**Commercial breeding for pest and disease resistance in cane and bush fruits**

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**Introduction**

While breeding for agronomic traits remains a priority in any commercial breeding programme, a key objective of both the Rubus and Ribes breeding programmes at SCRI is to incorporate resistance to pest and disease.

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**Aphid resistance**

- Aphid resistance largely depends on single major genes
- Currently over 90% of the Rubus germplasm is segregating for A₁,0' conferring resistance to *A. idaei*.
- Plans to screen for new sources of resistance are in progress due to increasing evidence of resistance-breaking strains in the south of England.

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**Raspberry root rot**

- *Phytophthora* is the most destructive disease of raspberries in the UK and accounts for ~20% of the tonnage lost in Scotland.
- ~25% of the commercial crossing programme is dedicated to breeding for resistance/tolerance to *Phytophthora*.
- Segregating progenies are screened in a deliberately infested plot.
- Genotypes with putative resistance are currently undergoing further evaluation for fruit quality.

**Development of molecular markers linked to root rot resistance**

- A population segregating for *Phytophthora* resistance was created using the cvs. Glen Moy x Latham.
- The progeny were screened for 3 years in infested field plots and then segregated into resistant, moderately resistant and susceptible bulks.
- The segregating progeny demonstrate continuous variation suggesting a strong quantitative component to resistance/tolerance.
- Using bulk segregant analysis, RAPD bands were found to be present in resistant and moderately resistant progeny but absent from the susceptible progeny.

Marker assisted selection will be a useful tool in future breeding strategies for *Phytophthora* resistance since it will identify resistant genotypes quickly relative to current practices. Field infestation plots show results only after several years and glasshouse screening shows no correlation to field results.

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**Key pests and pathogens of raspberries in Scotland**

- Raspberry root rot, *Phytophthora fragariae* var. *fragariae*.
- Large raspberry aphid, *Amphoraphora idaei*.
- Raspberry beetle, *Byturus tomentosus*.
- Raspberry cane midge, *Resseliella theobaldi*.

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**Development of molecular markers for gall mite resistance**

Traditional screening for mite-resistant seedlings involves the use of field infestation plots over a number of years. However, recent work at SCRI has concentrated on the development of molecular markers in order to facilitate the more efficient and timely selection of resistant *Ribes* hybrids.

Using populations segregating for resistance, classification into resistant and susceptible phenotypes was followed by bulk segregant analysis using AFLPs. From this analysis, 2 AFLP bands showed linkage to the *Ce* locus.

These markers have great potential utility in the marker-assisted selection of gall mite-resistant blackcurrant hybrids within the SCRI/Glaxo SmithKline *Ribes* breeding programme, and deployment strategies are under development. However, more recent work at SCRI is concentrated on the development of SSR markers, since the latter are highly polymorphic, multi-allelic and co-dominant.

The SSRs developed so far are currently being tested on a range of *Ribes* germplasm, and linkage of these SSRs to various traits of interest, from single-gene pest/disease resistances to QTLs for fruit quality, is under investigation.

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**Acknowledgements**

Glaxo SmithKline Consumer Healthcare
Scottish Soft Fruit Growers Ltd.
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