

Insect control recommendations for producing clover seed in Idaho

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NOTICE — According to Idaho's nonfood regulation of May 1990, once a field is designated as a "seed" production field no part of the seed crop including chaff, screenings, or field grazing may be used for human or animal feed. This regulation applies whether or not pesticides are used on that field.

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Pesticide residues — These recommendations for use are based on currently available labels for each pesticide listed. If followed carefully, residues should not exceed the established tolerances. To avoid excessive residues, follow label directions carefully regarding rate, number of applications, and minimum interval between application and reentry or harvest.

Groundwater — To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

Trade names — To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

Harmful insects and mites may reduce clover seed yields severely. In many cases, you must control these pests with pesticides to get economic yields. This publication describes the important insects found in Idaho on clover grown for seed, and lists the pesticides registered in Idaho for control of these pests.

To identify pest and beneficial insects, refer to University of Idaho publications MS 109, *Key to Damaging Insects* and PNW 343, *Beneficial Organisms Associated with Pacific Northwest Crops*. For the latest information on insecticide toxicity to bees, see CIS 458, *Prevent Insecticide Poisoning of Pollinators*. These publications are available through your county Extension office.

Important pest species

Clover aphids — These medium-sized, yellow-green aphids excrete large quantities of honeydew that cakes the seedhead, making it difficult to thresh. Serious injury also may result when large numbers of clover aphids suck sap from clover plants. This feeding injury causes stunting and irregular growth, particularly to the growing tips of young plants.

Clover aphids overwinter as eggs on apples and related woody plants. The eggs hatch at the same time as apple buds open in the spring. Wingless females produce succeeding generations of females, after which winged forms appear and fly to clover plants in late spring. Several generations of wingless and winged aphids develop on clover throughout the summer. In autumn, the winged aphids return to woody plants where males and females mate and the females lay eggs to complete the cycle.

Treatment is justified when developing seed heads are stripped and aphids are found in them.

Pea aphids — These large, pale green aphids pierce the leaves, stems, and blossoms with their mouthparts to suck sap from the clover plant. High populations feeding cause stunting of the plants resulting in fewer and smaller seeds. Unlike the clover aphid, the pea aphid produces small amounts of honeydew.

In Idaho, pea aphids overwinter in the egg stage on clover and alfalfa. The following spring, eggs hatch into wingless females that mature and give birth to living young. Ten to 15 generations may be produced in a single season on leguminous plants.

Pea aphid populations are considered damaging when they reach 100 per sweep without predators and parasites.

Cutworms — Several cutworm species occur on clover and are important in early spring in newly seeded fields. Cutworms spend the day in the soil at the base of the plant and come up at night to feed on leaves, stems, and blossoms.

| Insect control on clover seed | | |
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| Insecticide: Choose one of the following | Rate of active ingredient per acre | Remarks |
| Cutworms | | |
| Dylox | 1.0 to 1.5 lb | |
| Sevin XLR | 1.0 lb | Do not apply within 7 days of blossoming clover. Do not apply to the blossoming crop. |
| Grasshoppers | | |
| malathion | 1.25 lb | Do not apply diazinon or methyl parathion within 7 days of blossoming clover. Do not apply malathion to blossoming clover or within 1 day before bloom. |
| diazinon | 0.5 lb | |
| methyl parathion | .25 to 0.5 lb | |
| Sevin XLR | 1.0 lb | Do not apply within 7 days of blossoming clover. Do not apply to the blossoming crop. |
| Alfalfa loopers | | |
| Dipel 4L | 1 to 2 pints | Best results are obtained when loopers are small (1/2 inch or less). |
| Spittlebugs | | |
| malathion | 1.25 lb | Do not apply to blossoming clover or within 1 day before bloom. |
| Methoxychlor | 1.0 lb | |
| Spider mites | | |
| Metasystox-R | 0.5 lb | |
| Di-Syston 15G | 1.0 lb | Irrigate immediately or apply just before a rain. |
| Comite | 1.25 to 1.64 lb | Do not mix Comite with Dylox or other insecticides because the mixture is hazardous to bees. |
| Kelthane | 0.5 to 1.4 lb | |
| Capture | 0.06 to 0.1 lb | Do not apply more than 0.3 lb per acre per season. Do not apply or allow to drift to blooming crops or weeds while bees are actively visiting the treatment area. It shall be the growers' responsibility to notify the conditioning plant of any clover seed treated with Capture. Screenings from seed conditioning plants are prohibited from feed channels. |
| Clover aphids | | |
| Metasystox-R | 0.5 lb | |
| Pea aphids | | |
| Di-Syston 15G | 1.0 lb | Irrigate immediately or apply just before a rain. |
| Capture | 0.06 to 0.1 lb | Do not apply more than 0.3 lb per acre per season. Do not apply or allow to drift to blooming crops or weeds while bees are actively visiting the treatment area. It shall be the growers' responsibility to notify the conditioning plant of any clover seed treated with Capture. Screenings from seed conditioning plants are prohibited from feed channels. |
| diazinon | 0.5 lb | Do not apply diazinon or methyl parathion within 7 days of blossoming clover. Do not apply malathion to blossoming clover or within 1 day before bloom. |
| methyl parathion | .5 to 0.75 lb | |
| malathion | 1.25 lb | |

