

Alberni Armyworm Report - September 26, 2017

Summary

In 2017, producers in the Alberni Valley were devastated by an unprecedented outbreak of *Mythimna Unipuncta* (Armyworms). This outbreak decimated forage crops before the species of pest was even identified by Provincial Entomologists. The outbreak has spread since first detected in July, and the second generation of caterpillars is now also affecting producers on the Lower Mainland and elsewhere in the Province.

Armyworm caterpillars feed primarily on forage grasses, but can also affect corn and grain crops. 2016 census data reports 2212 acres of hay within the Alberni Valley, and the total agricultural receipts of the area in 2005 were 5.5 million dollars. The cost to Alberni producers is roughly estimated at \$500,000, with forage producers being severely affected. No compensation has been made available.

The ACRD convened three public meetings about the crisis and acted as a vital link between area producers and the Ministry of Agriculture. Information was distributed via newspaper articles, social media, email lists, and television news stories, and an ongoing connection with the Ministry ensured that producer inquiries were sufficiently and expediently addressed.

Generally, ACRD producers were not inclined to use chemical controls for the caterpillars, and information about other modes of cultural or biological control were actively solicited. Orders of a biological control, the parasitic wasp *Trichogramma Prediosum*, were coordinated, and the wasps were purchased and distributed by Naesgaards Farm Market.

The Ministry of Agriculture and particularly, Entomologist Tracy Hueppelsheuser, were very helpful and responsive to the Region's requests for support and information. To date, the Ministry has funded approximately 25% of the cost of management and information sharing of the outbreak within the ACRD, specifically for the development and conduct of a pheromone trapping and monitoring program. All of the information collected and collated at the ACRD level is being shared with the Ministry for the benefit of producers and researchers Province-wide.

At the UBCM conference in September, 2017, the ACRD requested to the Ministry of Agriculture that a continued monitoring and research program be established by the Ministry of Agriculture to protect the province's forage and grain industries from damage by Armyworms and other emerging pests, with a particular focus on funding governmental agricultural support at the local, community level.

About Armyworms (See also Appendix A: Ministry Infosheet)

- This is reportedly the first outbreak of this degree in Provincial History, though they are routinely seen in Manitoba, as well as in the United States and Mexico
- It is expected that the Armyworm moths rode an air current up from the south in the spring
- The moths lay eggs on grass; caterpillars emerge and start feeding within about 2 weeks
- Armyworm caterpillars have 6 instar phases, the last 3 are most damaging
- Caterpillars will pupate underground before emerging as moths in about 2 weeks.
- In other areas, the second generation is generally less damaging than the first, however it appears that in BC, the damage escalated in some regions
- It is possible that the Alberni Valley will see three generations of caterpillars in 2017
- The armyworm is not cold tolerant, does not have a diapause, and will continue to cycle as long as conditions allow. It can grow and feed at 10-29 degrees C. It is not supposed to survive freezing (zero degrees).

Alberni Armyworm Report - September 26, 2017

History and Timeline of 2017 Outbreak

- Armyworms were first seen in the Alberni Valley during the Canada Day long weekend (July 1). One producer noted 20 acres of prime forage was destroyed within 2 days.
- The Ministry of Agriculture was advised, and within about a week, they were also being spotted in the Comox and Cowichan Valleys.
- The ACRD began compiling a list of affected farms (See *Appendix D*) and working with the Ministry to disseminate information. *Not all affected farms reported in or are documented in the Farm Log. Data is incomplete with regards to the second generation of caterpillars.*
- The caterpillars were confirmed as True Armyworms by Ministry Entomologists on July 13.
- An infosheet was published by the Ministry of Agriculture on July 26. The ACRD worked with the Ministry to ensure that producer concerns and questions were addressed within it.
- Moths were first seen on July 26
- A pheromone trapping and monitoring program began on August 8 with the financial and logistical support of the Ministry of Agriculture
- The second generation of caterpillars was reported to be doing damage on August 23.
- A second and third info sheet and updates were subsequently published by the Ministry on August 28 and September 7 (*Appendix B and C*)

Controls and Potential Controls

- Generally, ACRD producers did not want to use chemical controls, and a variety of control options were brought forward by members of the public. These included Methyl Jasmonate (spurs cannibalization), nematodes, using City street cleaning vehicles to collect then ferment the caterpillars and apply as sprayed deterrent, *Bacillus Thuringiensis*, light 'bug zappers', parasitic wasps, and viral injection.
- Ministry Entomologists suggested that the most effective of those would be the parasitic wasps, but that they may only be marginally effective.
- It was recommended to cut hay or put livestock onto pasture immediately if the caterpillar count in a field was over 5 per square feet.
- See the attached info sheets (*Appendixes A, B, C*) for full accounting of Ministry recommended controls and management, including chemical control options.

