Lygus: Various Species
Monitoring Protocol

Host Plants:

A wide range of hosts including alfalfa, canola, lentils, potato, strawberries, flax, vegetable crops, fruit trees and weeds such as stinkweed, wild mustard and lamb's-quarters.

Identification, Life Cycle and Damage:

Adult: In western Canada, four species *Lygus lineolaris* (tarnished plant bug), *L. borealis, L. elisus* and *L. keltoni* have been observed in canola (Figure 1). Adult lygus bugs are 5-6 mm long and 2.5 mm wide. They vary in color from pale green to reddish brown and have a distinct triangle or "V" shaped mark on the back. Adult lygus bugs overwinter under litter, debris, or plant cover in shelterbeds, headlands and field margins. In the spring adults become active and feed on early-growing plants. Lygus bugs utilize a wide range of host plants that are available sequentially through the season. **Adults start to lay eggs in mid-May in the southern prairies and in mid-June in the Peace River region**. Eggs are inserted individually into the stems (Figure 2) and leaves of host plants. Egg laying usually lasts 3 weeks but may continue for up to 7 weeks and may vary depending upon the host crop and duration of the growing season.

Figure 1: Adult *L. lineolaris* adult (5-6 mm long) (photo: AAFC-Saskatoon).

Eggs: Eggs are slightly curved and approximately 1 mm long with a eye-shaped cap.

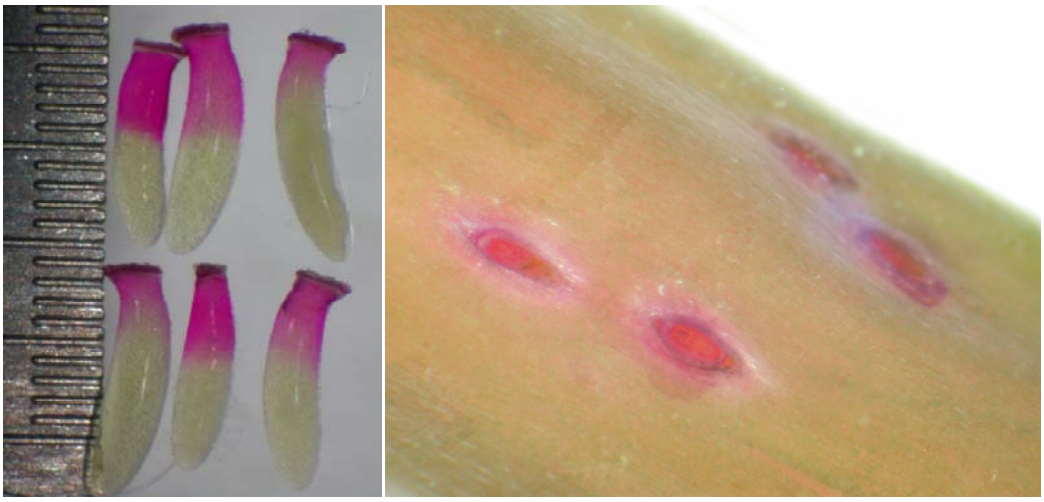

Figure 2: Lygus bug eggs (each 1.1-1.3 mm long) dyed pink during plant dissections (left) and four dyed eggs *in situ*, each with visible egg caps laid into a canola stem (right) (photos: AAFC-Beaverlodge).

Nymphs: There are five nymphal instars. Young nymphs are light green and wingless (Figure 3). Older nymphs develop black dots on the top of the thorax and abdomen. Wing buds are evident in the fourth and fifth instars. Hot dry weather favors build up of lygus bug populations. There are two generations per year in the southern prairies, but only one in the northern areas.

Figure 3: Fifth instar lygus bug nymph (3-4 mm long) (photo: AAFC-Saskatoon).

Lygus bugs have piercing-sucking mouthparts and physically damage the plant by puncturing the tissue and sucking plant juices. The plants also react to the toxic saliva that the insects inject when they feed. Lygus bug infestations can cause alfalfa to have short stem internodes, excessive branching, and small, distorted leaves. They feed on buds and blossoms and cause them to drop. They also

puncture seed pods and feed on the developing seeds causing them to turn brown and shrivel.

Monitoring

Begin monitoring canola when it bolts and continue until seeds within the pods are firm. Since adults can move into canola from alfalfa, check lygus bug numbers in canola when nearby alfalfa crops are cut.

Start monitoring at the bud stage. Sample the crop for lygus bugs on a sunny day when the temperature is above 20°C and the crop canopy is dry. With a standard insect net (38 cm diameter), take ten 180° sweeps. Count the number of lygus bugs in the net.

Repeat the sampling in another 14 locations. Samples can be taken along or near the field margins. Calculate the cumulative total number of lygus bugs and then consult the sequential sampling chart (Figure 4). If the total number is below the lower threshold line, no treatment is needed. If the total is below the upper threshold line, take more samples. If the total is on or above the upper threshold line, calculate the average number of lygus bugs per 10-sweep sample and consult the economic threshold table.

