PESTS OF BLACK CURRANTS AND THE INFLUENCE OF AZINPHOS-METHYL ON TWO SPOTTED SPIDER MITE

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SUMMARY

Pests which attack black currant (*Ribes nigrum*) include: sow thistle aphid, leafrollers, currant clearwing, mealy bug, scale insects and mites. Pest monitoring of commercial plantings suggested that two spotted spider mite (*Tetranychus urticae*) had become the major pest of the cultivar 'Magnus', as a result of intensive insecticide programmes. This was confirmed through repeated applications of azinphos-methyl which induced mite increase with an accompanying loss of crop yield compared to that of unsprayed plants. In the absence of insecticides currant clearwing (*Synanthedon tipuliformis*) increased in importance but the trials showed that it is possible to reduce chemical applications considerably without yield loss.

INTRODUCTION

Black currants and other *Ribes* spp were brought to New Zealand from Europe by the early pioneers, and established mainly as home garden plants. *Ribes* spp are prone to attack by the same species of insect pests, some of which (e.g. currant clearwing, currant bud mite) were probably introduced initially with the plant cuttings.

Langford and Mavromatis (1981) indicated that pest and disease control represented 8% of production costs. This figure reflected the cost of chemicals, application rates and the recommended MAF export schedule at that time. This spray schedule has since been modified by growers as a result of declining returns for the crop.

PESTS

The major insect and mite pests of black currants in New Zealand are listed in Thomas (1982). These pests have been monitored over 5 years by the regular collection and examination of foliage and cane samples from up to 15 commercial properties and from experimental trials.

Black currant aphid or sow thistle aphid: *Hyperomyzus lactucae*

In New Zealand this aphid infests alternate hosts, *Ribes* spp and *Sonchus* spp. Eggs are normally deposited in the autumn on black currant canes where they overwinter. The feeding of the first and succeeding generations produced in the spring, before alates migrate to other hosts, can severely distort shoot growth which leads to stunted and weakened canes. Subsequent loss of yield can occur.

A single aphicide applied just before flowering provides season long control of this aphid on currants.

Leafrollers: *Epiphyas postvittana*; *Planotortrix excessana* and *Ctenopseustis obliquana*

The complex of tortricids that attack black currants, all cause similar feeding damage and are alike in their life cycles. Multivoltinism (three generations in Canterbury) is possible on black currant bushes where economic loss of yield occurs from (a) bud injury, accounting for up to 30% of buds during winter (see also Baker and Batten 1978); (b) fruit damage, ranging in our trials and commercial crops from less than 1% to 3% and (c) foliar damage which is difficult to assess economically.

An insecticide applied in late November or preferably early December and another in early April controls these species adequately.

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Currant clearwing: *Synanthedon tipuliformis*

This is a univoltine moth, whose larvae tunnel and feed in the pith of cane growth. Adults emerge from the beginning of November to the end of January. A detailed account of the biology of the species is provided by Scott and Harrison (1979). Estimates of damage and loss of yield vary considerably overseas (Sedivy and Kodys 1959; Hardy 1981).

Insecticide control is normally practiced for this species and Baker (1980) found one post-harvest application of azinphos-methyl adequate. Recent research by Bedding and Miller (1981) showed that spraying a suspension of the nematode *Neoaplectana bibionis* provided excellent control of the larvae in black currant cuttings and this research is being extended to field plantings.

Mealybug: *Planococcus mali*

This native insect is a troublesome pest of some plantings in the South Island, especially cultivars with loosely formed buds. Over the past 5 years the incidence of this pest has increased despite the rather intense spray regimes applied on some properties. An application of chlorpyrifos at recommended rates following bud burst has provided adequate control (K. Jeffery pers comm).

Scale insects

Various species of scales attack black currants. Accompanying the adoption of reduced spray regimes by growers the incidence of one soft scale (*Parthenolecanium corni*) has increased markedly on foliage and cane samples, but no corresponding yield losses have been associated with this pest in our trials.

Currant bud mite: *Cecidophyopsis ribis*

This multivoltine species was rarely encountered. It causes enlargement and galling of buds which later fail to develop. Endosulfan after bud break can be used for control.

Two spotted spider mite: *Tetranychus urticae*

In commercial plantings where intensive insecticide spray regimes have been applied, two-spotted spider mite (TSSM) has been elevated to major pest status. An important factor contributing to TSSM buildup was found to be the destruction of beneficial predators especially the ladybird, *Stethorus bifidus* and the naturally occurring, phytoseiid mites, *Typhlodromus caudiglans* and *Amblyseius longispinosus*.

An undesirable feature of these TSSM outbreaks on black currants is the rapid leaf deterioration, bronzing and premature leaf abscission. This often causes premature bud break in late summer and poor cropping in the following season. Acaricides can be used to prevent mite outbreaks but as we show below reduced insecticide programmes can achieve a similar result.

EXPERIMENTAL

In a chemical trial specifically designed to control leafrollers and currant clearwing and to investigate the long-term effects of TSSM on black currants, each of 3 out of 4 experimental blocks of black currant plants received a specific treatment of azinphos-methyl over four seasons commencing in 1980/81.

One year old 'Magnus' plants were planted out at Tai Tapu, Canterbury according to commercial practice (30 cm apart by 2.5 m between rows) into four equal block (4 rows of 25 plants) separated by guard rows and with three additional guard plants at either end of each row. Shelter trees of varying height surrounded the entire planting.