Public Information Sharing Sessions and Methods

- Three public meetings were held
 1. Oosterom Farm, July 13:
 - Approximately 19 producers in attendance
 - With Phil Croteau: Claims Manager for Production Insurance and Wildlife Damage Programs - Ministry of Agriculture, and Graeme Fowler: Agriculture Wildlife Program - Ministry of Agriculture
 - Severe damage noted in field
 - High army worm count: on one 17 acre field, a total of 155 Army Worms was counted within a 12" square. This equals a total of 114 million insects in one field
 2. ACRD Boardroom, July 13:
 - 14 people in attendance, including producers and other area residents
 - With Phil Croteau, Claims Manager for Production Insurance and Wildlife Damage Programs - Ministry of Agriculture and Graeme Fowler, Agriculture Wildlife Program - Ministry of Agriculture
 - Discussion centred around the potential for compensation and disseminating information about the pest, pest cycles, and potential for damage and controls
 3. Beaver Creek Community Hall, August 2:
 - 44 people in attendance

Alberni Armyworm Report - September 26, 2017

- With Tracy Hueppelsheuser: Ministry of Agriculture, Entomologist and Jill Hatfield: Ministry of Agriculture, Regional Agrologist
- Discussion and presentation: life cycle, controls, and pheromone trapping program
- Numerous newspaper articles were published in the AV News
- Video interviews published on Shaw TV and Chek TV
- Numerous Facebook posts were published and shared both locally and across Vancouver Island
- A series of emails was sent to subscribers of the ACRD agriculturally related listserve with updates and responses to inquiries

Information about Insurance and Disaster Assistance

- Crop insurance is available for producers for compensation for crop losses/damage, but not retroactively, and no Alberni producers are currently subscribed.
- Insurance is uncommon for producers across the island (anecdotally, only one Island producer is subscribed).
- Provincial disaster compensation specifically excludes crop losses.
- As it stands currently, there is no avenue for any financial compensation to producers.
- Details about insurance programs is being passed on to producers. Some preliminary info:
 - Value is assigned to crop based on historical yields, eg 2.5 tones per acre
 - Comprehensive - covers insects, frost, flood, winter kill, seedling establishment, etc
 - Deductible is applied
 - Fast payouts, covers whole farm not spot losses
 - Premium costs are low per acre and don't go up with claim
 - Deadline for perennial forage crops is November 30, for coverage the following year

Parasitic Wasps

- A research paper forwarded by Ministry Entomologist pointed to potential benefit of *Trichogramma Prediosum*, an egg parasitoid of many types of moth eggs.
- Ministry Entomologist noted that they might help 'take the edge off' and suppress the impacts, though potentially only minimally.
- Wasps were sourced through the Bug Lady and distributed by Naesgaards Farm Market
- A total of 20 cards (120,000 wasps/card) were released over 9 properties during the week of August 7.
- None of the properties where wasps were released reported significant Armyworm presence in the 2nd generation, however this should not be assumed to imply it was because of the wasps, as many different factors are at play, such as field quality.
- The wasps were only applied for a single week as the supplier could not obtain more for the second week of the intended program

Pheromone Trapping Program

A Pheromone Trapping Program using bucket-style traps was initiated and conducted with the Assistance of the Ministry of Agriculture between August 8 and September 5.

