The Texas A&M
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**Texas
Agricultural
Extension
Service**

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# Soybean insect control suggestions

# Soybean Insect Control Suggestions

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Insects that feed on soybeans are numerous and the potential for yield or quality loss from their feeding is present each year. The frequency of pest damage and, thus, the need for chemical control differ in the various production areas from season to season. The greatest potential for economic pest losses exists in the Gulf Coast and Lower Rio Grande Valley counties. The inconsistency in damaging pest populations clearly indicates the importance of regular field inspections and established economic thresholds.

## ECONOMIC THRESHOLDS

Economic thresholds occur when the pest density is high enough to justify economically an insecticide application to control the pest or pests. The thresholds change throughout the growing season and when a different group of pests are present. They also depend on the type of damage, plant growth stage and general plant vigor. Since economic thresholds depend on several conditions, basic simple thresholds for field use are presented. Consider these as rules of thumb to determine "when to treat."

## INSPECTING SOYBEAN FIELDS FOR INSECTS

Insect populations in soybean fields can change rapidly. Growers should check fields at least once and preferably twice a week to determine the species present, the pest density and the amount of damage that has occurred.

Populations of most insects can be estimated by either the shake cloth method or with a sweep net. The shake cloth method is more accurate and works well in row beans when the soil is dry for sampling stink bugs and caterpillars. In broadcast beans or when the soil is wet, the sweep net is more convenient. The sweep net method requires less time but is less accurate, especially when plants are small, wet or when the canopy is dense. Plant damage estimates are also useful to make control decisions.

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### Shake Cloth Method

The equipment needed for this method consists of a piece of white or off-white cloth that measures 24 × 42 inches. Each end of the cloth is stapled to a thin strip of wood, approximtely ½ to 1 inch wide and 24 inches long. Select a random site in the field and unroll the cloth from one row over to the next row. Extend both arms forward parallel with the row on either side, then shake the plants vigorously over the cloth. Your arms, from your elbows to your fingertips, will allow you to sample approximately 1½ row feet of plants on each side of the cloth. Thus, a total of 3 row feet will be sampled at each site. Count the insects that fall on the cloth. Repeat the process at 10 locations in the field and sum the counts to get the number of each species per 30 row feet.

### Sweep Net Method

A standard 15-inch diameter sweep net is commonly used for sampling insects on soybeans. A sampling unit of 10 consecutive (180°) sweeps while walking through the field has proven an effective sampling method. The net is swung from side to side with each step. The net should be held so the lower half of the opening (7 to 8 inches) is drawn through the foliage. After 10 successive sweeps the insects are identified and counted as they are removed from the net. Repeat the sample at several random sites and calculate the number of each species per 10 sweeps.

### Plant Damage

Insects produce four types of damage to soybean plants. Underground chewing insects can feed on germinating seedlings or roots causing the plants to wilt or die. Above ground, stems can be damaged by tunneling larvae or girdling by the threecornered alfalfa hopper. Foliage can be damaged by chewing caterpillars or by mites, aphids and thrips feeding. Finally, pods can be hollowed out by corn earworms or misformed by stinkbug sucking damage. Estimating the level of insect related plant damage is essential in determining the need for control measures.

Insects that feed on seedling soybeans are important only if stands are damaged to the extent that yields are reduced. *Four to eight seedlings per row foot are sufficient to make optimum yields.* Uniform removal of seedlings is not as detrimental as the removal of all seedlings in portions of a row. Determine healthy and damaged seedlings in 3 row feet at randomly

selected locations in the field for stand loss resulting from early season pests.

Threecornered alfalfa hoppers girdle the main stems of soybean plants prior to bloom. These girdles appear initially as slight indentations and later as swellings encircling the entire main stem. Random row foot sections should be examined for fresh damage early in the season (3 to 10 inch plants) at several locations in the field. The number of girdled plants can be divided by the total number of plants counted and multiplied by 100 to determine the percent girdled plants.

Estimation of foliage loss from feeding of caterpillars and beetles is made by visual observation. Examine randomly picked individual leaves and estimate the percent leaf surface missing in each. Add these estimates together and divide by the total number of leaves examined to determine percent defoliation for the different areas of the sampled field.

