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Research Report

Control of Aphids with *Qingfengmeisu*

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We started our aphid control research with *Qingfengmeisu* in 1978. The results of our studies are as follows.

MATERIALS AND METHODS

1. Small plot experiments

Each small plot was 0.2 *mu* [a measure unit in China, 1 *mu* = 0.1644 acre], and all the tests were duplicated. When there was a wheat aphid outbreak, two sprays were applied at an interval of 7 days. The concentration of *Qingfengmeisu* spray was 80 units/mL, which was applied at 150 *jin* [a measure unit in China, one *jin* = 0.5kg] per *mu*. Five spots with 10 wheat plants each were studied in each treatment. The number of wheat aphids on each wheat plant were counted before spraying, and the surviving and dead aphids were also counted 24, 48, and 72 hours after spraying. These numbers were then used to calculate the control effects. Emulsions of 1 : 1000 diluted 40% Rogor (dimethoate) and 1 : 800 diluted 50% DDV (dichlorvos) were used as controls, and the sizes of control plots were 0.05 *mu*.

2. Field control effects by different insecticides and concentrations

In order to further explore the applicability of *Qingfengmeisu*, we conducted our collaborative field experiments with related research groups by using several common insecticides: 1 : 800 diluted DDV emulsion, 1 : 1000 diluted Rogor emulsion, 80-100 units/mL *Qingfengmeisu*, and 1 : 100 diluted aphicide. Clear water and 0.1% washing detergent were used as controls. Each treated plot was 0.1 *mu*. The dosage was 150 *jin* per *mu* with no replication. We examined 5 spots with 10 wheat plants each in all the treated plots. The number of aphids on each plant before spraying, the surviving and dead aphids 24, 48 hours after spraying were counted, which were then used to estimate the control effects.

3. Field control experiments

The plot size for field experiments in 1979 was one *mu* each. Two sprayings were applied at an interval of seven days during aphid outbreaks. The dosage was 150 *jin* per *mu* each time (0.1% detergent was added as a wetting agent). The number of surviving and dead aphids were counted two days after the sprayings. The control effects were

expressed by the mortality of aphids. The controls were an application of 1 : 1000 diluted 40% Rogor emulsion and no spray at all (unsprayed plot was 0.1 *mu*). The plot size for field experiments in 1980 was 10 *mu* each. A one to 1000 diluted 40% Rogor emulsion sprayed plot and an unsprayed plot were treated as controls (the Rogor sprayed plot was one *mu*, and the unsprayed plot was 0.1 *mu*).

RESULTS

1. Control effects on wheat aphids

1) Small plot experiments: the control effects of *Qingfengmeisu* and insecticides on wheat aphids are shown in Table 1.

Table 1. Control effects of different insecticides on wheat aphids *

Items / Results / Pesticides	Year	Control effects at different time intervals (%)		
		24 hours	48 hours	72 hours
Qingfengmeisu 80 unit	1979	39.9	90.75	95.75
	1980	73.4	81.8	100
1 : 1000 diluted Rogor	1979	71.65	83.9	87.65
	1980	69.6	70.3	74.2
1 : 800 diluted DDV	1979	-	-	
	1980	80	85	85.5
Effects increased by *Qingfengmeisu* (%)	1979	-31.75	6.85	8.1
	1980	-1.4	4.15	20.15

*There were 4 experiments and 12 examinations on control effects in 1979. There were 6 experiments and 18 evaluations of control effects in 1980.

Data in Table 1 indicate that the control effects of *Qingfengmeisu* on wheat aphids were between 39.9% and 73.4% 24 hours after spraying, which were 1.4% to 31.75% lower than those of the insecticides, whereas *Qingfengmeisu* was 4.15% to 20.15% more effective than insecticides 48 and 72 hours later.

2) Field control effects of different insecticides and concentrations: the results of field control experiments are shown in Table 2.

Table 2. Aphid control effects of different insecticides and concentrations *

Items / Results / Pesticides	Concentration	Aphids before spray	24 hours after spraying			48 hours after spraying		
			Surviving aphid number	Dead aphid number	Control effects (%)	Surviving aphid number	Dead aphid number	Control effects (%)
Qingfengmeisu	80 U/mL	580	110	470	81	0	580	100
	100 U/mL	250	0	250	100	0	250	100
Aphicide	1 : 100 dilution	263	29	234	88.9	8	255	96.9
Rogor	1 : 1000 dilution	200	150	50	25	50	150	75
DDV	1 : 800 dilution	530	100	430	81.1	50	480	90.5
Detergent	0.1%	320	300	20	0.6	300	20	0.6
Clear water	-	210	210	0	0	210	0	0

* Experiments were conducted together with the research unit of the Xiangjiazhuang village and Agricultural Technical Institute of TaiBai County.

Data in Table 2 showed that the spraying of 80-100 units/mL *Qingfengmeisu* achieved a 81-100% control of aphids 24 hours after the spraying, and the control effect reached 100% 48 hours after the spray. However, the control effects of 0.1% detergent were both only 0.6% at 24 and 48 hours after spraying. Clear water had no control effect on aphids at all.

3) Field control experiment: *Qingfengmeisu* (80 units/mL) and a 1 : 1000 diluted 40% Rogor emulsion were used to control aphids in the field experiments. The field control experiments were conducted twice in 1979, and 10 times in 1980. Each experiment was evaluated for effectiveness, and the results are shown in Table 3.

