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Revising Lygus bug economic injury levels

CATEGORY **insects** | ***March 26, 2024***

The overall Economic Injury Level was found to be around 9 to 23 Lygus bugs per 10 sweeps using $15.47/bu ($682/tonne) canola prices. However, insecticide trials on farmers' commercial fields found that yield was protected from Lygus feeding with a foliar insecticide application at the early pod stage only when catches exceeded 30 Lygus per 10 sweeps.

The historical lygus bug economic threshold of 15 Lygus bugs per 10 sweeps was established in the early 1990s on conventional canola cultivars and canola prices in the $6 to $7 range. With the development of higher yielding and more vigorous hybrid canola, there was a need to update the economic threshold for Lygus bugs in canola. Economic injury occurs when Lygus feed on pods and immature seeds at the early pod stage.

Research was conducted in Alberta to validate a Lygus threshold for canola. It used data collected over 23 years from 1999 to 2021 from small plots and commercial fields. The 97 study sites were in southern and south central Alberta. Canola yield and Lygus abundance of both adults and juveniles were collected for all trials. Canola yield in commercial field trials was obtained from combine yield monitors or weigh wagons, and in some trials, were harvested manually at two locations in each plot

to provide an additional estimate of yield. Lygus sampling was conducted at late flower or early pod stage before insecticide application and within 1 week after application.

Commercial field trials from 2010 to 2019 (Farm study 1 conducted 2010-2013; Farm studies 2 and 3 conducted 2016 – 2019) were used to help validate the Lygus threshold. These trials had 4 blocks per farm and each block contained large plots of sprayed and unsprayed treatments. In the sprayed plots, a pyrethroid insecticide of either lambda-cyhalothrin or deltamethrin was applied. Two of the 88 farm sites were irrigated. Lygus bug abundance in these trials averaged from 15.4 to 25.5 Lygus per 10 sweeps.

In 2021 during a severe Lygus outbreak, 3 commercial fields (Farm study 4) were studied where farmers left unsprayed strips to assess feeding damage. The fields were near Airdrie, Nanton and Stavely, AB. Lygus bug abundance was approximately 220 Lygus per 10 sweeps, but reached up to 1400 per 10 sweeps at the Airdrie field.

Plot trials were also conducted intermittently between 1999 and 2019. These trials typically had randomized sprayed and unsprayed treatments within a matrix of plots. Lygus bug abundance was around 58 Lygus per 10 sweeps.

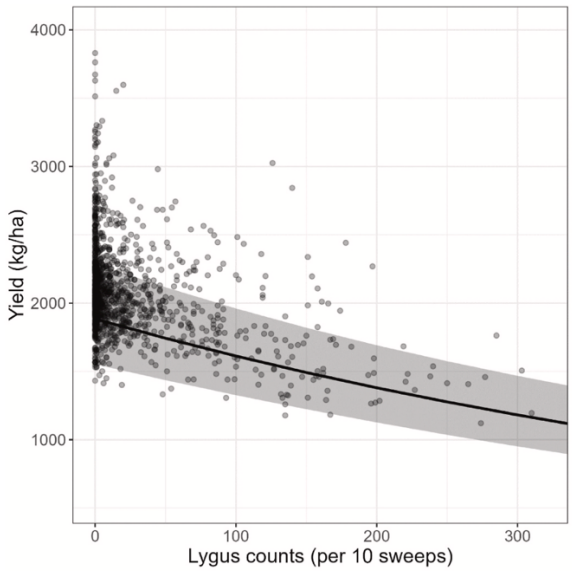
Towards an updated threshold

In Farm study 1 from 2010 to 2013, sprayed plots yielded 10.6% higher than unsprayed plots.

