

ALFALFA SEED INSECT PEST MANAGEMENT

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The major pests of alfalfa seed in Saskatchewan are lygus bug and alfalfa plant bug (APB). Pea aphids and grasshoppers are occasional pests. In addition, grower experience suggests that the bertha armyworm may find alfalfa an attractive host plant. The following table will give an indication of the life cycles of lygus bug and alfalfa plant bug in parkland Saskatchewan. The accompanying notes outline the optimum insect pest management program to follow for alfalfa seed production. Finally, a list of insecticides registered for alfalfa plant bug and lygus control is included.

TIME	LYGUS BUG	ALFALFA PLANT BUG
Winter	Winters as adults in headlands and tree rows.	Winters as eggs in alfalfa straw and stubble.
Crop is approximately 6" in height - late May, early June.	Adults migrate into fields, first around edges and gradually into the center. They feed on rapidly growing alfalfa, and the females begin laying eggs into the alfalfa stems.	The eggs hatch and first instar nymphs begin feeding on new alfalfa growth. Young nymphs are orange-green and have "clubbed" antennae.
Crop is actively growing - early instars are first found in late May to the 2nd week of June.	The eggs hatch, and first and second instars develop. They are very small, active, and bright green.	The population grows in size and number, and second and third instars develop. Third instar nymphs have small wing pads. Nymphs become bright green.
Mid June - crop is actively growing and first bud clusters are apparent.	Second and third instars develop. The third instars have wing pads and black spots on their backs.	

NOTE: When third instar nymphs of lygus and third and a few fourth instar nymphs of APB are present, the hatch is well underway. Insecticide application should be timed to this stage so that you are not spraying when there is still a large number of eggs present. Eggs are well protected and will not be affected by insecticides.

TIME	LYGUS BUG	ALFALFA PLANT BUG
Mid to late June - buds and early flowers are present.	Third, fourth and fifth instars are present in increasing numbers and the old adults decrease in number.	Fourth and fifth instars and new adults are present in increasing numbers.
Early July	New adults appear. They are lighter in colour and newer-looking than the old adults.	The new adults mate and the females begin egg-laying. The adults disperse.
Early - mid July	The new adults mate and some females lay eggs, while others begin physiologically preparing for the winter. Lygus of all stages are still present, but nymph numbers decrease.	The adults gradually disappear from the fields.
Late July - early August	A second hatch may occur and new young nymphs appear, progressing to later instars if climate and weather allow. Monitor this population.	A second hatch of APB has occurred once in the last several decades in central Saskatchewan. Areas in southern Saskatchewan may be more likely to experience this second hatch. Hot, early summers are a key to watching for second hatch.
Mid - late August	Migration of adults into late seed fields may cause a rapid climb in numbers and excessive damage to green seed in late August and September.	

CULTURAL CONTROL OF INSECT PESTS

1. Burning Stubble and Debris

Burning stubble and debris in the spring controls:

- alfalfa plant bug (APB)
- alfalfa weevil adults
- superb plant bug
- alfalfa seed chalcid
- other species that overwinter in the field

Burning also offers a field sanitation benefit, destroying the crop disease reservoir in stubble and debris. Another benefit is the immediate release of some nutrients to the crop; however, burning is often difficult to do, especially at the right time. It is difficult to control, it may set crop growth back and delay bloom, and it destroys organic material. Burning annually detracts from the soil improvement aspects of the alfalfa seed crop.

2. Cultivation

An early spring cultivation to incorporate straw and stubble is an alternative to spring burning that decreases the level of an alfalfa plant bug infestation. Cultivation can be either between-row, or broadcast. Alfalfa appears to be unharmed by the operation. Cultivation also removes winter annuals and early germinating spring annuals, and levels any gopher mounds in the field.

3. Monitoring in May and June

Monitoring is done using a sweep net and making 5 individual 180 degree walking sweeps at each field site, with at least one sampling site for every 10 acres. Insect numbers and stages are counted and tabulated, and a lygus + APB number per individual sweep is thus calculated.

What will I see in May and June?

Insects expected in May and June in chronological order:

- ladybird beetles, damsel bugs and spiders are present
- lygus adults migrate into fields and begin egg-laying
- *Plagiognathus* eggs hatch and young nymphs begin feeding
- APB eggs hatch, young nymphs begin feeding
- alfalfa weevil adults become active and begin egg-laying
- lygus eggs hatch, young nymphs begin feeding
- alfalfa weevil eggs hatch and larvae begin feeding
- grasshoppers and aphids may be present
- lygus and APB nymphs develop into new adults

4. Monitoring in July and August

What will I see in July and August?

