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Alfalfa Weevil Biology and Management

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Introduction

The alfalfa weevil is the most serious destructive insect to alfalfa grown for hay in the high and inter-mountain plains of the United States. Both larvae and adults feed on alfalfa, damaging its stems, plant terminals, and leaves. This damage lowers crop tonnage and forage quality due to leaf tissue losses.

Alfalfa Weevil Biology and Plant Injury

Life history

Adult alfalfa weevils are snout beetles approximately 3/16 inch (5 mm) long. Newly emerged adults are light brown with a broad, dark brown stripe from the head to about three-fourths the length of the back (Figure 1). Older adults appear dark brown to black. The stripe may not be apparent because as adults age they lose light-colored scales, making the stripe difficult to distinguish.

Figure 1

Alfalfa weevils overwinter as adults in the crowns of alfalfa plants and in plant debris found in and around the edges of fields. When temperatures warm to about 48° Fahrenheit (9° Celsius) in the spring, adults become active, and egg-laying activity typically begins after the alfalfa breaks dormancy (April through May) and decreases steadily through June.

Females prepare egg-laying sites by chewing holes in succulent alfalfa stems and into dead stems if no new growth is available. The females deposit clusters of 5 to 15 eggs in these holes. Egg clusters can be found by first checking for small punctures and then splitting the stems to expose the eggs (Figure 2). Eggs are tiny (about 1/50 inch [0.5 mm]), oval shaped, and lemon yellow when first laid. Just before hatching, the eggs turn dark brown. Each female will lay between 400 and 1,000 eggs.

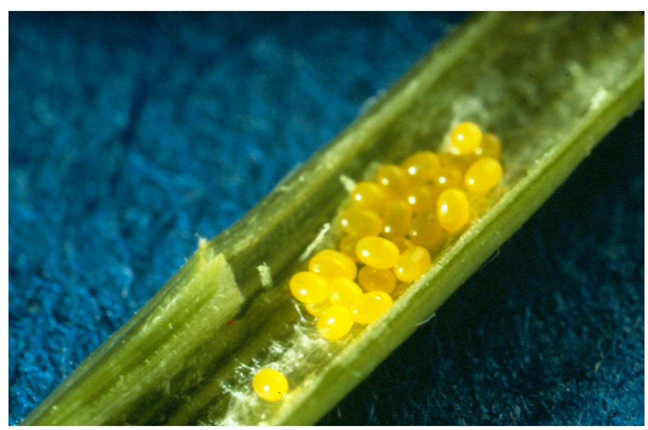

Figure 2

Eggs hatch and young larvae emerge from the stems after 7 to 14 days, depending on outdoor temperatures. Weevil larvae are about 1/20 inch (1.25mm) in length when first hatched. The four active feeding bodies of the larvae are known as the first through fourth instar larvae. All four bodies are pale green, curved, and have shiny black heads. Third and fourth instar larvae have a distinctive white stripe down the middle of their backs in addition to curved bodies and shiny black heads. The white stripe may also be visible on second instar larvae with the aid of a hand lens with 10x magnification. Fully grown fourth instar larvae are up to 3/8 inch (9.5 mm) in length and are wider in the midsection of the body than at either end (Figure 3)

Figure 3

First and second instar larvae feed within the tightly folded leaves of plant terminals. When half to full grown and at the third and fourth instar larvae stages, larvae will feed on expanded leaves near the terminals. The most destructive larval populations often coincide with the first cutting of alfalfa. Larval development is completed in about three to four weeks. Fully grown larvae move into plant crowns and soil debris before pupating in loosely woven, net-like cocoons (Figure 4). Parasitism of pupae by *Bathyplectes* spp., the most common alfalfa weevil parasite in the region, is easy to detect at this stage. (See the section on biological control to minimize alfalfa weevil damage.) Second-generation adults emerge from their cocoons in 7 to 14 days depending on outdoor temperatures. They feed on alfalfa for a short time before moving to a protected site in and around the field. It is here that they reduce their feeding activity for the rest of the summer, mate,

Figure 4

and pass the winter. Commonly, there is one generation per year in the northern intermountain plains of the United States.

