

CONTROL OF THE GREEN PEACH APHID [MYZUS PERSICAE (SULZ.)], AND
THE CRESCENT-MARKED LILY APHID. [NEOMYZUS CIRCUMFLEXUM (BCKT.)],
ON CHRYSANTHEMUM IN A GLASS-HOUSE BY DIFFERENT PESTICIDES AND
APPLICATION METHODS

ZWALCZANIE MSZYCY BRZOSKWINIOWEJ (MYZUS PERSICAE
SULZ.) ORAZ MSZYCY CHRYSANTEMY SZKLARNIOWEJ (NEO-
MAZUS CIRCUMFLEXUM BCKT.) PRZY UŻYCIU RÓŻNYCH PE-
STYCYDÓW I STOSOWANYCH METOD

Wojciech Goszczyński* and Marinus van de Vrie**

*Department of Applied Entomology, Agricultural University of Warsaw,
ul. Nowoursynowska 166, 02-766 Warszawa;** Research Station
for Floriculture, Linnaeuslaan 2a, 1431 XV Aalsmeer, The Nether-
lands

INTRODUCTION

Presently high volume applications are the most commonly used with such insecticides as Thiodan, DDVP, Ambush and Pirimor for controlling aphid pests on some ornamental plants in greenhouses. However, this method has two main disadvantages: (I) the amount of labour needed for spraying, (II) the large quantities of water needed. As a consequence, the substantial amounts of energy are needed for evaporation the water, and the water vapors have the deteriorating effect on the greenhouse climate [5].

New methods of pesticide application have been developed recently. Of them, the pulsfogging and smoke generating have the advantages that (I) a relative larger proportion of the insecticide is deposited on plants, (II) less labour is needed, (III) greenhouse climate is not influenced [5].

The aim of the present study was to compare the effectivity of different techniques of application of some pesticides. Beside the insecticides that are commonly used against pest in the greenhouses, the following aphicides were also

considered: „Vertalec”, a bioinsecticide based on *Verticilium lecani* (Zimmerman) Viégas which is pathogenic fungus to the most aphids as well to the other insect pests; „Avermectin BMK 936”, a newly developed insecticide with potentials for aphid control.

MATERIAL AND METHODS

The experiments were conducted on chrysanthemum plants infested by two species of aphids, *Myzus persicae* (Sulz.) and *Neomyzus circumflexum* (Bckt.). Some plants were infested also by the white flies (*Trialeurodes vaporariorum* Westw.).

The chrysanthemum plants grown in a greenhouse were artificially infested with either *M. persicae* or *N. circumflexum* at temperature of 19-22°C. During a period of three weeks the colonies on these plants were allowed to develop to the desired densities. Before applying the pesticides the number of aphids on each individual plant was estimated. After treatment the number of aphids was recorded at 24, 48, and 72 hour intervals; later the intervals were prolonged to 3 days.

The experiments with Vertalec were conducted under a plastic cover to ensure a relative air humidity varying between 70 and 90% that is needed for infection of the aphid by a fungus. In this experiments the countings of pests were done at 5 day intervals until 25 days after the treatment. Since no effect of Vertalec was noted after two weeks, a second application of the bioinsecticide was done on the day 15 th.

The following treatments were applied:

(a) smoke generating against *M. persicae* aphids with Fumisect 332, Ambush 25 EC, Pirimor 50 DP, and Thiodan 35;

(b) pulsfog application of Ambush 25 EC at a dose of $100 \text{ cm}^3/1000 \text{ m}^2$, Ambush 25 EC + D.D.V.P. at a dose of $400 \text{ cm}^3 (1000 \text{ m}^2)$, and Ambush 25 EC + D.D.V.P. + Amitraz at a dose of $400 \text{ cm}^3/1000 \text{ m}^2$ against *M. persicae* aphids;

(c) high volume application against *M. persicae* aphids with 0,1% Thiodan 35, 0,01% Ambush, 0,02% Ambush, 0,1% Avermectin BMK 936, and 0,05% Pirimor 50 DP;

(d) high volume application against *N. circumflexum* aphids with 0,05% Parathion, 0,1% Avermectin BMK 936, and 0,05% Pirimor 50 DP;

(e) high volume application of Vertalec at the rates of 0.5 g/m^2 and 1.0 g/m^2 against *M. persicae* aphids.

