

Economic Thresholds for Insects Attacking Oilseeds

Many economic thresholds for insects attacking oilseed crops currently in use are nominal (i.e. unsupported by research). Some economic thresholds have been developed for major pests attacking crops in Western Canada.

The following data have been compiled from various sources, including the guidelines published by the Western Committee on Crop Pests, and indicate the economic threshold recommendations being made.

Alfalfa looper

Crop	Threshold	Notes
Canola	No economic threshold has been established in canola, but check threshold levels for the Bertha armyworm as a guideline. ¹	Damage occurs through defoliation and clipping of flowers and immature seed pods. More than 15 larvae per square metre combined with heavy defoliation or flower and pod clipping may warrant control. ²

Aphids

Crop	Threshold	Notes
Flax	For potato aphid in flax, economic threshold is 3 aphids/stem at full flowering and 8 aphids/stem at the green boll stage in flax. ³ The yield loss of flax is 0.021 t/ha per aphid per plant for crops sampled at full bloom and 0.008 t/ha per aphid per plant for crops sampled at the green boll stage.	Potato aphid can cause yield losses of 20 % or more in flax when it reaches densities of 50 or more aphids per plant, but will reduce the weight of individual seeds only slightly and has no effect on oil quality. ³
Canola	Control in canola if densities exceed 25 aphids/10 cm shoot tip after flowering where aphids are found in clusters at the end of shoots. ⁴	To estimate aphid densities, randomly collect a minimum of 20 shoot tips.

Aster leafhopper

Crop	Threshold	Notes
Canola	No economic threshold established. Assuming 1 infected plant may produce 30 to 70 % misshapen seeds, producers may expect 0.3 to 0.7 % yield loss for every 1 % incidence of aster yellows in the field. ²⁰	The aster leafhopper is the main vector of the phytoplasma that causes aster yellows, which can infect many crops including canola, flax and sunflowers. ¹

Bertha armyworm

Crop	Threshold	Notes
Canola	<p>A loss in canola of 0.058 bu/acre for each larvae/m² can be expected.⁵</p> <p>Under drought conditions, where bertha armyworm feeding is concentrated on canola pods by early leaf drop, economic thresholds may be lower than indicated. Dividing the economic thresholds by 1.48 may give more appropriate economic thresholds under drought conditions.⁵</p>	<p>Thresholds apply to both Argentine and Polish-type canola and not to mustards, which are higher because they are a less preferred host⁶ and have a greater ability to compensate for feeding damage.⁷</p> <p>Once bertha armyworm numbers are at or over the economic threshold, spray as soon as they start feeding on pods.⁸</p>

The economic threshold for bertha armyworm varies with the cost of the insecticide, the method of application and the crop's value. Using crop values and application costs,

the Table 1 indicates the (larval density larvae/m²) at which an insecticide treatment in canola would be warranted.¹

Table 1. Economic threshold for bertha armyworm larvae											
Spraying cost (\$/acre)	Expected seed value (\$/bushel)										
	6	7	8	9	10	11	12	13	14	15	16
Number of larvae per square metre											
7	20	17	15	13	12	11	10	9	9	8	8
8	23	20	17	15	14	13	11	11	10	9	9
9	26	22	19	17	16	14	13	12	11	10	10
10	29	25	22	19	17	16	14	13	12	11	11
11	32	27	24	21	19	17	16	15	14	13	12
12	34	30	26	23	21	19	17	16	15	14	13
13	37	32	28	25	22	20	19	17	16	15	14
14	40	35	31	27	24	22	20	19	17	16	15
15	43	37	32	29	26	23	22	20	19	17	16

For example, the economic threshold would be reached and spraying could provide an economic return if larval counts were more than 19 per square metre (highlighted

in the above table) given a crop price of \$353/t (\$8.00/bu) and a spray cost of \$22/ha (\$9.00/ac).

Cabbage seedpod weevil

Crop	Threshold	Notes
Canola and mustard	Control is required at densities of 3 to 4 adult weevils per one 180° sweep net sample at 10 to 20 % flowering. ⁹	Apply by air or ground when crops are in 10 to 20 % flowering stage to prevent egg laying into newly formed pods. ^{9,10} , the stage when 70 % of plants in the field have at least 3 to 10 open flowers.

Cutworms

Species	Thresholds	Notes
Army cutworm	Seedling mustard - less than 5/m ² . (11)	
Pale western cutworm or Redbacked cutworm	Flax: Apply an insecticide if densities exceed 4 - 5 larvae/m ² . ¹² Canola: No thresholds established, but use flax as guideline. Sunflowers: 1 larva per square foot 30 by 30 cm or 25 to 30% stand reduction. ¹⁹	Apply an insecticide if densities exceed 10/m ² in sunflowers. ¹³

Diamondback moth

Crop	Threshold	Notes
Canola	A nominal threshold of 25 to 33% defoliation, with larvae still present on plants, can be applied for canola at seedling stage. ¹⁴ The nominal threshold when control is required in canola is if larvae exceed 100 - 150/m ² 1 to 2 larvae/plant in immature to flowering plants and 200 - 300/m ² 2 - 3 larvae/plant in plants with flowers and pods. ¹⁵	Threshold at all crop stages may be lower for Polish-type canolas than for Argentine-type canolas ¹⁶ and higher for mustard. ¹⁴

