Project number:	SF 12 (171)
Project title:	Evaluation of pest and disease levels in commercial plantations of Ben Gairn and Ben Hope, 2000/2001.
Project leader:	Roger Umpelby, ADAS Rosemaund
Keyworkers:	D J Owen, E L Pierce
Location of project:	Herefordshire, Norfolk and Somerset
Date project commenced:	April 2000/January 2001
Key words:	Blackcurrant, Ben Hope, Ben Gairn, pests, black currant gall mite, aphid, capsid, leaf midge, caterpillar, diseases, reversion, mildew, leaf spot, beneficial insects

Date of report
9 February 2001

PRINCIPLE WORKERS

R. A. Umpelby	B.Sc., M.Phil.	Author of report
D. J. Owen	B.Sc. (Hons.)	
E. L. Pierce	B.Sc. (Hons.)	

AUTHENTICATION

I declare that this work was undertaken either, directly by me, or under my personal supervision according to the procedures described herein and that this report represents a true and accurate record of the results obtained.

.....
Signed

R Umpelby
ADAS Rosemaund
Preston Wynne
HEREFORD
HR1 3PG

Tel: (01432) 820 444
Fax: (01432) 820 121

CONTENTS Page No

1. Practical Summary Report for Growers

i. Background and objectives

The objectives of the study were:

1. to monitor the susceptibility of commercial plantations of Ben Gairn and of Ben Hope to pests and diseases
2. to evaluate the effect of reduced pesticide inputs on the level of pest and disease
3. to evaluate the effect of alley maintenance method on pest and disease levels

ii. Results and conclusions

Three established commercial plantations of Ben Gairn and Ben Hope in different areas of England were monitored throughout the season for levels of pest and disease, and for the presence of beneficial organisms. At one site a comparison between a full spray programme and a reduced programme was made. At another site crops grown with either a herbicide treated alley or with a grass strip alley were compared.

Ben Gairn

Leaf spot was only identified at one site, but only on the part of the plantation that had received no fungicide sprays, but the disease was at a very low level and caused no leaf loss.

Active (sporulating) mildew was not confirmed at any site, however at all 3 sites foliage symptoms, typical of a hypersensitive reaction to mildew, were recorded. Symptoms appeared in late July, following the only dry significant spell of the summer. Plants subsequently grew away from the damage and no shoot death was seen.

No big bud (black currant gall mite) or reversion was seen.

Significant levels of currant-sowthistle aphid were seen at all sites, with 2 sites needing treatment.

Capsid damage was high at all sites and appeared higher than on adjacent cultivars.

Caterpillar damage was very high at one site.

Ben Hope

Leaf spot was recorded at all sites, but at two sites caused no significant damage nor early leaf fall. At the other site leaf spot was severe, and on an untreated area caused 90% leaf drop by October, and even where sprays had been applied a 50% leaf drop was recorded.

No active mildew was seen at any site, nor were any of the symptoms described above (for Ben Gairn).

No reversion was seen.

In April 2000 no big bud was seen at any site. At two sites no big bud was seen in December 2000, but at one site big buds were found and these were confirmed as being caused by an Eriophiid mite, probably the black currant gall mite. Checks will be done in Spring 2001 to confirm that the affected bushes are Ben Hope and not rogues or sports.

Ben Hope appeared much less susceptible to aphid and capsid attack than Ben Gairn at all three sites.

The method of alley maintenance had no consistent effect on levels of pests or diseases.

iii. Recommendations

The results have shown some real differences in the susceptibility of the two varieties to pest and disease pressures. The results of one years data cannot be relied on to form the basis of a programme of advice for future seasons, and as more plantations reach full cropping it is vital to generate more critical data to give growers the information on the potential risks for each variety.

The information on other invertebrates, including on beneficials and neutrals, was too varied to draw firm conclusions. For valid data to be generated on this aspect much more detailed studies are necessary

It is recommended that the study continue for a further year on the same sites, but that the focus is more on direct pest and disease susceptibility and less on side effects on other organisms.

2. Experimental Section

SUMMARY

Three established commercial plantations of Ben Gairn and Ben Hope in different areas of England were monitored throughout the season for levels of pest and disease, and for the presence of beneficial organisms.