Pod damage is not sampled directly. Insect populations which cause pod damage are estimated using sweepnet or drop cloth techniques.

If the resulting damage estimates are close to threshold levels, increase the number of samples to determine the level of plant damage. Larger sample units generally increase the confidence of the results obtained.

## SEEDLING AND EARLY SEASON PESTS

### Lesser Cornstalk Borer

Soybeans in the seedling stage may be damaged by the lesser cornstalk borer. The moth lays single eggs on the soil around the base of the plant. The eggs hatch and young larvae bore into the stem at the soil line. The larval feeding activity restricts the flow of nutrients to the upper portion of the plant, resulting in a wilted and eventually dead seedling. The bluish green larvae have brown stripes and are found inside the stem or in a silk tube below the soil surface adjacent to the stem. Infestations of lesser cornstalk borers usually are limited to soybeans growing on well drained, sandy soils.

### Garden Webworm

The larvae of this insect feed on the leaves of soybean seedlings. Plant stands can be reduced or eliminated in large areas if larvae are numerous. They frequently move into soybeans from weeds.

### Cutworms

Cutworms are the caterpillars of several moths and may be present in fields at planting. The larvae feed on young seedlings at or just below the soil surface. As the stems are cut, the top portion of the seedling wilts and dies. Locate larvae by digging below the soil surface around freshly damaged plants. Infestations often are more common in fields which had plant residue or weeds until near planting time.

### Armyworms

Armyworms are conspicuously striped caterpillars that may occur locally in high numbers. Often they develop in pastures or roadside vegetation and march en mass into fields, eating as they go. They also can develop anywhere that moths lay eggs in the field and may be spotty in distribution.

### Beet Armyworm

Beet armyworm caterpillars have a pale stripe on each side and a conspicuous black mark on the side of the second body segment. They prefer broad-leaved plants including soybeans and generally are more difficult to kill than fall armyworms.

### Threecornered Alfalfa Hopper

The threecornered alfalfa hopper is present in most soybean fields from the seedling stage through maturity. The feeding activity results in girdled stems in the seedling stage and girdled petioles in later growth stages. Plants damaged in the seedling stage may not be noticed until the plants are older and heavier. Because of damaged stems, plants may fall into the middle of the rows when stressed by rain or winds. The flow of nutrients also is restricted in plants with girdled stems or branches. Girdled plants produce fewer pods than healthy ones.

## MID- TO LATE-SEASON PESTS

### Foliage Feeding Pests

Various caterpillars, beetles and grasshoppers are all foliage feeding pests on soybeans. Since all cause defoliation, they are grouped together for damage estimation purposes. These can occur throughout the year but are most significant from blooming to pod fill when defoliation can cause yield loss throughout. Control of these pests is complicated when several species are involved. Infestations of one or a combination of these

species usually become important from August through September along the Upper Gulf Coast. Infestations may develop very rapidly and completely defoliate soybean fields.

## POD FEEDING PESTS

### Stink Bugs

Several species of stink bugs may feed on developing soybean pods. The southern green stink bug and brown stink bug are the most common ones in soybeans along the Gulf Coast of Texas. They move into fields when pods are beginning to fill. Stink bugs feed by inserting their beaks into the beans inside the pods. This feeding may reduce yield and quality of the soybeans, and increase the incidence of yeast spot seedling disease.

### Corn Earworm

This pest is also known as the bollworm and soybean podworm. The adult stage or moth of the corn earworm lays eggs on the terminal leaves of soybean plants. The young larvae feed for a few days and then move down the plant to feed on developing pods. Infestations are more common in areas where alternate hosts such as corn and cotton are grown.

## OCCASIONAL PESTS

The major insect pests of soybeans are discussed above. However, there are a number of pests that show up in soybean fields only occasionally. These pests are often not noticed or are controlled by sprays applied for major pests. Remember that occasional pests may occur; act to identify them when suspicious damage occurs.

