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Postharvest sprayings with 2 systemic pesticides against the black currant gall mite *(Cecidophyopsis ribis* Westw.*)* on black currant *(Ribes nigrum)*

Sprøjtning efter høst med 2 systemiske pesticider mod solbærknopgalmiden (Cecidophyopsis ribis *Westw.*) *i solbær* (Ribes nigrum)

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Summary

The possibility of obtaining chemical control of the black currant gall mite (*Cecidophyopsis ribis* Westw.) on black currants (*Ribes nigrum*) by replacing the traditional early season treatments with postharvest foliar sprayings was investigated over 2 seasons. The 2 systemic chemicals oxamyl and methomyl were applied 3 times after harvest. No controlling effect at all was obtained against the black currant gall mites by the postharvest sprayings.

It is concluded that it is not feasible to change the time of spraying from preharvest to postharvest. On the other hand, oxamyl and methomyl did show such controlling effects against the gall mites by spraying in the traditional early part of the season that further tests of the 2 chemicals seem worthwhile.

Key words: Black currant gall mite, *Cecidophyopsis ribis* Westw., postharvest treatments, oxamyl, methomyl.

Resumé

Muligheden for at flytte den kemiske bekæmpelse af solbærknopgalmiden (*Cecidophyopsis ribis* Westw.) i solbær (*Ribes nigrum*) fra først på sæsonen til efter høst blev undersøgt over 2 sæsoner. Der blev sprøjtet med de 2 systemiske midler oxamyl og methomyl 3 gange efter høst.

Behandlingerne efter høst havde overhovedet ingen virkning mod galmiderne.

Det konkluderes, at det ikke var muligt at flytte bekæmpelsestidspunktet fra perioden før høst til efter høst.

Derimod viste både oxamyl og methomyl så god en virkning mod solbærknopgalmiderne, når de blev udsprøjtet på de traditionelle tidspunkter tidligt på sæsonen, at yderligere undersøgelser af disse midler er relevante.

Nøgleord: Solbærknopgalmiden, *Cecidophyopsis ribis* Westw., sprøjtning efter høst, oxamyl, methomyl.

Introduction

Chemical control of the black currant gall mites (*Cecidophyopsis ribis* Westw.) on black currants in Denmark is traditionally achieved by 2 or 3 sprayings with endosulfan in the spring and early summer. Sometimes another spraying is carried out shortly after harvest. The strategy is to hit the gall mites as they migrate from the old galls to the new axillary buds. The migration takes place in May and June. The task is difficult because of the long period of migration and the immense number of gall mites. Every gall contains more than a thousand gall mites at the start of the migration period.

As an alternative to the traditional treatments, it was decided to investigate the possibility of controlling the pest by foliar sprayings during the postharvest period. Treatment during this period has the advantage of the black currant gall mites staying inside the galls, i.e. they have not yet had the possibility of infesting new buds, and have not multiplied so greatly either. A further advantage is the avoidance of pesticide residues on the berries. If the postharvest treatments turned out to be more effective than the traditional early season treatments, the overall purpose of reducing the use of chemicals could be served.

In the postharvest period, the gall mites have finished their free-living period of migration, and instead they live inside the axillary buds. This makes it necessary to use systemic chemicals for the purpose of getting inside the infested buds. Methomyl (»Lannate 20 L«) and oxamyl (»Vydate L«) were chosen. Methomyl is systemic to a moderate degree. According to *Hansen et al.* (3) and *Hansen* and *Schadegg* (4), methomyl shows an effect against the black currant gall mites, while *Dicker et al.* (2), on the other hand, dit not obtain any effect with methomyl. Oxamyl is strongly systemic, but its effect against the black currant gall mites was unknown before the present investigation.

Insufficient documentation of the efficiency of the 2 chemicals in controlling the black currant gall mite made it necessary to start by testing for this characteristic. This was carried out in an experiment where the effect of oxamyl and methomyl against the gall mites was compared to the effect of the standard chemical endosulfan (»Thiodan emulsion«). Endosulfan is a contact pesticide and possesses a well-known effect against the black currant gall mite (1, 3, 4, 7). The treatments were carried out early in the season in the free-living period of the gall mite to ensure an effect.

Materials and methods

The experimental treatments were carried out in 1983 and 1984 in black currants (*Ribes nigrum*) heavily infested with black currant gall mites (*Cecidophyopsis ribis* Westw.). In 1983 the variety used was 'Boskoop Giant', planting space 2.0 × 3.0 m, and in 1984 it was 'Baldwin', 0.8 × 3.0 m.

The experiments were designed with 3 blocks and the treatments applied at random in each block. Both years, the number of black currants per plot was 5. The spraying took place in the daytime with a motorized knapsac air mist sprayer »AS 1« with a spray volume of 1200 l per ha.

The chemicals tested were methomyl (»Lannate 20 L«) with 0.48 l a.i. per ha, oxamyl (»Vydate L«) with 0.60 l a.i. per ha and endosulfan (»Thiodan emulsion«) with 0.84 l a.i. per ha.

In 1983, the early-season experiment with the 3 chemicals was carried out as follows: Sprayings took place on 26 April at growth stage »grape«, on 10 May at »first open flower« and on 1 June at »100% fruit set«. In 1984, endosulfan and methomyl were applied on 10 May at the growth stage »first open flower«, on 4 June at »100% fruit set« and on 14 June. Oxamyl was only applied twice, namely at the first 2 dates of treatment.

