

Grower Summary

TF 211

Resources for future breeding
of apple utilising genome-wide
selection

Annual 2014

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HDC is a division of the Agriculture and Horticulture Development Board.

Project Number:	TF 211
Project Title:	Resources for future breeding of apple utilising genome-wide selection
Project Leader:	Richard Harrison, East Malling Research
Contractor/(s):	East Malling Research
Industry Representative:	Jim Quinlan, EMT
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Further information

If you would like a copy of this report, please email the HDC office (hdc@hdc.ahdb.org.uk), alternatively contact the HDC at the address below.

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GROWER SUMMARY

Headline

Developing cultivars with both disease resistance and high fruit quality requires extensive breeding.

Background and expected deliverables

The UK has lacked a cultivar development programme for many years. Many new cultivars with excellent fruit quality and storage attributes are now available. However, these are increasingly problematic to grow, primarily due to high susceptibility to fungal canker and high levels of susceptibility to apple scab, mildew and aphids. As a pilot study, a small amount of funding was made available by the HDC Tree Fruit Panel to carry out some capacity building work to identify methods of breeding that offer the ability to simultaneously select for fruit quality attributes and disease resistance.

Growers need both new rootstocks and new scion cultivars that are future-proofed against more variable climatic conditions. The beginnings of such a programme require experimental plantings in order to leverage additional funding from government (e.g. BBSRC and EU projects). As a result, a modest investment at this stage by HDC has the potential to deliver far more basic research in future years and hence contribute to growers by the delivery of new knowledge and later new cultivars that can be grown across the world.

The data generated in this study will feed into and complement an existing project currently funded by the HDC (TF 182), in the form of The East Malling Rootstock Club (EMRC). This will facilitate a quicker route to the release of new commercial rootstocks and hence subsequent financial benefit to the industry.

Summary of the project and main conclusions

A preliminary study of all reported sources of pest and disease resistance traits that are publically available revealed that there are multiple unexploited resistances to fungal canker, rosy apple aphid, powdery mildew and apple scab that are completely absent from modern commercial cultivars (assessed by pedigree-based analysis). Work is currently underway to propagate these sources of resistance, along with cultivars displaying exceptional fruit quality and storage attributes, to provide a set of mother trees, from which controlled pollination can be carried out. The establishment of material segregating for P&D, canopy architecture (suitable for modern production), yield and fruit quality, suitable for a genome-wide selection (GWS) population (allowing simultaneous selection of these traits) is likely to take in the order of 6-8 years.

Financial benefits

A brief summary of financial benefits will be provided in the final report.

Action points for growers

- Consider new cultivar development programmes for genome-wide selection (GWS).