- A total of 11 traps were placed on farms within the Alberni Valley, including McCoy Lake, Great Central Lake area, Beaver Creek, the Beaufort Region, and Cherry Creek
- The traps attract the male Armyworm moths and are intended as a monitoring tool, in particular so as to determine peak moth counts and the anticipated date of the next caterpillar damage
- The highest moth catch date was August 22 and the highest count per trap was 14

Alberni Armyworm Report - September 26, 2017

- The program was extended from 3 to 4 weeks when numbers continued to be higher than expected.
- The traps have been collected and stored within the region, and it is anticipated that trapping will resume in late spring, 2018
- See *Appendix E* for trapping results

General Notes About Local Impact

- Impact was generally worse in fields where a first cut of hay had been taken and the field was subsequently irrigated and fertilized, however this was not always the case.
- Many producers who were not affected in the first generation were affected in the second.
- Secondary impact was due to crows, ravens, and other birds digging up the pupae in the field, and killing the grass' remaining root system.
- Tertiary losses to producers is due to the lack of forage/feed available for winter. Many producers are selling off animals, which they cannot afford to feed.
- Forage was unable to recover prior to second generation of Armyworms, even with irrigation; producers region-wide saw negligible forage yields after July.
- Some producers did note that it would likely not have been a very high yielding year, even without Armyworms, due to less than ideal spring weather and possible Leatherjacket damage to 1st cuts, which was posited due to a noted high summer cranefly population.
- Local weather: August was much hotter and drier than normal, the average high temperature was almost 30 degrees, and the average low was 11. July was slightly warmer and drier than normal, and June was slightly drier than normal. For more information see summaries at [Alberni Weather](#)

Future Monitoring and Reporting

It is expected that the pheromone trapping program will be reinstated in late spring of 2018 and that a comprehensive year end report on the outbreak will be drafted by the Ministry of Agriculture. This report could include information about weather system that brought the moths, life cycle data, laboratory results, pheromone trapping results from across Vancouver Island, cultural and chemical controls, local impact data/maps, a summary of government and community response, procurement details for pheromone trapping supplies, and prognostics and plans for the future.

Summary

Alberni forage producers were devastated by the 2017 outbreak of Armyworms. Yields for most were only a small fraction of normal, and this has triplicate effects; firstly, loss of revenue via hay sales, secondly, the need for reseeding of damaged pastures, and thirdly, the need to downsize livestock herds or purchase large amounts of feed in order to continue operations. While most area forage producers are long time (multi-generational) and well-established farmers, such losses in any business can be devastating.

An ongoing monitoring program is necessary in order to prevent repeat episodes and ensure the long-term security of the forage industry. It is not yet known whether this is a one-time occurrence or whether Armyworms will pose a continuing challenge, but with forewarning and an understanding of control and crop management options, there is hope that future outbreaks could be less devastating.

Appendices

- A. True Armyworm Infosheet: pg. 6
- B. Armyworm Update, August 28: pg. 10
- C. Pest Alert, September 7: pg. 12

Alberni Armyworm Report - September 26, 2017

- D. Armyworm - Alberni Farm Log (*Names and addresses have been omitted for privacy*) pg. 14
- E. Alberni Pheromone Trapping Program: Results (*Addresses omitted for privacy*); pg. 17

Many thanks to:

Tracy Hueppelsheuser, Jill Hatfield, Graeme Fowler, and Phil Croteau for Ministry of Agriculture Support; Megan Duarte for the proactive and immediate research and resource compilation; Tooth Acres, Oosterom's and Shannon's Farms for hosting meetings and interviews; Beaver Creek Community Hall for donation of facilities for a public meeting; Naesgaard's Farm Market for purchasing and distributing parasitic wasps; all the producers and members of the public who shared data and information; and ACRD Board of Directors and Staff for committing to agricultural support in the region.

Author's Note

There were many times when I was truly touched by the heart of the Alberni farming community over the course of this outbreak. I first stood in a pasture field devastated by and crawling with Armyworms on July 13. It was no secret to the producer that he would withstand the loss of almost his entire crop (and annual income) at that time, but when he spoke, he only referenced the victims of the wildfires in the interior, and the producers there that were losing their homes. Later, when chemical control options were suggested as the most sure-fire way to combat the insect and protect forage operations, the collective voice spoke only about reluctance to spray and the potential for damage to birds, pollinators, or the broader regional ecology. When a suggestion was made to set up a public fundraising campaign to assist with financial losses, the idea was dismissed with the argument that they were not the only ones suffering in the community.

I truly tip my hat to this community of grounded, pragmatic, resilient, and wise people. You have taken your kicks, and shoulder the job of feeding the people like you always have, with little support or compensation, in both good times and bad. You truly are the salt of the earth; it is a pleasure to support you in whatever way I can.

