

PROGRESS TOWARD AN ECONOMIC THRESHOLD FOR LYGUS BUGS IN SUGARBEET

Justin O. Knott, Graduate Research Assistant
Mark A. Boetel, Assistant Professor
Phillip A. Glogoza, Associate Professor
Robert J. Dregseth, Research Specialist
Allen J. Schroeder, Research Specialist

Department of Entomology
North Dakota State Entomology
Fargo, ND

Introduction:

Sporadic infestations of Lygus bugs in late season sugarbeet fields have continually raised questions about the potential for economical damage. The decreasing availability of quality food sources in the general landscape is thought to stimulate the movement and resulting build-up of Lygus bug populations in sugarbeet fields. The physical and chemical action of Lygus bug feeding causes a blackened area on the leaf or petiole that is often referred to as “tarring.” The current economic threshold for this insect in sugarbeet is set at one-third of the plants in a field having Lygus present. Growers and pest managers opted for chemical control measures on more than 7,000 acres in 2001. It is uncertain whether control methods are warranted at this low level of Lygus bug infestation. This uncertainty prompted us to evaluate the effects of several levels of Lygus bugs caged on sugarbeet plants.

Methods:

Lygus bugs (0, 6, 12, 18 nymphs and 6, 12, 18 adults) were placed on caged sugarbeet plants for about forty days to evaluate the influence of feeding on yield and quality characteristics. Yield and quality analysis was performed with the assistance of personnel at the USDA – ARS, Northern Crop Science Laboratory (Fargo, ND), and a total of 276 sugarbeet plants were tested.

Growth Chamber study - Sugarbeet plants were grown in a photo-thermal room at the Beet Seed Division of the American Crystal Sugar Company (Moorhead, MN). Lygus bugs were placed on sugarbeet and caged when the plants reached degree-day accumulations similar to August commercial sugarbeet plants, the time when historical infestations have occurred. The cages consisted of a lightweight, white fabric that allowed air exchange and light penetration. A transparency glued to one side of each cage permitted visual inspection of the number of living insects. Upon completion of inspection, the appropriate number of insects were added to compensate for mortality. Inspections were carried out every three days.

Field Cage study - Sugarbeet plants grown with standard agronomic procedures were grown near Glyndon, MN in 2002 and 2003. Screened cages were placed over two sugarbeet plants along with the treatment of Lygus bugs. The field cages did not allow for inspection to compensate for mortality. The two treatments involving 18 Lygus bugs were not included in 2002.

Results:

Growth Chamber - All levels of Lygus bugs, except the 6 adult treatment, significantly ($P < 0.05$) decreased recoverable sucrose per acre in comparison to the check. Feeding by 6 nymphs decreased the estimated average yield by 370 pounds per acre relative to 0 Lygus per plant. This amounted to a 13.6% decrease. The only significant difference between treatments involving Lygus bugs was a decrease ($P < 0.05$) in recoverable sucrose that 12 nymphs caused when compared to 6 adults. There were no significant differences in tons per acre between treatments that included Lygus bugs. Also, Lygus bug feeding had no significant effect on percent sucrose. Trends suggested that nymphs may cause more damage than adults. Combining the life stages and analyzing data by the number of Lygus bugs per plant produced similar results. All of the Lygus bug treatments significantly ($P < 0.05$) reduced recoverable sucrose and yield. Roots of the sugarbeet plants grown in the growth chamber were uniformly small in comparison with field-grown beets.

Field Cage - The treatments did not have a significant effect on any of the factors tested for both years. Some trends can be seen, e.g. the check often ranked first or second and at worst third.

Discussion:

Lygus bugs do cause economical damage to sugarbeet. Nymphs seem to cause greater yield damage than adults. The inconsistencies between the growth chamber and field cage studies can be attributed to the added control exhibited in the growth chamber and the ability to compensate for Lygus bug mortality. However, the feeding injury should have a very similar impact on sugarbeet plants in the two environments. Several hours after a feeding event, the area can be seen as a dull colored depression. The characteristic tarring is present about 2 days after feeding takes place.

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Table 1. Growth Chamber: effect of Lygus bug feeding on sugarbeet yield

Treatment # Lygus bugs	Recoverable Sucrose (lbs/acre)	Yield (Tons/acre)	Sucrose (%)
0 (Check)	2730 a	8.9 a	17.2
6 Nymphs	2360 bc	7.6 b	17.4
12 Nymphs	2168 c	7.6 b	16.4
18 Nymphs	2357 bc	7.9 b	17.1
6 Adults	2477 ab	8.2 ab	17.0
12 Adults	2261 bc	7.9 b	16.3
18 Adults	2264 bc	7.6 b	16.8

Means within a column sharing the same letter are not significantly ($P < 0.05$) different (LSD)

Table 2. Growth Chamber, Adults & Nymphs combined: effect of Lygus bug feeding on sugarbeet yield

Treatment # Lygus bugs	Recoverable Sucrose (lbs/acre)	Yield (Tons/acre)	Sucrose (%)
0 (Check)	2730 a	8.9 a	17.2
6 Lygus	2418 b	7.9 b	17.2
12 Lygus	2215 b	7.7 b	16.3
18 Lygus	2311 b	7.7 b	17.0

Means within a column sharing the same letter are not significantly ($P < 0.05$) different (DMRT)