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# Field Evaluations of Selected Insecticides to Control Russian Wheat Aphid on Winter Wheat

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The Russian wheat aphid (RWA), *Diuraphis noxia* Mordvilko, was recently introduced into Kansas and has the potential to be a serious pest of small grains. It was first detected in the United States in the Texas Panhandle in March 1986. The first report of this aphid in Kansas was from Stanton County in April 1986. The RWA is indigenous to Russia and has been regarded as a pest of wheat and barley in southern Russia and surrounding Mediterranean countries since 1900. It does not usually damage oats or rye. The winged aphids probably reached the United States from Mexico (where they were discovered in 1980) by making use of strong, prevailing air currents.

The RWA can be easily confused with other common cereal aphids (greenbug, English grain aphid, corn leaf aphid, bird cherry-oat aphid), but it can be distinguished by some unusual physical characteristics (Figure 1). Unlike other aphids, the RWA has no visible cornicles or 'tail pipes' protruding from the rear dorsal portion of the body. The aphid has a prominent supracaudal appendage at the end of the abdomen, which gives it a 'double-tail' appearance when viewed from the side. The RWA has short antennae extending from the head and is lime-green in color, with an elongated, spindle-shaped body.

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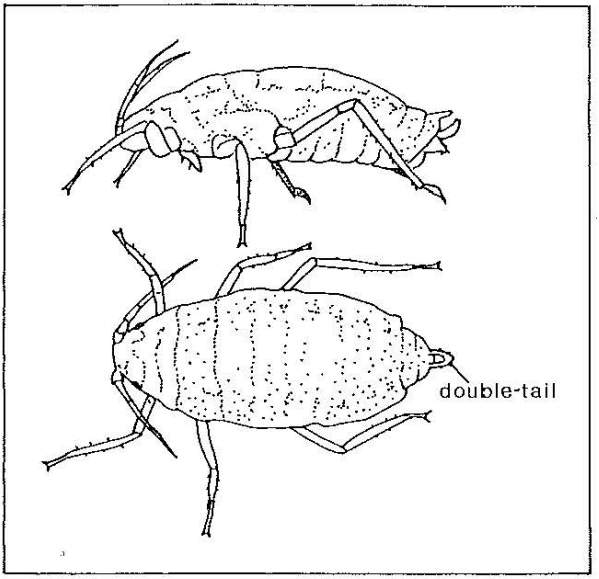


**Figure 1. Russian wheat aphid, *Diuraphis noxia*.**

Experience in controlling this pest with chemicals is still very limited in the United States. Information gleaned from the literature suggests that the RWA may be difficult to control because it is protected within the leaf sheaths and tightly rolled leaves of plants. In order to obtain more information on the effectiveness of insecticidal treatments, field tests were conducted in Kansas during 1987.

## Procedure

Field-plot tests were conducted at two locations to determine the efficacy of selected insecticides against the RWA, using a randomized complete block design with three replications.

**Sharon Springs (Wallace Co.) Test.** Six insecticide treatments (Table 1) were evaluated for RWA control in a farmer-owned field of dryland wheat. Experimental plots measured 18 ft × 25 ft. A single broadcast application of each insecticide was made on May 8 using a $CO_2$-pressurized, backpack sprayer calibrated to deliver 12.8 gal/acre through four hollow-cone 6X nozzles, mounted on a hand-held boom, at 20 psi. The crop was in Feekes growth stage 10 (boot) at time of application. Population densities of the RWA were assessed prior to treatment and at 4-, 10-, and 21-days

**Table 1. Efficacy of selected insecticides for control of Russian wheat aphid on winter wheat. Sharon Springs, Wallace Co., KS, 1987.**

| Treatment | Rate lb (AI)/acre | Mean number of RWA per stem[a] and % control | | | | Wheat yield bu/acre |
|---|---|---|---|---|---|---|
| | | Pretreat | Day 4 | Day 10 | Day 21 | |
| Di-Syston 8E | 0.50 | 70.1 | 3.9a (94) | 1.6a (97) | 18.8abc (66) | 8.04 |
| Cygon 400 | 0.33 | 88.8 | 5.6a (94) | 3.2a (96) | 8.0ab (88) | 10.60 |
| Parathion 8E | 0.50 | 93.7 | 6.0a (94) | 6.9a (92) | 25.0bc (66) | 8.70 |
| Lorsban 4E[b] | 0.50 | 102.3 | 6.4a (94) | 3.0a (97) | 4.7a (94) | 8.07 |
| Di-Syston 8E + Parathion 8E | 0.42 + 0.25 | 128.5 | 6.4a (95) | 3.3a (97) | 16.0ab (84) | 6.48 |
| Malathion 57E | 0.94 | 134.3 | 13.0a (90) | 19.2b (84) | 34.0bc (68) | 6.90 |
| Untreated check | 0.00 | 77.6 | 77.1b (—) | 67.3c (—) | 61.3d (—) | 4.35 |
| | | | | | | N.S. |

[a]Means in same column followed by same letter are not significantly different (P = 0.05), DMRT. Percent control shown in parentheses.
[b]Not currently labeled for use on wheat.

posttreatment. Ten culms per plot were collected and placed into Berlese funnels for a period of 48 hours to extract the aphids into recovery jars containing 70% alcohol. Samples were then filtered through Buchner funnels to separate the aphids from the alcohol. Aphids were counted utilizing a binocular microscope. Grain yield estimates were obtained on June 18 by hand-harvesting 32 row-ft from each plot (8 ft from each of four rows). Samples were threshed, cleaned, and weighed for yield comparisons.