If weather allows, second-generation females may become active, move from the protected sites, and lay eggs during late summer and early fall. Few, if any, of these eggs will survive Wyoming winters. Some eggs may hatch, and larvae may complete development before winter. The resulting adults will then seek protected sites to overwinter. This extra summer generation is unlikely to occur under most Wyoming weather conditions; however, it may occur in areas where three cuttings are obtained and the summer is cool, wet, and long.

Plant injury

Terminals can be heavily damaged by early instar larval feeding within the folded leaves, making initial damage difficult to see. The overlapping foliage of the stem terminals should be unfolded in order to detect larval feeding. Alfalfa is particularly affected by defoliation during early first cutting growth and early regrowth after the first cutting. At these times root reserves can be quickly depleted, resulting in poor regrowth and decreased yield in subsequent cuttings. Peak defoliation often occurs near the time of the first cutting due to late instar larval feeding on plant terminals and expanded leaves. Detection of larvae is important during the growth of the first cutting and the regrowth after the first cutting. (See section on alfalfa weevil monitoring.)

At high larval densities foliage can be stripped, leaving only skeltonized, ragged leaf fragments and stems. Heavily infested stands have a grayish or frost-like appearance due to the dried, defoliated leaves. Although there is some larval mortality during harvest, surviving larvae will congregate under the windrows and damage regrowth buds. If larval survival is high, this damage will be visible as yellow defoliated stripes through the field once the hay is baled. Overall, yield losses of 30 to 40 percent of the standing hay crop are possible under extreme feeding pressure. This damage reduces forage quality due to high leaf tissue loss.

Alfalfa Weevil Monitoring

Predict weevil development using degree days

Estimates of when different stages of alfalfa weevil development occur in the field can be obtained using degree days to predict weevil development. Alfalfa weevil growth increases at a near constant rate in response to increasing spring temperatures above approximately

48° Fahrenheit (9° Celsius). The amount of warm weather required for weevils to complete development is measured in units of degree days. For the alfalfa weevil, degree days are accumulated for each 24-hour period that temperatures rise above 48° Fahrenheit after March 1. Table 1 shows the procedure for degree-day calculation using daily high and low temperature readings. The degree days necessary for weevil development are shown as well as the corresponding average calendar dates that these events occur in seven locations in Wyoming. These dates are based on 30-year temperature patterns. In years of unusually warm or cold springs, specific degree-day accumulations may occur several weeks earlier or later than normal, resulting in a prediction range of about one month for any stage of alfalfa weevil development. Using a high-low temperature gauge and the equations in Table 1, more specific dates can be obtained for peak occurrence of different development stages. Accumulating degree days for a location will allow for the maximizing of sampling efforts during the time the growth stage of interest is at or near its peak occurrence.

If early detection of the first instar larvae is desired, inspect stems twice a week beginning with the first inspection when the 310 degree-day accumulation is reached. At this time, the first instar larvae will have emerged from eggs laid inside stem punctures and will be found mostly in the folded leaves of stem buds. Detection of young larvae can be used as an early warning to determine which fields should be more carefully inspected as larvae mature.

Table 1-- Accumulating degree days and dates of peak occurrence of alfalfa weevil life stages

Accumulating degree days using a high-low temperature gauge

1. Begin accumulating degree days on March 1 or when the temperature first exceeds 48° Fahrenheit (the developmental threshold):

   $$\text{Degree days} = \frac{\text{maximum temperature} + \text{minimum temperature}}{2} - 48^{\circ}\text{ Fahrenheit}$$

2. Add each day's accumulations to the previous total.
3. Compare the running total to the degree days that correspond to dates of peak occurrence for each weevil life stage in order to time field surveys.

