HL0170:

Linking phenotype to genotype in red raspberry for major quality traits; a genetic, sensory and compositional approach

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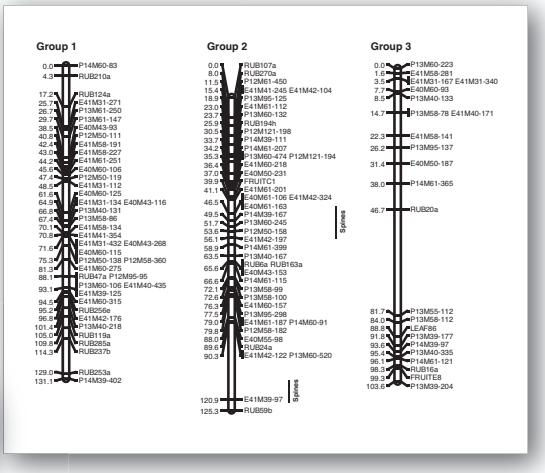
The UK raspberry industry was traditionally a processed fruit industry which has been in decline for the past two decades as a result of the wide availability of imported fruit and a decrease in yield produced by British growers.

In order to prevent a further decline in the UK raspberry industry, it was evident that alternative strategies must be employed. The industry has therefore been revitalised by growing fruit under protected cultivation for the high quality fresh market. Further improvements which are aimed at breeding raspberries of high fruit quality and at the same time extending the narrow growth season of current varieties are required to sustain this new raspberry regime.

Breeding in raspberry, a highly heterozygous perennial fruit crop with relatively long periods of juvenility is a long process. The speed and precision of breeding can be improved by the utilization of genetic linkage maps. A genetic linkage map is a representation of a plant's chromosomes with signposts placed along the chromosome in the form of molecular markers, to which phenotypic traits can be associated. Such maps can facilitate the development of diagnostic markers for polygenic traits and the identification of genes controlling complex phenotypes. The availability of a map provides the basis to locate and hence manipulate quantitative traits in breeding programmes. (Graham *et al* 2006)



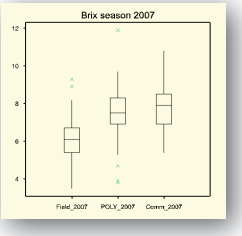
Marker assisted breeding is the attractive future for plant breeding and projects linking phenotype to genotype, will greatly contribute to our understanding of the genetic control of commercially important traits and therefore our ability to combine desirable traits in the same cultivar. Current factors that lead to consumer disappointment are poor or lack of flavour, unattractive fruit, short availability and quality compromise that given the high price of fresh fruit discourage repeat purchases.

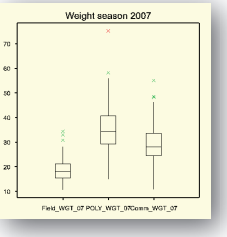
Project Results

The overall aim of this project is to link the phenotype of individual seedlings from the Glen Moy X Latham cross, those deemed the sweetest, brightest most enjoyable, to the actual genotype. This can lead to the development of markers which can be screened for as part of a molecular breeding strategy. This will be done by identifying molecular markers linked to the quality traits of interest through phenotypic analysis as well as using a candidate gene approach to map genes underlying traits of interest identified in other genomes.

Replica populations have been developed at an experimental field, experimental protected and protected commercial sites.

The main quality traits of interest to producers and buyers alike are the overall sweetness and sourness of fruit as well as the balance and intensity of the two combined. Second to that is the overall appearance of the raspberry which includes not only size and colour but overall druplet cohesion and shape, which if found to be visually attractive to the buyer, will encourage initial purchase and if the fruit is subsequently enjoyed may lead to repeat purchases.





Trait correlations across three sites in 2007

	Field 2007	Polytunnel 2007	Commercial 2007
Brix	6.08*	7.52	7.84
Weight	18.85*	34.74	29.35
Colour	14.32	14.22	14.30
Sweetness	2.5 *	3.24	3.30
Sourness	3.98*	3.65	3.85
Flavour Intensity	3.70*	4.06	4.28

*Significantly different p<0.001