Ben Gairn
Leaf spot was recorded at one site, but only on the part of the plantation that had received no fungicide sprays, and even the at a very low level.
Active (sporulating) mildew was not confirmed at any site, however at all 3 sites foliage symptoms, typical of a hypersensitive reaction to mildew, were recorded. Symptoms appeared in late July, following the only significant dry spell of the summer. Following a return to wetter conditions the plants subsequently grew away from the damage and no shoot death was seen.
No big bud (black currant gall mite) or reversion was seen.
Significant levels of currant-sowthistle aphid were seen at all sites, with 2 sites needing treatment.
Capsid damage was high at all sites and appeared higher than on adjacent cultivars.
Caterpillar damage was very high at one site.

Ben Hope
Leaf spot was recorded at all sites, but at two sites caused no significant damage nor early leaf fall. At the other site leaf spot was severe, and on an untreated area caused 90% leaf drop by October, and even where sprays had been applied a 50% leaf drop was recorded.
No active mildew was seen at any site, nor were any of the symptoms described above on Ben Gairn seen.
No reversion was seen at any site.
In April 2000 no big bud was seen at any site. At two sites no big bud was seen in December 2000, but at one site big buds were found and these were confirmed being caused by an Eriophiid mite, probably the black currant gall mite. Checks will be done in Spring 2001 to confirm that the affected bushes are Ben Hope and not rogues or sports.
Ben Hope was much less susceptible to aphids and capsids than Ben Gairn at all three sites.

At the one site where a comparison between conventional and reduced pesticide inputs was made there was little difference in pest numbers between the programmes, but leaf spot levels were much higher on Ben Hope where inputs were reduced.

In plantations where a comparison was made between alley maintenance methods, no consistent differences in pest or disease levels were detected.

INTRODUCTION

The first commercial plantings of Ben Gairn and Ben Hope were established at 4 sites in England in 1998, and a considerable number of commercial plantations were established in 1999. Although the varieties' resistance to gall mite and reversion are well documented, their susceptibility to the full range of black currant pests and diseases under commercial conditions has not been critically evaluated. Because of their gall mite or reversion resistance, the number of pesticides applied to Ben Gairn and Hope for gall mite control could theoretically be substantially reduced compared to that applied to the major current commercial varieties. The main side effect of such a reduction in pesticide application could be that any incidental control of other pests achieved by the routine gall mite treatments will be lost. The work reported was a result of regular and structured monitoring of the full range of pests and diseases, and of beneficial and neutral invertebrates in 3 of the longest established plantations. The aim of the work was to identify potential problems that may arise on these varieties in commercial plantations and therefore to alert growers of any potential problems.

MATERIALS AND METHODS

Sites

1. Tuddenham, Dereham, Norfolk
2. Pixley, Ledbury, Herefordshire
3. Bradford on Tone, Taunton, Somerset

Variety

Ben Gairn and Ben Hope at each site planted in the winter of 1996/7 or 1997/8. Bushes cut down in winter of 1998/9 to provide cutting material for new plantations.

Plots

Site 1
1.5 ha of Ben Hope in a single block ('20 acres')
2.0 ha of Ben Gairn in a single block ('The Brickyard')
3 rows of Ben Hope adjacent to Ben Gairn in 'The Brickyard'

Site 2
Approx 3.2 ha of Ben Gairn
Approx 3.4 ha of Ben Hope
The two plantations were immediately adjacent in one field.

Site 3
Approx 0.8 ha of Ben Gairn
Approx 1.5 ha of Ben Hope
The two plantations were immediately adjacent in one field.

Layout

At each site there was no replication and assessments were done in single large blocks.

At Site 1 there were 4 comparisons. The single block of Ben Gairn was split and 3 rows adjacent to the 3 rows of Ben Hope in 'Brickyard', and both of these 3 row blocks received a significantly reduced spray programme to give a comparison with the conventional treatment applied to the rest of the Ben Gairn plantation and to the Ben Hope in '20acres'.

At Site 2 there were 4 comparisons. For each variety, approximately half of the plantation had the conventional herbicide treatments in the alleyways, while the remainder had a well-established grass strip. The two separate parts of the plantation of each variety were assessed separately.