soms. They will damage severely tender seedlings.

The most common species occurring from March through May include the redbacked cutworm and army cutworm. Depending upon the species, cutworms overwinter as partially grown larvae or pupae. The larvae attack the clover just as it breaks dormancy in the spring.

The variegated cutworm occurs from May through August and often is the most important pest on established clover. Larvae feed directly on blossoms and developing seed. The variegated cutworm is a grayish-brown caterpillar with distinctive diamond-shaped markings on its back.

Treat if you feel the foliar damage is

excessive, or if they are clipping the developing heads.

 **Alfalfa loopers** — Alfalfa loopers feed on leaves and blossoms during June and July. They are occasional pests, but, when numerous, may cause heavy bloom loss. Larvae range in color from light green with a white stripe on the side to brown or black with a light stripe on the side. They range in size from 1/2 inch when first noticed to 1 1/2 inches in length when mature.

This insect overwinters as a pupa emerging in May as an adult moth. The alfalfa looper deposits eggs on weed hosts. The eggs hatch in 3 to 5 days. The larvae feed on the weed host until mature, and then

pupate in the soil. The next generation of adult moths emerges in about 7 days. Although there are three to four generations in a season, only the early generation (June to July) is a serious pest of clover seed.

Injury in early spring prevents the plants from growing and sometimes kills the plants. Treat if you feel the foliar damage is excessive.

 **Meadow spittlebugs** — Using their piercing-sucking mouthparts, spittlebugs feed on clover plant sap. Feeding causes stunting, dwarfing, loss of vitality, and lowered seed yield.

Adult spittlebugs are slightly more than 1/4 inch long and mottled gray and brown in color. They resemble leafhoppers but