- lygus and APB 4th and 5th instar nymphs and new lygus and APB adults appear
- APB adults decrease in number after egg-laying
- alfalfa weevil larvae peak feeding activity extends to mid-July
- second generation lygus and APB eggs hatch in southern and central regions
- pea aphids and grasshopper numbers may build up
- ladybird beetles, damsel bugs, lacewings, and spider populations build up;
- big-eyed bugs and minute pirate bugs are also present, as are parasitic wasps

CHEMICAL TREATMENTS

1. Prebloom Treatment

Generally, season-long control of insects in alfalfa seed can be achieved using a prebloom insecticide application. This application must be timed to best control alfalfa weevil, lygus, and alfalfa plant bug populations without affecting pollinator species. Check alfalfa seed fields with a sweep net.

Why would I use a prebloom treatment?

- if the numbers of insect pests exceed economic threshold levels for the region (estimated at 4 alfalfa plant bugs or 8 lygus bugs per individual sweep in parkland Saskatchewan or a combination of 5 - 6 lygus + alfalfa plant bugs; for alfalfa weevil, estimated at 20 - 35 larvae per individual sweep or when 30 - 50% of plant tips show damage)

When do I apply this treatment?

- APB nymphs are in the 1st - 4th instars
- 3rd instar lygus nymphs are present along with 1st and 2nd instar nymphs (the presence of 3rd instar nymphs indicates that the hatch is well underway and there are few eggs left to hatch); burned fields are generally in early bud stage, non-burned fields in late bud stage

NOTE: The prebloom treatment can be hard on beneficial insects and pollinators such as bumble bees, solitary bee species, and honey bees. If insecticide application coincides with bloom of hawksbeard or dandelion:

- (a) use a chemical with a short residual period
- (b) avoid insecticide drift into non-target locations
- (c) spray in the evening after bees have ceased foraging

These practices will minimize risk to these beneficial insects.

2. Summer and Late Summer Chemical Treatments

If an insecticide application is needed during the bloom period, it must be selective for pest species and timed for the least harm to pollinators.

Why would I need to apply a summer insecticide treatment?

Generally, if an insecticide is used in the prebloom period then further insecticide applications will not be needed. However, there are sometimes situations when the numbers of insect pests during the prebloom monitoring period do not trigger the need for control. In these instances there is a need to continue to monitor the fields during July and August. A mid- or late season economic infestation of alfalfa weevil, lygus, and / or alfalfa plant bug is not common, but there is a possibility that insect pest numbers will exceed their damage thresholds. We do not have firm damage thresholds for this time of year, since these situations rarely occur. The best advice is to monitor these fields and watch for damaged pods.

Alfalfa weevils can cause considerable damage to alfalfa seed fields throughout the prairies. Alfalfa weevils overwinter as adults in alfalfa stubble, and feed and lay eggs on young alfalfa stems. The small green larvae defoliate leaves, stems, and buds.

It is quite common to see an increase in lygus numbers in the second or third week of July and up until the first two weeks of August; normally, the numbers will then drop. However, if mid-season monitoring shows in excess of 8 lygus per individual sweep for more than two weeks, the crop is suffering from moisture stress, and the seed is young and milky, insects may cause damage to the seed crop. Also, occasionally late blooming alfalfa seed fields act as magnets for lygus adults which are leaving cut hay fields or maturing fields of canola and grain in search of a new feeding ground prior to onset of hibernation. These lygus adult populations can reach very high numbers and can severely damage young green seed pods. Again, we have no firm damage thresholds for these situations; 15 per individual sweep in late August in green fields have been seen to lead to pod drop. Monitor these fields closely and watch for pod damage or drop.

Generally, alfalfa plant bug adults leave the fields in mid July and are not seen again. However, in some years, an abnormally early summer season will allow for the development of a full second generation of alfalfa plant bug which may necessitate a second treatment.

In Saskatchewan, the pea aphid overwinters in the egg stage on alfalfa and other perennial legumes. Depending on heat units, there can be five or more generations per year here. Small numbers of this overwintering population are present in spring and early summer, but the main part of our population migrates in on air streams from southern areas of the continent, usually in mid- July. Populations can remain high until early to mid-August, when aphid crowding, plant quality decline, and increased predator and parasite numbers cause winged aphids to develop and leave the fields, and the populations crash. Inclement weather, especially heavy rain and high winds, can also cause populations to decrease.