Southern corn rootworm, the banded cucumber beetle and a few close relatives are seen frequently as adults in soybean fields. However, adults seldom cause severe defoliation damage. Larvae feed on roots of many plants including soybeans but are seldom of economic importance.

A small longhorned beetle in the genus *Dectes* is another occasional pest. Larvae of this species feed inside the stems and cause lodging in some fields. They are abundant enough to cause problems only in localized areas.

## BENEFICIALS

Natural populations of beneficial insects and spiders often control pests such as loopers, corn earworms and velvetbean caterpillars. Key predators in soybeans include spiders, big-eyed bugs,

assassin bugs and damsel bugs. Certain wasp and fly parasites are also important in reducing pest populations. Because most insecticides are injurious to beneficials, insecticide applications should be avoided unless economically damaging levels of injurious pests have been detected.

## INSECTICIDE APPLICATION METHODS

Use ground machines or aircraft to apply most insecticides to soybeans. For best results with aerial applications, flag the swaths so that they meet or overlap not higher than 15 feet above the plant canopy.

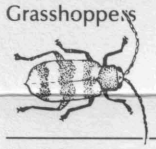
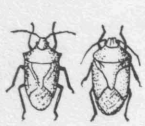
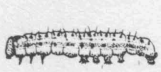
Spray applications are most effective and hazards minimized when wind velocity does not exceed 15 miles per hour. For broadcast crops, number 3 cone nozzles set 20 inches apart on a rear-mounted boom of a tractor sprayer are satisfactory. A pump pressure of 60 pounds per square inch is recommended.

Nozzle size and number, ground speed and pressure influence the rate of output per acre; therefore, calibrate the sprayer carefully to insure application of recommended insecticide amounts. One nozzle per row usually is adequate for young row crops, but two to three nozzles per row may be desirable on larger plants to obtain adequate coverage. See L-486 *Insecticidal Spraying of Field Crops with Ground Machinery* and L-764 *Pesticide Application Ground Equipment Calibration Guide* for additional information.

## BIOLOGICAL INSECTICIDES

*Bacillus thuringiensis* (Bactur®, Thuricide®, Dipel® and others) is presently labeled for use on soybeans. Research evaluations and field experience with *Bacillus thuringiensis* clearly indicate the uniqueness of this compound. Use of this biological insecticide offers its greatest advantage in controlling foliage-feeding larvae before bloom or moderate populations after bloom initiation and during the pod-formation stage. It is not recommended where heavy populations develop during the pod-filling period. This product will not control defoliating beetles or stink bugs.

*Bacillus thuringiensis* use requires a different approach to insect pest management. It is rather slow acting, is much more effective on smaller worms and performs much better when applied in greater volumes of water per acre (10 to 15 gallons by ground application and 5 to 8 gallons by air). Application rates are related to thorough coverage.

