Modified atmosphere storage of red raspberries harvested at early and mature stages of ripeness

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Raspberries harvested at early (very light pink) stage of ripeness maintained light colour longer in modified atmosphere packaging and developed comparable levels of key taste indicators

Raspberry fruit has an extremely short shelf life, with the colour change from light red to a dark purple colour often being a major limitation in the marketability of fruit. This trial examined how fruit harvested at an earlier stage of development (very light pink) would perform compared to industry standard (pink – red) in modified atmosphere packaging designed to extend shelf life.
Tullameen raspberries were harvested at the two stages of development and stored at 2°C in two types of modified atmosphere packaging, and in macro-perforated plastic packaging for a period of a week.

Fruit were analysed for soluble sugar content (SSC), pH, titratable acidity (TA), anthocyanin content, total phenolics, and colour density.

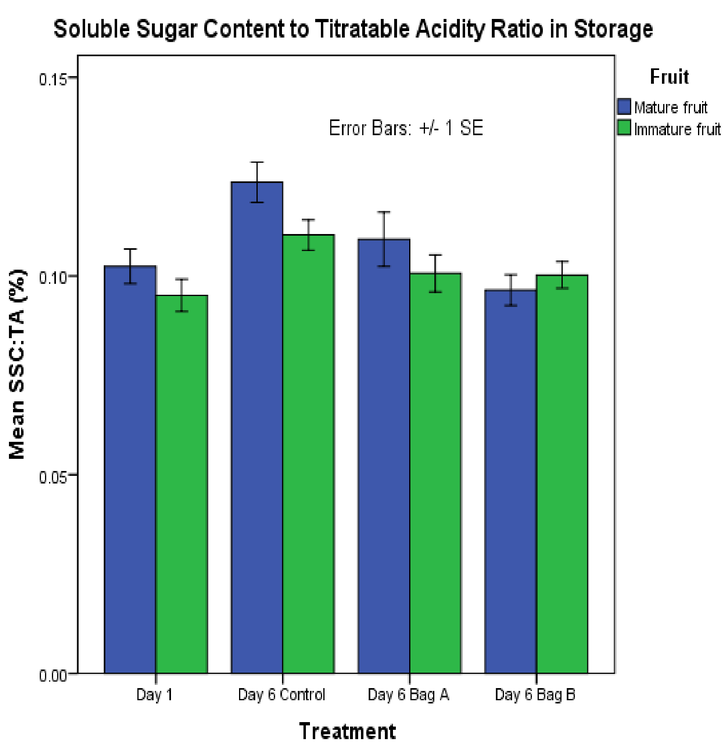

Figure 1. Mean SSC:TA (%) ratio in fruit. Error bars are SEM (n=12)

Fruit in cold storage saw a significant drop in acidity which was reduced by both types of bag ($P<0.05$), with no significant difference between bag types. Immature fruit was not significantly different in SSC, TA, or pH to ripe fruit at harvest or after cool storage in bags, but had a lower SSC:TA in the control treatment.

Photo 1. Mature harvested fruit after one week MAP. Bagged fruit maintained its bright colour longer than control fruit in both pink and red harvested trials

Photos 2, 3. Mature (red) and immature (light pink) fruit

Photo 4. Immature fruit after one week storage. Immature fruit had a smaller colour difference between treatments, but all were significantly brighter than mature fruit after one weeks storage

Bag "A" was micro-perforated packaging designed to increase CO_2 and decrease O_2 concentration. Bag "B" was designed to remove ethylene and minimize moisture formation inside the packaging

Fruit picked early was able to retain its bright pink colour longer in MAP

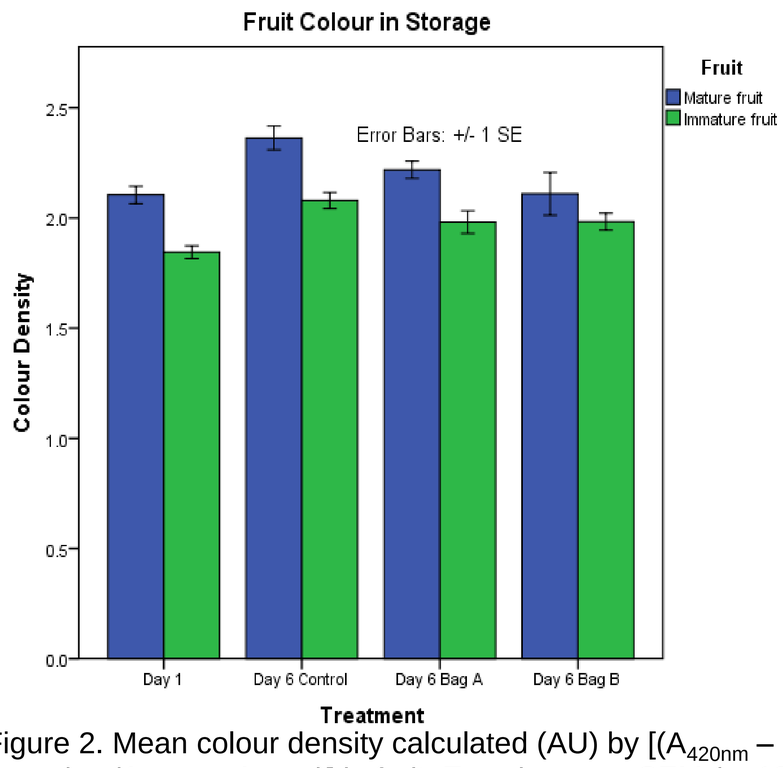

Figure 2. Mean colour density calculated (AU) by $[(A_{420nm} - A_{700nm}) + (A_{520nm} - A_{700nm})]$ in fruit. Error bars are SEM (n=12)

Fruit in both bag types maintained a brighter colour than control fruit after storage ($P<0.05$), but the difference between control and bagged fruit was much larger in red than pink fruit. Bag "A", performed better for pink fruit but not red fruit in slowing fruit darkening.

Mould development limited shelf life

Although high CO_2 environments will often inhibit mould growth, spoilage from mould was still seen in all treatments in this trial where passive atmosphere modification was used (bags were not flushed with CO_2). While a combination of early harvesting or colour sorting with modified atmosphere storage of fruit may extend shelf life where mould growth does not occur, mould was still the limiting factor for shelf life in this trial.

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