The experiments were performed at the Research Station for Floriculture, Aalsmeer, The Netherlands, in 1982.

RESULTS AND DISCUSSION

When the pesticides were applied by smoke generating, a high level of aphid control was obtained. The Ambush and Thiodan smokes caused a 100% mortality of *M. persicae* already after two days. However, the Pirimor and Fumisect smokes did not evoke a complete mortality of aphids (Table 1). It should be emphasized that the phytotoxic effects were visible after the treatments with Fumisect 332. All the treatments did not prevent the infestation of chrysanthemum plants by the white flies as they appeared on the plants on the 24 th day after the treatment. Also, the pulsfog treatments were highly effective. They caused a complete mortality of aphids on the second day after the treatment. However, they did not prevent the plants against the white fly infestation (Table 2). Diverse results were obtained when Thiodan 35, Ambush 25 EC, Avermectin BMK 936, and Pirimor 50 DP were sprayed using a high volume application technique. The green peach aphid population remained at the low density level on plants treated with Avermectin BMK 936, but on the Pirimor treated chrysanthemum a normal population development was continued after three days. Other treatments were very effective and caused a complete mortality of *M. persicae* aphids on the first day after the experiment start (Table 3).

The results dealing with controlling the crescent-marked lily aphid, *N. circumflexum*, are summarized in Table 4. It is seen that when the high volume application technique was used, Parathion was the most effective insecticide as it caused a 100% mortality of aphids after 6 days. However, the winged forms of *N. circumflexum* has appeared later on the sprayed plants indicating that no residual effect of the poison was present. A slowly acting pesticide against *N. circumflexum* was Avermectin BMK 936. An increase of aphid mortality was observed until the 6th day after the treatment. Also, the winged aphids appeared on the treated plants on the 9th day. The surprisingly low measure of aphid control was obtained when Pirimor 50 DP was applied. As the winged forms of *N. circumflexum* have appeared on the sprayed plants already on the 6th day after the treatment, one may assume that this specific aphidicide shows a short residual activity against this pest.

The results of *M. persicae* control with Vertalec were negative (Tables 5, 6 and 7). The population of the green peach aphid was not affected when the pathogen was introduced on the chrysanthemum plants using the high volume application technique. The reason for this lack of effect is unknown.

Vertalec is a bioinsecticide containing the conidial spores of *Verticillium lecanii* (Zimmermann) Viégas, which is the pathogenic fungus for many aphid spe-

Table 1

Effect of smoke generating of some insecticides on *M. persicae* aphids infesting the chrysanthemum plants
 Wpływ pestycydów stosowanych techniką zadymiania na śmiertelność mszyc *M. persicae* żerujących na złocieniach

Treatment done with	Avg. no. of aphids per plant before treatment	Aphid mortality (%) at indicated days after treatment								
		1	2	3	6	10	13	17	24	28
Fumisect 332	67	99.1	99.2	98.3	96.4	98.4	94.8	93.8	94.0t	mt
Ambush 25 EC	74	96.4	98.1	100.0	100.0	100.0	100.0	100.0	100.0t	t
Pirimor 50 DP	72	87.8	99.1	99.5	99.5	98.2	97.2	97.0	96.6t	t
Thiodan rook-tablet	81	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0t	t

Explanations: m - the green peach aphids (*M. persicae*) present on the plants;
 t - the white flies (*Trialeurodes vaporariorum*) present on the plants.

Table 2

Effect of pulsfog application of some insecticides on *M. persicae* aphids infesting chrysanthemum
 Wpływ insektycydów stosowanych w formie aerozoli wytwarzanych za pomocą pulsopylu na śmiertelność mszyc *M. persicae* żerujących na złocieniach

Treatment done with	Avg. no. of aphids per plant before treatment	Aphid mortality (%) at indicated days after treatment							
		1	2	3	6	10	13	17	24
Ambush 25 EC 100 ml/1000 m ²	69	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0 t
Ambush 25 EC 100 ml + DDVP ₂ 400 ml/1000 m ²	80	99.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0 t
Ambush 25 EC 100 ml + DDVP 400 ml + Amitraz 40 ml per 100 m ²	72	99.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Explanations: t - the white flies (*T. vaporariorum*) present of the plants.