Information collated by Heather Shobe, ACRD Agricultural Support Worker
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Alberni Armyworm Report - September 26, 2017

Appendix A: True Armyworm Infosheet

British Columbia Ministry of Agriculture, July 2017



True Armyworm: information for B.C. growers

True Armyworm (*Mythimna unipuncta*, formerly *Pseudaletia unipuncta*) is a North American insect in the family Noctuidae which is introduced annually, in April, to southern Canada on wind currents from the southern USA and Mexico. Southern areas of Manitoba and Ontario do experience outbreaks of this pest periodically. True armyworm is not known to overwinter in Canada.

Hosts: grass crops, including cereals, forage, and corn are the primary hosts, but true armyworm larvae will feed on broad leaved plants as well, including peas and canola, and other crops or vegetables when populations are high.

Damage: Larvae feed on leaves of grass and less frequently on developing seed heads. Feeding occurs mostly at night, or during cool mornings. Once the area is defoliated the growing larvae move in groups to other grass stands to continue defoliation. Damage in a field can be spotty and variable, and quickly result in devastation if the population of larvae is high. The first generation (larval feeding in June and July) is the worst, and the second generation in August is expected to be less destructive.

Biology: Adult moths 'blow in' to BC in April, in unpredictable numbers, and then begin laying eggs in grass. Eggs are laid densely, and then larvae feed in close proximity to each other; distribution of eggs and consequently larvae is highly clumped or aggregated. Larvae have 6 instars, with the last two instars resulting in the most feeding damage. The larval stage lasts about 1.5 months, depending on temperature, and they grow to about 35 mm before pupating. The larvae burrow into the soil just below the surface to pupate, within an earthen cocoon, and remain there for 1-2 weeks. The adult moth emerges from the pupae and a second generation of eggs and larvae occur in late summer (August). Adults are brown delta-shaped heavy-bodied moths (3 cm long) that may be seen flying around outdoor lights at night. During the day they hide at the base of plants or other dark protected places.



Image credit: H. Shobe



Image credit: H. Shobe

True armyworm larvae and fecal pellets on soil surface

Larvae feeding on grass hay

Monitoring for True Armyworms: Adult moths can be watched for around lights at night, but also by using pheromone baited bucket-type traps ('uni-traps') from April-May and in late July and August. Trapping for adults is useful to show when the moths are present and if numbers could be high enough to be of concern. Additionally, trapping moths is useful for predicting when and where larvae will occur. Set traps in areas of concern, such as beside a field that had heavy larvae infestation earlier in the summer or in previous years.

Alberni Armyworm Report - September 26, 2017

British Columbia Ministry of Agriculture, July 2017



Full grown larva



Close up of netted pattern and 'V' on head of larva



Armyworm pupa in soil

Field scouting for larvae should be in mid to late June by checking at least 5 areas of a field. During the day, larvae will be down low on the plant or in the thatch. Scout after sunset or early in the morning and larvae will be up on the plants, where they will be easier to count. Larvae can be dislodged by shaking plants over a drop-sheet or panel and then counted. Get an average number per square foot (30x30 cm) over the 5 sampling sites for an estimate of the field density. Be aware that egg-laying moths prefer to lay eggs in lush grass stands, which may be at high risk of re-infestation and should be monitored for larvae.



Image From: Manitoba Factsheet

True armyworm moth at rest



Image from: C. Wiley, Ohio State University

Uni-trap set up in corn field for catching armyworm moths

Management: Because true armyworm outbreaks are unpredictable and loss can occur quickly, insecticides can be considered for incorporation into a management plan. There are a few products registered for use in Canada for control of armyworms in forage, cereals, and corn (Table 1.). In addition, modifying harvest plans may be necessary to limit losses. Consider cutting, baling, or grazing earlier, as well as irrigation and fertilization to encourage regrowth will help limit losses in hay fields. Cereal crops or corn will face yield reductions if they are defoliated early, but will not be as impacted if feeding occurs later in plant development.

Alberni Armyworm Report - September 26, 2017

British Columbia Ministry of Agriculture, July 2017

The working threshold for insecticide treatment in forage grass/hay is 5 larvae per 30x30 cm. The threshold is lower for annual cereals: 2-4 larvae per 30x30 cm. For the application to be most worthwhile, apply before most of the larvae reach 25 mm in length.