At Site 3 the blocks were not subdivided so the only comparison was between the varieties.

Treatments

Site 1

Variety	**Variable**	**Date**	**Pesticide**
Ben Gairn	Full spray programme	23 March	Kumulus
		30 April	Rubigan Thiodan Elvaron
		7 May	Elvaron Aphox
		12 May	Teldor Thiodan Systhane
		30 May	Meothrin Elvaron Systhane
		August	Aphox
Ben Gairn	Reduced spray programme	23 March	Kumulus
		August	Aphox
Ben Hope	Full spray programme	23 March	Kumulus
		24 April	Rubigan Manganese
		7 May	Elvaron Aphox
		13 June	Systhane Aphox
Ben Hope	Reduced spray programme	23 March	Kumulus
		August	Aphox

Site 2

Variety	Variable	Date	Pesticide
Ben Gairn	Both grass and herbicide	10 April	Bravo
		10 May	Bravo Elvaron
		15May	Aphox
		14 June	Bravo
		14 June	Dursban
Ben Hope	Both grass and herbicide	10 April	Bravo
		10 May	Bravo Elvaron
		22 May	Elvaron Bravo

Site 3

Treatments applied to whole site

Variety	Variable	Date	Pesticide
Ben Gairn and Ben Hope	None	12 March	Kumulus
		27 March	Kumulus
		27 April	Dodine
		28 April	Bravo
		14 April	Lynx Mini Pellets
		12 May	Fenitrothion Bravo
		30 May	Nimrod Bravo

Assessments:

At each site a pre-season check was made for black currant gall mite (big buds).

At each site four detailed assessments of pests, other invertebrates and diseases were done (May, June, July and August). During these visits 50 bushes were selected at random and were assessed for disease presence and pest damage, 50 branches were beaten onto a collecting tray for insect monitoring and 50 leaves were checked for phytophagous and beneficial insects and mites. The visit during May included a check for flower symptoms of reversion. Visual assessment of leaf quality was done at each visit, which included checks for symptoms of reversion.

At Sites 2 and 3 pitfall traps were set up on two occasions to monitor levels of ground-dwelling insects, particularly predators. Traps were left for between 24 and 72 hours before collection. Specimens caught in the pit-fall traps were identified where possible to species.

At each site the presence of slugs and snails was monitored at each visit, and at Site 3 tile trapping was done on 2 occasions.

In December each site was checked for big buds caused by the black currant gall mite.

As a result of the findings of the December big bud assessment, a further check on big bud was made at Sites 1 and 3 in late January/early February 2001.

At Site 2 water traps were set up for trapping adult black currant leaf midge adults in early May. These were monitored 3 times per week until early June.

Crop Husbandry:

Details of the insecticide, acaricide and fungicide programmes applied are given above. In addition routine applications of herbicides were made overall at site 1 and 3, at Site 2 herbicide application to the alley was not applied to the grassed rows.

RESULTS and DISCUSSION

Over 40 different types of pest, neutral and beneficial invertebrates were identified at the 3 sites during the study. Some types were identified to species where relevant, but others were lumped 'to type', particularly the casual or neutral types. The raw data from the monitoring have been summarised below on the basis of individual pest and disease. Beneficial and neutral invertebrates are lumped together.

Aphids

Aphids were recorded at all sites, the currant-sowthistle aphid was the dominant species, but the permanent currant aphid and the currant-lettuce aphid were also each seen at one site at low levels. At all sites the percentage of bushes attacked by the currant-sowthistle aphid was highest on Ben Gairn, as an example at one site 20% of bushes of Ben Hope were infested in May compared to 72% of Ben Gairn, and in June the corresponding levels were 60% and 92%. Specific treatment for aphid control on Ben Gairn was applied at two sites, and on Ben Hope at one site.