The blocks received the following treatments, sprays being applied to run off using a knapsack with a hand lance.

Block 3 — 3 sprays of azinphos-methyl at 75 g/100 litres during the first week of November, December and January in each year.

Block 2 — 2 sprays at the beginning of December and January.

Block 1 — 1 spray at the beginning of January.

Block 0 — was unsprayed.

All blocks received identical fertilizers, watering and weed control. No fungicides or acaricides were applied.

Crop yields were recorded for 10 randomly selected plants out of each block, when 95% of the berries were virtually entirely black. The results are given in Table 1.

TABLE 1: Yield of black currant plants growing at Tai Tapu and receiving various azinphos-methyl applications at 75 g/100 litres. No other sprays were applied.

Block	Programme	Mean plant yield with 95% C.L.		
		1981/82	1982/83	1983/84
3	3 sprays N.D.J.	226 ± 65	435 ± 123	427 ± 124
2	2 sprays D.J.	433 ± 151	596 ± 168	658 ± 224
1	1 spray J.	349 ± 98	520 ± 131	685 ± 153
0	Unsprayed	490 ± 150	691 ± 89	888 ± 232

RESULTS AND DISCUSSION

The harvested crop per plant in the initial year of the trial 1980/81, was very similar for each block at approximately 109 g. At this time (December/January) the TSSM population was low and was considered not to have influenced yield. However, following the third azinphos-methyl application, TSSM became evident in block 3 during January 1981 and successively in blocks 2, 1 and 0. Serious leaf bronzing, dessication and defoliation of plants occurred in block 3 from early February onwards. This led to premature bud break in March with some flowering and fruit set which influenced yield the following season. Partial defoliation occurred in the other blocks but this was less serious. Block 0 showed signs of mite invasion in late autumn, but leaf retention was highest in this block with natural leaf abscission occurring in late May.

The ladybird *S. bifidus* became common as the TSSM populations increased but was not effective in preventing the rapid increase in mite numbers. The phytoseiid predators, *T. caudiglans* and *A. longispinosus* (and in later years others) also appeared in low numbers. These have remained in block 0. Trends were similar each year.

As a consequence of the TSSM outbreaks each season there have been clear differences in the growth of the plants. In the absence of a specific aphicide treatment for *H. lactucae* this aphid remained longer on plants in block 3, because of the destruction of the predators by the November spray and possible leaf changes. The combined influences of the aphid and TSSM together led to losses in crop yield (Table 1) but the greater part of this is attributable to the mite damage.

Block 3 remained essentially free of leafrollers during each season and has had the best control of currant clearwing. However, control of the latter has not been entirely adequate despite the number of chemical applications. Baker (1980) reported the success of a single post-harvest azinphos-methyl application for currant clearwing control. Similar results may have been achieved in our trials if the population pressure had been lower in the area. Infestation levels of currant clearwing were repeatedly higher in block 0 than in the other blocks, but this was not reflected in the harvest results because of the greater importance of TSSM affecting yield in blocks 3, 2 and 1. In a commercial operation where mechanical harvesting is normal, cane breakage resulting from currant clearwing infestations could influence the harvestable yield.

These trials suggest that the level of TSSM infestations and resultant yields were directly influenced by the intensity of the insecticide programme in the absence of acaricides. Highest crop returns were obtained from unsprayed plants and, based on these results, we suggest that black currants could be produced in New Zealand with minimal well-timed spray applications for insect and mite control.

The diseases *Mycosphaerella ribis* and *Botrytis cinerea* did not cause serious problems during our trials.

In the present economic climate for the marketing of black currants it is essential that production costs are kept to a minimum and in this respect reduced insecticide programmes can make a valuable contribution.

We recommend an insecticide programme comprising an aphicide preflowering, an insecticide in early December and another in early April.

REFERENCES

- Baker, R.T., 1980. Control of the currant cleaving. *Proc. 33rd N.Z. Weed and Pest Control Conf.*: 129-132.
- Baker, R.T. and Batten, J.F., 1978. Leafroller in black currants. *N.Z. J. Agriculture* 136: 28-29.
- Bedding, R.A. and Miller, L.A., 1981. Disinfesting black currant cuttings of *Synanthedon tipuliformis*, using the insect parasitic nematode, *Neoaplectana bibionis*. *Environmental Entomology* 10: 449-453.
- Hardy, R.J., 1981. Field observations of the effect of currant borer moth *Synanthedon tipuliformis* (Clerck) (Lepidoptera:Aegeriidae) on the yield of black currants produced in Tasmania. *Scientia Horticulturae* 15: 165-172.
- Langford, G. and Mavromatis, G., 1981. A review of the New Zealand black currant industry. MAF publication June 1981. 51p.
- Scott, R.R. and Harrison, R.A., 1979. The biology and life history of currant clearwing *Synanthedon tipuliformis* (Lepidoptera:Sesiidae), in Canterbury. *N.Z. J. Zoology* 6: 145-163.
- Sedivy, J. and Kodys, F., 1959. K bionomii a skodlivosti nesytiky rybizove (*Aegeria tipuliformis* Clerck). *Folia Zoologica* 8: 97-104.
- Thomas, W.P., 1982. Black currants. Pests — biology and symptoms. MAF Aglink 1/3000/12/82: HPP 258. 3p.