

EFFECTS OF TANK-MIXING INSECTICIDES ON THRIPS MANAGEMENT

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Objective

Determine the effectiveness of tank-mixing insecticides for thrips management in onions.

We examined the effects of tank-mixing Agri-Mek, Lannate, and Radiant to determine if binary mixtures of these insecticides improve thrips management over the use of the insecticides individually.

The expectation for tank-mixed insecticides is that a mixture should produce an additive or synergistic effect that produces better pest management than an application of any of the products individually. Ideally, an improvement in pest management will be enough to justify the economic cost of the additional insecticides. Alternatively, mixtures may produce antagonistic effects where a combination of insecticides does not improve pest management.

Materials and Methods

To address the objective, a field trial was conducted during 2021 at Malheur Experiment Station to compare binary mixtures of Agri-Mek, Lannate and Radiant to their individual use. Spray applications were initiated on June 1, 2021 and continued weekly for eight weeks. The last applications were made on July 20, 2021. The experiment was designed as a randomized complete block design with treatments replicated in four blocks.

The trial was planted on March 24, 2021 at 150,000 seeds per acre. Seed (cv 'Vaquero') was planted in double rows spaced 3 inches apart on beds spaced 22 inches apart. The field had drip tape laid at 4-inch depth between pairs of beds during planting. The drip tape had emitters spaced 8 inches apart and an emitter flow rate of 0.09 gallons per hour (0.22 gal/min/100 ft, Toro Aqua-Traxx, Toro Co., El Cajon, CA). The distance between the tape and the center of each double row of onions was 10 inches. Standard management practices were followed to maintain the crop during the season. Onion emergence started on April 12. On May 13, alleys 4 ft wide were cut between plots, leaving plots 23 ft long for data collection.

Insecticide Applications

Insecticides were applied weekly beginning June 1 and ending by July 20, 2021. Agri-Mek SC was applied at 3.5 fl oz/acre. Lannate LV was applied at 3 pints/acre. Radiant SC was applied at 8 fl oz/acre. Binary combinations of the insecticides (Agri-Mek + Lannate; Radiant + Agri-Mek; Radiant + Lannate) were applied at the rates for each individual product as described above.

The applications were made with a CO₂ backpack sprayer delivering 35 gallons per acre at 30 PSI. The sprayer has a 4-boom nozzle fitted with Tee Jet 11004 flat fan nozzles. All insecticides were applied with Dyne-Amic (Helena) at 0.7 pints per acre. Dyne-Amic is a refined MSO blend

+ organosilicone-based adjuvant that enhances deposition and spreading of insecticides across the leaf surface and increases penetration of insecticides into leaf tissue.

Data Collection

Thrips counts were made twice per week starting May 27, which was before insecticide applications began and were used to determine when thrips populations reached a threshold of 1 per leaf to begin insecticide applications. Thereafter, counts were made two and six days after each insecticide treatment. Thrips counts were made by counting the number of thrips on 10 consecutive plants in one of the middle two double rows of each plot. Adult and larval thrips were recorded separately. In addition to individual sample date counts, total accumulated thrips numbers were determined by calculating the area under the curve for cumulative thrips numbers from one sample point to another.

The effects of the insecticide treatment programs and their interaction on thrips numbers were analyzed using Proc Glimmix (SAS v.9.4).

Results and Discussion

*Note: None of these application treatment programs described are permitted under the labels for Agri-Mek, Lannate, or Radiant.

The Lannate only treatment had significantly more thrips over the course of the season than the other treatments, including the untreated control (Table 1; Figures 1, 2).

The Agri-Mek + Lannate treatment had fewer thrips than did the Lannate treatment, but the mean number of thrips in this treatment was not significantly different from the control.

The Radiant + Lannate treatment had significantly fewer thrips than did the control. However, the mean for this combination was not significantly different from the Radiant alone treatment (Table 1; Figure 2).

The Agri-Mek and Radiant individual treatments had significantly fewer thrips over the course of the season than the untreated control (Table 1; Figure 3). However, the combination of Agri-Mek and Radiant performed no better than Agri-Mek or Radiant applied alone (Table 1; Figure 3).

