## Evaluation of Lannate LV to Control Slugs in No-till Corn

In 2010, interest was expressed in evaluating the efficacy of Lannate (methomyl) LV for slug management in no-till corn systems. Although data from Europe indicated that Lannate may provide some level of slug control, no information was currently available in the United States regarding efficacy, length of control and the best timing for an application.

***2010 Season--*** *Don Ganske, DuPont, Joanne Whalen and Bill Cissel, University of Delaware*
The objective of this trial was to evaluate the efficacy of Lannate LV (methomyl) to control slugs at three different application timings: 1) late evening, 2) after dark and 3) early morning. Plots 20 ft long by 9 ft wide were replicated four times and arranged in a randomized complete block design. The trial was conducted in a commercial no-till corn field located near Middletown, DE. Corn was planted into heavy wheat-soybean stubble and slug pressure was rated as moderate to severe. Treatments were applied on 3-leaf stage corn using a $CO_2$ pressurized backpack sprayer equipped with a 6 nozzle boom on 18 inch spacing delivering 20 gpa at 35 psi. A one ft. x one ft. shingle trap was placed in the center of each of the plots in an attempt to estimate the slug population for each plot following the application of treatments. Visual slug counts were taken at night, 2 days after application by recording the total number of slugs found on 10 consecutive plants from each plot. Five days after treatment, 10 plants from each plot were examined for slug feeding injury on the newest emerged whorl leaves and the total numbers of slugs found under the shingle traps were recorded. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05)

| | | | Number Slugs per 10 Plants May 21 (2 DAT) | | May 25 (5 DAT) | | |
|---|---|---|---|---|---|---|---|
| | | | | | | Number Slugs per Shingle Trap | |
| Treatment Timing | Treatment | Rate/ Acre | Grey Garden | Marsh | % Damaged Plant | Grey Garden | Marsh |
| Early Evening (6:55 PM) | Lannate LV (2.4 SL) | 1.5 pt | 2.25b | 0.00a | 87.5a | 1.25a | 1.00a |
| Late Evening – (9:40 PM) | Lannate LV (2.4 SL) | 1.5 pt | 3.75b | 0.25a | 80.0a | 0.25a | 0.25a |
| Early Morning (5:15 AM) | Lannate LV (2.4 SL) | 1.5 pt | 2.75b | 0.25a | 100.0a | 0.25a | 1.25a |
| Untreated Check | -- | -- | 24.5a | 0.75a | 92.5a | 0.25a | 0.75a |

Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05)

***Conclusions***: At two days after treatment, there were significantly fewer grey garden slugs in each of the treatments compared to the untreated check. At five days after treatment, there were no significant differences between the treatments and untreated check for the percentage of plants with slug feeding injury and slug counts under the shingle traps. Overall, grey garden slugs were the prominent species causing damage to the corn plants. Although some level of control was observed, this study indicated that additional information is still needed to determine timing and length of control. At all three application timings, weather conditions were favorable for slug activity on the plants. For the evening applications, slugs were present at both application timings because it was extremely still and there was free moisture on the leaves. We

have observed that slugs are not out on plants at night even under slightly breezy conditions. For the morning application, weather conditions were foggy /dewy resulting in early morning slug presence on plants. This year's results lend support to the conclusion that Lannate acts as a contact material only and residual control is limited. It appears that slugs need to be present on the plants at the time of application to provide any level of suppression. However, more data is still needed.

**2012 Season – Joanne Whalen and Bill Cissel University of Delaware**

***Replicated Study***

Due to drier spring weather, conditions favoring slug damage were lower in 2011. However, the unusually warm winter and spring conditions in 2012 were extremely conducive to slug problems. Since limited information was available on the proper application timing of Lannate as well as length of control for slug management in no-till corn systems, a second study was conducted in 2012. Plots were established in a field located near Wyoming, DE with heavy wheat-soybean stubble and history of severe slug problems. The field was treated with Deadline MP-s on April 28. An untreated strip was left in the most severely damaged section of the field and plots were placed in this strip. Plots 10ft wide (4 rows) by 17.5ft long were arranged in a randomized complete block design with four replications. Treatments were applied on 2-3 leaf stage corn with a $CO_2$ pressurized backpack sprayer equipped with a 6 nozzle boom delivering 16.9 gpa at 40 psi. Treatments consisted of (1) Lannate LV at 1.5 pt/acre applied at dusk (7:40 PM) on May 3, (2) Lannate LV at 1.5pt/acre applied at dawn (5:40 AM) on May 4 and (3) an untreated check.. Slug populations were monitored at night by visually inspecting all the plants in the center two rows of each plot and recording the number of slugs. The predominant species was the grey garden slug. Pre-treatment damage assessments were done on the entire plant. Post treatment damage assessments were performed by counting the number of plants with newly damaged whorl leaves in the center two rows. A plant was rated as damaged only if the newest emerged leaves had active feeding signs. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