Larvae will take refuge under swaths or bales and can inadvertently get picked up in or on bales. If possible, don't move bales to different farms immediately; we suggest storage on cement pads or in sheds for a week or so prior to transport to allow larvae to disperse or die, and limit movement to new farms.

There are naturally occurring biological control agents that feed on or kill true armyworm larvae, including parasitic wasps and flies, ground beetles and rove beetles, and fungal, bacterial, and viral diseases. As well, several bird species will feast on the larvae. These agents do not prevent an outbreak but can curtail damage to a limited extent. While some biocontrol agents can be purchased for release, this is not a practical approach to limit outbreaks and damage to commercial or economically significant hay crops.

For Home Gardeners:

True armyworms can be found readily on lawns and other turf or grassy areas. They can move in vegetable gardens. Some homeowners have had success trapping larvae by use of blankets as refuges and then collecting and killing larvae in buckets of soapy or salty water. Moths can be killed with light bug-zappers during their flight in the evenings and night. Domestic insecticides for larvae are available, including Malathion, Sevin (carbaryl), and Btk (*Bacillus thuringiensis kurstaki*). The best time to apply is to small larvae (less than 2 cm).

More information:

- Manitoba Ministry of Agriculture: <http://www.gov.mb.ca/agriculture/crops/insects/print,true-armyworm.html>
- Ontario Ministry of Agriculture, Field Crop News: <http://fieldcropnews.com/tag/true-armyworm/>
- University of Florida: http://entnemdept.ufl.edu/creatures/field/true_armyworm.htm

Alberni Armyworm Report - September 26, 2017

British Columbia Ministry of Agriculture, July 2017

Insecticides registered for control of armyworm in forage, grass, corn, July 20, 2017

Labels searched on PMRA Label Search site: <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

PCP #	Product name	Active ingredient	Crops	Pre-harvest or grazing interval	# applications per year
28982	Coragen	Chlorantraniliprole Group 28	Corn (field, sweet), Grass forage, fodder, and hay group, non-grass animal feed group, oilseeds and cereals	Forage grasses: 0 days PHI Forage corn: 14 day PHI	Up to 4 apps, 7 days apart, Use high rate
5821	Malathion	Malathion, Group 1	Cereals, grasses, legumes, alfalfa, clover for hay	7 days	1 app
27876	Sevin	Carbaryl, Group 1A	Forage, pasture, cereals	1 day	Up to 2 apps, 8 days apart
24984, 26837	Matador, Warrior	Lambda-cyhalothrin, Group 3	cereals, corn	Corn for silage: 14 days Cereals: 28 days Sweet corn: 1 day	Up to 3 apps, 4-7 days apart
28778	Delegate	Spinatoram, group 5	Cereals, field/forage corn	Cereals: 21 day PHI, Forage corn: 7 day PHI	Up to 3 apps, 5 days apart

Compiled by Tracy Hueppelsheuser, BC Ministry of Agriculture, Abbotsford, Tracy.Hueppelsheuser@gov.bc.ca, ph: 604-556-3031

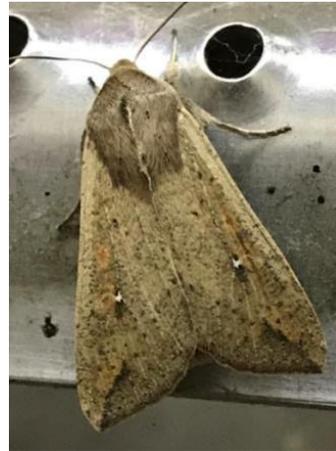
Alberni Armyworm Report - September 26, 2017

Appendix B: True Armyworm Update, August 28

True Armyworm Update August 28, 2017

Prepared by: Tracy Hueppelsheuser, B.C. Ministry of Agriculture, Tracy.Hueppelsheuser@gov.bc.ca 604-556-3031

Moth traps were set up during early August near fields that experienced damage during the first generation of caterpillars/armyworms. Moths have been seen in fields and caught consistently in traps in Port Alberni, Courtenay/Comox, and Cowichan valley locations. Traps are checked approximately weekly and number of moths recorded.



