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Chemicals tested in the laboratory for the control of of black currant gall mite (*Cecidophyopsis ribis* Westw.)

Afprøvning i laboratoriet af bekæmpelsesmidlers virkning mod solbærknopgalmider
(Cecidophyopsis ribis *Westw.*)

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Summary
32 chemicals were tested in the laboratory against the black currant gall mite (*Cecidophyopsis ribis* Westw.). Only 5 chemicals showed an acceptable controlling effect. They were endosulfan, oxamyl, avermectin, lime sulphur and wettable sulphur.

8 pyrethroids, 3 other insecticides and 8 acaricides were all ineffective and the same applied to 8 fungicides normally used against diseases in black currants.

Key words: Chemicals, laboratory test, black currant gall mite, *Cecidophyopsis ribis* Westw.

Resumé
32 pesticider blev afprøvet i laboratoriet for deres virkning mod solbærknopgalmider (*Cecidophyopsis ribis* Westw.). Kun 5 midler gav en tilfredsstillende virkning. Det var endosulfan, oxamyl, avermectin, svovlkalk og sprøjtesvovl. 8 pyrethroider, 3 andre insekticider og 8 acaricider havde ingen eller en utilstrækkelig virkning mod solbærknopgalmiderne. Det samme gjaldt for 8 fungicider, der er almindeligt benyttet til bekæmpelse af svampesygdomme i solbær.

Nøgleord: Pesticider, laboratorie-test, solbærknopgalmider, *Cecidophyopsis ribis* Westw.

Introduction

The most serious pest in black currants in Denmark is the black currant gall mite. Black currants are a rather small crop, so little effort has been made to find suitable chemicals to control the gall mite. Endosulfan is virtually the only chemical used in Denmark to control the gall mite, but it has some disadvantages. It has high mammalian and honeybee toxicity and has a long harvest interval of 6 weeks, therefore there is a need for alternatives. Different types of chemicals were chosen to be tested for their controlling effect on the gall mite: Pyrethroids because of their low mammalian toxicity and their repellent action against honeybees; acaricides with harvest intervals of 4 weeks or less; fungicides commonly used against diseases in black currants because a double-acting chemical will reduce the consumption of pesticides; sulphur preparations because they are harmless to honeybees. The chemicals were

tested in the laboratory by a quick method to reserve the labour-consuming field tests for the chemicals which showed a controlling effect on the black currant gall mites in the laboratory test.

Materials and methods

The tests were carried out in the laboratory according to a method of *Taksdal* (13). The experimental procedures all took place at a room temperature of 18–20°C.

Galls were picked from black currants (*Ribes nigrum* L.) infested with black currant gall mites (*Cecidophyopsis ribis* Westw.). The galls were halved, and the exposed surfaces were observed under a microscope to ensure the presence of many living gall mites. More than hundred gall mites were exposed on each surface. 8 half galls were placed with the exposed surfaces upwards in a petri dish on filter paper moistened with water.

The pesticides were applied with an air atomizing nozzle with flat spray pattern (»Spraying Systems co. E 18A, fluid cap 2050, air cap 62240–60°«), where the liquid and air are supplied under pressure. The petri dishes were placed on a conveyor belt and passed beneath the static nozzle at a defined speed. By adjusting the hydraulic and the air pressures the desired spray volume was obtained. It was 2,1 μl per cm^2, which corresponds to 416 l per ha. The drop frequency was about 2800 drops per cm^2.

After the spraying the petri dishes were placed without covers to avoid a rise in the vapour pressure of the chemicals. The filter papers were moistened to avoid desiccation of the gall mites. 3 hours after spraying, the controlling effect of the chemicals was measured. The gall mites were observed through a binocular microscope and the proportion of dead gall mites was roughly estimated in every half gall. Afterwards the covers were replaced, and 21 hours later the same procedure was followed.

Galls sprayed with clean water and endosulfan respectively, were present as controls in every spray series. The water-treated galls were used to ensure that elimination of gall mites could be ascribed to the effect of the chemicals. The galls treated with endosulfan were used to control that the test method worked as endosulfan has a well-documented controlling effect on the black currant gall mite (1,3,6,15).

Every dose of chemical was tested with at least one petri dish with 8 half galls. The chemicals and the doses tested are shown in Table 1 and 2. The controlling effects are given as the arithmetic average of the proportion of dead gall mites in the 8 halved galls per petri dish and, in the case of more than one test per chemical, as the average of these tests.

Results

The chemicals which showed a controlling effect on the black currant gall mite are listed in Table 1.

There were pronounced differences between the efficiency of the chemicals and how quickly the gall mites responded to them.

The chemicals which showed no controlling effect on the gall mites 24 hours after the treatment are listed in Table 2.

Discussion and conclusions

Only a few of the chemicals tested had any controlling effect on the black currant gall mite, and of these only few gave acceptable control. They were endosulfan, lime sulphur, wettable sulphur, oxamyl and avermectin.

The controlling effect of some of the chemicals obtained in the present test has been verified in field tests. This is the case with endosulfan (1,3,6,15), lime sulphur (9,10,15) and oxamyl (7). The good effect of wettable sulphur was expected considering the known effect of lime sulphur, but conflicting results have been obtained in field tests (7,12,14). The satisfactory effect of avermectin has not been repeated in a field test with a dose of 2.0 g per 1 (7). Increasing the dose may help. A controlling effect of methomyl has been shown in several field tests (5,6,7), but not in all (4). The reason for these contradictory results is not clear.

