New Project

TF 211

Resources for future breeding of apple utilising genome-wide selection

Project Number:	TF 211
Project Title:	Resources for future breeding of apple utilising genome-wide selection
Project Leader:	Dr Richard Harrison
Contractor:	East Malling Research
Industry Representative:	Dr Jim Quinlan
Start Date:	01 April 2013
End Date:	31 December 2014
Project Cost:	£9,500

Project Summary:

Genome-wide selection (GWS) is a new method of breeding in which a small population that captures all of the desired phenotypic variation is characterised in great depth, both at the whole-plant level and at the genetic level. The combined phenotypic and genotypic information is then used to generate predictions (using sophisticated mathematical models) of the optimal genotype for a desired set of phenotypic values.

These resources will underpin future research at EMR to improve commercially viable apple scion and rootstocks as crosses will be made between the predicted best parents. Far fewer crosses are required and selections from crosses will be made based on genotype alone, meaning that selections are made at the seedling stage and planted for multi-site trials without evaluation in the field first. This cuts the breeding cycle by >5 years at a minimum. EMR is well placed to develop GWS and move within Europe to the forefront of modern breeding research.

Aims & Objectives:

(i) Project aim(s):

To identify and plant a replicated set of near elite germplasm for phenotyping as part of work towards genomic selection

(ii) Project objective(s):

To identify a set of germplasm that captures the majority of important phenotypic variation for a future genomic selection population, including fruit quality traits, disease resistance traits and canopy architecture traits.

To create and plant a three-fold replicated set of these apple scion and rootstock varieties that can be used to underpin future research and breeding work on apple (Total 450 cultivars/lines).

Benefits to industry

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 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 fundamental research in future years and hence contribute to growers by the delivery of new knowledge and later on new varieties.

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 industry.

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