1-800-346-9140
ATTRA
National Sustainable Agriculture Information Service
www.attra.ncat.org

Field Bindweed Control Alternatives

Current Topic

By Preston Sullivan
NCAT Agriculture Specialist
August 2004

Abstract: Field bindweed can be a pernicious weed. This publication outlines alternative cultural and physical controls and the use of cover crops and crop rotations to suppress field bindweed. It also discusses least-toxic herbicides and provides a list of resources for supplies and additional information about field bindweed control.

Introduction

Field bindweed (*Convolvulus arvensis*; also known as Creeping Jenny) is difficult to control without herbicides. The weed produces a long taproot that generates many side roots. These side roots produce buds that can develop into new plants. Bindweed plants also produce many seeds that, with their tough seed coats, can remain viable in the soil for years. To control established bindweed in field crops, you must deplete the roots' energy resources by repeatedly destroying the top growth. This can be done through a combination of intensive tillage, frequent mowing, competitive crops, cover crops, and herbicides.

Cultural Controls

Bindweed is spread from plant pieces on tillage equipment, moved from field to field by seeds on combines, introduced by contaminated crop seed, and left on pastures when livestock are fed hay or grain containing bindweed seeds. Bindweed-free fields can be kept clean by keeping out bindweed seeds or plant parts and by eliminating the spread of the weed from fields already contaminated. Grazing can also be effective. Sheep and cattle eat the leaves and stems, while hogs and chickens not only eat the leaves and stems but also expose roots and crowns, further depleting root reserves.(Stahlman, 1984)

Physical Controls

Black plastic mulch or fabric weed barrier will stifle bindweed in high-value plantings by keeping light from reaching the ground. Typically, the weed-free area is limited to the row, while the middles are maintained with cultivation, mowing, or herbicides. It may take three to four years of light exclusion to kill the bindweed. Perennial plantings or vegetable plantings previously not using either black plastic mulch or fabric weed barrier can realize the benefit of bindweed control by switching over. Fabric weed barrier is available from major horticultural and greenhouse suppliers such as A.H. Hummert, A.M. Lenard, Peaceful Valley, DeWitt Company, and Greenhouse suppliers. Black plastic mulch is typically available through wholesale farm suppliers.

ATTRA is the national sustainable agriculture information service operated by the National Center for Appropriate Technology, through a grant from the Rural Business-Cooperative Service, U.S. Department of Agriculture. These organizations do not recommend or endorse products, companies, or individuals. NCAT has offices in Fayetteville, Arkansas (P.O. Box 3657, Fayetteville, AR 72702), Butte, Montana, and Davis, California.

NCAT

Growing alfalfa has been shown to greatly reduce or eliminate bindweed.

Crop Rotations and Cover Crops

Rotations that include tall, shade-producing crops can reduce bindweed problems, since the weed is not very competitive under shady conditions. Forage sorghum and sudangrass are excellent competitors with bindweed, especially when they are solid-seeded in narrow rows. Sunflowers planted at 40,000 plants per acre can also be a good competitor.

Some northern organic vegetable growers report good results from a sequence of green-manure crops. One such sequence starts with fall-planted rye and vetch. Then the cover crop is disked down in late spring, and the field is replanted to buckwheat or oats with peas. Later in the summer, the field is disked and replanted to buckwheat again. In the fall, rye and vetch are planted again for over wintering. The following spring, this field will be well suited to organic vegetable production. This sequence is used to control many perennial weeds, including bindweed. In southern states, a summer cover crop of forage sorghum or sudangrass could be substituted for buckwheat or oat-pea mixtures.

In 1985, *The New Farm* magazine featured a farmer in Fort Collins, Colorado, who used pumpkins and banana squash as a cheap bindweed "herbicide."(Mattingly, 1985) The farmer, John Mattingly, allowed the bindweed to germinate in spring then tilled the field. In June he planted pumpkins. He fertilized with liquid nitrogen injected through the irrigation water, which stimulated the pumpkins' leaf and vine growth. Within a few weeks, the bindweeds were shaded and strangled by the pumpkins so badly that they produced no seed. After pumpkin harvest, he disked down the pumpkin vines. Mattingly suspects that there is a chemical in the pumpkin vines that discourages bindweed, because he's had no bindweed in his pumpkin field for nine years.(Mattingly, 1985) He finds uses for his pumpkins, including Halloween sales and feeding them to his cattle and hogs. He says pumpkins have twice as much crude protein as corn.