| Insecticide: Choose one of the following | Rate of active ingredient per acre | Remarks |
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| Armyworms | | |
| Sevin XLR | 1.0 lb | Do not apply within 7 days of blossoming clover. Do not apply to the blossoming crop. |
| Dylox | 1.0 to 1.5 lb | |
| Methoxychlor | 1.5 to 2.0 lb | |
| methyl parathion | 0.5 | Apply before armyworms reach third instar. Do not apply within 7 days of blossoming clover. |
| malathion | 1.25 lb | Do not apply to blossoming clover or within 1 day before bloom. |
| Clover leaf weevils | | |
| Methoxychlor | 1.0 lb | |
| Capture | 0.06 to 0.1 lb | Do not apply more than 0.3 lb per acre per season. Do not apply or allow to drift to blooming crops or weeds while bees are actively visiting the treatment area. It shall be the growers' responsibility to notify the conditioning plant of any clover seed treated with Capture. Screenings from seed conditioning plants are prohibited from feed channels. |
| Clover seed chalcids | | |
| No effective chemical control is available. Taking a cutting of hay in early June will reduce seed chalcid populations. Volunteer and waste area clover plants should be removed. These plants act as reservoirs for the chalcids. Fall cultivation and irrigation also helps to reduce chalcid populations. Disking in waste seed to bury developing chalcids at least 1 inch in soil will reduce adult emergence. Late summer or early fall burning of crop residue in the field helps to control seed chalcids. | | |
| Clover head weevils | | |
| Parathion | 0.5 lb | Apply spray when first seed crop blooms, begins to turn down and becomes brown, and you reach two weevils per sweep with an insect net (usually the first week in June). Allow at least 7 days between spraying and introduction of bees into the field. Do not spray clover during bloom period to avoid injury to honeybees. |
| Capture | 0.06 to 0.1 lb | Do not apply more than 0.3 lb per acre per season. Do not apply or allow to drift to blooming crops or weeds while bees are actively visiting the treatment area. It shall be the growers' responsibility to notify the conditioning plant of any clover seed treated with Capture. Screenings from seed conditioning plants are prohibited from feed channels. |
| Lygus bugs | | |
| Capture | 0.06 to 0.1 lb | Do not apply more than 0.3 lb per acre per season. Do not apply or allow to drift to blooming crops or weeds while bees are actively visiting the treatment area. It shall be the growers' responsibility to notify the conditioning plant of any clover seed treated with Capture. Screenings from seed conditioning plants are prohibited from feed channels. |
| Dylox | 1.0 to 1.5 lb | |
| malathion | 1.25 lb | Do not apply to blossoming clover or within 1 day before bloom. |
| methyl parathion | 0.7 lb | Do not apply within 7 days of blossoming. |
| Add a buffering agent when organophosphates are used in alkaline water. | | |

are usually larger and more robust. Immatures (nymphs) are yellow or green and are protected in a wet, bubbly mass of spittle on the plant stem.

In the fall, adults lay eggs in plant stems. They hatch in late March and April. The nymphs migrate to tender growing plants to begin feeding. They feed for 7 to 8 weeks inside the spittle before maturing as adults in early June. Adults continue to feed on plants until late summer.

 **Clover leaf weevils** — Clover leaf weevils damage clover plants when they feed on leaves and stems. Larvae and adults have chewing mouthparts, but the larvae cause greater damage because they feed on foliage for several

weeks before maturing into adult weevils.

Clover leaf weevil adults are large, brown, snout beetles measuring about 0.3 inch in length. The larva is light green in color with one white stripe down its back and has a brown head. A fully grown larva is about 1/2 inch long.

Clover leaf weevils lay eggs in the fall. Larvae feed throughout the winter when weather permit. Fully grown by April or May, pupation occurs in the soil with adult weevils emerging in 10 to 12 days. Adults feed briefly but become inactive for most of the summer. Normally, only one generation occurs in a year; but in exceptionally mild seasons, a second generation of adults may emerge before winter. Females

of this generation lay eggs the following spring.

 **Grasshoppers** — Adult and immature grasshoppers cause damage as they feed on plant leaves, stems, and blossoms. Usually, heavy infestations are in fields near rangeland and uncultivated waste areas. As the rangeland dries in early summer, the grasshoppers migrate to irrigated fields.

You may find several species of grasshoppers in clover seed fields including migratory grasshoppers, two-striped grasshoppers, redlegged grasshoppers, and clearwinged grasshoppers. Various species of larger bandwinged grasshoppers often are present in low numbers.

Grasshoppers overwinter in the soil as eggs. Nymphs hatch in April or May and feed on vegetation for up to 60 days before maturing. Fully winged adults then disperse to suitable plant hosts where additional crop damage may be severe. Adults mate in late summer and lay eggs in the soil.

 **Clover root curculios** — The main damage caused by this pest is a result of larval feeding on the root. Often roots are girdled, and the damage allows entry of infectious soil organisms that kill or weaken the plant.

The adult root curculio is a small (1/8 inch), grayish weevil that feeds on foliage, but does little damage. Fully grown, whitish-colored larvae are about 0.4 inch in length.

Both adult and egg stages overwinter in the soil and plant debris. Eggs laid in the spring hatch in 1 week, whereas fall-laid eggs overwinter to hatch the following spring. Adults emerge in June and July and live for about a year. There are no registered insecticides to control this pest.