Table 3. Aphid control results of field experiments*

Items / Results / Pesticides	Aphid number before spray	Control effects 48 hours after spraying (%)				Unsprayed plots	
		Qingfengmeisu (80 units/mL)	Rogor	DDV	Percentage increased	Aphid number before spray	Aphid number after spray
May, 1979	2180	100	98	-	2	3520	3534
May, 1980	356	86.5	63.9	80.1	14.5	312	323

* The experiments were conducted at the Angou village in 1979; In 1980, experiments were conducted 5 times at the Xiangjiazhuang village, 4 times at Angou, and once at the Gaojia village.

The data in Table 3 revealed that the results of field experiments were similar to that of the small plot experiments. The field experiments were performed 10 times in 1980. The results showed that 48 hours after the spraying of 80 units/mL *Qingfengmeisu*, the control effects reached 86.5%, which was 14.5% higher than those sprayed with 1:1000 diluted Rogor, or 1:800 diluted DDV.

2. Control effects of *Qingfengmeisu* on other aphids

From 1978, we conducted collaborative experiments with some related research groups in comparing the control effects of *Qingfengmeisu* and other insecticides on the following aphids -- cabbage aphid, cauliflower aphid, cowpea aphid, soybean aphid, redpepper aphid, and tomato aphid. Results are listed in Table 4, which showed that the control effects of *Qingfengmeisu* on the aphids of seven different crops reached 85 to 100% 48 hours after spraying.

3. The effects of *Qingfengmeisu* on natural enemies of aphids

The results of our three year experiments indicated that *Qingfengmeisu* was not harmful to the natural enemies of aphids, such as lady beetles, braconids, spiders, and green lacewings. The LiuHe Biological Control Station in Jiling Province conducted a large-scale field experiment on soybean aphid control in 1978. They found 108 braconids and 7 green lacewings in the test plots three days after the spraying of 60-80 units/mL *Qingfengmeisu*. There were 112 braconids and 10 green lacewings in the control plots, but only one braconid and three green lacewings in plots sprayed with 1 : 500 diluted or 1 : 1000 diluted Rogor.

Table 4. Control effects of *Qingfengmeisu* on other aphids

Items / Results / Target aphid	Experiment scale	Place of experiment	Insecticide	Concentration (unit/mL)	Control effects (%)

Cabbage aphid	Small plot	Scientific research unit fo Rujiazhuang village	*Qingfengmeisu* Rogor	80 1:1000 dilution	97 95
	5-10 *mu*	Fujiaocun village team #1	*Qingfengmeisu* Rogor	80 1:800 dilution	90 90
Turnip aphid	Small plot	Agricultural research institute of Taibai county	*Qingfengmeisu* Aphicide 1059	100 1:200 dilution 1:1500 dilution	94.1 81.3 92.2
Green peach aphid	5-10 *mu*	Research unit of Fengjiazhuang village	*Qingfengmeisu* DDV	80 1:800 dilution	100 98.4
Soybean aphid	10-20 *mu*	Liuhe county station for disease control	*Qingfengmeisu* (powder) Aphicidous fungus Rogor	80 1:30 dilution 1:1000 dilution	99.1 76 93.9
Redpepper aphid	Small plot	Rujiazhuang village team #1	*Qingfengmeisu* Rogor	80 1:1500 dilution	100 80
Cauliflower aphid	Small plot	Same as above	*Qingfengmeisu* Rogor	80 1:1500 dilution	96 75.9
Tomato aphid	5-10 *mu*	Same as above	*Qingfengmeisu* Rogor	80 1:1500 dilution	96 70
Cowpea aphid	Small plot	Research unit of Xiangjiazhuang village	*Qingfengmeisu* Rogor	80 1:1000 dilution	85 80

In order to learn if there is any adverse effect of *Qingfengmeisu* on natural enemies of aphids, we studied the effects of *Qingfengmeisu* on those natural enemies in this year's field experiment. Our method was: three spots with 100 wheat plants each were chosen and examined for natural enemies in both *Qingfengmeisu* and Rogor sprayed plots. Results are shown in Table 5. The experiment was conducted at the Angou village.

Data in Table 5 show that *Qingfengmeisu* was safe for common natural enemies of wheat aphids. The numbers of natural enemies even slightly increased after the spraying. However, the mortality of natural enemies in the Rogor sprayed plots was 100%.

Table 5. Investigation of natural enemies in *Qingfengmeisu* and Rogor sprayed plots

Items Results Spray Conc.	Date of counting	Names of the natural enemies					Comments
		Lady beetles		Braconids	Spiders	Green lacewings	
		Adults	Larvae				
Qingfengmeisu 80 u/mL	May 28	7	18	1	3	1	May 28 was
	May 31	7	19	0	3	0	the day before
	June 3	6	23	2	5	2	spraying
1:1000 dilution 40% Rogor	May 28	5	10	0	3	2	Same as
	May 31	0	1	0	0	0	above
	June 3	0	0	0	0	0	
Unsprayed	May 28	8	12	0	0	1	Same as
	May 31	6	14	0	0	0	above
	June 3	5	17	2	1	0	

DISCUSSION

The results indicate that *Qingfengmeisu* is effective in controlling many kinds of aphids. Its control effect could be above 60% if we operate carefully, spray evenly, and thus ensure that the agent has good contact with the insect bodies.

The effectiveness of *Qingfengmeisu* in aphid control is comparable to those of 1:1000 diluted Rogor and 1:800 diluted DDV. Besides, *Qingfengmeisu* has the following advantages over Rogor: it does not pollute the environment; it is not harmful to the natural enemies of aphids; and it is cheaper than Rogor.

Note:
Upon research, the translator provides the following information about *Qingfengmeisu:*
Also called as Qingfengmycin; Chemical formula: $C_{16}H_{25}N_7O_8$; CAS No.: 56832-53-2.