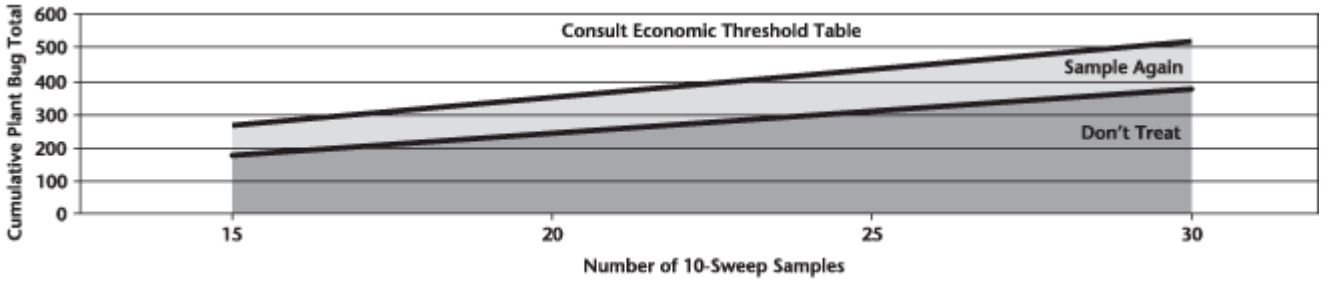

Figure 4: Sequential sampling for lygus bugs at late flowering stage in canola.

Economic Threshold

The economic threshold for lygus bugs in canola covers the end of the flowering and the early pod ripening stages. Once the seeds have ripened to yellow or brown, the cost of controlling lygus bugs may exceed the damage they will cause prior to harvest, so insecticide application is not warranted.

Consider the estimated cost of spraying and expected return prior to making a decision to treat a crop. **Remember that insecticide applications at bud stage in canola have not been proven to result in an economic benefit in production.** The exception to this is in the Peace River region where early, dry springs and

unusually high densities of lygus bug adults can occasionally occur at bud stage. In this situation, high numbers of lygus bugs feeding on moisture-stressed canola at bud stage is suspected to result in delay of flowering so producers in that region must monitor in fields that fail to flower as expected.

The economic threshold for lygus bugs in canola is listed in Tables 1 and 2 (based on Wise and Lamb 1998. Can Ent. 130: 825-836). **For example:**

Scenario #1

a) If the crop is at early pod stage (Refer to Table 1),
b) If an application to control lygus bugs costs $16.00/ac ($39.54/ha),
c) If the canola value or price is $12.00/bu ($528.63/tonne),

➔ **THEN** an insecticide application will economically benefit when sweep-net sampling in multiple spots in a field reveals an average of **10 or more lygus bugs per 10 sweeps**.

Scenario #2

d) If the crop is at mid-pod stage (Refer to Table 2),
e) If an application to control lygus bugs costs $12.00/ac ($29.65/ha),
f) If the canola value or price is $14.00/bu ($616.74/tonne),

➔ **THEN** an insecticide application will economically benefit when sampling in multiple spots in a field reveals an average of **9 or more lygus bugs per 10 sweeps**.

Cautionary note: If soil moisture levels and rainfall are high at flowering, plants likely will be able to compensate for damage caused by lygus bug populations well above economic thresholds and control may not be necessary. If the plants are under moisture stress during this time they are unable to compensate for most of the feeding injury. Spray using the economic thresholds above.

Table 1. Economic thresholds for lygus bugs in canola at late flowering and early pod stages (Wise and Lamb 1998).

Control costs		Late flower to early pod (Canola crop stages 4.4-5.1[1])						
$/ac	$/ha	Economic Injury Level[2]						
$8.00	$19.77	8	6	5	4	4	3	3
$10.00	$24.71	10	8	7	6	5	4	4
$12.00	$29.65	12	9	8	7	6	5	5
$14.00	$34.59	14	11	9	8	7	6	5
$16.00	$39.54	16	13	10	9	8	7	6
$18.00	$44.48	18	14	12	10	9	8	7
$20.00	$49.42	20	16	13	11	10	9	8
Canola	**$/bu**	$8.00	$10.00	$12.00	$14.00	$16.00	$18.00	$20.00
value	**$/tonne**	$352.42	$440.53	$528.63	$616.74	$704.85	$792.95	$881.06

[1] Canola crop stage estimated using Harper and Berkenkamp 1975).
[2] Economic thresholds are based on an assumed loss of 0.1235 bu/ac per lygus bug caught in 10 sweeps.

Table 2. Economic thresholds for lygus bugs in canola at pod stage (Wise and Lamb 1998).

Control costs		Late pod (Canola crop stages 5.2[1])						
$/ac	$/ha	Economic Injury Level[3]						
$8.00	$19.77	11	9	7	6	5	5	4
$10.00	$24.71	14	11	9	8	7	6	5
$12.00	$29.65	16	13	11	9	8	7	7
$14.00	$34.59	19	15	13	11	10	9	8
$16.00	$39.54	22	18	15	13	11	10	9
$18.00	$44.48	25	20	16	14	12	11	10
$20.00	$49.42	27	22	18	16	14	12	11
Canola	**$/bu**	$8.00	$10.00	$12.00	$14.00	$16.00	$18.00	$20.00
value	**$/tonne**	$352.42	$440.53	$528.63	$616.74	$704.85	$792.95	$881.06

[3] Economic thresholds are based on an assumed loss of 0.0882 bu/ac per lygus bug caught in 10 sweeps.