

Production and Nutritional Assessment of Phytochemical-Rich Soft Fruit and Lettuce

Implications of a Nutrition Driven Food Policy (Work Package 3)

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Background

- Berries are a good source of phenolics
 - Flavonoids, phenolic acids and anthocyanins
- Phenolics have proven health benefits for humans
 - Reduce risk of chronic diseases (coronary heart disease, stroke, atherosclerosis and cancer)
- The biological effects of phenolics have been linked with their antioxidant properties
- Phenolics are synthesised partly to protect plants from UV damage in response to UV
- Soft fruit production in the UK relies on protected cropping
- Plastic films currently used for crop protection limit the availability of UV light
- Novel plastic films are being developed which affect the UV light available to protected crops

Aims

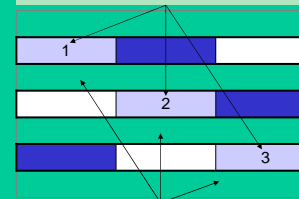
- To analyse the effect of novel plastic films on soft fruit and lettuce grown using current commercial practices:
1. Identify any differences in yields and crop development
 2. Quantify the effects of the films on the phenolic content and antioxidant capacity of fruit and lettuce
 3. Assess the effects of producing phytochemical-rich fruit on the soft fruit and lettuce markets
 4. Identify the potential impact of a nutrition driven food policy on the rural environment

Experimental plan

Analyse fruit and lettuce grown to commercial standards under 3 plastics:

- UVI/EVA – standard commercial film (39% transmission across UV range)
- UV block – blocks UV up to 380nm (4% transmission)
- UV window – transmits full UV range (80% transmission)

The plastics are arranged to each give three independent replicated blocks in the multi-span tunnel structure.



Gaps are used to reduce 'edge' effects and light contamination.

Facilities

Each tunnel is 75m in length



The structure consists of seven spans and is 45m across

Plastics are joined together in a patchwork



Strawberries are grown in peat bags on a tabletop system

Crops

Crops have been chosen to be commercially representative and allow the identification of seasonal changes in the effects of the films:

- Strawberry
 - Junebearing (Elsanta)
 - Everbearing (Everest / Flamenco)
- Lettuce
 - (Lollo Rosso)
- Raspberry
 - Biennial (Tulameen)
 - Primocane (Joan Squire)
- Blueberry
 - Highbush (Bluecrop)

Measurements

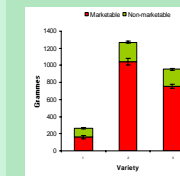
Yield & crop physiology

- Marketable yield: Fresh / dry weight
- Non marketable yield: Fresh / dry weight
- Flower to fruit development: Time
- Sugar content: °BRIX
- Vegetative development: Size / leaf number
- Assimilate partitioning: Harvest index

Nutritional content

- Phenolic profile
 - Total Phenolics: Folin Ciocalteu's method
 - Specific Phenolics: High Performance Liquid Chromatography (HPLC)
- Antioxidant activity: Oxygen Radical Absorbance Capacity assay

Strawberry Yields (2005)

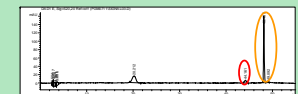


1. Elsanta: 265g per plant (60% marketable)
2. Everest: 1272g per plant (82% marketable)
3. Flamenco: 956g per plant (79% marketable)

HPLC Analysis

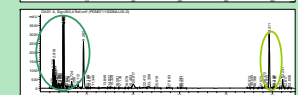
Anthocyanins (520 nm)

- Pelargonidin
- Cyanidin



Ellagic acid (260nm)

- Ellagic acid
- Ellagittannins



Acknowledgements

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