Table 3

Effect of high volume application of some insecticides on *M. persicae* aphids infesting chrysanthemum plants

Wpływ insektycydów stosowanych techniką wysokoobjętościową na śmiertelność mszyc *M. persicae* porażających złoczenie

Treatment done with	Avg. no. of aphids per plant before treatment	Aphid mortality (%) at indicated days after the treatment								
		I	2	3	6	10	13	17	24	28
Thiodan 0.1%	66	100.0	100.0	100.0	100.0	100.0	100.0	100.0	t	t
Thiodan 0.2%	61	100.0	100.0	100.0	100.0	100.0	100.0	100.0	t	t
DDVP 0.1%	77	100.0	100.0	100.0	100.0	100.0	100.0	100.0	t	t
DDVP 0.2%	65	100.0	100.0	100.0	100.0	100.0	100.0	100.0	t	t
Ambush 0.01%	63	100.0	100.0	100.0	100.0	100.0	100.0	100.0	t	t
Ambush 0.02%	67	100.0	100.0	100.0	100.0	100.0	100.0	100.0	t	t
Pirimor 0.05%	77	99.3	99.4	98.0	96.2	86.3	84.7	89.0	80.7	mt
Avermectin 0.1%	68	99.6	99.7	98.7	96.8	93.3	99.0	99.2	99.7	m

Explanations: m - the green peach aphids (*M. persicae*) present on the plants;

t - the white flies (*T. vaporariorum*) present on the plants.

T a b l e 4

Effect of high volume application of insecticides on *Neomyzus circumflexum* (Buckt.) infesting the chrysanthemum plants

Wpływ insektycydów stosowanych techniką wysokoobjętościową na śmiertelność mszyc *N. circumflexum* żerujących na złocieniach

Treatment done with	Avg. no. of aphids per plant before treatment	Aphid mortality (%) at indicated days after the treatment						
		I	2	3	6	9	I4	I6
0.01% Avermectin	64	26.7	67.8	92.6	98.8	94.4w	90.1w	92.3w
0.05% Parathion	79	69.0	98.2	98.8	100.0	99.3w	95.7w	96.0w
0.05% Pirimor	111	46.7	79.1	82.4	67.1w	11.9w	31.6w	25.2w

Explanation: w - the winged aphids present on the chrysanthemum plants.

Table 5

Effect of Vertalec applied at the dose of 0.5 g/m^2 on the population development of *M. persicae* aphids on particular chrysanthemum plants

Wpływ preparatu Vertalec stosowanego w dawce $0,5 \text{ g/m}^2$ na rozwój populacji mszycy *M. persicae* na poszczególnych roślinach złocienia

No. of plant	Number of aphids on the plant before treatment	Number of aphids on the plant at indicated days after the treatment				
		5	10	15	20	25
I	91	149	151	138	140	125
2	77	80	82	78	80	65
3	105	121	130	106	101	109
4	191	215	228	198	205	190
5	41	53	69	79	86	78
6	89	128	132	102	97	105
7	110	116	115	125	98	72
8	90	97	98	63	71	75
9	121	140	138	145	131	139
10	105	108	115	99	101	118
11	81	85	83	85	84	98
12	109	110	111	123	115	117
13	79	97	102	87	92	84
14	62	59	61	69	76	74
15	81	83	85	93	88	92
Total	1432	1641	1700	1590	1565	1541
Mean	95.5	109.4	113.3	106.0	104.3	102.7

cies [1, 2, 3]. It is well documented in the literature that both temperature and humidity are very important conditions controlling the infection process, the course of disease as well as the spore production by the fungus. Generally the fungi need the relative humidity to be higher than 70% for spore germination and successful infection of the host [4]. In our experiments, however, the relative humidity varied between 60% and 90%, and so it may have been too low for the spore germination and disease development at some periods of the experiment.

It is suspected also that the quality of the bioinsecticide batch (Batch no, C 223195) may have been poor.

