Susan McCallum

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Last Updated: Monday, 26 March 2007, 06:38 GMT 07:38 UK

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Blueberries tackle bowel cancer

A compound in blueberries may be good for preventing bowel cancer, US scientists believe.

The key ingredient, pterostilbene, is a natural antioxidant and mops up highly reactive molecules called free radicals that can trigger cancer growth.

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Putting the 'super' into 'superfoods'
Friday 29 June 2007

No foods will be allowed to claim they are 'good for your heart', 'help lower cholesterol' or are one of the growing list of 'superfoods' without scientific backing. A new European Nutrition and Health Claims Regulation comes into force on Sunday 1 July 2007, to help protect consumers from misleading claims.

Previously the rules on claims have been very general, making it difficult for consumers to know what a term means and difficult for food companies (particularly smaller ones) to be sure they are not misleading the public. In future, any claims made in relation to the nutrition and health benefits of a food will only be allowed if the claims are based on science, which has been verified by the European Food Safety Authority (EFSA).

Blueberries on the rise!

Twice as many antioxidants as spinach, three times as much as oranges and red grapes, four times as much as apples and bananas

Cholesterol free, 80 calories in cupful

Good source of: vitamin A, B Vitamins, Vitamin C, Vitamin E, Calcium, Iron, Phosphorus

High in resveratrol

Industry background

- Commercial need to fill large un-met demand (97%) for UK grown blueberries

- UK growers have infrastructure & skills

- UK produce some of the best fruit in the world

- Long lived crop – environmental advantage

Consortium 5 Year Project

- Adamston Farms Ltd
- Dorset Blueberry Co
- T. Thomson Ltd
- Cobrey Farms Ltd
- Hargreaves Plants
- GSK
- Ella Drinks
- ReDeva
- M&S plc
- Tesco plc
- MRS

- SCRI
- BioSS
- University of Strathclyde

Help to establish a successful blueberry industry

- Need knowledge of existing cultivars -crop characteristics and fruit quality and how to grow well across UK

- Consumer requirements fresh and processed met

- Competitive advantage over imported fruit

- Research base including genetics and mapping to sustain and support industry

- Encouragement to invest in a long term crop and overcome future challenges

Development of high profile germplasm for UK production of blueberries

Crop/fruit traits

- Variety testing

- Sensory/compositional analysis

- Genetics x Environment

- Machine harvesting

Linkage Map and QTL analysis – collaboration with US/NZ researchers

Socio-economic impact

Plant Material for Study

- Range of germplasm at different environments (G x E effects)

     different sites for different purposes as well as sites for
 examining common traits

- Mapping population in UK (and US)

A socio-economic analysis

- Financial model

- Cost and availability of pest and disease control

- Potential dangers of climate change

- Licensing arrangements of material to growers

- Development of cost effective methods of propagation

- Threats/opportunities to growers developing the industry

Major outcomes

- Identification of suitable high quality varieties for establishment, growing and machine harvesting across a wide season that meet all requirements

- Clear definition of the genetic and environmental impact on variation of key traits including sensory and health promoting compounds

- Development of a genetic map for autotetraploid blueberry and identification of key QTLs and markers for accelerated breeding in blueberry

- Socio-economic impact assessment

Benefits to UK

- Improving size, quality and competitiveness of UK blueberry industry

- Increased supply of local fruit for retailers

- UK fruit for processing in UK

- Support in future growth/development

Mark Longstroth 2001

7. 4. 2001

Susan McCallum

- Project details

- Progress so far…………

The Blueprint

Best practice for growing
-Environmentally sustainable
-Productive
-Cost-effective

Maximising the market
-Economically sustainable
-Consumer studies

Maximising the health benefits
-Phytochemical analysis for nutrition
-Genetic and environmental impacts

