

## THE INFLUENCE OF THE STORAGE MOMENT ON THE PRESERVATION OF CURÉ WINTER PEARS VARIETY

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### Abstract

*Of all the factors that influence the storage capacity of horticultural products, the time of storage in refrigerated conditions is of particular importance, because the delay in storage of fruits in refrigerated areas reduces their storage capacity and losses during storage increase. Taking into account that in current practice the increase of the period between harvesting and storage differs depending on transport and conditioning, we conducted research in pedoclimatic conditions on the Transylvanian plateau, on the influence of storage on the behavior of pears during storage. Curé pears harvested at the optimum time and stored within 24 hours of harvest, are generally better preserved, compared to the pre-stored fruits for 15 days at 9-12 °C temperature. The losses registered after 100 days of storage are on average by 7.3-14.1% lower, and the qualitative depreciations by 5.2-12.3%. Pears harvested 14 days earlier than the optimal time, behave better when stored if they were pre-store for 7 days at 9-12 °C.*

*Keywords: Curé winter pears, preservation, storage.*

### 1. INTRODUCTION

Pear, as a fruit species, have a high economic value, due to the fact that large harvests are obtained every year and that pears have superior taste properties to the fruits of other species of fruit trees and shrubs, as is the case for pear varieties with buttery and fondant fruits (Mitre, 2007).

Pears are also represented in culture by a large number of varieties with a long ripening period and with long storage possibilities (Villalobos-Acuna and Mitcham, 2008).

Pears are grown today on all continents, both in the northern and southern hemispheres. From a systematic point of view, pears belong to the family *Rosaceae* Juss., subfamily *Pomoideae* Focke, genus *Pirus* L (Mitcham and Mitchell, 2007).

The fruit storage technique has improved a lot lately, so that the fruits in general, and therefore the pears, can be kept until the next harvest almost without depreciation (Murayama et al., 1998).

Although the period of consumption maturity of most pear varieties currently grown, corresponds to the autumn and early winter months, there are also varieties that are kept under controlled conditions until late spring. In this way, the large number of varieties in the crop allows the consumption period of pears to be extended by 8-9 months after harvest (Sugar and Basile, 2009).

Pears have a high nutritional value due to the fact that their chemical composition includes significant amounts of sugars, organic acids, pectic substances, proteins, mineral salts and vitamins (Sugar, 2007).

Of all the factors that influence the storage capacity of horticultural products, the time of storage in refrigerated conditions is of particular importance, because the delay of storage of fruits in refrigerated areas reduces their storage capacity and losses during storage increase (Park, 2002; Bhat et al., 2010).

Taking into account that in current practice the increase of the period between harvesting and storage differs depending on transport and conditioning, we conducted research in pedoclimatic conditions on the Transylvanian plateau, on the influence of storage on the behavior of pears during storage (Carrillo et al., 2003; Drake et al., 2004).

## 2. MATERIALS AND METHODS

The studied variety, Cure, is one of the most widespread varieties in culture, being an old variety, of French origin, discovered by the priest Leroy de Villiere in 1760. This variety spread quickly in France and Belgium, then in all European countries. It is also very widespread in Romania.

The degree of ripeness of the fruit at the time of harvest had the following characteristics:

- the average age of the fruits at harvest: 152 days
- sum of temperature degrees from flowering to harvest: 2475 °C
- average fruit weight: 147g
- structo-textural firmness: 5.92 kgf
- dry matter: 8.77%

In this experiment, only quality I fruits were used, and the experimental variants were the following (figure 1):

V1 - fruit placed in the cold store within 24 hours of harvest

V2 - fruits introduced into the cold room after a pre-storage of 10 days at a temperature of 9-12 °C and relative humidity of 75-80%

V3 - fruits introduced into the cold room after a pre-storage of 15 days at a temperature of 9-12 °C and relative humidity of 75-80%