Capsids

Capsids were recorded at all sites, and at all sites the most severe damage was seen on Ben Gairn. At one site 48% of bushes of Ben Gairn were damaged in May, compared with only 20% of Ben Hope. Equivalent figures for June were 88% and 68%. At another site in late June 100% of the Ben Gairn bushes were damaged but only 30% of the Ben Hope bushes. At the third site, in the absence of any insecticide usage, in early August 38% of Ben Hope and 66% of Ben Gairn were damaged by capsid. The main species found during bush beating was the common green capsid, but some European tarnished plant bug were found, particularly early in the season. Given the level of damage seen on the 3 sites it would seem logical to expect capsid to become an increasingly major pest of black currants, perhaps in direct relation to the reduction in insecticide usage.

Caterpillars

Caterpillars were recorded at all sites, with several different species identified. Tortrix moths were the dominant type, particularly at Site 3, but the currant pug moth was present at high

numbers at site 2. A number of other moth species were recorded (as adults) in the beating assessments but these were mainly casuals using the plantation as a shelter. At least 3 different Tortrix moth species were found, but they were not identified to species. At one site caterpillar damage started first on Ben Gairn, but subsequently both cultivars were severely and equally affected. At the 2 other sites damage was much lower, but most damage occurred on Ben Gairn at one of these sites.

Gall mite

At the start of the observation in April 2000, no black currant gall mite was recorded at any of the sites. A further assessment of 50 bushes per plot per site in December 2000 did not record any galled buds on Ben Gairn, even though at one site it was directly adjacent to a plantation of heavily infested Baldwin. At one site Ben Hope was also free of infestation.

At another site of Ben Hope some swollen, but small, buds were found, but microscopic examination showed they were free of gall mite. A second check of this site in January 2001 revealed more similar buds but again there were no mites present. Although these buds were almost spherical, they were much smaller than a typical infested big bud, and also were very dense and hard, unlike the typical soft and slightly loose gall mite infested big bud.

At the third site a small number of swollen buds were found on plants in the Ben Hope plantation in December. Microscopic checks confirmed the presence of Eriophiid mites in these buds. A subsequent more detailed check on the distribution of infested bushes showed them to be concentrated in a single run of plants in one row. At the time of writing it is not possible to confirm either that the mites are black currant gall mite, although that is highly likely, or that the bushes are true-to-type Ben Hope. It is possible that the infested bushes are rogues or sports and this can only be confirmed in the next growing season.

Leaf midge

At one site, where no Meothrin had been applied to the Ben Gairn and Ben Hope since planting in 1997, intensive water trapping of adult leaf midge was done. Twelve traps at the site were each assessed 16 times between early May and early June, and a grand total of 7 adult black currant leaf midges were caught. To put the catches in perspective the same traps caught over 50 raspberry cane midge adults, even though the nearest commercial raspberry plantation was several hundred metres away. Not surprisingly no leaf midge damage was seen at this site. At one other site no leaf midge damage was seen.

At the third site where no Meothrin has been used for many years, leaf midge damage was first seen on 5 May and by late June, despite the application of fenitrothion, was present on 100% of bushes, and on the majority of shots on each bush. Both varieties were equally affected by leaf midge attack.

Scale insect

There was a single record from one site. Although the scale insect was not identified to species it was unlikely to have been the woolly currant scale, but more likely was one of the other polyphagous soft scales.

Slugs and snails

Present at all sites. At one site, with polythene still in place, slug numbers were quite high, main species found was the grey field slug. Snails were found at all of the sites, with very high numbers of at least 2 species of banded snails (*Cepaea* sp.) at one site. At this site snails are major contaminants at harvest. There was no difference in distribution between the different cultivars.

Two-spotted spider mite
Not found at any site.

Vine weevil
Very low numbers at all sites, no difference between the different cultivars.

Beneficial insects and mites
A wide range of beneficials was recorded at all sites. Most common during bush beating were parasitic wasps (aphid parasites) and anthocorids (aphid predators), but a large number of lacewing, ladybird and hoverfly larvae were also found associated with the aphid infestations. A few predatory capsids were found. Inspection of the leaves showed heavy aphid parasitism at all sites. No predatory mites were found at any site, which is perhaps not surprisingly in the absence of detectable levels of two-spotted spider mite.

