

Silverleaf Nightshade Control in West Texas Cotton

U. U. Alexander,
Billy E. Warrick
and
Dave N. Weaver*



Silverleaf nightshade (*Solanum elaeagnifolium* Cav.w) commonly called "whiteweed" because of the silvery green appearance of the underside of the leaves, is particularly competitive in cotton.

Silverleaf nightshade is a 1-2 foot tall, spreading to erect, competitive, perennial weed which becomes woody with age. Leaves are linear to oblong and are from 2 to 4 inches long and are covered with coarse short hairs. Roots are fibrous with a taproot which produces creeping rhizomes.

The fruit is a round berry from 1/2 to 2/3 inch in diameter. Immature berries are green with dark streaks from the top. Upon maturity, the berries are yellow to dark brown. Each berry contains 40 to 120 yellow to dark brown seed.

*Extension agronomists, Texas Agricultural Extension Service, Research and Extension Center, P. O. Box 2159, Vernon, Texas 76384 and 7887 North Highway 87, San Angelo, Texas 76901 and Weed Specialist, College Station, Texas 77843, respectively.

The authors appreciate the review of this publication by the following persons in the Department of Soil and Crop Sciences: Texas Agricultural Extension Service - Paul Baumann, Extension weed specialist, College Station; Brent Bean, Extension agronomist, Amarillo; Charles Stichler, Extension agronomist, Fort Stockton and James R. Supak, Extension agronomist, Lubbock. Texas Agricultural Experiment Station - J. Wayne Keeling, weed research, Lubbock and M. G. Merkle, professor, College Station.

Method of Spread

Silverleaf nightshade is spread by both seed and underground rhizomes. The major spread is by seed, although new infestations may be initiated by transport of root stock or rhizomes on tillage equipment.

Research conducted by the Texas Agricultural Experiment Station at Lubbock revealed that a dense population of silverleaf nightshade can produce from 5 million to more than 100 million seed per acre annually. Fortunately, germination percentage is low, averaging only 28 percent after 19 days in a germinator. A greenhouse study was done at Lubbock to determine emergence percentage at planting depths of 0.4, 0.8, 1.2, 2.0 and 4.0 inches in sand. After 6 weeks, emergence percentages were 28, 29, 33, 12 and 1, respectively. Deeply buried seed are not likely to emerge. Studies in California have indicated that seed can remain viable in the soil for a least 10 years.

Research by Oklahoma State University indicates that one weed per square foot can increase to 20 plants per square foot by the second year in an uncultivated area. Also, in Oklahoma studies, 20 percent of the seedlings were perennials by the 4 to 6 leaf stage of growth, at approximately three weeks of age. By four weeks of age, 8 to 10 leaf stage, 82 percent of the plants were perennials, and at five weeks, 10 to 14 leaf stage, all were perennials.

Economics of Silverleaf Nightshade Control in Cotton

Silverleaf nightshade is the most common perennial weed in West Texas cotton fields. It is most competitive where continuous cotton production systems are used. These fields usually have been treated with dinitroaniline (yellow) herbicides and are under reduced tillage systems which allow seedlings to develop into perennials.

Over 2 million acres of land used for cotton production in West Texas are infested with silverleaf nightshade. Research by Oklahoma State University, indicates that a population of one nightshade per square foot will reduce cotton yields by 45 percent. A 1985 demonstration in Knox County, Texas showed similar results. Demonstrations conducted over a three year period in Kent County, Texas indicated a 48 percent yield increase from the control of silverleaf nightshade. Similar demonstrations in the Pecos Valley of West Texas in 1983 with nightshade densities of 1, 5 and 10 plants per 10 feet of row resulted in dollar losses of \$8, \$35 and \$65 per acre, respectively.

Tables 1 and 2 on the back page list programs that might be undertaken in a rotation system in West Texas. Table 3 outlines a herbicide application program for use after cotton harvest.

Assuming that lint yield is reduced 100 pounds per acre on the two million acres of West Texas cotton infested with silverleaf nightshade and that lint is worth 50 cents per pound, then the total cost of this weed to producers is \$100 million per year.

Control of Silverleaf Nightshade

A rope wick applicator adapted to treat the skip rows in cotton planted in a two-in-one-out pattern. A 2 percent Roundup solution wiped in both directions at the green berry stage has proven effective. It does require delayed cultivation in the skipped row to allow silverleaf nightshade plants to reach the proper stage.



Principles of Control

A planned system of cultural and chemical practices is required for a successful silverleaf nightshade control program. This involves prevention of establishment, proper tillage and timely herbicide application. Carbohydrate accumulation in the rhizomes greatly increase during the green to yellow berry stage of weed growth. Herbicides with the ability to translocate through the plant will be deposited into the root system along with the carbohydrate, when applied at the green berry stage. Herbicides applied to weed foliage prior to this stage will result in effective top kill but ineffective control of the perennial root system.