The experimental method of survey, where the gall mites were examined 3 and 24 hours after the spraying, revealed differences in the action of

Table 1. 9 chemicals which showed a controlling effect against the black currant gall mite.
9 pesticider, der havde en virkning imod solbærknopgalmider.

Product name *Middel*	Active ingredient *Virksomt stof*	Dosage *Dosering* g product per 1	Number of tests *Antal forsøg*	Proportion of dead gall mites *% døde galmider* after 3 hours *efter 3 timer*	after 24 hours *efter 24 timer*
Thiodan emuls.	Endosulfan 35%	10.0	7	80	100
Lime sulphur	Sulphur 27%	20.0	1	90	100
		100.0	1	100	100
Wettable sulphur	80%	30.0	1	70	100
		60.0	1	100	100
Vydate L	Oxamyl 25%	10.0	1	0	100
MK 0936	Avermectin 1.8%	2.5	1	50	100
		5.0	1	70	100
Lannate 20 L	Methomyl 20%	10.0	2	20	75
Torque	Fenbutatin-	2.5	1	0	50
	oxid 50%	5.0	1	10	50
Plictran 25 W	Cyhexatin 25%	7.5	1	30	30
		15.0	1	10	50
Cropotex 50 WP	Flubenzimin 50%	5.0	1	0	20
		10.0	1	0	30

the chemicals. The gall mites responded very quickly to the sulphur preparations, endosulfan and avermectin. As early as 3 hours after the spraying, 70–100% of the exposed gall mites were eliminated. Oxamyl and methomyl, on the other hand, only showed a controlling effect 24 hours after the spraying. These differences in the speed with which the chemicals eliminate the gall mites are important for the control of black currant reversion virus. The quicker the gall mites are killed, the less virus infection is transferred (11,15). From this point of view, the old preparations lime sulphur, sulphur and endosulfan are more effective against reversion virus than the new preparations methomyl and oxamyl.

The acaricide cyhexantine gave a controlling effect, though not sufficient. The same results were obtained in a field test by *Nielsen* (7), whereas cyhexatine was ineffective in a field test carried out by *Dicker et al.* (4). The other acaricides tested were also ineffective. It is surprising that acaricides, which exhibit good effects against the closely related tetranycide mites, are so ineffective against the black currant gall mite. Dicofol has been tested against the black currant gall mite by *Taksdal* (12) and *Collingwood* and *Dicker* (2) also with unsatisfactory results.

None of the pyrethroids tested showed any controlling effects on the black currant gall mite. Contrary to this, the very closely related phytopte gall mite *(Aculus sp.)* has shown to be very sensitive to permithrin, deltamethrin and cypermethrin (8). The reason for these differences between closely related species is not clear.

None of the fungicides tested showed any controlling effects on the gall mite. Neither did benomyl, although is was included in the test because of reports of some positive effect on the black currant gall mite in field tests (4,7). This discrepancy between the results of the test in the laboratory and in the field shows that the laboratory test method is rather rough and can be used only as an indication. In the light of these results, none of the fungicides are to be preferred to the others.

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Table 2. Chemicals which showed no controlling effect against the black currant gall mite.
Pesticider, der ikke havde nogen virkning mod solbærknopgalmider.

Type of chemicals *Middel-type*	Product name *Middel*	Active ingredient *Virksomt stof*	Dosage *Dosering* g product per 1	Number of tests *Antal forsøg*
Pyrethroids	Ambush	Permethrin 25.8%	1.0	2
			2.0	2
	Cybolt	Flucytrinate 10%	5.0	2
			10.0	2
	Danitol 10 FW	Fenpropathrin 10%	5.0	1
			10.0	1
			30.0	1
			50.0	1
	Decis	Deltamethrin 2.5%	1.5	1
			5.0	1
	Fastac	Alfoxylate 10%	0.18	1
			0.36	1
	Ripcord	Cypermethrin 11%	5.0	1
			10.0	2
	Sumicidin 10 FW	Fenvalerat 10%	30.0	1
			50.0	1
	Sumicidin 20 EC	Fenvalerat 20%	5.0	1
			10.0	1
Acaricides	Camostan	Captan 50% + Chino-methionat 5%	10.0	1
			20.0	1
	Kelthane E 30	Dicofol 30.6%	5.0	1
			10.0	1
	M 96 oil emulsion	Mineraloil 96%	100.0	1
			200.0	1
	Pentac SP	Dienochlor 50%	5.0	1
			10.0	1
	Tamaron 600 EC	Methamidophus 60%	5.0	1
			10.0	1
Insecticides	Dimilin	Diflubenzuron 25%	10.0	1
	NNI – 750	Thiadiazin 50%	5.0	1
			10.0	1
Fungicides	Afugan	Pyrazophos 32%	10.0	3
	Bayleton 5 WP	Triadimefon 50%	10.0	3
	Benlate	Benomyl 50%	1.8	1
			3.6	1
			6.0	1
			12.0	1
	Daconil	Chlorothalonil 50%	25.0	3
	Euparen- M	Tolylfluanid 50%	25.0	3
	Orthocid 83	Captan 83%	15.0	3
	Ronilan	Vinclozolin 50%	10.0	3
	Rubigan	Fenarimol 12.1%	3.5	3

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