

**Project title:** [Resources for future breeding of apple utilising genome-wide selection](#)

**Project number:** TF211

**Project leader:** Richard Harrison, EMR

**Report:** Final , 31<sup>st</sup> March 2015

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**Key staff:** Richard Harrison

**Location of project:** EMR

**Industry Representative:** Jim Quinlan, EMT

**Date project commenced:** 1/4/2013

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**(or expected completion date):**

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## **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.

Richard Harrison

Group Leader

EMR

Signature ..... Date .....31/3/2014.....

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## **GROWER SUMMARY**

### **Headline**

- Sources of pest and disease resistance have been exploited to benefit future apple scion and rootstock breeding.

### **Background and expected deliverables**

The UK has lacked an apple variety development programme for some 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, powdery mildew and aphids. As a pilot study, a small amount of funding was made available by the AHDB 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 varieties that are future-proofed against more variable climatic conditions. The beginnings of such a programme require experimental plantings to leverage additional funding from government (eg BBSRC and EU projects). As a result, a modest investment at this stage by AHDB has the potential to deliver far more basic research in future years, contribute new knowledge and hence later new varieties 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 AHDB (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 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 in order 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 population (allowing simultaneous selection of these traits) is likely to take between 7 and 10 years.

## **Financial benefits**

New varieties can transform profitability, either through differentiation in the market place and a higher price point, or through agronomic improvements and efficiency savings.

## **Action points for growers**

- Consider supporting further research for a further study of the genetics behind resistance and susceptibility to important diseases by providing small matched funds for BBSRC research that will be of benefit to growers.