It is time to scout for armyworm larvae (caterpillars) in the lush regrowth of the grass fields. Check in areas near or adjacent to the earlier armyworm-damaged fields. Moths will be looking for lush green growing grass to lay new eggs in August. Larvae will be feeding now in those areas. Scout by laying down a ruler or meter stick, and estimating a square foot or quarter meter square and count the larvae you see feeding in the grass. You will need to be down on your knees where you can look closely for larvae up to 1.5 cm long (3/4 inch). Do the first count this week, and then count again in one week. **If, on average, more than 5 larvae per square foot are found, you can expect damage from feeding to the grass crop.** Do counts in several locations (at least 20) in a field each time before deciding if and where to treat. It may be that only edges or part of a field need to be treated, as the population may be localized or spotty. Armyworm larvae may be green or darker, and have a brown or mottled head capsule. We do not expect to see as many as in July, but is worth counting larvae in areas of concern to know for sure what is happening in the fields.



Full grown larva



Close up of netted pattern and 'V' on head of larva



Armyworm pupa in soil

Alberni Armyworm Report - September 26, 2017

Use a ruler, measuring tape, or yard stick, and count the larvae in 1 square foot. This photo is from the first generation, when there were many larvae per 1 sq. ft. (and lots of damage).



Look for feeding damage in grass. This is fairly significant feeding by caterpillars during July (first generation of larvae):



Larvae may also feed on corn, but the corn will be able to withstand some feeding and no control actions are expected to be necessary.

Larval feeding damage and their frass pellets on young corn plants (July)



If you meet or exceed the larval threshold for grass crops, control may be warranted.

Options for your consideration:

- Foliar spray if possible or desired
- Cut hay early to minimize damage (get the crop before the caterpillars do)
- Graze sooner rather than later (caterpillars are not hazardous to livestock)

More information:

- True Armyworm in B.C. : <http://www.acrd.bc.ca/cms/wpattachments/wpID254atID2500.pdf>
- Illinois: <https://ipm.illinois.edu/vegetables/insects/armyworm.pdf>
- Missouri : <https://ipm.missouri.edu/pestmonitoring/taw/identification.cfm>

Alberni Armyworm Report - September 26, 2017

Appendix C: Pest Alert, September 7

Pest Alert September 7, 2017

Prepared by Tracy Hueppelsheuser, Tracy.Hueppelsheuser@gov.bc.ca 604-556-3031, B.C. Ministry of Agriculture, Abbotsford

True Armyworm (*Pseudaletia unipuncta* or *Mythimna unipuncta*) second generation larvae have been observed severely damaging grass hay and forage corn in the Fraser Valley and Vancouver Island.

General Locations confirmed with heavy larvae feeding and damage to grass hay and corn:

- Vancouver Island locations seeing damage on grass fields: Saanich, Duncan, Chemainus, Port Alberni, Comox, Courtenay, Black Creek
- Fraser Valley locations seeing damage on grass fields and forage corn: Delta, Abbotsford, Sumas, Chilliwack, Deroche



Scout your fields for larvae activity. If you can easily find larvae, the damage threshold has been reached, and management options should be considered. Significant foliage loss can occur in a few days, either in spots, edges, or throughout a whole field. Moist, lush areas are preferred, i.e. low areas, shady, and greener areas. Larvae will move to new feeding sites en masse once an area is consumed. They can be seen on roads and in yards, searching for new feeding areas. Significant damage can happen quickly, within a few days.

Feeding mostly occurs from sunset through until mid-morning when temperatures warm up. During the warmer mid-day times, the larvae take refuge under plant bases, foliage on the ground, under plant crowns, and even under dirt clods and stones.

Alberni Armyworm Report - September 26, 2017

The larvae go through 6 instars (stages), and the last 3 stages are when they feed the most and do the most damage. Currently, there are a range of sizes being observed, from 0.5 to 1 inch in size (1-3 cm). Larvae will continue to feed and cause damage for at least another couple of weeks.