Growing alfalfa has been shown to greatly reduce or eliminate bindweed.(Cox, 1909) The frequent cutting for hay and the smothering effect of the crop puts bindweed at a disadvantage. Hay cutting works like mowing and tillage to reduce top growth. Once cut, the alfalfa grows faster than bindweed and shades it out. Two or three years of alfalfa in the crop rotation will greatly reduce bindweed in a following corn crop.(Cox, 1909)

Combining Mechanical and Cropping Strategies

Fred Kirschenmann writes about a five-year non-chemical strategy developed at South Dakota State University that makes it pretty difficult for any bindweed to survive.(Kirschenmann, 1992) The overall tillage system used in this five-year plan starts by tilling in bindweed at the bloom stage, when bindweed has most of its energy stored in the above-ground portion rather than the roots.

The first year of the rotation begins with seeding the infested field to sweet clover with an oat nurse crop. The oats are harvested at maturity, and the sweet clover is allowed to grow until the following spring.

Year two starts by tilling the sweetclover into the top 3 to 4 inches with a heavy disc. Generally, within three weeks bindweed will start coming back, along with some of the clover. Then a sweep plow or under cutter is used to kill this regrowth. The sweep plow's advantage is that it cuts the bindweed roots off underground, will not drag plant roots to other parts of the field, and it leaves a mulch of dead plants on the field. Kirschenmann continues using the sweep plow on bindweed spots throughout the bindweed's bloom stage. The sweep plow can be run at a 3-inch depth during these later stages.

Sunflowers planted at 40,000 plants per acre can be good competitors against bindweed.

The third year, he plants an aggressive early spring crop such as spring wheat. Following wheat harvest, Kirschenmann chisel plows the field to encourage the bindweed to regrow. After bindweed regrows, he runs the sweep plow through the field.

In year four, he tills as soon as the fields are dry enough to get bindweed to grow, and he runs the sweep plow when the bindweed reaches bloom stage. By mid-June a buckwheat crop is planted. The sweep plow can be run again just prior to buckwheat planting, if necessary, to take out the final bindweed plants. The fast-growing buckwheat smothers any remaining bindweed. Following buckwheat harvest, Kirschenmann runs the sweep plow again then plants a rye cover crop.

In the fifth year, following rye harvest, he chisel plowed the field again to cause any remaining bindweed to regrow. Around mid-October the sweep plow is run one last time.

Least-toxic Herbicides

There are several new herbicides made from natural substances such as acetic acid, clove oil, thyme oil, and soap, some of which can be used in certified organic production. These are discussed below. Before using one of these herbicides, make sure it is approved under the National Organic Program by first checking with your certifying agency.

Several acetic acid (vinegar) based herbicides have been developed for non-selective post-emergent use, including St. Gabriel Labs' BurnOut Weed and Grass Killer concentrate, Nature's Glory Weed and Grass Killer concentrate, Greenergy's Blackberry and Brush Block, Alldown Green Chemistry Herbicide, and Ground Force from Abby Labs. These may come in handy as a spot spray in combination with cultural controls. Acetic acid herbicides work best when used in the sun. All of these, except Blackberry and Brush Block, are effective at burning down top growth but will not kill the roots. Blackberry and Brush Block is designed to kill the roots; it is applied as a soil drench. It is made of concentrated vinegar, and the soil will have to be limed after treatment to restore the pH before plants can grow on the site again. Reapplication is typically necessary for sustained control. A word of caution, however; vinegar in concentrations greater than 5% acetic acid may be hazardous—causing burns on the skin or eye damage—and should be handled with care. When applying acetic-acid herbicides, it is wise to wear a mask to avoid inhalation, and gloves to prevent skin contact. Acetic acid can also erode some sprayer parts.

Nature's Glory Weed and Grass Killer RTU and Fast Acting BurnOut RTU are registered with EPA. Greenergy's Blackberry and Brush Block and Alldown Green Chemistry herbicide have a 25(b) "minimum risk pesticide" exempt status with EPA so do not have EPA registration numbers. The Greenergy product label lists acetic acid as an inert ingredient and citric acid (at 7% concentration) as the active ingredient. If an herbicide has an EPA registration number, it has been approved for sale "at the Federal level," however, companies must still register their products with the individual states to sell them there.

Acetic-acid herbicides are an expensive treatment for large areas, and thus are much better suited for spot spraying. Approximate cost for broadcast application of these vinegar herbicides ranges from about $70 per acre to more than $800 per acre. These products are available at some yard and garden outlets. I found them for sale on several Web sites by using a typical search engine like Google.com.