| Pests | Economic threshold | Insecticide and rate (active ingredient/acre) | Days from last application to harvest | Remarks |
|---|---|---|---|---|
| Cutworms  | When stands are threatened (30% or more of young plants lost) | Methyl parathion - 0.25 lb (climbing cutworm only)<br>Trichlorfon (Dylox®) - 1.0 to 1.5 lb (variegated cutworm on seed crops only) | 20<br>7 | Direct spray to base of plants and to soil several inches on each side of rows. Observe all additional label precautions. See restrictions. |
| Armyworm<br>Fall armyworm  | When stands are threatened (30% or more of the seedling plants are killed) | Carbaryl (Sevin®) - 1.0 lb<br>Fenvalerate (Pydrin®) - 0.1 lb<br>Methyl parathion - 0.5 to 1.0 lb<br>Parathion - 0.5 to 0.8 lb (fall armyworm only)<br>Toxaphene - 2.5 lb (armyworm only) | 0<br>21<br>20<br>20<br>21 | See restrictions. |
| Beet armyworm  | When stands are threatened (30% or more of the seedling plants are killed) | Fenvalerate (Pydrin®) - 0.1 lb<br>Methomyl (Lannate® or Nudrin®) - 0.25 to 0.4 lb | 21<br>14 | See restrictions. |
| Threecornered alfalfa hopper   | Before bloom, when 10-15% of plants are girdled and nymphs are still present See discussion under "Plant Damage." | Acephate (Orthene®) - 0.5 lb<br>Carbaryl (Sevin®) - 1.0 lb<br>Methyl parathion - 0.5 lb | 14<br>0<br>20 | Thorough coverage of plants and stems is needed. See restrictions. |
| Velvetbean caterpillar  <br>Green cloverworm  | *Prebloom* — when defoliation exceeds 40%<br>*Blooming to pod filling* — when defoliation exceeds 20%<br>*Full pod to harvest* — when defoliation exceeds 35% | Acephate (Orthene®) - 0.5 lb<br>*Bacillus thuringiensis* (Dipel®, Thuricide® and others) - 0.25 to 0.5 lb<br>Carbaryl (Sevin®) - 1.0 lb<br>Fenvalerate (Pydrin®) - 0.1 lb<br>Methomyl (Lannate® or Nudrin®) - 0.3 to 0.4 lb<br>Methyl parathion - 0.5 lb<br>Parathion - 0.5 lb<br>Toxaphene - 2.5 to 3.0 lb | 14<br>0<br>0<br>21<br>14<br>20<br>20<br>21 | Check infestations at weekly intervals to determine damage level. Applications may need to be repeated at 5-day intervals to achieve control. See restrictions. |
| Soybean looper<br>Cabbage looper  | *Prebloom* — when defoliation exceeds 40%<br>*Blooming to pod filling* — when defoliation exceeds 20%<br>*Full pod to harvest* — when defoliation exceeds 35% | Acephate (Orthene®) - 0.5 lb<br>*Bacillus thuringiensis* (Bactur®, Dipel®, Thuricide® and others) - see labels for rates (see remarks in text)<br>Methomyl (Lannate® or Nudrin®) - 0.45 lb | 14<br>0<br>14 | |
| Bean leaf beetle<br>Blister beetles<br>Grape colaspis<br>Grasshoppers  | *Prebloom* — when defoliation exceeds 40%<br>*Blooming to pod filling* — when defoliation exceeds 20%<br>*Full pod to harvest* — when defoliation exceeds 35% | Carbaryl (Sevin®) - 0.5 to 1.0 lb<br>Fenvalerate (Pydrin®) - 0.1 lb<br>Methyl parathion - 0.5 to 1.0 lb (not for bean leaf beetle, grape colaspis or grasshoppers)<br>Toxaphene - 2.5 lb (not for grape colaspis) | 0<br>21<br>20<br>21 | |
| Stink bugs  | Pod formation to bean maturity — when 10 bugs per 30 feet of row are found | Carbaryl (Sevin®) - 1.0 to 1.5 lb<br>Methyl parathion - 0.5 to 1.0 lb<br>Parathion - 0.5 lb | 0<br>20<br>20 | Check infestations weekly and repeat applications as necessary to maintain populations below economic levels. See restrictions. |
| Corn earworm (bollworm)  | Pod formation to bean maturity — when 30 larvae per 30 feet of row are found. Seldom causes economic damage after solid plant canopy formed | Carbaryl (Sevin®) - 1.5 lb<br>Fenvalerate (Pydrin®) - 0.1 lb<br>Methomyl (Lannate® or Nudrin®) - 0.3 lb<br>Methyl parathion - 1.0 lb<br>Parathion - 0.8 lb | 0<br>21<br>14<br>20<br>20 | Difficulty in controlling large worms is encountered frequently. When treatment becomes necessary, repeat applications at less than 5-day intervals until the infestation is reduced below economic levels. If worms are large and emergency or salvage treatments are necessary, apply at 3-day intervals until the outbreak is under control, or use methomyl at 5-day intervals. See restrictions. |

**RESTRICTIONS**

*Carbaryl* — To avoid possible injury to tender foliage, do not apply when foliage is wet or when rain or high humidity is anticipated within 48 hours of application.
*Methomyl* — Do not graze treated soybean plantings within 3 days of application or feed soybean hay to livestock within 7 days of application. Thorough plant coverage is required.
*Methyl parathion* — Do not apply more than twice per growing season.
*Parathion* — Do not apply more than twice per season.
*Toxaphene* — Do not feed treated plants or ensilage from treated plants to poultry, dairy animals or animals being finished for slaughter. Do not feed soybean mill trash to livestock or poultry. Thorough plant coverage is essential. Ground application is more effective on small plants.
*Trichlorfon* — Do not pasture or use treated soybeans for feed, food, forage or oil.