Conclusions

Although combining either Agri-Mek or Radiant with Lannate improved control compared with Lannate alone, the combinations did not improve control compared with either Agri-Mek or Radiant alone.

Lannate proved to be antagonistic to Agri-Mek, leading to poorer thrips control compared with Agri-Mek alone.

There are situations where tank mixes may be appropriate. One example of a beneficial tank mixing of insecticides is applying Movento with an adulticide. Movento takes time to become active in a plant and targets larval thrips. Combining it with an adulticide provides coverage as the Movento becomes active.

Often combining insecticides in an effort to increase the efficacy of an insecticide application is not cost effective.

Acknowledgments

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Table 1. The effects of Agri-Mek, Lannate, Radiant, and binary tank mixes of those insecticides on thrips management. Seasonal mean number of thrips per plant, cumulative thrips per treatment.

Treatment	Mean Thrips per Plant (seasonal mean)	Cumulative Thrips	Difference from Control (%) for Cumulative Thrips
Control	10.88	6585.50	--
Agri-Mek	9.31	5596.75	-15.0%
Lannate	13.60	8260.75	+25.4%
Radiant	9.25	5574.13	-15.4%
Agri-Mek + Lannate	10.92	6548.25	-0.6%
Radiant + Agri-Mek	9.70	5851.50	-11.1%
Radiant + Lannate	7.71	4569.75	-30.6%