Dates of peak occurrence of alfalfa weevil life stages

Stage	Cumulative degree day	Average date of occurrence by location[1]						
		Afton	Casper	Gillette	Powell	Riverton	Torrington	Wheatland
Egg Hatch	310	June 7 – July 10	May 10 – June 15	May 10 – June 17	May 4 – June 6	May 9 – June 9	May 2 – June 1	Apr. 25 – June 1
First instar	350	June 14 – July 12	May 12 – June 17	May 17 – June 21	May 10 – June 8	May 16 – June 13	May 4 – June 6	May 6 – June 6
Second instar	425	June 19 – July 9	May 23 – June 23	May 23 – June 28	May 16 – June 15	May 25 – June 19	May 11 – June 14	May 6 – June 10
Third instar	500	June 28 – July 24	May 27 – June 29	May 27 – July 14	May 20 – June 20	May 29 – June 23	May 20 – June 19	May 15 – June 17
Fourth instar	580	July 5 – Aug. 5	June 1 – July 5	May 28 – July 5	May 23 – June 27	June 3 – June 29	May 25 – June 22	May 23 – June 29
Adult emergence	850	July 22 – Sept. 20	June 12 – July 17	June 20 – July 18	June 10 – July 11	June 20 – July 13	June 9 – July 7	June 6 – July 7

1 Modified from tables based on a 30-year average database for high and low degree day accumulations beginning March 1 (Pochop, 1977). These dates should be used as a general check for degree-day accumulation for specific locations. Note that temperature fluctuations for any given year may result in alfalfa weevil development through a one-month window for the various alfalfa weevil growth stages. During warm spring and summer days, a degree-day accumulation of 15 to 30 can be expected per day using a 48° Fahrenheit temperature base.

When 425 degree-days have been accumulated, fields should be inspected for larvae, paying particular attention to fields where the first instar larvae were detected. During this period larvae will be mostly in the second instar and will be found feeding on or near the plant terminals. Tip damage is readily visible at this time if a heavy infestation is present. Folded leaves must be opened to detect lighter infestations that may still develop into an economically important infestation. If any larvae are detected during a minimum of a 10-minute initial search in any field, sample surveys should be conducted in each field to determine if the infestation is likely to cause economic damage. (See the section on potential yield reduction and economics of insecticide use.) The third and fourth instar larvae cause most of the economically important damage; therefore, it is optimal to inspect for the second instar larvae before the economic damage occurs.

Larval surveys

Alfalfa weevil larval surveys are conducted according to a predefined pattern determined by field acreages. Field infestations may be spotty to uniform depending upon terrain, weather, and soil conditions. An inspection of every distinctive field section will aid in determining the spatial nature of the infestation. As a general rule for using the six-stem county sampling method described below, take three six-stem county samples for fields 1-19 acres in size, four samples for fields 20-29 acres in size, and five samples for fields greater than 30 acres. Begin surveying the fields to detect the population peak of second instar larvae when an accumulation of 425 degree-day occurs. This typically occurs in May or June depending on what the temperature has been. Inspection should occur weekly until a degree-day accumulation of about 550 is reached, an insecticide has been used, or it is reasonably safe to assume that the infestation is noneconomic. If an insecticide is used, inspect the field when the reentry period has elapsed to check for larval kill.

At a degree-day accumulation of 550, third and fourth instars are peaking. This typically occurs in June in most Wyoming locations. These instars cause more defoliation than earlier instars; therefore, it is optimal to detect larval infestations at the second and early third instar stage. If damage is becoming unacceptable as harvest approaches, the crop may be cut early or a rescue insecticide treatment may be adopted. Care should be used in applying insecticides at this time because honey bees may be present if the stand is coming into bloom. Also, pay close attention to the waiting period to harvest because of insecticides used at this time. Generally, alfalfa should be cut or sprayed before it blooms if the weevil population is a significant problem.

