



Economic threshold for pea aphid in lentil

CATEGORY [insects](#) | July 18, 2023

A new economic threshold of 36 ± 7 aphids (29 to 43 aphids) per 180 degree sweep was calculated for Saskatchewan lentil, and provides 7 days lead time to arrange insecticidal application. The economic injury level was calculated at 78 ± 14 aphids (64 to 92 aphids) per 180 degree sweep.

Pea aphid (*Acyrtosiphon pisum* Harris) is a significant pest to lentil in Saskatchewan, and can cause yield losses by feeding on the phloem, reduced nitrogen (N) content in plant tissue, reduced N-fixation, and impaired pod development.

The current nominal threshold for pea aphid control in Saskatchewan was adopted from North Dakota from the 1980s. It recommends aphid control when 30 to 40 aphids are present per 180° sweep of a 15 inch (38.1-cm) wide sweep net with few natural enemies of aphids present, and aphid populations are not decreasing.

The objectives of this research study were to assess 3 insecticides for pea aphid control, and to establish an economic threshold (ET) and economic injury level (EIL) for pea aphid in Saskatchewan. The EIL is the smallest number of insects that will cause yield losses equal to the insect management

costs. The ET is defined as the pest density when control should be implemented to prevent an increasing pest population from reaching the EIL, and also accounts for the cost of the insecticide.

The study was conducted in 2019 and 2020 at the AAFC Saskatoon Research and Development Center farms (AAFC Saskatoon and AAFC Llewellyn) for both insecticidal efficacy evaluations and ET studies. In 2020, the study was extended to include 2 additional sites at the University of Saskatchewan's Goodale and Saskatchewan Pulse Growers research sites.

In each year, CDC Impulse, a small red Clearfield-tolerant lentil was seeded in early June. Replicates were divided into 5 'aphid density' plots, and each of these plots were split into 4 insecticide treatments.

The insecticide treatments included an water-only control, and two registered insecticide treatments of Matador at 100 g/l (Lambda-cyhalothrin; Group 3 pyrethroid), and Voliam Express (Lambda-cyhalothrin at 50 g/l + chlorantraniliprole; Group 28 at 100g/l). A third unregistered insecticide with systemic activity, Exirel (cyantraniliprole 120 g/liter; Group 28) was also applied.

Pea aphid populations were sampled by counting the number of pea aphids per 180° sweep with a 15-inch diameter sweep. Sampling was conducted before insecticide application, 2 days after application, and 10 days after application.

Insecticide applications were applied in 2019 when pea aphid densities reached 120–150, 250– 500, 501–1,000, 1001–1,500 per 180 degree sweep. Refined thresholds in 2020 targeted aphid populations below 600, and these were a non-treated control of less than 20 per sweep, and treated densities of 21–60, 61–110, 111–210, 211–320 per 180 degree sweep.

Insecticide efficacy and seed yield were calculated for each treatment, and ET and EIL were determined.

Insecticide efficacy and yield

Aphids were first detected in 2019 at the early budding stage in early July, and at the 2% flowering stage around late July in 2020. Pea aphid populations in 2019 reached more than 1500 aphids per sweep at peak infestations, but were lower in 2020 with peak populations around 400 aphids per sweep.

All 3 insecticides significantly reduced pea aphid densities compared to the control at all initial densities. There was no difference in efficacy between insecticides when measured at 2 or 10 days

after treatment. At 2 days after application, Matador reduced average aphid population by 89.1%, Voliam Express reduced populations by 85.6%, and Exirel was lower at 55%. Similar efficacy was seen 10 days after application.

Yield data found that when pea aphid populations exceeded 500 per sweep before insecticide application, there were no significant differences between untreated and insecticide-treated plots – the damage had already been done. The highest yields were achieved with insecticide application when aphid densities were below 500 per sweep, and there were no significant differences between the three insecticide treatments.

Pea aphids can also cause early maturity of lentil, and the untreated plots did mature earlier than plots treated with an insecticide.

Economic threshold and economic injury levels determined

The economic injury level was calculated at 78 ± 14 aphids (64 to 92 aphids) per 180 degree sweep.

The optimal ET was 36 ± 7 aphids (29 to 43 aphids) per sweep, which provides 7 days lead time to arrange insecticidal application. If insecticidal application could be immediately applied, the ET was 70 ± 13 aphids (57 to 83 aphids) per sweep

These ET results are slightly higher than the nominal threshold of 30 to 40 aphids per 180° sweep previously recommended. These new recommendations should help lentil producers better time insecticide applications, and help minimize impact on beneficial insects and the environment.

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Photo by Ningxing Zhou