| Treatment | Rate/A | Application Timing | Percent Damaged Plants | | | Mean Number Slugs/35 ft. of row | |
|---|---|---|---|---|---|---|---|
| | | | May 2 Pre-trt | May 7 4 DAT | May 10 7 DAT | May 2 Pre-trt | May 6 3 DAT |
| Lannate LV (2.4SL) | 1.5 pt | Dusk (7:40 PM) | 79.33a | 49.27ab | 40.19a | 5.25a | 11.5a |
| Lannate LV (2.4SL) | 1.5 pt | Dawn (5:40 AM) | 87.82a | 42.8b | 45.94a | 4.0a | 9.75a |
| Untreated Check | --- | --- | 87.77a | 65.8a | 53.92a | 7.5a | 15.0a |
| Deadline MP-s | 10 lbs (Apr.28) | Main Field by Grower | 50.0 (April 27) | 9.2 (May 3) | 9.0 (May 17) | --- | 1/ 50 pl (May 6) |

Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

**Conclusions**: At four days after treatment, the percent damaged plants were significantly greater in the untreated check compared to the Lannate LV application applied at dawn. Weather conditions were extremely foggy and dewy when the application was made at dawn

and slugs were active on the plants. It was slightly breezy at the time of the early evening treatment and slugs were not active on the plants. The Lannate LV treatment applied at dusk was not significantly different from the untreated check for percent damaged plants. There were no significant differences between either treatment timing at seven days after treatment for the percent damaged plants and at three days after treatment for the number of slugs per 35ft row. Lannate LV appears to have provided some level of control when applied at dawn but not at dusk. This is due to the fact that slugs were active on the plants at dawn but not at dusk lending support to the fact that Lannate is providing contact control. It did not provide extended control as evidenced by the lack of difference in plant damage at seven days after treatment. Overall, slug pressure remained moderate to high regardless of the treatment timing and the percent damaged plants and severity of damage remained at levels that were capable of causing economic losses. Although not part of the replicated study, the Deadline MP-s applied by the producer to the main part of the field provided very good control as evidenced by the reduction in the number of plants damaged at 19 days after treatment and the low number of slugs present on 50 plants at 8 DAT.

***2012 Lannate Grower Demonstration – Commercial Field***

We also evaluated the effectiveness of a Lannate LV application in a second commercial field with heavy wheat-soybean stubble and history of severe slug problems near Dover, DE. In this field Lannate LV and Deadline were compared. Pre-treatment damage assessments were done on the entire plant. Post treatment damage assessments were performed by counting the number of plants with newly damaged leaves. Two hundred plants were sampled for plant damage in each treatment area (10 consecutive plants in 20 locations). Treatments were applied on May 5 with the Lannate treatment being applied at 5 AM when slugs were active and the Deadline MP-s in the middle of the day. Corn was in the one-leaf stage. The grower did not feel that the Lannate was providing control so decided to treat the Lannate demonstration area with Deadline MP-s as well.

| Treatment | Rate/A | Timing | Percent Damaged Plants | |
|---|---|---|---|---|
| | | | Pretreatment – May 4 | Post Treatment – May 7 |
| Lannate LV | 1.5 pt | 5 AM – May 5 | 71.3 | 82.0 |
| Deadline MP-s | 10 lbs | Middle of the Day - May 5 | 67.0 | 20.0 |

**Comments*:*** Although replicated plots indicate that Lannate provides some level of control, Lannate applications in this commercial field in Delaware as well as commercial fields in Maryland and Virginia in 2012 resulted in poor control. In many cases, fields were re-treated with Deadline MP-s with good results.

**Overall Summary** : As a general summary, information from replicated trials and grower experiences indicate that:

(a) Lannate may provide 2-4 days control maximum which can vary with weather conditions at application time
(b) At 5-7 days after treatment in our two research trials, the percent damaged plants in the Lannate treated plots was not significantly different from the untreated plots. This would indicate that Lannate provides short residual control.
(c) Although we now have some information, more information is needed on proper timing of Lannate applications related to weather conditions. Slugs must be out on plants at the time of application. This would indicate that it is providing contact control only.
(d) Based on observations in commercial situations, the Deadline MPs are still providing the most consistent control and providing longer residual control. Lannate LV is providing some level of control, better than liquid nitrogen applied at night; however, more research is needed.