Quality preservation of Japanese strawberry ‘Sagahonoka’ in refrigerated shipping containers

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1. Introduction

Strawberry (Fragaria × ananassa Duch.) is favored amongst other fruits because of its delicate taste, shape, colour and high vitamin content. In Saga prefecture, ‘Sagahonoka’ is a leading cultivar and its potential of promotion and development in overseas market is currently discussed. As Japanese strawberry is softer and loose quality easily, keeping freshness during transportation is a matter of critical importance for overseas markets or even in long distance local markets. Refrigerator or reefer containers have been crucial in transporting fresh produce.

In this study, two improvements have been studied for longer postharvest life retention; application of an electric field in container, and attachment of external gas absorbents using charcoal and titanium oxidant.

2. Materials and methods

Postharvest material and reefer containers:

Strawberry ‘Sagahonoka’, cultivated in Imari city and harvested at similar maturity were examined in Saga University. Three types of containers were used for storage. Normal reefer container (Reefer 1), reefer with electric field inside (Reefer 2), reefer with external gas absorbent (Reefer 3). Storage temperature and relative humidity in 3 containers were adjusted to 3°C ±1 and 90%±5%. Containers were disinfected using 0.1% NaOCl on the walls and floors of Reefer 1 and 2 and electrolytic acidic water on Reefer 3 before storage.

Sampling and measured quality parameters:

Measurements were done in weekly intervals, up to three weeks of storage for following parameters.

External fruit colour

Colour was measured by CIE L*a*b* tristimulus values using Konica Minolta® CR-200 Handheld Chroma Meter.

Fruit firmness

Samples were measured via a universal testing machine (Tensilion model UTM-4L). Fruits were placed as the axis from stem end to tip of a fruit pointed horizontal. A puncture test was conducted using load cell (CLB-5LFB, Orientec Co.) with 10 mm/min speed. All the deformation profiles were recorded using AR-6000-2, Orientec Co. Rupture force and average firmness were calculated from recorded chart sheets.

Total soluble solids and acids

Total soluble solids were measured in brix index and acidity using the refractometer (PAL-BX/ACID1 Master Kit, ATAGO CO,LTD, Japan). Individual fruits were squeezed and filtered to acquire juice.

3. Results and discussion

Colour change and acid was lowest in reefer 3 with delayed ripening resulting from the ethylene absorbents. In reefer 2, Brix was significantly (p<0.05) lower than the others. Concerning firmness related measure, reefer 2 had significantly higher rupture force (peak force) and average firmness, preventing the sogginess of the fruits.

Strawberry is a high respiring (21-30 mlCO2/kg.h) non-climacteric fruit, therefore ethylene inhibition in strawberry storage showed less cost-effectiveness compared to previous research, Bowler, et al., 2003. For keeping the physical strength of strawberry during storage, application of an electric field might have promising results.

References


Figure 1. Results of quality variation during storage of ‘Sagahonoka’ by refrigerated shipping containers;

1.a Brix and acid value, 1.b Rupture force and average firmness