The tools and supplies needed for sampling alfalfa weevil larvae include a 3-gallon, light-colored plastic bucket, light-colored cloth, a hand lens, a clipboard, paper, and a pencil. Procedures for using the six-stem county method are listed in Table 2.

Alfalfa Weevil Management

Potential yield reduction and economics of insecticide use

Research at Oklahoma State University has shown that alfalfa weevil present in the first crop can diminish the yield and quality of the first cutting and can have a carryover effect into the second hay crop. Table 3 shows how much yield reduction for the first and second hay crop can be expected for various infestation levels (the average number of larvae per stem) when alfalfa is up to 15 inches in height. When weevil populations increase to a point at which economic loss due to yield reduction is expected to exceed management costs, control measures should be considered. Insecticide applications and early harvesting are the most common growing season management strategies. If an economic infestation of third and fourth instar larvae is found when the plants are at 10 percent bud break stage or later, an early cutting is an alternative to insecticide use. If larval survival under the windrow is high, stubble treatment may be necessary. (See the early first harvest section for further discussion.)

Not all alfalfa weevil infestations will cause enough alfalfa damage to justify implementing control efforts. When insecticide control of alfalfa is used, only labeled insecticides at recommended rates should be used. An insert addition (appendix) to this manual lists registered insecticides used in the region as of 1992. Note that label clearance and rates are subject to change and that users are responsible for compliance as per the most current label.

The bottom half of Table 2 will aid in determining if an insecticide is needed for alfalfa weevil infestations in particular fields. For example, using an average alfalfa hay price of $80 per ton and insecticide control costs with applications costs of $9.50 per acre, 0.14 tons per acre is the crop yield that is of equal value to the insecticide treatment. As shown in Table 2, the 1.0 larva-per-stem density most closely corresponds to the 0.12 ton-per-acre value, assuming two cuttings will be taken. If the larvae-per-stem estimate obtained in the field exceeds 1.0 per stem, then the control will be economically advantageous. If the larva-per-stem field estimate is lower than 1.0 larva per stem, then the control will not be economically profitable to pursue.

Table 2. Surveying for alfalfa weevil and estimating the economic value of insecticide use

Procedures for using the six-stem survey to estimate alfalfa weevil larval densities

1. Walk into the field at least 20 steps from the field border, looking toward the horizon and not at the plants.

2. At the first stop, bend over while still looking at the horizon and grasp the base of an alfalfa stem.

3. Cup the stem tip and gently break it from the crown.

4. Place the stem tip first into a 3-gallon bucket.
   Straighten up, look at the horizon, turn in any direction, take one to three steps, bend over while still looking at the horizon, and randomly select another stem. Collect this stem in the same manner as the previous one.

5. Repeat step five until six stems have been collected at the sample site.

6. Grasp all six stems by their bases and vigorously shake and beat them inside the bucket to dislodge the larvae.

7. Pour the contents of the bucket onto a white cloth, count the number of larvae present, and record this number.

8. Go to the next sampling site and repeat this procedure.

9. To obtain an estimate of larvae per stem for the entire field, divide the total number of larvae counted for all sampling sites by the total number of stems collected for all sampling sites.

Procedures for determining if an insecticidal application is warranted

1. Calculate the cost of insecticidal control in dollars per acre. Be sure to incorporate the cost of application with the cost of the insecticide.

2. Divide the insecticide control costs in dollars per acre by the expected price for alfalfa hay in dollars per ton. The result is the expected yield in tons per acre that is the same value of the insecticide and application costs.

3. Select the larvae-per-stem density that most closely corresponds to the calculated tons-per-acre yield that is equivalent to control costs. Use the first cutting column in Table 3 if only one cutting per season is expected and the total column if two cuttings are expected. The total column should also be used if additional cuttings beyond the second cutting are expected.

