Investigating the suitability of blueberry germplasm for UK production and developing tools for long term breeding

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Introduction

Fruit consumption in the UK, particularly of berry fruits, is expanding rapidly and consumer demand for blueberries (Vaccinium spp.) is at record levels with UK growers unable to meet current demand. Leading imported cultivars have often been found unsuitable for UK conditions requiring the development of new productive cultivars with large, flavoursome fruit that are disease resistant and can be easily established and produced in our climate and soils.

Phenotypic analysis

Genotype × environmental interactions have been reported for many plant traits in highbush blueberry indicating the importance of selecting varieties best suited for different regions[1]. Previous work has shown cultivar choice is not simply a case of importing cultivars adapted elsewhere, as these often fail to establish, ripen or perform in the same way once trialled in the UK. Analysis of germplasm across different parts of the UK is required to properly assign the most appropriate cultivars to specific regions, markets and cropping systems.

Plant characteristics

A number of characteristics will be assessed by site visits to both field and tunnel plantations and these will include

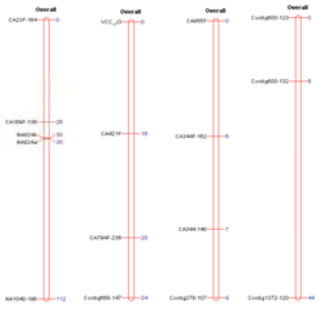
- Yield
- Visual fruit quality (visual bloom, shape, berry size)
- Growth habit and branch strength
- Date of 1st flowering
- Natural infection

Sensory analysis

Environmental impacts on fruit sensory and phytochemical composition have been frequently observed[2]. Sensory analysis will identify a range of desirable flavour, composition and appearance attributes that contribute to fruit quality and consumer appeal within the available germplasm and the progeny from the 'Draper' × 'Jewel' cross made available from US partners.

Genotypic analysis

The development of linkage maps in both diploid and tetraploid blueberries is a major step towards understanding the genetic controls underlying traits of agronomic interest. A mapping population developed from two key US blueberry cultivars (Draper × Jewel) and a selection of EST based molecular markers will be used as the basis for linkage map development and QTL analysis using the software programme TetraploidMap[3].



Linkage analysis

The production of linkage maps can facilitate the development of molecular markers with the identification of genes which underlie phenotypic traits. Markers on different sets of chromosomes are passed from parent to offspring independently, but markers on the same set are passed on together unless a recombination occurs between them. Cluster analysis can be used to separate markers into chromosome sets allowing the markers within each set to be ordered, based on map distances between all pairs of markers.

Conclusion and future work

Progress has been made in the construction of a tetraploid blueberry linkage map using both SSR and EST-PCR markers. Additional work focusing on increasing the mapping population and markers analysed will produce a useful and robust genetic tool for use in marker assisted selection and breeding accelerating the development of new high quality blueberry cultivars.

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