Matran II is a non-selective post emergent for use on annual grasses and broadleaf weeds. It contains 34% clove oil and is best used on young weeds less than 2 inches high. It can be mixed with vinegar. Xpress herbicide, containing clove and thyme oils, is also a non-selective herbicide for burn-down of a large number of weed species. It's typically used for general broadleaf and annual grass control before or after planting vegetables, grains, legumes, fruit or nut trees, berry bushes, and grape vines.

Depending on how bad the infestation is, it may be worth considering spot-spraying the bindweed with a systemic herbicide such as Roundup, or another glyphosate formulation, if you are *not* certified organic. A systemic herbicide kills the whole plant, including the roots. Some other least-toxic herbicides to consider in non-organic production would be Finale (glufosinate-ammonium) and Scythe (pelargoic acid). Scythe, made by Mycogen Corporation, is a contact, non-selective, broad-spectrum, foliar-applied herbicide. Less control is typically seen on mature, inactive, or biennial and perennial weeds using Scythe. It has no root activity or residual effect but kills only top growth. Finale is promoted as an environmentally safe herbicide used as a burn-down spray. It has very low toxicity, and once applied, it breaks down into natural compounds such as carbon dioxide, nitrogen, and water. It has no root activity.

Possible least-toxic herbicide choices for bindweed control.

Herbicide	Organic Allowed?
BurnOut Weed and Grass Killer	Yes/NOP ingredients
Nature's Glory Weed and Grass Killer	Unknown
Greenergy's Blackberry and Brush Block	Unknown
Alldown Green Chemistry Herbicide	Yes/OMRI listed
Ground Force	Yes/OMRI listed
Matran II	Yes/ USDA Organic
Xpress	Yes/NOP ingredients
Glyphosate (Roundup et al)	No
Finale	No
Scythe	No

References

Anon. 2001. You can conquer field bindweed. Growing for Market. June. p. 10-11.

Cox, H.R. 1909. The Eradication of Bindweed or Wild Morning Glory. USDA Farmers' Bulletin 386. U.S. Government Printing Office, Washington, DC. 19 p.

Kirschenmann, F. 1992. Eradicating field bindweed; tillage, rotation knock out weed. Northern Plains Sustainable Agriculture Society Newsletter. January. p. 5.

Mattingly, John C. 1985. This feed kills weeds. The New Farm. September-October. p. 35.

Stahlman, P.W. 1984. Field Bindweed: Prevention and Control. North Central Regional Extension Publication 206. Kansas State University. June. 8 p.

Further Resources

Leininger, Wayne C. 1988. Non-chemical Alternatives for Managing Selected Plant Species in the Western United States. Colorado State University Cooperative Extension and U.S. Department of the Interior Fish and Wildlife Service. p. 20-23.

Weaver, Susan. 2001. Field Bindweed. Ontario's Ministry of Agriculture and Food. Fact sheet. Agdex No. 640. 4 p. On-line at www.gov.on.ca/OMAFRA/english/crops/facts/01-007.htm.

Zollinger, Richard K., and Rodney G. Lynn. 2000. Identification and Control of Field Bindweed. North Dakota State University Extension Service. W-802. 10 p. On-line at www.ext.nodak.edu/extpubs/plantsci/weeds/w802w.htm.

Suppliers List

St. Gabriel Laboratories
800-801-0061
www.milkyspore.com/index2.htm

SommerSet Products, Inc.
4817 Normandale Highlands Dr.
Bloomington, MN 55437
952-820-0363
www.sumrset.com

Nature's Glory
866-298-2229
http://naturesglory.intrnear.com/US/

Greenergy, Inc.
P.O. Box 6669
Brookings, OR 97415
Greenergy@Earthlink.net

DeWitt Company
905 S. Kingshighway
Sikeston, MO 63801
573-472-02048
800-888-9669
www.dewittcompany.com

ENCLOSURES:

Martin, Jeff. 1998. Organic control of field bindweed. The Ecological Solutions Roundtable. McGill University. www.eap.mcgill.ca/

Senft, D. 1990. Mighty mite takes on bindweed. Agricultural Research. October. p. 26.

By Preston Sullivan
NCAT Agriculture Specialist
August 2004

Edited by Paul Williams
Formatted by Robyn Metzger
CT 103
Slot# 150

The Electronic version of Field Bindweed Control Alternatives is located at:
HTML
http://www.attra.ncat.org/attra-pub/bindweed.html
PDF
http://www.attra.ncat.org/attra-pub/PDF/bindweed.pdf