4. Scout each alfalfa field for larvae as described in the first half of the table.

5. Determine if insecticidal control is economically justified.
   a. If the larvae-per-stem estimates obtained in the field exceed the larvae-per-stem density calculated using Table 3, the control will be economically advantageous.
   b. If the larvae-per-stem estimates obtained in the field are the same or lower than the larvae-per-stem density calculated using Table 3, the control will not be economically profitable to pursue.

6. If an insecticide is to be used, consider its effects on non-targeted organisms such as honey bees and natural enemies of the alfalfa weevil. Because of the complex nature of these factors, Table 3 does not incorporate this information. If honey bees are present, sprays should be timed in the evening or early morning when the bees are not active. Some insecticides are extremely hazardous to bees and should not be applied when alfalfa is in bloom.

Table 3. Expected yield loss (tons per acre) for first and second hay crops for various densities of alfalfa weevils (larvae-per-stem) found on alfalfa that is up to 15 inches in height.

Larvae per stem	Yield loss (tons per acre)		
	First cutting	Second cutting	Total
0	0.0	0.0	0.0
0.50	0.042	0.035	0.077
0.75	0.063	0.052	0.115
1.00	0.084	0.069	0.153
1.25	0.105	0.087	0.192
1.50	0.126	0.104	0.230
1.75	0.147	0.121	0.268
2.00	0.168	0.139	0.307
2.25	0.189	0.156	0.345
2.50	0.210	0.173	0.383
2.75	0.231	0.191	0.422
3.00	0.252	0.208	0.460
3.25	0.273	0.225	0.498
3.50	0.294	0.243	0.537
3.75	0.315	0.260	0.575
4.00	0.336	0.277	0.613
4.50	0.378	.0312	0.690
5.00	0.420	0.347	0.767
5.50	0.461	0.381	0.842
6.00	0.503	0.416	0.919
6.50	0.545	0.451	0.996
7.00	0.587	0.485	1.038
7.50	0.629	0.520	1.149
8.00	0.671	0.555	1.226

Adapted from "Alfalfa Integrated Management in Oklahoma," Oklahoma State University. The "total" column should be used if two or more cuttings are expected. These data should be used as a general guide, and modifications should occur as site-specific information is gathered. For those wishing to calculate more specific values, data were derived from the following equations: 1^{st} cutting yield loss = larvae per stem multiplied by 0.0839; 2^{nd} cutting yield loss = larvae-per-stem multiplied by 0.06935; total loss = 1^{st} cut yield loss + 2^{nd} cut yield loss.

Cultural controls to minimize alfalfa weevil damage

Early first harvest
A non-insecticide control measure for alfalfa weevils is an early first harvest if an economic infestation is not detected until late in the growth of the first cutting. First–cutting alfalfa can be harvested prior to flowering without damaging the stand if the second cutting is allowed to bloom. Harvesting alfalfa in an immature stage provides good control of larvae for the first crop. Rapid removal of hay will accelerate larval mortality due to desiccation by direct sunlight. An early first cutting tends to cure more rapidly because lighter windrows dry quickly, and forage quality is enhanced by higher crude protein and lower fiber content.

Additional steps should be taken to ensure that surviving larvae do not cause economic damage to the regrowth. If larvae surviving under the windrows are high and baling is delayed (e.g., due to rainfall), damage to regrowth may be exacerbated. Regrowth should be inspected at a height of 1 to 2 inches to determine larval density. Larval densities of eight per square foot when regrowth measures 1 to 2 inches warrant an insecticide treatment when crop yields and market prices are at or above average.

Field boundary sanitation and grazing of alfalfa stands
Mowing or burning field boundaries before first snows may reduce adult overwintering survival, but research verifying this is needed. Fall grazing of alfalfa is effective only in regions where fall-laid eggs and fall-hatched larvae survive the winter. Due to the severity of Wyoming weather, only the adult stage is likely to survive the winter. Therefore, fall grazing is probably not an effective control measure and should not be considered as a method to reduce alfalfa weevil populations in Wyoming.