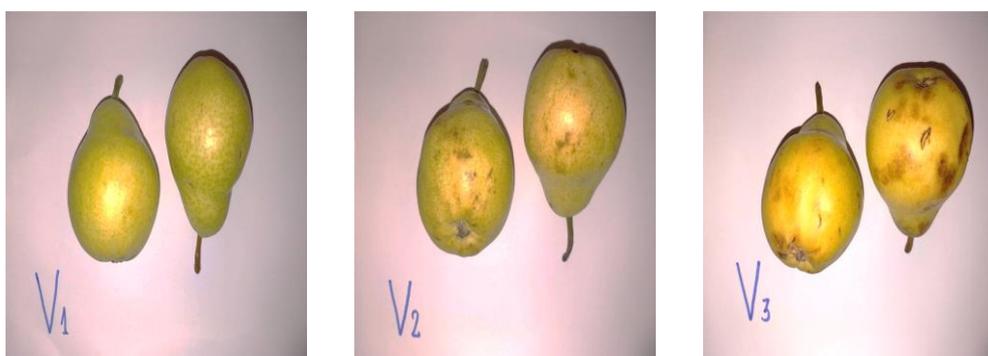


Figure 1. Experimental variants - Curé variety

Each experimental variant consisted of 2 repetitions of 100 kg. The fruits were stored in cold rooms, where the average temperature varied between 1-3 °C, and the relative humidity between 87-92%. The following characteristics were determined during storage:

-structo-textural firmness, with the help of the Effegi penetrometer with 8 mm diameter piston

-soluble dry matter, with Zeiss refractometer

Losses during storage were grouped as follows:

-weight loss, determined by weighing and expressed as a percentage of the quantity taken as an experiment

-losses due to qualitative depreciation and alteration, determined quantitatively by sorting, the results being expressed in percentages

### 3. RESULTS AND DISCUSSIONS

The textural firmness of the pulp is an important property with which it can characterize the degree of ripeness of the fruit and is shown in Figure 2.

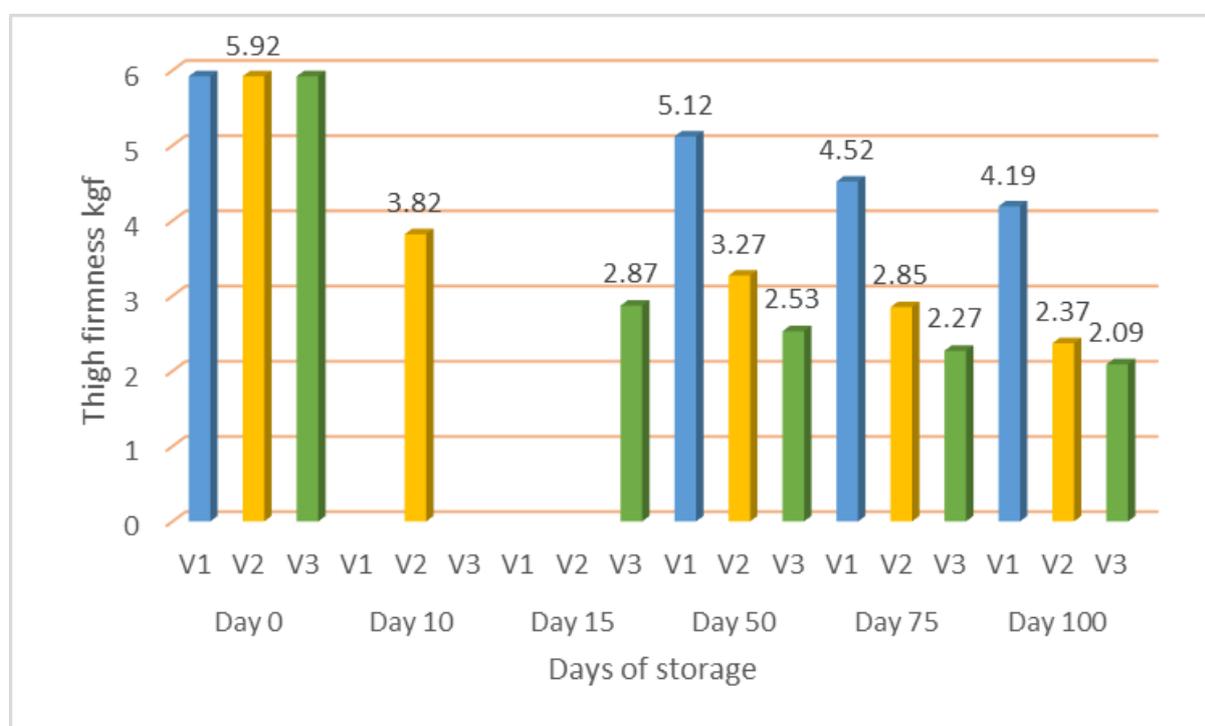


Figure 2. The textural firmness of the pulp, Curé variety, day 0-100

The decrease of the firmness of the pulp during the ripening of the fruits is determined by the transformation of the insoluble protopectins into soluble pectins, being greater in the pre-storage period of the pears.