Better varieties
-Use existing and new genetic information
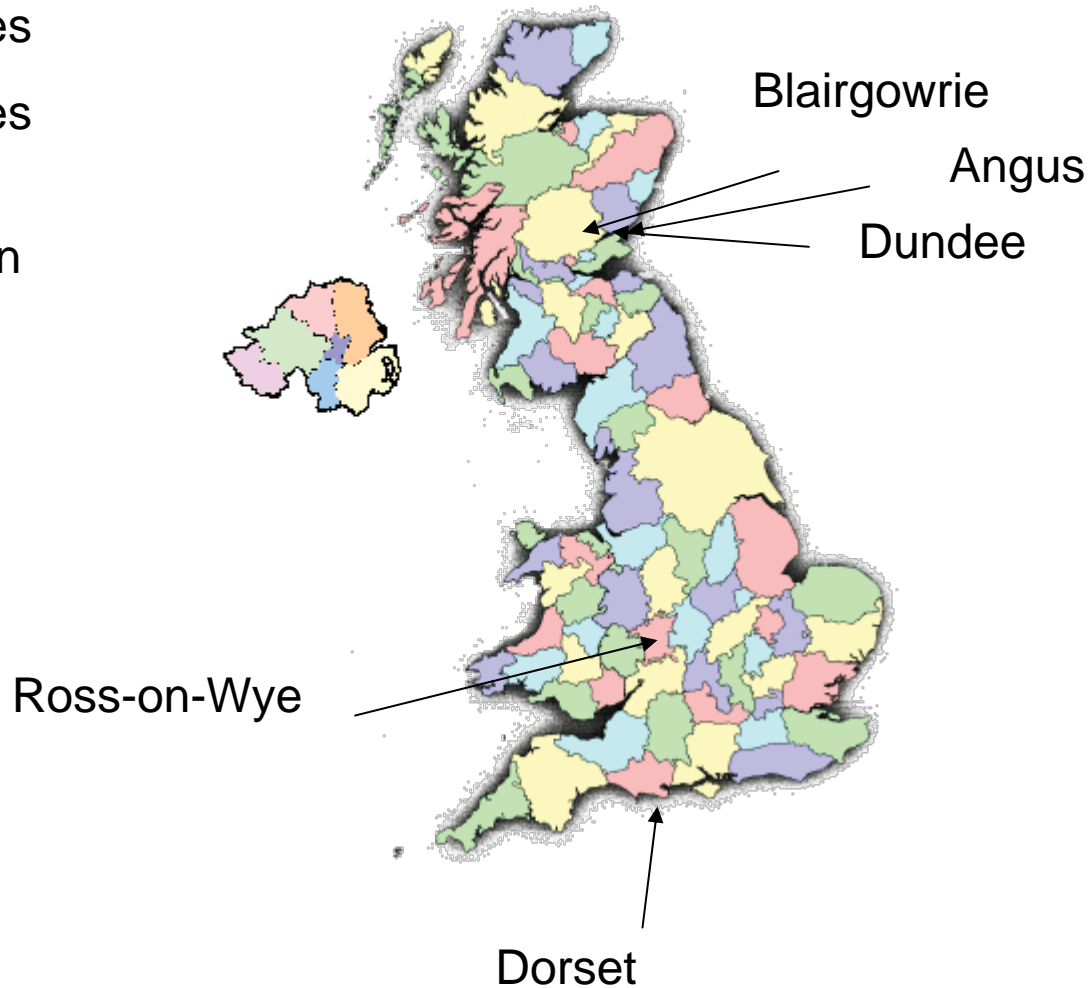-Data-mining to find the best traits

Distribution of trial sites across UK

33 varieties

6 at 5 sites

8 at 3 sites

Mapping population

SCRI/US

Blairgowrie

Angus

Dundee

Ross-on-Wye

Dorset

Crop Establishment

Crop establishment and root growth

Major impediments to production

Known to have generally poor root development

Creating soil conditions to overcome establishment restrictions

Characterise soil conditions under best producing crops

Crop characteristics across a number of sites

- Yield

- Visual fruit quality

- Growth habit and branch strength

- Season

- Natural infection by pests and diseases

Germplasm and mapping population

Crop characteristics at designated trial sites

- Establishment

- Machine harvestability

- Potential for fresh market fruit from mechanical harvesting

- Examine season

Germplasm

Fruit traits across a number of sites

- Sensory characters (before and after processing) sweetness, sourness and flavour intensity, texture

- Fruit composition (both fresh and processed) - sugar and organic acids, flavour volatiles, antioxidant capacity, total phenolics, anthocyanins and vitamin C

- Juice yield for processing (GSK)

Germplasm and mapping population

Linkage Analysis and QTL Mapping in Autotetraploid Species

- Separate markers into linkage groups, based on independent segregation

- Within linkage groups, calculate recombination frequencies between markers

- Order markers using recombination frequencies to obtain linkage maps

- Relate marker data to phenotypic traits to identify regions containing QTLs

Results to date

- Fruit collected from the end of 2009 season

- Local farm visits to establish germplasm and obtain leaves

- Primers obtained for genotyping diploid and tetraploid populations

- Initial results compiled to produce draft tetraploid linkage map

Future Outcomes

- Establish desirable fruit traits

- Identify suitable varieties for UK production

- Develop linkage map and heredity patterns

- Identify QTLs and polymorphic markers for accelerated breeding

- Recommend optimum cultivar and growing techniques