Although grazing of initial spring alfalfa growth is usually not recommended, the practice might be justified to control weevils. Once an alfalfa stand has reached a height of about 6 inches, short-duration grazing at high stocking rates can lead to the destruction of eggs and young larvae. Grazing should be intensive enough to remove new growth in a few days to a week at the most. Livestock might be reluctant to graze because high levels of estrogen-like compounds that decrease palatability are present in immature alfalfa. Therefore, supplemental or alternative forages may need to be provided to ensure the consumption of standing alfalfa and to avoid mortality from bloat. After grazing, the stand should be allowed to flower before taking the first hay crop in order to replenish root reserves. It is during bloom that carbohydrate root reserves are recharged. Spring grazing should be considered only when a severe weevil infestation is likely as predicted by a history of field infestation or by egg and first instar larval surveys. More research is needed to clarify the potential benefits of spring grazing for alfalfa weevil control.

Spring burning of alfalfa stands
A burn is most effective if conducted soon after the initiation of spring growth to destroy overwintered adults, spring-laid eggs, and new hatched larvae. The amount of standing crop necessary to conduct an effective spring burn includes some carryover of ungrazed or unharvested hay produced during the previous autumn. However, excessive amounts of plant residue may provide excellent overwintering sites for adult weevils and foster a rodent population that may damage alfalfa root systems. After a stand is burned, blooming should be allowed prior to the removal of the first hay crop in order to restore root reserves. This strategy requires planning and may require the sacrifice of temporary pasture in the autumn. As with spring grazing, the effectiveness of spring burning to control alfalfa weevil is unknown unless a severe weevil infestation is predicted by egg or first instar larvae surveys or if the field has a history of severe weevil infestation.

Weevil-tolerant cultivars of alfalfa
Several cultivars of alfalfa (Arc, Perry, Liberty, Team, and Weevilchek) are moderately tolerant to alfalfa weevils. They tend to have a greater degree of auxiliary branching and associated buds that continue to grow after stem terminals are defoliated by weevil larvae. No deleterious effects to forage quality have been found in cultivars with some degree of tolerance or resistance to insect damage. Unfortunately, these weevil-tolerant cultivars have little resistance to the three most economically important alfalfa plant pathogens in Wyoming -- Phytophthora root rot, Verticillium wilt, and stem nematode. Furthermore, the capability of tolerant cultivars to outgrow or keep up with weevil damage may not be sufficient to avoid the application of insecticides. Consequently, weevil-tolerant cultivars currently available are not considered to be a viable alternative in Wyoming.

Biological controls to minimize alfalfa weevil damage
Many insect predators and parasites like lady bird beetles, green and brown lacewings, damsel bugs, and parasitic wasps are present in the field. Parasitic wasps have been considered the most effective biological control agents of alfalfa weevils. At least seven species of parasitic wasps have been commonly found in Wyoming. Some of these may be native to the region, but most have been intentionally introduced to control al-

falfa weevils. Most attack the larval stage. In Wyoming, parasitism of alfalfa weevils by the parasite *Bathypectes curculionis* varies from 0 to 100 percent with a season average of 26 percent.

There is considerable field-to-field variation in parasitism rates. Parasitic wasps can be recognized by a constriction where the abdomen meets the thorax (a "slender waist"), two pairs of wings, and slender antennae measuring about one-third to near the length of the body. Their body length is about 3/8 inch (9.5 mm) or shorter (Figure 5). They may be seen in flight among alfalfa terminals as they forage for alfalfa weevils to parasitize. Parasitized alfalfa weevil larvae may be recognized by color and body shape deformities. Larvae with yellowing bodies may indicate the presence of parasite activity. This indicator should be confirmed by observing adult parasites. If *Bathyplectes* spp. are the principal parasites, parasitization rates can most easily be assessed once larvae have pupated. Pupae parasitized by *Bathyplectes* spp. (Figure 6) are easily distinguished from healthy pupae (Figure 4) once the netting of the cocoon is cut open to expose

