Identification and Assessment of the Nutritional Relevance of Antioxidant Compounds from Soft Fruit Species

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Introduction

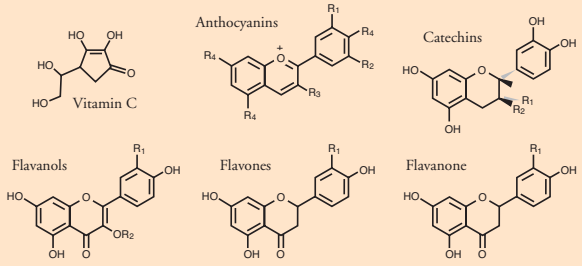
Diets which contain an abundance of fruit and vegetables are protective against a variety of diseases, particularly cardiovascular disease and epithelial (but not hormone-related) cancers. One of the principal components thought to provide this protection are antioxidants. These are compounds that scavenge the free radicals produced during oxidative metabolism thereby limiting damage.

Soft fruits, such as blackcurrants, raspberries, strawberries are known to be rich in antioxidants. Our aims are to establish the antioxidant potential of a range of these fruit using wild and bred species and, ultimately, to discover whether antioxidant potential *per se* is an heritable trait and can be mapped, and used in marker assisted breeding.

Soft fruit antioxidant chemistry

In addition to Vitamin C (ascorbic acid) soft fruit contain several classes of soluble (polyphenol) antioxidants, such as anthocyanins, flavonols, flavones, flavanones and catechins.

The general chemical structures of vitanin C, anthocyanins, catechins, flavonols, flavone and flavanones.

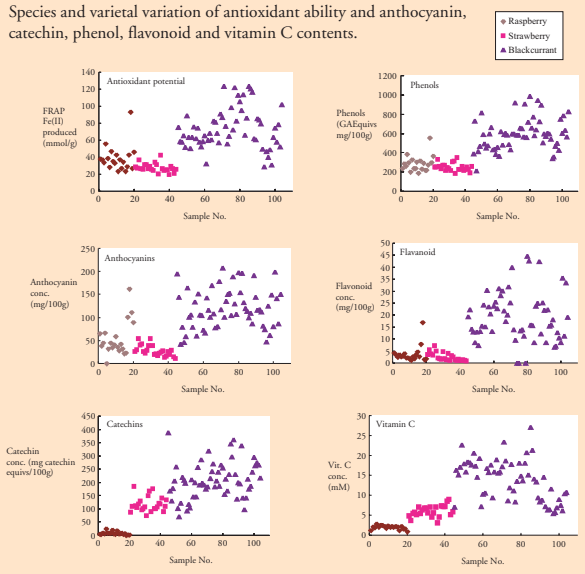


Antioxidant	Anthocyanin	Flavonol/Flavone/Flavanone	Catechin
R1	**H or OH**	**H or OH**	**H, OH, Glycosyl or Gallate**
R2	**H or OH**	**H or Glycosyl**	**H or OH**
R3	**H or Glycosyl**	-	-
R4	**OH or Glycosyl**	-	-

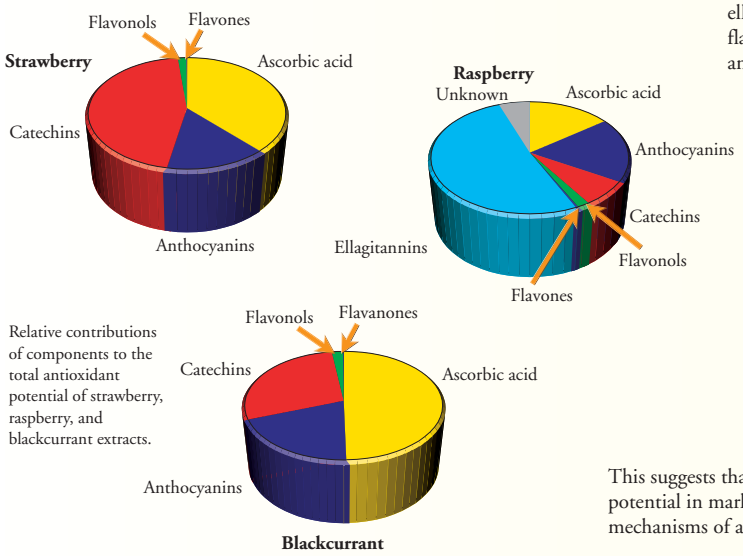
Compositional variation was minimal for strawberry whilst for raspberry the outlier displaying a significantly greater antioxidant capacity was a wild species. The variation for blackcurrant was greater both in antioxidant potential and composition.

Due to the varying substitution patterns there are many compounds within each of these class. Several compounds within each class can be present at the same time making the derivation of the antioxidant ability very complex. In addition the levels of these compounds vary with species and variety.

Species and varietal variation of antioxidant ability and anthocyanin, catechin, phenol, flavonoid and vitamin C contents.



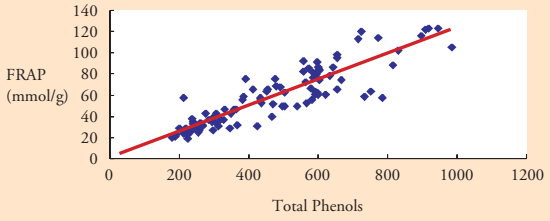
The contribution to each of the compounds made to the total antioxidants of the fruit varies according to the fruit.



Relative contributions of components to the total antioxidant potential of strawberry, raspberry, and blackcurrant extracts.

Blackcurrant and strawberry are similar in that Vitamin C, catechins and anthocyanins are the major contributors to the antioxidant potential. However, in raspberry this is largely derived from a combination of anthocyanins and ellagitannins. By grouping the anthocyanins, catechins, flavonols, flavones, flavanones together as total phenols a direct relationship between it and the antioxidant capacity can clearly be seen.

Correlation of total phenol concentration with antioxidant potential determined by FRAP assay.



This suggests that this parameter can be used as a chemical marker for antioxidant potential in marker assisted selection. Studies to assess the bioavailability and mechanisms of action of these phenolic-based compounds are now underway.