For Farm study 2 from 2016 to 2019, data analysis identified 3 Lygus population groupings that influenced yield. In 141 observations with less than 17 Lygus per 10 sweeps, canola yield was actually slightly higher in unsprayed plots than sprayed plots. For populations between 17 and 30 Lygus per 10 sweeps, yield was similar between sprayed and unsprayed treatments. This suggested that canola plants compensated for Lygus feeding damage. When Lygus populations were greater than 30 Lygus per 10 sweeps, yield declined significantly in the 45 treatments analyzed.

In Farm Study 3 from 2017-2019, conducted in south central Alberta (Lacombe area), there were no treatment effects as far as yield responses, suggesting that Lygus are less damaging to canola in this fertile and moist black soil zone. This agrees with the observation from local canola growers that even 50 Lygus per 10 sweeps did not appear to cause damage. It also confirms an earlier study from the Vegreville area in the same ecoregion, which noted that yield losses were highest when Lygus surpassed 50 per 10 sweeps (Butts and Lamb 1991).

Relationship between canola yield and Lygus abundance (per 10 sweeps) from plots and commercial farms from Alberta (1999–2019).



Source: Cárcamo et al. 2024

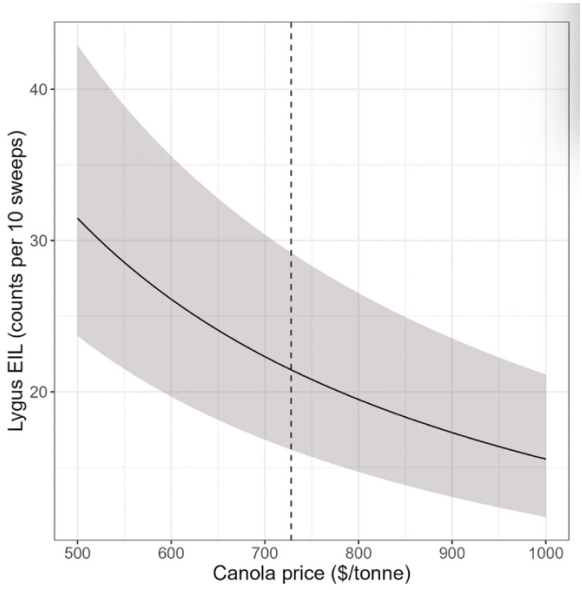
In Farm study 4 during the 2021 severe outbreak, crop yields were significantly higher at the three sites when sprayed. At the field near Nanton, yield was 20% higher in the sprayed treatments, while the Stavely site had 15% higher yield, and the field near Airdrie had 2.8% higher yield.

To determine the Economic Injury Level (EIL) for the field plot and farm trials, data from all plots and commercial fields (1229 observations) were merged. Yield was modelled as a function of Lygus abundance. The 2023 canola commodity price used in the calculations was $15.47/bu ($682/tonne) and an aerial application cost of $18/ac ($44.48/ha) was used.

The researchers considered that the EIL and the Economic Threshold would be the same, since spraying often takes place quickly after scouting. Linear and non-linear models suggested the EILs ranged from 8.9 Lygus per 10 sweeps up to 23.2 Lygus per 10 sweeps at the pod stage, which were similar to the historical threshold. But a detailed analysis of Precision Yield Data from commercial fields found that yield was protected from Lygus feeding by spraying a foliar insecticide at the early pod stage only when populations exceeded 30 Lygus per 10 sweeps.

Modelling also found that the threshold can rapidly rise when canola prices are in the $11.34 to $13.60/bu ($500 to $600/tonne) range. Conversely, the threshold population would be lower when canola prices move higher than the 2023 commodity price used in these calculations.

Modeled relationship of canola price and EIL for Lygus in canola sampled at the pod stage.



Source: Cárcamo et al. 2024

The study also highlighted the value of on-farm yield and long-term plot data in validating decision making tools, and is now leading to the era of Big Data in agricultural research. On-farm Precision Yield Data allows farmers to work closely with researchers and agronomists to develop and demonstrate decision making tools from large data sets.

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Photo by Dan Johnson