

CONFIDENTIAL

**Research report on the effect of different packaging on  
extending the shelf-life of red tomatoes during the 2018  
season**



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## 1. OBJECTIVE

To assess the effect of different packaging on extending the shelf-life of red tomatoes during commercial trading conditions.

## 2. MATERIALS AND METHODS

### 2.1 *Treatments*

- Cultivar
  - Dutch tomatoes
- Treatments
  - Standard plastic bag (1 kg)
  - Xtend bag (1kg)
  - KIF 1 – 16 punch holes (1kg)
  - KIF 2 - hot needle and punch bag (1kg)
- Storage period for red tomatoes
  - 7 days at 5°C + 6 days at 15°C

### 2.2 *Quality assessment*

Fruit quality evaluations were done on arrival at the ARC, after cold storage and after the shelf-life period. External defects/disorders were assessed for each bag. A representative sample of 6-7 tomatoes was selected from each replicate to measure physico-chemical parameters and assess for internal defects or disorders. Total soluble solids (TSS, expressed at °Brix) was determined with a calibrated refractometer (Pocket refractometer PAL-1, ATAGO Co. LTD, Japan). To measure titratable acidity (TA), 54mL juice sample was titrated against

0.333N of sodium hydroxide (NaOH) to a pH of 8.2 using a Crison Titromatic 1S/2B (Crison Instruments, Barcelona, Spain). TA was expressed as gram per 100mL. A Fruit Texture Analyzer (FTA 20, Güss, South Africa) with a 11.1 mm compression probe was used to measure flesh firmness expressed as newton (N). Skin colour was assessed using Minolta Chroma Meter CR-400 (Minolta Corp, Osaka, Japan). The data were expressed as hue angle [ $^{\circ}H = \arctan(b^*/a^*)$ ] where a higher hue angle value represents a more green colour whereas a lower hue value would represent a more red colour (0 red to purple; 90° yellow and 150° green). Weight loss (%) was determined. Ethylene was measured in the packaging including O<sub>2</sub> and CO<sub>2</sub> concentration in the Xtend bag.

### ***2.3 Statistical design and analysis***

The experimental design was completely random with four treatments and four replicates. An experimental unit consisted of a bag with approximately 1kg tomatoes. Analysis of variance was performed on all variables accessed using GLM (General Linear Models) Procedure of SAS software (Version 9.4; SAS Institute Inc, Cary, USA). Shapiro-Wilk test was performed to test for deviation from normality. Fisher's least significant difference was calculated at the 5% level to compare treatment means. A probability level of 5% was considered significant for all significance tests.

## **3. RESULTS**

**Results are shown in Table 1.**

There was no significant difference in weight loss between the different packaging after cold storage. However, the tomatoes in the Xtend bag tended to have the lowest percentage of weight loss. The KIF 2 bag had the highest percentage of weight loss and the Xtend bag the lowest after shelf-life.

The tomatoes stored in the Xtend bag was less red than the tomatoes of the other treatments. There was no difference in ground colour between the other three treatments after cold storage and after shelf-life. All the tomatoes was more red in colour after shelf-life. The tomatoes from the different treatments did not differ in TSS after cold storage. There was a slight increase in TSS after shelf-life except for the tomatoes stored in the standard bag which decreased in TSS. This might be due to a variation in maturity. The TA decreased after shelf-life. There was no difference in TA between the treatments either after cold storage or after shelf-life. There was no difference in firmness between the treatments after cold storage. The KIF 2 bag retained the firmness the best after shelf-life.

There was no decay development after cold storage. The decay incidence was between 33 and 48% after shelf-life, with no difference between treatments.

The ethylene concentration in the standard bag tended to be higher than the concentration in the two KIF bags. The O<sub>2</sub> and CO<sub>2</sub> concentration in the Xtend bag was respectively 17.5% and 0.5% after cold storage. During shelf-life, the O<sub>2</sub> decreased to 16.8% and the CO<sub>2</sub> increased to 1.1%.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

There was no clear significant differences between the treatments to allow us to recommend a packaging type. However, tomatoes stored in the KIF 2 bag (hot needle and punched) retained flesh firmness the best. The only negative is that this treatment had the highest weight loss percentage. The decay incidence in this trial was high.

Another dataset is required before final recommendations can be made.