True armyworm larvae feeding on tassel on ground	Management options include (not necessarily in this order!):
	<p>Harvest: get the crop off before the larvae devour it.</p> <p>Cultivate: and then wait 10-14 days before planting a new fall crop to ensure larvae have either starved or moved on.</p> <p>Spray: there are insecticides registered for grass hay and corn. Decision to treat will depend on the field, plan for the crop and how many larvae there are in the field (if you find larvae and damage you are already over the action threshold!). One to two applications may be needed; check the field 2 days after the first spray and then scout regularly to determine if a second spray is needed. Suitable rates are on the labels for armyworm, use the higher rates of the rate range if possible.</p>

Some Insecticides registered (there are others) for control of armyworm in forage, grass, corn, (search done July 20, 2017), retrieved from Labels searched on PMRA Label Search site: <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

PCP #	Product name	Active ingredient	Crops	Pre-harvest or grazing interval	# applications per year
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28778	Delegate	Spinatoram, group 5	Cereals, field/forage corn	Cereals: 21 day PHI, Forage corn: 7 day PHI	Up to 3 apps, 5 days apart

Alberni Armyworm Report - September 26, 2017

Appendix D: Armyworm - Alberni Farm Log (*Addresses withheld for privacy*)

Note: many other producers did not report in or offer damage estimates

ARMYWORM - FARM LOG

Address/Area	Total	Affected	Loss	Losses \$ (minimum)	Date, crop type, notes	Parasitic Wasps?	Pheromone trap?
Beaver Creek					Not affected in first generation, only takes one cut and had gotten it already - no fertilizer		
Port Alberni					City property, lettuce patch and zinnias affected, unconfirmed		
McCoy Lake	68	50	Hay, will sell 2/3 of cattle	\$10,000	3/4 of cattle have to go (14 calves and 10-15 cows). Lots of birds on fields.	6 acres x 1 weeks	Y
Sproat Lake	27				pastures looking pretty good at end of July. Saw caterpillars in second generation, early september		
Beaufort				\$50,000	None seen in first generation. Was 3-4 weeks behind, had been mowed two weeks before infestation, clay soil with poor drainage. Hit hard in second generation starting Aug 23		
Beaufort					None seen in first generation		
Port Alberni					Garden in South Port. Used BTK 2 days after finding. Killed 100s of caterpillars, reportedly ate azalea and petunias. Not confirmed species.		
Cherry Creek	71	12 badly	Last year 252 round and 2000 square, this year 3000 square	\$20,000	Cut hay and were crawling out of barn from bales. Moved equipment and there were pupa there. No irrigation still had problem. One field wet, with buttercup and they ate buttercup leaves/flowers. Grass wasn't great to begin with. Got 102 bales - Was no worms in good fields. Started in early July. Pupa on July 26	3 acres x 1 week	Y
Great Central Lake	170	25	200 round bales	\$20,000	5 acres of Timothy, plus another 20 acres-on July 28 has lots of moths, also caterpillars		Y
Beaver Creek	3				None seen in 1st generation		
Beaver Creek					None seen until second generation, Sept. 7		

Alberni Armyworm Report - September 26, 2017

Address/Area	Total	Affected	Loss	Losses \$ (minimum)	Date, crop type, notes	Parasitic Wasps?	Pheromone trap?
Beaufort	220	80	Down 5000 squares bales after 1st generation	\$50,000	40% wiped out, 80% down on 2nd cut, one field about one foot July 30 ravens digging down in ground, 180 acres in hay hit where lush grass was. Hit harder in second generation. NOTE: Damage estimate does not include second generation loss		Y
Beaver Creek					On Kale, tomatoes have variegated cutworm	3 acres x 1 weeks	
Cherry Creek					Second green on July 17		
Beaufort					2/3 lost on one field that was second cut		
Beaufort					Hit badly in first generation		
Cherry Creek	80				Not seen in first generation		
Cherry Creek					Has some grain, no damage reported in 1st generation		
McCoy Lake					Severe damage reported anecdotally		
Port Alberni					3 acres of corn, some damage in grass at edge of corn field one row of tomatoes which has damage from cutworms.	5 cards x 1 Weeks	Y
Beaufort					None detected in 1st generation		
Cherry Creek	5				Garden affected, 2/3 of acre variegated cutworm. Forage had been cut	1 acre x 1 weeks	
Beaufort			6000 bales	\$60,000	Very hard hit in first and second generation. Damage estimate does not include 2nd generation losses		Y (2)
Cherry Creek	10	2			Has grain crops, no damage noted in 1st generation		
Cherry Creek					Spotty, ate thistles, in watering tubs, low yields, only one crop	1 card x 1 weeks	
Beaver Creek	2	1	70 bales square bales lost	\$700	Went through pond to get to pond grasses.	1 acre x 1 week	Y
Beaver Creek	5	1	50 bales	\$500	Was lush, first cut done on May 1st, noticed July 1 weekend		
Beaver Creek	5	3			Reported damage in 1st generation		

