

Grower Summary

TF 212

Generation of genomic
resources for apple rootstocks
project

Final 2014

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Contractor/(s):	East Malling Research
Industry Representative:	Dr Jim Quinlan
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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

- The genomic sequence data generated for apple rootstock accessions will improve the scientific understanding of rootstocks and aid marker-assisted breeding for important rootstock traits in the East Malling Rootstock Club

Background and expected deliverables

The advent of new technology in the form of next generation sequencing is now changing many aspects of research in horticulture. Of most significance is the increasing ability to transfer knowledge from model organisms, such as the brassica *Arabidopsis*, into non-model crops and growing systems. Such developments include the ability to identify and develop new crop varieties with increased resistance to biotic and abiotic stresses along with an understanding of how these processes work in plant systems.

A major cross-cutting theme in EMR's science strategy is to develop an understanding of how rootstocks control scion architecture and the generation of genomic resources for rootstocks is pivotal to this research. These resources will provide an essential platform that will feed into existing and new funding proposals. Additionally, generation of the sequence data will not only raise the profile of both the HDC and EMR nationally, but will also support the development of collaborative links with scientific and horticultural communities overseas.

The generation of genetic resources for apple rootstocks will enable a more informed approach to rootstock breeding through the development and deployment of marker assisted breeding technologies.

Summary of the project and main conclusions

Apple accessions, which have been sequenced, include germplasm that is currently used as parental material in the East Malling Rootstock Club (EMRC) breeding program, namely 'M.27', 'M.116' and 'M.M.106' (Figure 1). These rootstocks exhibit a number of interesting traits such as dwarfing, precocity and disease resistance, which are highly valued by the industry. The selected rootstocks have also been incorporated into a unique seedling progeny known as the mapping population 'M432', which is the basis of a number of

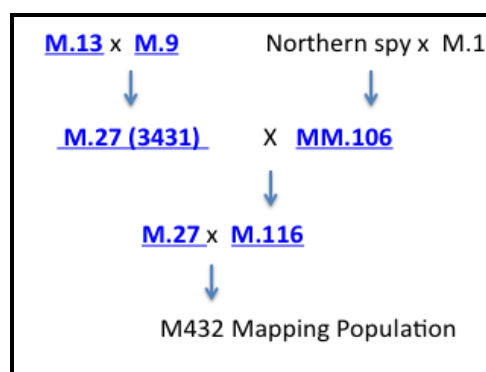


Figure 1. Apple rootstocks selected for genome sequencing (blue) and their relevance to the M432 mapping population. NB: 'M.9' sequencing already completed prior to TF 214.

research projects that are developing molecular markers for important rootstock traits. In order to gain a better scientific understanding of how these traits are bestowed, genomic sequence data is needed.

Financial benefits

The data generated in this study will inform on-going HDC-funded work by the EMRC by providing essential data for the development of new marker-assisted breeding strategies in apple rootstocks. The potential to reduce the time from initial seedling screening to final selection of new commercial rootstocks with increased tolerance to biotic and abiotic stresses would improve greatly the economic and environmental sustainability of the UK tree fruit industry.

Action points for growers

There are no specific action points from growers arising from genetic research of this nature. In future, the information developed from this project will aid fruit breeders in developing improved genetic material for apple rootstocks.