Table 6

Effect of Vertalec applied at the dose of 1.0 g/m^2 on the population development of *M. persicae* aphids on particular chrysanthemum plants

Wpływ preparatu Vertalec stosowanego w dawce 1.0 g/m^2 na rozwój populacji mszycy *M. persicae* na poszczególnych roślinach złoczenia

No. of plant	Number of aphids on the plant before treatment	Number of aphids on the plant at indicated days after the treatment				
		5	10	15	22	25
1	84	90	92	93	88	87
2	91	89	93	79	81	76
3	53	62	61	68	72	82
4	61	71	76	70	73	79
5	25	29	33	39	37	45
6	51	50	56	59	61	53
7	70	76	74	84	79	71
8	41	58	51	62	58	63
9	82	94	93	96	81	71
10	29	51	52	49	56	62
11	31	43	48	39	38	43
12	93	81	81	82	80	69
13	81	84	91	89	92	79
14	34	39	45	48	40	38
15	29	54	53	39	48	51
Total	855	971	999	996	984	969
Mean	57.0	64.7	66.6	66.4	65.6	64.6

Table 7

Development of *M. persicae* populations on particular chrysanthemum plants treated with water only; the data within the table are the control for the results presented in table 5 and 6

Rozwój populacji *M. persicae* na poszczególnych roślinach złocienia opryskanych tylko wodą; dane tej tabeli stanowią kontrolę dla wyników przedstawionych w tabeli 5 i 6.

No. of plant	Number of aphids on the plant before treatment	Number of aphids on the plant at indicated days after the treatment				
		5	8	12	15	26
1	94	39	48	59	59	48
2	47	59	58	68	67	71
3	73	70	78	71	70	52
4	81	90	81	91	82	68
5	81	25	39	31	30	15
6	46	63	74	74	74	71
7	48	59	72	68	68	51
8	41	40	68	72	70	63
9	45	45	57	59	58	51
10	97	52	62	62	63	65
11	42	58	59	72	70	78
12	99	38	41	51	51	45
13	95	40	43	41	40	28
14	99	38	45	45	45	62
15	63	79	74	69	70	59
Total	1051	796	899	935	927	827
Mean	70.1	53.1	59.9	62.3	61.8	55.1

LITERATURE

1. Burges H. D., Hussey N. W. 1971. Microbial Control of Insects and Mites. Academic Press, London - New York, 861 pp.
2. Kenneth R., Wallis G., Olmert Y., Halperin J. 1971. A list of entomogenous fungi of Israel. Israel J. agric. Res., 21: 63-66.

3. Kenneth R., Olmert I. 1975. Entomopathogenic fungi and their insect hosts in Israel: Additions. Israel J. Entomol., 10: 105-112.
4. Lipa J. J. 1967. Zarys patologii owadów. PWRiL, Warszawa.
5. Matthews G. A. 1979. Pesticide application methods. Longman, London, New YORK, 334 pp.

В. Гоциньски, М. Ван де Ври

БОРЬБА С ПЕРСИКОВОЙ ТЛЕЙ [*MYZUS PERSICAE* (SULZ.)]
И С ТЛЕЙ ТЕПЛИЧНОЙ ХРИЗАНТЕМЫ [*NEOMYZUS CIRCUMFLEXUM* (БЕСКТ.)]
С ПОМОЩЬЮ РАЗНЫХ ПЕСТИЦИДОВ И ПРИМЕНЯЕМЫХ МЕТОДОВ

Р е з ю м е

В труде приводятся данные касающиеся борьбы с персиковой тлей (*Myzus persicae* Sulz.) и с тлей тепличной хризантемы (*Neomyzus circumflexus* Beskt.). Для борьбы использовали ряд пестицидов в виде фумигантов, аэрозолей и жидкостей для опрыскивания. Наиболее эффективным действием отличались пестициды примененные в виде опрысков (табл. 3). Подобно высокую эффективность наблюдали при применении смеси пестицидов в виде аэрозолей (табл. 2). Наиболее слабые эффекты были получены при применении пестицидов в виде фумигантов (табл. 1).

Тли вида *Neomyzus circumflexus* оказались мало восприимчивыми к опрыскиванию исследуемыми пестицидами (табл. 4).

Грибной пестицидный препарат (Верталек) базирующий на *Verticillium lecani* оказался неэффективным в борьбе с персиковой тлей поражающей хризантему (табл. 6 и 7).