Alberni Armyworm Report - September 26, 2017

Address/Area	Total	Affected	Loss	Losses \$ (minimum)	Date, crop type, notes	Parasitic Wasps?	Pheromone trap?
Beaufort				\$100,000	Buying hay now, can't use winter feed, bringing in from states. Damage in 1st and 2nd generation. Damage estimate does not include 2nd generation losses		Y (2)
Beaver Creek	5	3.5		\$500	Saw in barns in 1st generation		
Port Alberni					Saw on July 13		
Beaver Creek	1				Some in tomatos, unconfirmed as army worms		
Beaufort					Nothing reported, however losses are assumed		
McCoy Lake	40	20	800 bales	\$8000		1 acre x 1 week	Y
				\$319,700			

Alberni Armyworm Report - September 26, 2017

Appendix E: Pheromone Trapping Results (*Addresses withheld for privacy*)

RESULTS - Pheromone Trap Sites, Alberni Valley - Traps Set on AUGUST 8, 2017									
Area	# of Traps	Week 1-August 15	Week 1 notes	Week 2-August 22	Week 2 notes	Week 3-August 29			
Area	# of Traps	Week 1 notes	Week 2 notes	Week 3-August 29	Week 3 notes	Week 4 - Sept 5			
McCoy Lake	1	0	Edge grasses lush, nearby pastures moderate	1 moth, 2 spiders, 1 ladybug	Very lush edge grasses	2	Lush edge grasses	2 Moths, 1 spider, 1 fly	Still very green edge grasses
Cherry Creek	1	0	Fields dry, had seen moths flying right beside traps 4 days ago	1		0	TRAP DISMANTLED, pastures very dry	N/A	
Great Central Lake	1	1	Pasture dry, sparse	0	Still very dry	0	TRAP DISMANTLED, pastures very dry	N/A	
Beaufort	1	0	Ravens digging in field	4 moths, 1 bumblebee	Greening up	2 moths, 1 earwig, 1 wasp, 1 unknown moth (photo sent to Tracy)	Damage and heavy infestation reported on 14 acre field	1 bumblebee	Heavy infestation throughout fields, ravens/geese eating caterpillars, between 5-15/square ft
Port Alberni	1	0	Corn ripening	0		1		0	
Beaufort	2	0	Grass coming back, but with significant bird damage	Maple Stump Field: 11 Moths, 2 earwigs, 1 wasp, 1 fly; Old Apple Orchard Field: 1 Moth	Cutting hay, poor yields	Maple Stump Field: 11 Moths, 3 bumblebees; Old Apple Orchard Field: 1 Moth, 1 fly, 1 earwig	Greening up, but not much grass	Maple Stump Field: 3 moths, 2 earwigs, 2 flies; Old Apple Orchard Field: 0 Moths, 1 earwig	Numerous caterpillars seen in Maple Stump field - approx 5-10/square ft, mostly small but up to 1"
Beaver Creek	1	2	Very brown, sparse pasture	1 Moth, 2 earwigs		2 moth, 1 earwig	Very dry	0	

Alberni Armyworm Report - September 26, 2017

Beaufort	2	West Section: 2 Moths; East Section: 2 Moths, 1 Hornet	Pastures greening up with irrigation	West Section: 14 Moths; East Section: 4 Moth, 2 Earwigs	Cows grazing on West field	West Section: 11 Moths, 1 wasp; East Section: 1 Moth, 1 fly	Greening up, found numerous medium sized caterpillars in field that had not been grazed, about 8" tall grass	West Section: 1 Moths; East Section: 1 Banded Alder Borer	Numerous caterpillars in front field adjacent to hwy, only seemed slightly bigger on average than last week
McCoy Lake	1	1 Small Moth (not Armyworm)	Upper pasture greening up	1 Small Moth (not Armyworm)	Greening up	0	Left trap up as it was on the way to others and site had received severe damage	0	
TOTAL ARMYWORM MOTH COUNT		12		37		31		6	