Figure 5

the pupa. Combined with other cultural control practices, parasite activity may prevent a weevil population from achieving numbers sufficient to warrant insecti-

Figure 6

cidal control. Unfortunately, this result is difficult to document, and there is little an individual hay grower can do to initiate biological control of alfalfa weevils. Biological control can be enhanced by the preservation of naturally occurring parasites and predators through the reduction of insecticide use when possible. If an early cutting of the first crop is a feasible alternative to insecticide use, parasites and predators will be preserved to aid in control of larvae in the second crop.

Selected References

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Appendix

Insecticides registered for control of the alfalfa weevil in the United States

Insecticide	Active ingredient per acre	Preharvest/pregrazing interval and use remarks
Ambush 2E*, 25W*	1/10 – 2/10 pound	0 days for 1/10 pound, 14 days for higher rates. No more than 2/10 pound active ingredients per cutting. Apply in a minimum of 1 gallon of finished spray by air or 10 gallons of finished spray by ground. Use higher gallonage and rates when pest populations are high. Ambush is **hazardous to bees**. Do not apply to alfalfa in bloom.
Furadan 4F*	¼ to 1 pound	7 – 28 days depending on rate. Limit usage to one application per cutting and two applications per season. Do not use more than ½ pound active ingredients in the second application. Apply only to pure stands of alfalfa. Furadan is **hazardous to bees**. Do not apply to alfalfa in bloom and do not move bees into the field within 7 days of application.
Lannate*	1 pound	7 days. Registered for alfalfa weevil larvae control; control of adults may not be as effective. Do not apply at below 50° Fahrenheit or if crop is dormant or semi-dormant. For aerial applications, use a minimum of 2 gallons of finished spray per acre. Flaggers must wear protective clothing or be in an enclosed vehicle. It is **hazardous to bees**. Do not apply to alfalfa in bloom.
Lorsban 4E	¾ to 1 pound	21 days at listed rates. Limit usage to one application per cutting and four applications per year. For best results, use 2 to 5 gallons of water per acre for aerial application; use 20 gallons of water per acre for ground application. It is **hazardous to bees.** Do not apply to alfalfa in bloom.
Malathion	1 – 1¼ pounds	0 days. For alfalfa weevil larvae control. Do not use when temperature is below 65° Fahrenheit. It is **hazardous to bees.** Apply only during late evening.
Malathion ULV	16 fluid ounces	5 days. For alfalfa weevil larvae control. Do not use when the temperature is below 65° Fahrenheit. It is **hazardous to bees.** Do not apply to alfalfa in bloom.
Parathion*	½ to ¾ pound	15 days. It is **hazardous to bees.** Do not apply to alfalfa in bloom.
Penncap-M*	½ to ¾ pound	15 days. Do not use with screens finer than 50 mesh. For aerial application, use a minimum of 2 gallons of finished spray per acre. It is **hazardous to bees.** Do not spray during bloom. Stir or shake during use.
Pounce 3.2*, 25WP*	1/10 to 2/10 pound	0 days for 1/10 pound, 14 days for higher rates. No more than 2/10 pound active ingredients per cutting. Apply in a minimum of 1 gallon of finished spray by air or 10 gallons of finished spray by ground. Use higher rates when pest populations are high. It is **hazardous to bees.** Do not apply to alfalfa in bloom.
Sevin, carbaryl	1 to 1½ pounds	7 days. May cause temporary bleaching of tender alfalfa foliage. Apply only once per cutting. For alfalfa weevil larvae control only; product is not effective against adult weevils. Most formulations are **hazardous to bees**. Do not apply to alfalfa in bloom.

* Restricted-use pesticide

University of Wyoming

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