Flea beetles

Crop	Threshold	Notes
Mustard & Canola	Treatment is recommended when flea beetles are present and 25% or more of the cotyledon's surface area has been injured.	Foliar insecticide provides an economic benefit when damage reaches 50%, but feeding can reach this stage fairly quickly when flea beetle numbers are high and damage is already 25%. Spray only if flea beetles are still actively feeding. ⁸

Lygus bugs

Crop	Threshold	Notes
Canola	Thresholds are based on the number of lygus bugs sampled per 10 net sweeps. ¹⁷ Canola should be sampled as flowering ends (stage 4.4), particularly if precipitation is low. If densities are near but less than the threshold at stage 4.4, canola should be re-sampled at stage 5.1 (when seeds in the lower pods are full size, translucent). If densities are sufficiently high, control is still warranted at stage 5.2 (seeds in lower pods green). At crop stages before the end of flowering, feeding by lygus bugs on canola does not generally result in economic damage.	Lygus bug densities should be determined from a minimum of 15 samples of 10 sweeps or 10 samples of 20 sweeps per field. ¹⁸

Table 2. Economic thresholds

Economic thresholds at the end of flowering in canola are calculated based on an assumed loss of 0.1235 bu/acre for each lygus bug per 10 sweeps. ¹⁷

Application cost		End of flowering (canola crop stages 4.4 - 5.1) ¹					
\$/ha	\$/ac	Economic injury level					
22	8.00	11	8	7	5	5	4
25	10.00	13	10	8	7	6	5
27	12.00	16	12	10	8	7	6
30	14.00	19	14	11	9	8	7
32	16.00	22	16	13	11	9	8
35	18.00	24	18	15	12	10	9
Canola price (\$/bu)	6.00	8.00	10.00	12.00	14.00	16.00	

Economic thresholds at pod ripening in canola are calculated based on an assumed loss of 0.0882 bu/acre for each lygus bug per 10 sweeps. ¹⁷

Application cost		Pod ripening (canola crop stage 5.2) ¹					
\$ / ha	\$/ ac	Economic injury level					
22	8.00	15	12	9	8	7	6
25	10.00	19	14	11	10	8	7
27	12.00	23	17	14	11	10	9
30	14.00	27	20	16	13	11	10
32	16.00	30	23	18	15	13	11
35	18.00	34	26	20	17	15	13
Canola price (\$/bu)	6.00	8.00	10.00	12.00	14.00	16.00	

¹ Crop stages of Harper and Berkencamp (1975):

- 4.4 is flowering complete, seeds enlarging in lower pods
- 5.1 is when seeds in the lower pods are full size, translucent
- 5.2 is when seeds in the lower pods are green

Crop	Threshold	Notes
Confectionary sunflower	One adult lygus bug per 9 heads can result in economic loss through the reduction of seed quality. ¹⁹ Lygus bug management should be initiated between the R4 to R5.1 stage if adult densities reach the economic injury level. Processors discount the finished product with only 0.5% damage. ¹⁹	Research in North Dakota shows approximately 36 seeds are damaged by each adult lygus bug ¹⁹ . Therefore, 0.5 % damage on heads with 800 seeds would occur with feeding on only 4 seeds per head. Damage to sunflower heads was approximately twice as severe when infestations occurred at growth stages R4 and R5 compared with stages R6 and R7.
Oilseed sunflowers	No control needed in oilseed sunflowers.	

Painted lady

Crop	Threshold	Notes
Sunflower	25 % defoliation provided that most of the larvae are still less than 32 mm (1.25 in.) in length. If most larvae are larger, then most of the feeding damage will have already occurred and treatment is not advised. ¹⁹	Insecticide use has not been warranted for control of painted lady larvae in sunflower.

Sunflower beetle

Crop	Threshold	Notes
Sunflower	Control required with 1 - 2 adults/seedling or 10 - 15 larvae/plant. ¹⁹ Count larvae in the plant tops where they rest during the day. Sample a minimum of 20 plants to estimate larval densities.	Severe leaf damage may occur to plants in the 2- to 6-leaf stage when adults are numerous and on growing plants throughout the season when larvae are numerous.

Sunflower maggots

Crop	Threshold	Notes
Sunflower	None established.	Larvae burrow inside the stem and can reach densities high enough to cause stem breakage to individual plants. Yield losses have not been found to be high enough to warrant chemical control. ¹

Sunflower midge

Crop	Threshold	Notes
Sunflower	Economic damage may be severe but is often sporadic and localized. ¹⁹	Losses are more severe around field edges. Losses can be estimated by sampling heads and classifying them on the basis of the degree of head distortion. ²⁰

Red and grey sunflower seed weevils

Crop	Threshold	Notes
Oil sunflower	5 to 8 seed weevil adults/head. ¹⁹ Economic Threshold = Cost of Insecticide Treatment (Market Price x 21.5) (0.000022 x Plant Population + 0.18)	Optimal Treatment Timing: at least 3 out of 10 plants in the field are at early bloom (R5.1 to R5.4) and the ET has been reached. If spray application is delayed past the time when more than 4 out of 10 plants are at stage R5.4, many eggs already will be laid in the developing seeds, and those eggs and larvae cannot be controlled. If fields are sprayed too early, re-infestation may occur in areas with a high weevil population. ¹⁹
Confectionary sunflower	1 seed weevil adults/head. ¹⁹	

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