 **Clover seed chalcids** — Adult clover seed chalcids are tiny, black wasps that emerge in early summer and lay eggs inside the developing clover seed. The white, legless larvae devour the inside of the seed and mature into adults in 30 to 40 days. Chalcids may have two or three generations per year. Larvae overwinter in the harvested seed or in seeds that have fallen to the ground. Seed chalcids may reduce yields by 20 percent. Damaging populations are found primarily on red clover.

Chemical control of chalcids is ineffective. The only method of control is sanitation. Before April 1, remove clover chaff from the field, remove weed clover plants on ditchbanks and field margins, and plant new seedlings 1/2 mile away from old fields.

 **Spider mites** — Spider mites are spider-like in appearance and almost microscopic at 1/20 inch long. They overwinter in the field in the previous year's crop residue and become active in

late spring. Depending on their food supply, they vary in color from green to yellow or orange.

Feeding injury to the leaves first gives the appearance of light green stippling. Severe injury causes the leaves to turn brown and become dry, making them useless. Mite webbing may make harvesting difficult.

Control spider mites early in the season (June or July) when 25 percent of the leaves show feeding injury. Late season treatments are not justified.

 **Lygus bugs** — Adult lygus bugs are 1/4 inch long and 1/8 inch wide. They range from green to brown in color with a light yellow "V" on their back. Immatures (nymphs) range in size from less than 1/10 to 3/8 inch long and are glossy green in color. Lygus overwinter as adults in old crop residue and other protected places. They insert eggs into the stems of plants just before the clover starts to bud in late spring.

Lygus bugs occur in large numbers in all types of clover seed fields; however, damage varies between clover cultivars. In red clover seed, lygus do little damage and are not economically important. In other cultivars including white Dutch, Alsike, and Ladino, lygus bugs feed on many parts of the plant causing blasted buds, blossom drop, and shriveled seed. Treatment is suggested when lygus average 10 per sweep using 180 degree sweeps.

Clover head weevils — Two weevils are in this group: the clover seed weevil that is the major pest and the clover head weevil that is a minor pest. The seed weevils are small, gray weevils less than 1/8 inch long. The larvae feed on the seeds, damaging two to four seeds in each head. Weevils often damage severely Alsike, white Dutch, and Ladino clovers but do not attack red clover.

Adults overwinter beneath dead plant material and other debris and emerge in late May. The adults move into clover fields and lay eggs in immature heads when blossoms start to turn brown. Eggs hatch and larvae feed on seeds for 2 to 3

weeks. Pupation occurs in the soil, and mature adults emerge in about 2 weeks, feed on green foliage for a short period, and prepare to spend the winter. Only one generation occurs each year.

Sample for weevils after bloom when the first blossoms start turning brown. Two adults per sweep justify treatment.

 **Minor pests**—Armyworms occur late in the season and feed primarily on weeds in the field. They cause little damage to clover seed. Pea leaf weevils occur rarely in established clover seed but may cause significant damage to seedling plants. Nitidulid beetles feed on pollen on clover flowers causing the clover flowers to dry, thus preventing seed set..

Pollinator safety precautions

1. Honey bees are attracted to clover blossoms and are important as pollinators of clover seed crops. Do not use pesticides during the clover bloom period unless absolutely necessary.
2. Choose pesticides that are the least hazardous to bees. Consult University of Idaho publication CIS 458, *Prevent Insecticide Poisoning of Pollinators*, for an up-to-date list of insecticides and their toxicities.
3. Use extreme care when applying any hazardous insecticide next to a blooming clover field. Do not allow sprays to drift to the clover field.

Insect control precautions

1. Buffering increases effectiveness of certain insecticides, so follow label recommendations to prevent injury to beneficial insects.
 2. Do not use insecticide-treated clover, chaff, or seed screenings for food or animal feed.
 3. Thorough coverage is necessary for insect and mite control. Use sufficient water.
 4. Time applications to proper weather conditions so the least amount of drift to neighboring crops will occur.
 5. Methyl parathion is especially hazardous to applicators. Follow label instructions precisely when storing, handling, and applying poisonous materials. Post fields as required to prevent others from entering and destroy empty containers as label directs.
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