Although pea aphid populations infrequently cause alfalfa seed loss, if immigration occurs early in the season, and if weather conditions are optimal for aphid reproduction, populations may reach levels high enough to cause yield decline, especially if the crop is drought-stressed. Some growers believe that, in some years, pea aphid numbers warrant treatment. Our damage threshold is about 200 per individual sweep - this equates to about one quarter cup of aphids in the net after 5 sweeps.

The pea aphid prefers to feed on field peas rather than alfalfa. Alfalfa seed producers in areas that have few nearby pea fields may experience more damage than those in areas with many such fields. Likewise, growers in warmer, more southerly areas of the province may have greater pea aphid problems than those in northern areas.

The alfalfa blotch leaf miner is a small fly that lays its eggs in alfalfa leaves. The larvae feed inside and mine the leaf, giving it a flecked, mottled, or tunneled appearance. This pest has been in eastern Canada for about 30 years; it has recently been found in many parts of the prairies. The larval mines decrease alfalfa forage quality; to date their effect on seed production is unknown.

Finally, grasshoppers are an occasional problem in alfalfa seed production. Grasshopper damage generally appears to be more severe when the alfalfa seed crop is thin, dry and under environmental stress. A lush, thick, healthy alfalfa field is able to support a grasshopper population with little damage. The Saskatchewan Agriculture & Food extension bulletin, Grasshopper Control, outlines grasshopper infestation ratings in detail for egg, nymph, and adult populations. A severe infestation is equivalent to 13 or more grasshoppers moving away as you take a step in the field. Often grasshopper numbers will appear high in the shelter access roads in the field, but in these roads and open areas numbers over 25 grasshoppers per step to equate to a severe infestation.

When would I apply a summer insecticide treatment?

- lygus and APB are in 4th and 5th instars and significantly exceed the 5 - 6 per individual sweep early season damage threshold, or
- 2nd generation lygus hatch is well underway and exceeds the 8 per individual sweep early season damage threshold for more than a week, or
- when numbers of aphids (200 per sweep) or grasshoppers (a severe infestation might be 13 or more grasshoppers per metre step) warrant, or
- when lygus adult numbers increase rapidly at season end and the seed crop is late and still mostly green (numbers exceeding 15 per individual sweep for more than one week and new seed still milky and green; pod drop evident)
- remember that a healthy, lush crop can withstand much more damage than a drought-stressed one

Order a sweep net directly from:

Tim Kinneberg
Pro Metal
555 Park Street
Regina, SK S4N 5B2
tel (306) 525-6710 fax (306) 525-5434
Cost \$39.95 + tax + shipping cost

REGISTERED INSECTICIDES COMMONLY USED FOR LYGUS
AND ALFALFA PLANT BUG CONTROL

Insecticide	Recommended Product per Acre
Cygon 480 / Lagon 480 E (dimethoate)	470 ml
Decis 5.0 EC (deltamethrin)	80-100 ml
Dylox 420 L (trichlorfon)	1113 ml*
Matador 120 EC (cyhalothrin-lambda)	34 ml

* this is the label rate; tests by Craig (1980) and May (1994, 1995) found 550 ml/acre to be sufficient for control of lygus bug and alfalfa plant bug

Cygon 480 / Lagon 480 E

- controls lygus and alfalfa plant bugs, alfalfa weevil, pea aphids, and alfalfa blotch leaf miner
- has residual toxicity; allow at least 1 week before releasing leafcutting bees
- will kill honey bees and native pollinators foraging on flowering weeds in the field

Decis 5.0 EC

- controls lygus bugs and alfalfa weevil; not effective against older instar and adult APB
- the EC formulation appears to be safe when applied 12 hours before bee release or foraging activity, thus Decis can be used as an in-season treatment
- not registered for aerial application in alfalfa

Dylox 420 L

- controls lygus bugs; does not control pea aphids
- safe to use 12 hours before leafcutting bees are released, and in the evening after they finish foraging; avoid direct contact of bees with spray; covering shelter is recommended

Matador 120 EC

- controls lygus bugs, alfalfa weevil, and pea aphids
- very toxic to bees; avoid spraying when bees are foraging; spray deposits should be dry before bees commence foraging in the crop
- seed from treated crops is not to be used for production of alfalfa sprouts for human consumption