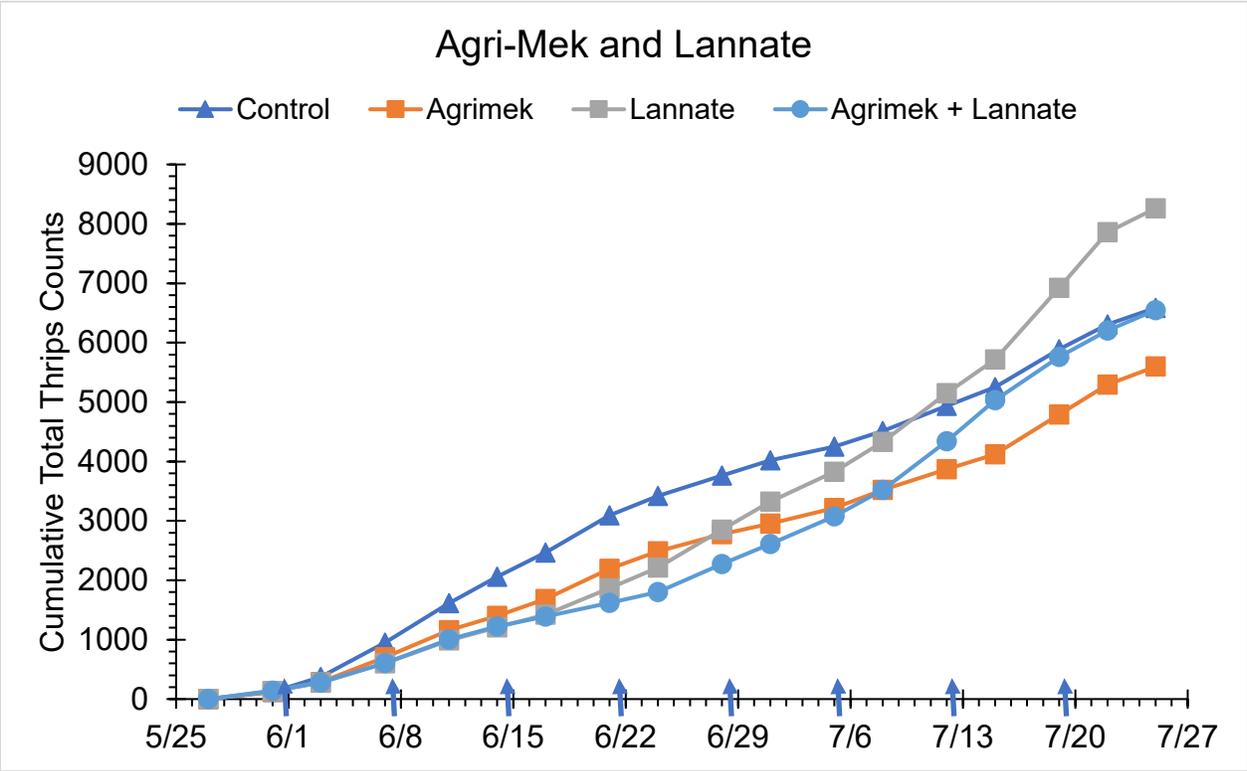


Figure 1. Mean total thrips accumulated from May 27 to July 25 for insecticide application programs for Agri-Mek, Lannate, their combination, and the untreated control. Data represent the mean number of thrips accumulated per plot from one sample date to the next. The steeper the slope of the line, the greater the thrips numbers and intensity. Insecticide application dates are marked by arrows on the x-axis. Malheur Experiment Station, 2021.

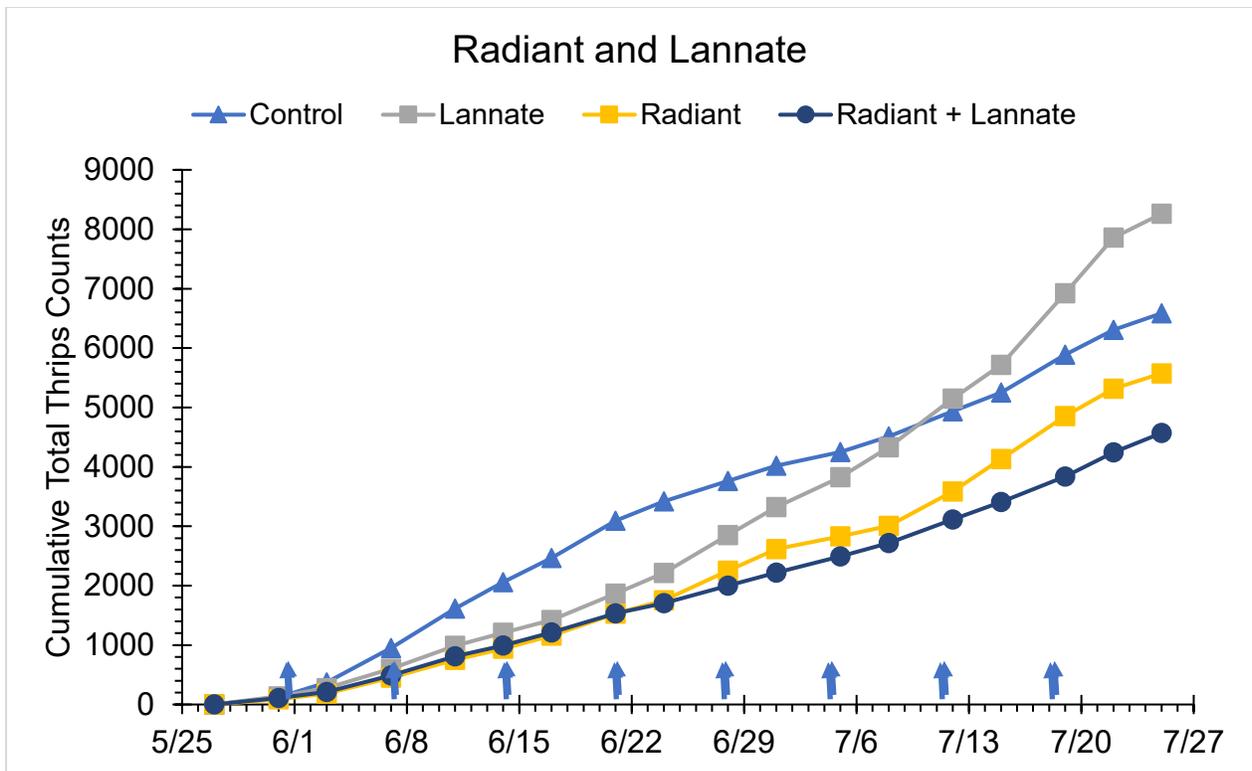


Figure 2. Mean total thrips accumulated from May 27 to July 25 for insecticide application programs for Radiant, Lannate, their combination, and the untreated control. Data represent the mean number of thrips accumulated per plot from one sample date to the next. The steeper the slope of the line, the greater the thrips numbers and intensity. Insecticide application dates are marked by arrows on the x-axis.

