

Studies on prolonging the storage life of "Le Conte" pear fruits

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This investigation was conducted during two consecutive seasons of 1995 and 1996 at Fruit Handling Research Department, Horticulture Research Institute, Giza. In both seasons, "Le Conte" pear fruits were harvested as soon as the fruits attained the maturity indices. The fruits were sorted (all malformed, crushed and diseased fruits were discarded) and the uniform fruits were chosen, washed with tap water, air dried, then the fruits were divided into three main groups to study the effect of storage temperature on storability of "Le Conte" pear. The fruits of the first group were stored under room conditions (around 25 °C) and the fruits of the second group were stored at 5°C, with 90-95% R.H., whereas the fruits of the third group were stored at 0°C with 90-95% R.H. Furthermore, the fruits of each tested storage temperature were subdivided into eight subgroups to receive one of the following post harvest treatments:

- 1- Wrapping: Two groups of fruits were devoted to this study. The first group of fruits were wrapped with fine tissue paper, meanwhile, the second group of fruits was left unwrapped "control". Besides, both wrapped and unwrapped fruits were packed in carton boxes (60x40x20cm) previously treated with Cifadex as a fungicide.
- 2- Polyethylene Package: The chosen "Le Conte" Pear fruits were packed in perforated and sealed polyethylene bags (30 micron thickness), then packed in carton boxes, previously treated with Cifadex.
- 3- Calcium chloride: "Le Conte" pear fruits were dipped for five minutes in 2 or 4 % calcium chloride (CaCl₂) solution. Thereafter, the fruits of each treatment were air dried and packed in carton boxes previously treated with Cifadex.
- 4- Potassium permanganate: Blocks of, absorbed potassium permanganate (KMnO₄) which is known as ethylene trap were packed in carton boxes previously filled with "Le Conte" pear fruits, and treated with Cifadex.
- 5- Sodium hypochlorite: The chosen fruits were dipped in sodium hypochlorite solution (NaOCl) solution at 1.5% for five minutes. Thereafter fruits were air dried and packed in carton boxes, previously treated with Cifadex.
- 6- Yeast: The chosen fruits were dipped in yeast suspension (2%) for five minutes. The fruits were then air dried and packed in carton boxes, previously treated with Cifadex.

Conclusively, this investigation included three storage temperatures (room temperature, 5 and 0°C) and within each storage temperature eight post harvest treatments. The obtained results could be summarized as follows:

5.1. Fruit Physical Properties

5.1.1. Weight Loss Percentage :Shortly, weight loss percentage increased with the progress of storage period. The storage potentiality of post harvest treated fruits under room temperature reached 28 days against 21 days for the control, whereas storability of post harvest-treated fruits stored at 5 or 0°C recorded 140 days against 126 days for the control. The loss of weight was time and temperature dependent. In other words, the higher the storage temperature (room temperature), the higher was the loss in weight and the reverse was true hence the lower the storage temperature (0°C) the lesser was the loss in weight than 5°C. Furthermore, fruit package in polyethylene bags, fruit wrapping and CaC12 proved to be the most effective treatments in minimizing loss in weight of "Le Conte" pear fruits. Generally, fruit packing in polyethylene bags, fruit wrapping and Ca C12-treated fruits stored at 0°C (in particular) showed the lowest weight loss percentage.

5.1.2. Fruit Decay Percentage :Conclusively, the decay percentage of "Le Conte" pear fruits was increased with the progress of the storage period. The decay percentage recorded over 50% at 21 days and 28 days for control and post-harvest treated fruits, respectively, stored under room conditions . Besides, the decay percentage scored 126 and 140 days for control and post harvest-treated fruits stored at 5 and 0 °C, respectively. Furthermore, calcium chloride treatments and yeast proved to be the most effective treatments in reducing the decay percentage of "Le Conte" pear.

5.1.3. Flesh Firmness:Conclusively fruit flesh firmness showed sharp reduction towards the end of storage period. The higher the storage temperature (room temperature, 25 °C) the higher was the rate of flesh firmness reduction and the reverse was true with 0°C than 5°C. This means that fruit flesh firmness was storage and temperature dependent. Moreover, CaC12, NaOC1 and yeast treatments showed to be the most effective treatments in retarding the sharp reduction in fruit firmness under the three storage temperature particularly 0°C rather than room temperature.

5.1.4. Shelf Life:It is obvious that increasing the cold storage period , the decay percentage of "Ler Conte" pear at room temperature was increased and shelf life was decreased. Moreover, the tested post harvest treatments succeeded in enhancing shelf life of "Le Conte" pear fruits stored at 0°C than those at 5°C. The most effective treatments in this respect could be descendingly arranged as follows: 2 and 2% Ca C12, NaOC1, Yeast, wrapping and fruit packing in polyethylene bags.

5.2. Fruit Chemical Properties :

5.2.1. Total Soluble Solids (T.S.S.):Briefly, fruit total soluble solids increased with the progress of storage period. The rate of increment of T.S.S. reduced as the storage temperature decreased. A positive correlation was noticed between the storage period and storage temperature. All tested post harvest treatments under the different storage temperature (room temperature, 5 or 0 °C) failed to affect fruit total soluble solids percentage.

5.2.2. Titratable Acidity :Briefly, fruit total acidity tended to decrease as the storage period advanced with rate of reduction increased as the storage temperature became lower. All tested post harvest treatments increased the fruit acidity compared with the control. Ca C12 and fruit wrapping treatments induced a remarkable increment on fruit acidity content under the storage temperature treatments particularly under room conditions.

5.2.3. Reducing Sugars :Generally, reducing sugars content of Le Conte" pear fruits increased with the increase of storage temperature and storage period. Yeast treatment exerted the highest stimulating effect under the three tested storage temperature. Consequently out of all yeast-treated fruits stored at 0°C gave the best results in this respect.

5.2.4. Non Reducing Sugars :Abstractly, there was reversible relationship between the nonreducing sugars and both storage temperature and storage period. Ca C12 and KmnO4 treatments were the superior treatments in reducing the non reducing sugars with the progress of the storage period under the three tested storage temperatures. Ca C12 and KIVIno4 treated fruits stored at 0°C showed the lowest values of non reducing sugars.

5.2.5. Total Sugars :Conclusively, there was a positive correlation between fruit total sugars content and both the storage period and temperature. In other words, the higher the storage temperature, the higher was the fruit total sugars content with the progress of storage period. Yeast , NaOCl and Ca C12 treatments enhanced fruit total sugars content under the three tested storage temperatures. Yeast and Ca C12-treated fruits stored at 0°C, induced the highest stimulating effect in this respect.

5.4.6. Phenols :Shortly, fruit phenols content increased with the increase of storage temperature and the storage period. The rate of phenols increment was positively correlated with the storage temperature. Yeast and CaC12-treated fruits had the lowest phenols content. Besides, yeast and CaC12-treated fruits, stored at 0°C showed the

lowest fruit phenols content.5.2.7. Tannins :Conclusively, fruit tannins content of "Le Conte" pear fruits increased with the increase of storage temperature and with the advance of the storage period. Besides, all tested post harvest treatments enhanced fruit tannins content. Yeast and CaC12 treatments induced a remarkable effect in this respect. The effect of yeast and CaC12 treatments was pronounced under cold storage at 0°C rather than at room temperature or 5°C. Consequently, yeast and CaC12-treated fruits stored at 0° C showed the highest tannins content. Generally, storage ability of "Le Conte" pear fruits could be prolonged with good keeping quality to be about 140 days by cold storage at 0°C and fruit treatment with 2 or 4% CaC12, yeast or fruit package in polyethylene bags.