Pitfall trapping, at the two sites checked, demonstrated that there were many predatory ground beetles in the plantations. At one site where 4 different beetles were present, the dominant predatory beetles were Staphylinids (rove beetles), particularly *Staphylinus olens*, the Devil's coachhorse which is the largest common beetle of this group. At the other monitored site which had a much wider range of species (11)), Carabid beetles were most common, particularly *Carabus violaceus* and *Pterostichus madidus*.

Neutral invertebrates
During bush inspection and beating a wide range of invertebrates which were neither pests of black currants nor could be regarded as beneficial. Some of these were just casuals, sheltering in the crop, while others live on the bush and feed on dead plant or animal material. The most common neutrals were Psocids, bark or book lice, which are scavengers, and they were present at all sites at high levels. Somewhat surprisingly the number of neutrals recorded was not affected by level of insecticide usage. Psocid numbers were higher during May and June in the plantations with herbicide maintained alleyways compared to those with grassed alleyways. There was no obvious reason for this and the differences were not apparent in the later assessments.

Mildew

No active (sporulating) mildew was seen at any site on either variety. On Ben Gairn at all sites in July leaf symptoms appeared which were thought to be due a hyper-sensitive reaction to mildew infection. Leaves developing from a sequence of up to 5 new buds were downwards cupped, slightly fleshier and more brittle than normal leaves, and they developed a distinct red tinge. The appearance of these symptoms could not be linked to any pesticide application, but did follow a period of dry weather when the level of mildew inoculums would have been high. The symptoms seen were worst at two sites where the plantation was immediately adjacent to other mildew susceptible varieties. At no site did the damage kill the shoot tips, and subsequent leaves developed normally corresponding with a return to wet

weather. The susceptibility of Ben Gairn to mildew needs further evaluation to determine whether routine fungicides for its control may be needed.

Leaf Spot

At one site a low level of leaf spot was recorded late in the season on Ben Gairn on the reduced pesticide plot. On the other plot at this site where 3 sprays for leaf spot had been applied, and also at the other 2 sites, leaf spot was not recorded. Leaf spot was seen at all sites on Ben Hope, with 90% defoliation in early October in the unsprayed plot at one site compared to 50% defoliation where a single spray had been applied in June. At the other sites there were much lower levels of leaf spot and, even in late September, there was very little leaf loss which could be attributed to the disease. At these other sites leaf spot did not appear until August or September and the lesions were generally very small and discrete giving a sort of 'peppering' effect. At one of these sites the Ben Hope was next to a plantation of Baldwin which was completely defoliated by leaf spot in late September/early October. In comparison Ben Hope retained most of its leaves into mid October. Both varieties appear to have reasonable field resistance to leaf spot, but some fungicide protection in periods of high risk appears to be advisable.

Botrytis

Levels at all sites were very low, with slightly higher levels on Ben Gairn. These higher levels may have been simply due to the fruit being allowed to ripen fully before harvest to allow continuity of harvest with later varieties.

Reversion

Reversion was not seen at any site on either variety. This was slightly surprising at one site where Ben Hope was adjacent to a plantation containing both high levels of gall mite and reversion.

Effect of alley maintenance on pest and disease levels

At the one site where two different alley maintenance methods were used it was not possible to identify any consistent differences in pest or disease levels between the two systems.

CONCLUSIONS

The critical evaluation of new varieties in a commercial growing situation can, and in this case has, provided information which can aid growers to manage their pest and disease control strategies. One years data can only provide a 'snapshot' and the influence of seasonal factors needs to be evaluated further. Ben Gairn appears to be particularly susceptible to aphid and capsid attack. Cumulative side-effects of the omission of treatments for black currant gall mite could not be demonstrated, but concern about increased levels of capsids, caterpillars and leaf midge remains and needs further appraisal. Some indications of disease susceptibility were seen, the re-action of Ben Gairn to mildew pressure needs further evaluation as does the field resistance to leaf spot

RECOMMENDATIONS

It is recommended that the study continue for a further year on the same sites, but that the focus should be more on direct pest and disease susceptibility and less on side effects on other organisms.

ACKNOWLEDGEMENTS

The cooperation of William Price, Edward Thompson and Alastair White in allowing critical appraisal of their plantations for the benefit of other growers is gratefully acknowledged.