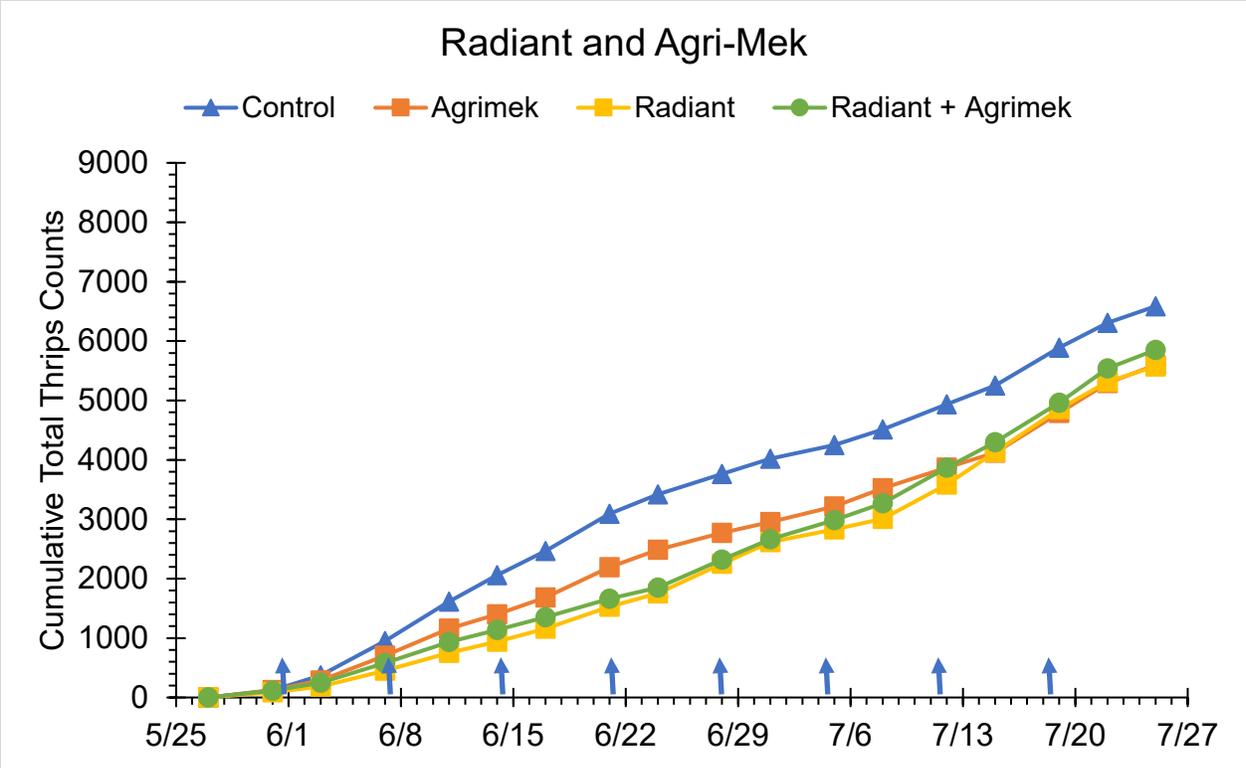


Figure 3. Mean total thrips accumulated from May 27 to July 25 for insecticide application programs for Agri-Mek, Radiant, their combination, and the untreated control. Data represent the mean number of thrips accumulated per plot from one sample date to the next. The steeper the slope of the line, the greater the thrips numbers and intensity. Insecticide application dates are marked by arrows on the x-axis.