The real advantage of the biological insecticide lies in its ability to suppress pest species without disrupting beneficial species that contribute to natural control. This is an extremely important characteristic. To be used effectively, careful field monitoring and accurate analysis of the potential for pest loss are essential. Precise application (timing, rate and coverage) is required. Application equipment must be clean to avoid parasite and predator mortality, which can result from a "carryover" of the broad-spectrum, conventional insecticides remaining in application equipment.

## PROTECTING BEES AND OTHER POLLINATORS FROM INSECTICIDES

Pollination is extremely important in producing many seed crops. This is particularly true for legumes such as alfalfa, clovers and vetch. Most grass-type plants are wind- or self-pollinated and do not require insect pollinators. Where pollen-collecting insects are required for flower fertilization, the producer, insecticide applicator and beekeeper should cooperate closely to minimize losses of bees. The following guidelines reduce bee losses:

1. Apply insecticides, if practical, *before* bees are moved into fields for pollination.
2. Where insecticides are needed, use materials least toxic to bees.
3. Make all applications when bees are away from the field. Evening or early morning treatments between the hours of 7 p.m. and 6 a.m. generally are more satisfactory. Evening applications, after bees have left the field, are less hazardous than early morning applications.
4. Use spray or granular formulations.
5. Where it is necessary to use an insecticide from groups 1 or 2 in the following list, notify beekeepers so they can make necessary arrangements to protect their bees.
6. To prevent heavy losses of bees, avoid insecticide drifts or sprays directly on colonies. Bees often cluster on the front of their hives on hot evenings. Pesticide drift or direct spray at this time generally results in high mortality.

**Insecticides Grouped According to Their Relative Hazards to Honey Bees**

| Insecticides | Remarks |
|---|---|
| **Group 1 - Highly Toxic**<br>Acephate (Orthene®)<br>Carbaryl (Sevin®)<br>Dimethoate (Cygon®, DeFend®)<br>Fenvalerate (Pydrin®)<br>Methyl parathion<br>Parathion | This group includes materials that kill bees on contact during application or for several days following application. Remove bees from the area if these are used on plants being visited by the bees, with some exceptions. |
| **Group 2 - Moderately Toxic**<br>Methomyl (Lannate®, Nudrin®) | Do not apply when bees are working in field.<br>Apply in late evening. |
| **Group 3 - Relatively Nontoxic**<br>*Bacillus thuringiensis*<br>Demeton (Systox®)<br>Toxaphene<br>Trichlorfon (Dylox®) | Make applications in late evening or early morning when bees are not foraging. |

## Policy Statement for Making Chemical Control Suggestions

Suggestions for use of pesticides made by the Texas Agricultural Extension Service and the Texas Agricultural Experiment Station are based upon:

- Effectiveness under Texas conditions
- Avoidance of residues in excess of allowable tolerances
- Avoidance of toxicity to desirable vegetation, animals and humans
- Avoidance of adverse side effects upon beneficial predators, parasites, honeybees, fish and other wildlife, plants, animals and humans.

Suggested pesticides must be registered and labeled for use by the Environmental Protection Agency and the Texas Department of Agriculture. The status of pesticide label clearances is subject to change and may have changed since this publication was printed. County Extension agents and appropriate specialists are advised of changes as they occur.

The USER always is responsible for the effects of pesticide residues on his livestock and crops, as well as problems that could arise from drift or movement of the pesticide from his property to that of others. **Always read and follow carefully the instructions on the container label.**

Proper disposal of waste pesticides and "empty" or used containers is an essential step in safe pesticide use. For additional information see L-1008 *Disposal — Pesticide and Pesticide Containers.*



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