New Project Summary Report for TF 213: Extend the marketing period of Gala apples

Project Number	31802130
Title	Extend the marketing period of Gala apples. Phase I: Establishing analytical methods to assess flavour
Short Title	TF 213
Lead Contractor	University of Greenwich
Other Contractors	N/A
Start & End Dates	31 May 2013 - 30 July 2014
Industry Representative	Nigel Jenner
Project Budget	£21,666
AHDB Contribution	£21,666

The Problem

Project summary

UK production of Gala is expected to increase by 40% over the next four years. To provide a market for this fruit there is a need to extend the marketing period of UK Gala into April/ May by developing protocols for retaining good flavour of long-stored fruit.

This preliminary project (Phase 1) sets out to establish analytical methods for determining good flavour of Gala in order to facilitate optimisation of pre and post-harvest management regimes, and also to start identifying the key management factors for optimising flavour.

Taste panel analysis based on representatives across the apple industry will be used to grade samples from a range of orchards through the storage season. Data from the taste panels will be correlated with volatile analyses, compositional analyses and texture in order to model good eating quality in terms of these characteristics.

During Phase 1 up to 10 orchards will be identified that produce superior tasting fruit during periods of extended storage. The quality of UK Gala will be benchmarked against imported fruit from the Southern hemisphere as it arrives into the UK in early April. These orchards will be used to allow comparison of picking dates and use of SmartFreshTM on Gala standard CA storage Gala regimes (5% CO2, 1% O2 at 1.5°C)

It is anticipated that the results from Phase 1 of the project will help to identify orchard practices (tree age, rootstock, thinning, pruning, fertigation) that yield the best eating quality alongside identifying alternative storage regimes that can maintain the eating quality of Gala for longer. These orchard and storage

practices will be assessed and delivered as best practice in a potential future project (Phase 2).

Benefits to industry

Increasing the window for marketing UK Gala will allow for increased returns to growers and help to alleviate the increasing volumes of UK Gala that will need to be marketed in the UK season. The information from the first phase of the project will be disseminated to UK Gala growers at industry events and as factsheets

Aims and Objectives

Project aims

To identify best orchard and storage practices that maintain the optimum eating quality of Gala for extended periods of storage.

Project objectives

(i) To select of orchards that provide fruit with good taste quality after long-term storage to identify locations, management practices and storage protocols that maintain fruit quality

(ii) To identify fruit quality parameters (dry matter content, sugar concentration, acid concentration, texture and flavour volatiles) over two picking dates and during storage from selected orchards following long-term storage using standard Gala storage regimes

(iii) To establish analytical methods for determining good flavour of Gala in order to facilitate optimisation of management regimes

(iv) To disseminate recommendations to growers

Approach

Programme of the work

(i) Selection of orchards that provide fruit with good taste quality after long-term storage to identify locations, management practices and storage protocols that maintain fruit quality

During the 2012/13 storage season a taste panel formed of industry representatives (including representatives from Norman Collett, Worldwide Fruit, FAST) will make blind assessments of fruit samples from a range of orchards previously identified as providing consistent eating quality, alongside imported Southern hemisphere fruit. This assessment will inform the choice of orchards to be used for trials in the 2013/14 season and will allow initial analysis to relate volatiles and chemical composition to taste quality through the storage season. Furthermore these orchards will be useful for identifying best practices in later phases of this project.

(ii) Identification of fruit quality parameters (dry matter content, sugar concentration, acid concentration, texture and flavour volatiles) at harvest and during storage from selected orchards following long-term storage using standard Gala storage regimes

Samples of fruit will be harvested by the project team using standardised selection strategies from up to ten orchards identified in (i) and will be harvested at two fruit maturities (80% and 60% starch coverage) and subsequently stored at the Jim Mount facility at EMR under a standard Gala regimes (5% CO_2, 1% O_2 at 1.5°C) with or without SmartFreshTM.

At harvest and in February and April/May samples will be assessed for colour, firmness, %brix, mineral nutrition and dry matter content. Flavour will be assessed by the taste panel of industry representatives. Flavour volatiles and composition will be analysed as detailed below. Where feasible, samples of imported Southern hemisphere fruit will be included in the analysis.

Volatile analysis

Methods of volatile sampling will be optimised during the early stages of this project. Methods to be tested will follow those developed previously, for example by Aprea et al. (2011). Volatiles will be collected both from whole fruit and/or from cut/homogenised samples. A fixed weight of whole fruit, or prepared tissues samples will be sealed in a glass jar and maintained at a controlled temperature. Accumulated volatiles will be captured on a Solid Phase Micro-Extraction (SPME) system and then injected directly into a Gas Chromatograph with Mass Spectrometer.

Compositional analysis

Fruit juice will be frozen in liquid nitrogen, and analysed for sugars (sucrose, fructose and glucose) and organic acids (malic, oxalic and citric acid) using HPLC.

(iii) To establish analytical methods for determining good flavour of Gala, in order to facilitate optimisation of management regimes

Data from the taste panels will be correlated with the volatile analyses, compositional analyses and texture. The combined data will be used to model good eating quality in terms of measured volatiles (e.g. butyl and hexyl acetates, 2 methylbutyl acetate) sugar and acid ratios and fruit firmness characteristics.

Those orchards providing consistently good eating quality at the end of the trial will be investigated further in later phases of the project (Phase 2) for orchard practices (thinning method, rootstock, tree age, fertigation/spray programmes, and location) in order to identify orchard factors that impart good eating quality.

(i) To disseminate recommendations to growers

Data will be presented at forthcoming EMRA days, HDC review days, and presented in scientific publications and trade press article (HDC News)