The first postharvest treatment with oxamyl and methomyl took place immediately after harvest both years, and a further 2 sprayings were applied at fortnightly intervals.

In 1983, the date of harvest was 2 August, and the treatments were carried out on 4 and 19 August and on 2 September. In 1984, the corre-

sponding dates were 7, 9 and 23 August and 6 September.

Assessment of results

From every plot, a number of branch tendrils were picked at random from the bush in the middle during the following winter. The buds on the shoots were visually divided into healthy and infested until 200 buds per plot had been collected. The 200 buds comprised about one tenth of the total number of buds on the branch tendrils of a good-sized bush. Doubtful buds were dissected and inspected with a binocular microscope to establish if they were infested or not. From these counts the levels of infestation were calculated.

A possible effect of the postharvest treatment could be that even if the gall mites had been destroyed, they might have triggered off a swelling of the infested buds to form galls. If this was the case, the applied method of assessment would give an incorrect picture of the effect of the treatments. For this reason, galls from the postharvest experiment in 1984 were inspected to establish the incidence of dead and living gall mites inside the galls. The following method was applied.

4 galls were each divided into 16 pieces and placed in 8 ml ion-exchanged water in a beaker. Only fresh galls were used. One drop of detergent was added, and the mixture was stirred for 5 minutes with a magnetic stirrer. While the mixture was still being stirred, a sample of 3 ml was removed and placed into a counting slide (dimension 5.1 × 3.6 cm divided into squares of 0.09 cm^2). For each sample, the number of dead and living gall mites in 20 squares were counted. Only gall mites which moved were assessed as living, and only intact gall mites were counted, i.e. those with transparent skin were excluded. From every plot, gall mites from 12 galls were counted.

Results

The results of the early-season experiment with oxamyl and methomyl for their controlling effects on the black currant gall mite is shown in Table 1. The 2 chemicals are compared with the standard endosulfan.

Table 1. The effect of 3 chemicals against black currant gall mites on black currants applied early in the season. All the chemicals were applied 3 times per season except oxamyl, which was applied only twice in 1984.
Virkning af 3 pesticider mod solbærknopgalmider i solbær ved sprøjtning forår og tidlig sommer. Alle behandlinger blev foretaget 3 gange undtagen med oxamyl i 1984, hvormed der kun blev behandlet 2 gange.

Chemical *Pesticid*	Dose *Dosering* l/ha	% infested buds *% inficerede knopper* 1983	1984
Endosulfan	0.84	18 a*	20 a
Methomyl	0.48	31 a	41 b
Oxamyl	0.60	9 a	39 b
Control *Ubehandlet*	–	57 b	54 c

* Numbers followed by the same letter within columns are not significantly different at P = 0.05.
Tal efterfulgt af samme bogstav i hver kolonne er ikke signifikant forskellige for P = 0.05.

All the treatments significantly decreased the level of infestation with black currant gall mites.

Table 2 shows the proportion of infested buds found after the postharvest treatments in 1983 and 1984. The table further shows the proportion of living gall mites inside the galls found after the postharvest treatment in 1984.

Table 2. The effect of methomyl and oxamyl against the black currant gall mites on black currants applied after harvest.
Virkning af methomyl og oxamyl mod solbærknopgalmider i solbær ved sprøjtning efter høst.

Chemical *Pesticid*	Dose *Dosering* l/ha	% infested buds *% inficerede knopper* 1983	1984	% living gall mites inside the galls *% levende galmider i gallerne* 1984
Methomyl	0.48	63 a*	55 a	44 a
Oxamyl	0.60	67 a	59 a	43 a
Control *Ubehandlet*	–	58 a	56 a	46 a

* Numbers followed by the same letter within columns are not significantly different at P = 0.05.
Tal efterfulgt af samme bogstav i hver kolonne er ikke signifikant forskellige for P = 0.05.

Whether the results were assessed as a proportion of infested buds or as a proportion of living

gall mites inside galls, no difference was found in the level of infestation between the control and the treatments with methomyl and oxamyl.

An examination of a number of bisected galls from the treatments did not show any presence of more dead gall mites near the inner surface than at the centre of the galls.

Discussion and conclusion

The early-season experiment with oxamyl and methomyl showed that both chemicals had a controlling effect on the black currant gall mites. These results made it natural to use the 2 chemicals for the postharvest treatments. The postharvest foliar sprays with oxamyl and methomyl did not show any controlling effect at all against the black currant gall mites although both the chemicals are systemic.

The results of the postharvest treatments were assessed in 2 different ways: by counting the number of infested buds and by counting the proportion of living gall mites inside the galls. Both methods gave the same clear result: no effect of the postharvest treatments. *Smith* (6) did not obtain any effect against black currant gall mites, neither by postharvest foliar spraying nor by soil application of 5 out of 6 systemic chemicals. Only fluoreacetamide showed an effect which was insufficient.

The observation that the bisected galls showed no accumulation of dead gall mites along the inner surface of the galls indicated that the 2 chemicals had not penetrated into the galls. Possibly the 2 chemicals cannot penetrate any of the above ground parts of the black currants. Or even if they can, the waterflow to the galls at this late time of the season may be too small.

It must be concluded that it is not feasible to change the times of spraying from the preharvest to the postharvest period.

Another result of the investigation is that both oxamyl and methomyl showed an effect against the gall mites when applied early in the season. As the number of chemicals which show any effect against black currant gall mites is very limited (5), it seems worthwhile to conduct further tests with oxamyl and methomyl.

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