Project number:	GSK Project 216 (SF 12)
Title:	Investigating the use of Pre-Tect to prevent run-off (fruitlet abscission) after flowering
Project leader:	Gary Saunders, FAST Ltd Crop Technology Centre Brogdale Farm Brogdale Road Faversham Kent ME13 8XZ
Final report:	*Contract report for GlaxoSmithKline and the Agriculture & Horticulture Development Board* Annual report, December 2008
Key workers:	Mr Rob Saunders (GSK) - Project co-ordinator
Location of project:	Wellbrook Farms, Boughton, Faversham, Kent. ME13 9NA.
Date project commenced:	7th April 2008
Date project completed:	1st October 2009
Key words:	Abscission, Ben Gairn, Ben Tirran, Harpin, Pre-Tect, run-off

DISCLAIMER:

The Horticultural Development Council seeks to ensure that the information contained within this document is accurate at the time of printing. No warranty is given in respect thereof and, to the maximum extent permitted by law the Horticultural Development Council accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Gary Saunders
Trials Co-ordinator
FAST Ltd

Signature ..... Date .....12/12/08.....

Report authorised by:

Signature ..... Date .....

CONTENTS

GROWER SUMMARY

Headline

- Applications of Pre-Tect (harpin) to blackcurrant plants at six different timings did not significantly affect fruit number or weight.

Background and expected deliverables

Harpin is one of a class of proteins naturally produced by certain bacterial plant pathogens. In nature, harpin is produced by *Erwinia amylovora*, a bacterium that causes the disease fire blight in apples and pears. A weakened strain of *Escherichia coli* was modified to produce harpin on a commercial scale. Commercially produced harpin protein (the active ingredient in the commercial product Pre-Tect) is identical to the protein that occurs in nature. *E. coli* K-12 is considered to be a non-pathogenic, nutritionally deficient bacterium which is unable to grow in the environment. Harpin is concentrated from the growth medium of the genetically modified *E. coli*, and the bacterial cells are killed and removed from the marketed product.

Harpin acts by eliciting a complex natural defence mechanism in plants, analagous to a broad spectrum immune response in animals. The application of harpin to crop plants has been shown in both laboratory and field studies to accelerate plant growth, induce early flowering and fruit set and increase fruit set. Recent research using harpin on blackcurrant, has shown that a single application has the effect of increasing photosynthesis for five to seven days post application. 'Run off' (fruit abscission) after fruit set has been linked to low levels of photosynthesis and subsequently photosynthates. The application of Pre-Tect therefore has the potential to reduce the 'run-off' of blackcurrants if applied at around blossom time.

Summary of project and main conclusions

In the first year of the project, sprays of Pre-Tect were applied to two varieties of blackcurrant (Ben Gairn and Ben Tirran) at Wellbrook Fruit Farms, Macknade, Kent, by kind permission of Mr. Stephen Holmes. At each application, a rate of 1.5kg/ha was used at the times listed in Table 1.

Table 1: Treatment timings

Treatment	Timing
Control	No application
1	Late cluster
2	White bud
3	Full bloom
4	Petal fall
5	Late cluster + Full bloom
6	White bud + Petal fall

Sprays were applied by motor-blower to plots of 10 bushes per treatment for each of the varieties. Four sets of 10 flower buds per bush were marked with electrical tape at white bud. At harvest fruit set per floral bud was determined by recording fruit number per bud and fruit weight was recorded.

The results of average number of berries per strig and average weight per single fruit are shown for Ben Gairn in Table 2 and for Ben Tirran in Table 3.

Table 2: Average fruit number per strig and average fruit weight for Ben Gairn, 2008

Treatment	Average fruit number per strig	Average weight per fruit (g)
0	5.2	1.71
1	5.7	1.79
2	5.3	1.85
3	5.4	1.72
4	4.8	1.82
5	6.1	1.68
6	5.7	1.85

Table 3: Average fruit number per strig and average fruit weight for Ben Tirran, 2008

Treatment	Average fruit number per strig	Average weight per fruit (g)
0	3.1	1.39
1	3.4	1.46
2	2.8	1.36
3	3.5	1.35
4	3.5	1.42
5	4.1	1.46
6	3.6	1.59

For Ben Gairn average fruit number per strig ranged from 4.8 to 6.1 (Table2) and individual fruit weight ranged from 1.68g to 1.85g per fruit. Ben Tirran average fruit number per strig ranged from 2.8 to 4.1 (Table 3) and individual fruit weight ranged from 1.35g to 1.59g.

Although fruit number per strig was greatest with treatments applied at late cluster and full bloom in both Ben Gairn and Ben Tirran, these values were not significantly different from the control treatment and none of the other treatments were significantly better or worse than the control.

Average weight per fruit was not significantly affected by any of the treatments for either Ben Gairn or Ben Tirran compared to the control.

Variable weed pressure was observed in the plots at the time of fruit assessment, principally *Urtica dioica* (Stinging Nettle, Perennial Nettle). These would have competed with the crop for water, nutrients and light, potentially affecting yield.

Although previous experiments with applications of harpin to various field crops have resulted in positive effects on growth, flowering and fruit set, results so far have been inconclusive.

This work will be repeated in year 2 to determine the effect of harpin, applied at these specific times, on run-off and fruit weight.

Financial benefits of the project

- There are no financial benefits for growers to date.

Action points for growers

- There are no action points for growers so far.