



Agriculture & Horticulture  
DEVELOPMENT BOARD



# **Grower Summary**

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**SF 101**

**Neonicotinoid alternatives to  
chlorpyrifos for raspberry  
cane midge control 2010**

Final Report 2011

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## **Further information**

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## Headline

Half rate Calypso+Silwet and Gazelle+Silwet sprays were of low to moderate (21-58%) efficacy for control of raspberry cane midge, only giving good results when applied curatively a few to several days after egg laying.

## Background and deliverables

Raspberry cane midge is a major pest of raspberries in the UK. Growers currently rely on chlorpyrifos sprays for control. If use or registration of chlorpyrifos on raspberry is lost there would be no effective control for cane midge. The pest would increase and severely limit the productivity of raspberry plantations. The sex pheromone of the raspberry cane midge has been identified by EMR and NRI and pheromone traps are now available commercially for monitoring the pest to time spray applications. Work is in progress in HortLINK project HL0175 (SF74) to develop methods of using the pheromone for control of the pest by attract and kill, mass trapping or mating disruption, but mixed results have been obtained to date and it remains uncertain as to whether an effective pheromone based control method can be developed. In project SF59 in 2003-05, EMR conducted three trials to evaluate a wide range of alternative insecticides to chlorpyrifos for control of cane midge. None of the alternative products tested were found to be either suitable or sufficiently effective for commercial purposes. Treatment with Talstar + LI700 (adjuvant) reduced larval populations by 93% in one trial but synthetic pyrethroids have persistent harmful effects on natural enemies and their use is incompatible with IPM. Importantly, recent work in Poland has indicated that the neonicotinoid insecticides acetamiprid (Gazelle) and thiamethoxam (Centric) have significant activity against cane midge. The neonicotinoid, thiacloprid (Calypso), is already approved for use on raspberry and whilst it did not show promise in project SF79, further investigation is warranted. This finding needed to be verified and the most effective product and timing of spray application identified. Use of silicone based adjuvants (e.g. Break Thru 240 S, Silwet L-77) which may aid penetration of insecticides into splits also needed to be investigated.

The expected deliverables from this project were:

- Identify an effective neonicotinoid insecticide for control of raspberry cane midge.
- Ascertain the optimum timing of spray application in relation to pheromone trap catches.

- Determine whether the addition of a silicone based adjuvant significantly improves the performance of insecticides against cane midge.

Approval may be needed for some of the products identified.

## **Summary of the project and main conclusions**

A replicated field experiment further investigated the effect of varying the timing of application of the neonicotinoid insecticides Calypso and Gazelle (used at half rate in admixture with a silicone adjuvant) on efficacy for control of raspberry cane midge, in comparison with the standard product chlorpyrifos. Work in 2009 had shown that applications of these neonicotinoid insecticides at half rate in admixture with a silicone adjuvant gave good control of the midge when applied curatively 6 days after artificial splits were made in primocanes, but gave poor results when applied preventively 6 days before artificial splits were made in primocanes.

In 2010, a wider range of application times relative to egg laying in artificial splits were investigated. Two experimental sprays were applied during the second generation of cane midge activity. The first was applied on 10 June 2010 during the first half of the generation. The second was applied on 17 June 2010, during the second half of the generation. Artificial splits were made in primocanes both before and after these spray applications were made. These split canes were then collected for examination periodically up until 32 days after the first split was made. The following conclusions were drawn:

- Half rate Calypso+Silwet and Gazelle+Silwet sprays were of low to moderate efficacy (21-58%) for control of raspberry cane midge. They were of considerably lower efficacy than the standard chlorpyrifos treatment (87 – 88% efficacy).
- The timing of their application was more critical and the time period of their efficacious effect was also much narrower than for the chlorpyrifos.
- They only worked well when sprays were applied a few days after the splits were made. Egg laying is known to occur mainly in fresh splits so they acted curatively, probably mainly against young larvae.

- They were used at half the normal recommended rate, to comply with the requirement to do so when they are used in admixture with a silicone adjuvant.
- Several applications of half rate Calypso or Gazelle with a silicone adjuvant would be required to get a good standard of commercial control and timing of application would be critical.
- Sex pheromone traps give a good indication of the period of risk, which for the second generation (the most damaging) lasts about 3-4 weeks. To cover this period, a programme of 3-4 sprays at weekly intervals would be required. This would be a significant increase in the number of applications and in cost compared to a single chlorpyrifos treatment, but may be less harmful to IPM and the environment.
- Further work is required to investigate the efficacy of such programmes of sprays, comparing targeting of the first with targeting of the second generation.
- A considerable improvement in timing and efficacy could probably be achieved if there was a greater knowledge of the timing of occurrence of natural splits. Most modern varieties have a low propensity to split. Splits probably mainly occur in periods of windy weather, or when mechanical operations are undertaken in the plantation. A simple split risk simulation model may greatly improve the targeting of sprays and hence overall efficacy.
- If approval for use of chlorpyrifos is lost, further work on this topic will become important.

## **Financial benefits**

Chlorpyrifos is relied on for control of cane midge in the UK but its future approval status is uncertain. If alternatives to control these pests cannot be found, raspberry production would become uneconomic in the UK. Finding alternative treatments is crucial to the raspberry industry. At current prices, treatment of 1 ha of raspberry at the recommended dose with Lorsban, Calypso or Tracer costs £14, £39 and £50 respectively.

## Action points for growers

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