**Hays (Ellis Co.) Test.** Eight insecticide treatments (Table 2) were evaluated for RWA control in a field of dryland wheat at the Fort Hays Branch Experiment Station. Experimental plots measured 15 ft × 30 ft. Plots were artificially infested with RWA by taping two infested wheat culms (placed in vials of water) per plot to the plants so that infested flag leaves were at the same height as those of the planted wheat. A single broadcast application of each insecticide was made on May 12 using a self-propelled, high-clearance, ground sprayer that delivered 20 gal/acre. Treatments were assessed for initial mortality 1 day after application by removing the infested culms and counting the number of live RWA. Residual effectiveness was determined by caging 30 RWA on the flap leaf of each of two randomly selected, treated plants per plot at 7 and 21 days posttreatment. The number of surviving aphids in the cages was recorded 1 day after each posttreatment date.

## Results and Discussion

**Sharon Springs (Wallace Co.) Test.** All insecticide treatments, when compared to the untreated check, significantly reduced RWA 4 days after application (Table 1). The Di-Syston treatment had the fewest RWAs, but it did not differ significantly from the other insecticides. Ten days after application, all treated plots continued to have significantly fewer RWAs than the untreated check. Except for malathion, there were no significant differences between insecticides. At 21 days posttreatment, all treated plots still had significantly fewer RWAs than the untreated check. Lorsban was the most effective insecticide at that time and was significantly better than either parathion or malathion.

Grain yields did not differ statistically, but all treated plots yielded more grain than the untreated check (Table 1). The late application of insecticides, extremely high RWA densities at the time of application, and plot variation were probably responsible for the low yields and nonsignificant data.

**Hays (Ellis Co.) Test.** All insecticide treatments significantly reduced the number of RWAs, when compared to the untreated check, at 1 day posttreatment (Table 2). Except for Capture, there were no significant differences between insecticides. Seven days after application, Di-Syston, Lorsban, Karate, and Capture provided significant residual control. The other insecticides did not differ significantly from the untreated check. Karate and Capture gave 100% residual control at 21 days posttreatment, but they did not differ significantly from Di-Syston, which gave 89% control. Except for Furadan, there were no significant population differences among treatments compared with the untreated check.

**Table 2. Efficacy of selected insecticides for control of Russian wheat aphid on winter wheat. Hays, Ellis Co., KS, 1987.**

| Treatment | Rate lb (AI)/acre | Mean number RWA per leaf and % control[a] | | | |
|---|---|---|---|---|---|
| | | Pretreat | Day 1[b] | Day 7[c] | Day 21[d] |
| Di-Syston 8E | 0.50 | — | 2a (97) | 6a (72) | 2a ( 89) |
| Cygon 400 | 0.33 | — | 4a (91) | 20b ( 3) | 13c ( 17) |
| Furadan 4F[d] | 0.50 | — | 5a (90) | 12ab (42) | 8b ( 49) |
| Lorsban 4E[e] | 0.50 | — | 5a (89) | 4a (81) | 15c ( 3) |
| Parathion 8E | 0.75 | — | 8a (84) | 18b (17) | 16c ( 0) |
| Malathion 57E | 1.00 | — | 9a (82) | 22b ( 0) | 14c ( 14) |
| Karate 1E[e] | 0.02 | — | 9a (81) | 4a (83) | 0a (100) |
| Capture 2E[e] | 0.04 | — | 20b (58) | 3a (88) | 0a (100) |
| Untreated check | 0.00 | — | 47c (—) | 21b (—) | 16c (—) |

[a]Means in same column followed by same letter are not significantly different (P = 0.05), DMRT. Percent control shown in parentheses.
[b]Mean number of aphids from artificially infested leaves.
[c]Mean number of aphids 1 day after caging aphids on flag leaves.
[d]Not currently labeled for aphid control on wheat.
[e]Not currently labeled for use on wheat.

## Conclusions

Results of these trials indicate that among the insecticides broadly labeled for aphids on small grains, Di-Syston, Cygon, and parathion gave excellent initial control of RWA, but residual effectiveness varied. Among the insecticides not currently labeled for application to wheat, Lorsban, Karate, and Capture gave excellent initial control and good residual activity at the rates tested.

Producers are urged to consult with their local county agricultural extension agent and/or the current issue of the Kansas 'Wheat Insect Management Guide' for assistance in selecting the right insecticide(s) for RWA control on winter wheat.

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Brand names are used to identify products. No endorsement is intended, nor is any criticism implied of similar products not mentioned. **Lorsban, Karate, and Capture insecticides do not have current label registration for use on wheat and CANNOT be utilized for that purpose until they receive proper labeling. Furadan is not currently labeled specifically for aphid control on wheat and, therefore, CANNOT be used for RWA control on that crop unless future label changes are made.**

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