints 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 picloram plus 2,4-D when field bindweed has at least 12 inches of growth and is actively growing. Use the lower rate of picloram or discontinue picloram use in pasture at least two 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 picloram has been applied at 0.5 pound per acre or more, do not cut grass for feed within two weeks after treatment. Meat animals grazing within two weeks after application should be removed from treated areas three days prior to slaughter. Do not graze dairy animals on treated areas within two weeks after treatment. Picloram 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 seven days of grazing on untreated grass.

Dicamba can be used in pastures at 4 to 8 pounds per acre (4 to 8 quarts per acre of Banvel/Clarity). 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 seven to 90 days. Refer to the label for additional information.

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

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