Prevention

Preventing the establishment of new plants from seed is the first step in the control of perennial weeds such as silverleaf nightshade. Sanitation is a means of preventing invasions or re-invasions of clean fields. Sanitation involves weed control in surrounding non-crop areas such as fence rows, right-of-ways and use of clean tillage and harvest equipment. Also, avoid using cotton seed, gin trash or manure that may contain weed seeds.

Since silverleaf nightshade emerging from seed will develop perennial root systems within 3 to 5 weeks after emergence, cultivation done early in the season is a vital component of a prevention program. Once the weeds become perennial, control is difficult and expensive.

Cultural and Chemical Control

Moldboard plowing or subsurface tillage can weaken nightshade roots and rhizomes. Tillage will reduce the potential to store root reserves and result in a low root survival.

Cropping systems with a fallow period, such as a wheat-fallow-cotton rotation, which allow summer tillage, can contribute to effective control. The fallow period allows for cultivation and herbicide application to reduce weed populations of both seedlings and perennials.

Table 1. Suggested practices to reduce silverleaf nightshade populations in a wheat-fallow-cotton rotation system.

1. Immediately following wheat harvest; moldboard, list, or use some means of subsurface tillage (May-June).
2. Cultivate throughout the summer and fall (June-October). Do not allow seedlings to reach 3 weeks of age.
3. As an alternative to steps 1 and 2, Glyphosate (Roundup) may be applied during the fallow period. Method of application could be either ropewick, spot spray or broadcast treatment.
4. Control seedlings with tillage until cotton is planted.
5. Plant cotton at recommended time. Apply prometryn (Caparol) preemerge to suppress seedling weeds.
6. Cultivate the crop as needed (June).
7. Spot treat silverleaf nightshade plants, at the green berry stage, with a 2 percent solution of Roundup (July- August).
8. Harvest cotton as early as possible (October-November).
9. Prepare soil as needed.
10. Plant wheat if moisture is available. Otherwise allow to fallow for the winter and revise rotation system to return to cotton.

Table 2. Suggested practices to reduce silverleaf nightshade populations in a continuous cotton system.

Skip Row Planting Pattern

1. After cotton planting and establishment, cultivate no more than 1 time (June).
2. Allow nightshade to reach the green berry stage of development (July).
3. Use a low-mounted wick applicator in the skip rows and operate no more than 4 inches above the soil surface. The wick applicator should be filled with 2 parts water to 1 part Roundup solution. Operate the wick in two directions (wipe twice) in July or early August.
4. Spot-treat nightshade within planted rows, with a 2 percent Roundup solution (1 gallon of Roundup per 50 gallons of water). Keep the spray off the cotton (July-August).
5. Do not plow for at least 7 days after herbicide application.
6. The following year, rotate the skip rows and treat the new skip row area as in steps 3 thru 5. Continue this process to suppress nightshade.

Solid Row Planting

1. After cotton planting and establishment, cultivate as needed.
2. Allow nightshade to reach the green berry stage of development (July).
3. Spot-treat nightshade with a 2 percent Roundup solution (1 gallon of Roundup per 50 gallons of water). Keep the spray off the cotton (July-August).
4. Do not plow for at least 7 days after herbicide application.
5. Repeat steps 1 thru 4 to keep nightshade suppressed.

Table 3. Suggested after-harvest control of silverleaf nightshade in a continuous cotton program.

1. After cotton harvest (at least 2 weeks before normal frost date), treat when at least 60 percent of the weeds have developed berries (October).
2. Broadcast 2 quarts of Roundup in 3 to 10 gallons of water per acre. Add 17 pounds of spray grade ammonium sulfate plus 2 quarts of a non-ionic surfactant per 100 gallons of spray solution. To mix, partially fill the sprayer tank with water, then add the ammonium sulfate, followed by the herbicide and finally add the surfactant.

OR

- Broadcast 1 quart of dicamba (Banvel) per acre plus 20 gallons of water per acre for suppression, but not complete control.
3. Do not plow for at least 7 days.
 4. Prepare land in the fall or spring using proven production practices.
 5. Cultivate during the season as needed.
 6. Spot treat with a 2 percent solution of Roundup at the green berry stage of weed growth during the summer. Keep spray off the cotton in July-August.

Read and Follow the Label

Before using any herbicide, it is very important to read and follow label instructions. Check the label to be sure that the intended use of the chemical is currently approved by the manufacturer. Labels contain information necessary for environmentally safe and effective use of herbicides. Labels are constantly changing. Review the label to assure that the herbicide is being legally applied.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas Agricultural Extension Service is implied.