Thus, under the given conditions, the firmness decreased in 10 days of pre-storage (V2) by 35.47% compared to the value at harvest, and in 15 days of pre-storage (V3) decreased by 51.52%.

These findings lead to the conclusion that the temperature of 9-12 °C for 10-15 days accelerates the ripening process of pears.

The firmness of the fruit after 100 days of storage, compared to the value at the time of harvest, decreased in a higher proportion in variant V3 (on average by 64.69%) and in a lower proportion in V1 (on average by 29, 22%).

The decrease in firmness was 0.0173 kgf / day when the storage temperature was reached immediately after harvest (V1) and 0.0383 kgf / day when the fruits were predetermined for 15 days (V3).

During the post-ripening of pears, at 17-18 °C the decrease of the firmness of the pulp had an accelerated rhythm, being in direct correlation with the temperature in the maturation chambers and the degree of maturation of the fruits (Figure 3).

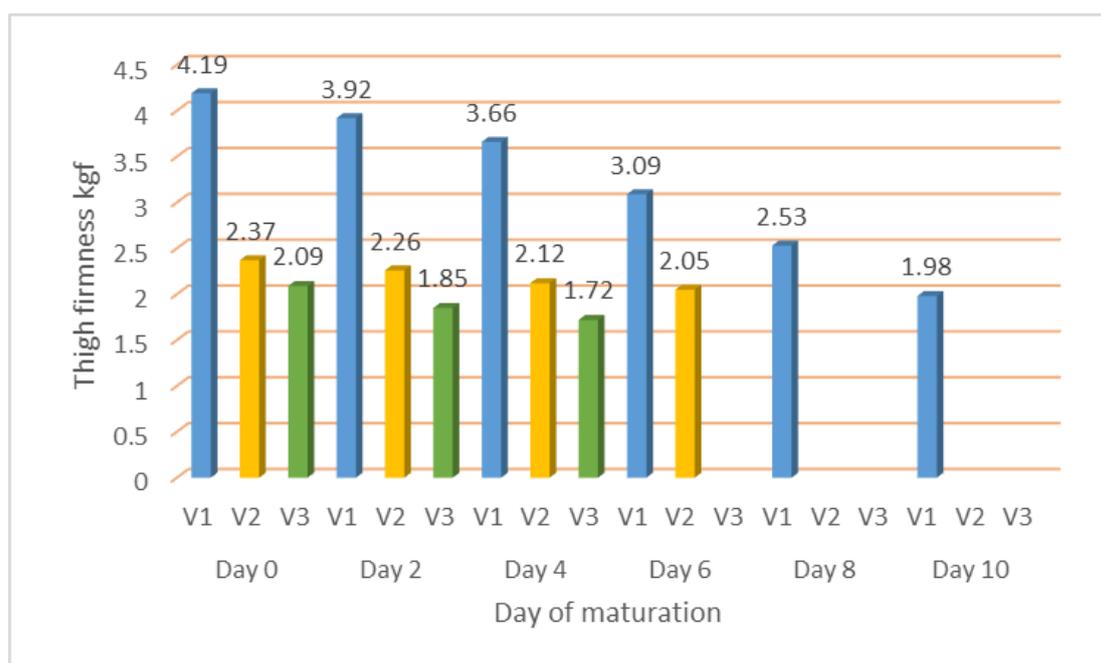


Figure 3. The decrease of the firmness of the pulp during the post-ripening of pears

In order for the firmness of the pulp to reach the limit of 2 kgf corresponding to the demand for consumption (Bhath et al., 2010), after removing the fruit from the refrigerated cells stored for 100 days, it took 10 days for V1 and 4 days for V3 to reach this value.

Changes in soluble dry matter and sugar content after 100 days of storage are shown in Table 1.

Table 1. Changes in soluble dry matter and sugar content after 100 days of storage Curé variety

Experimental variant	Storage time (days)	Soluble dry matter (s.d.m.)		Total sugars	
		g/100g fresh substance	% from the value at harvest	g/100g (s.d.m.)	% from the value at harvest
V <sub>1</sub>	100	14.72	97.2	8.73	97.1
V <sub>2</sub>	100	14.58	95.8	8.45	95.3
V <sub>3</sub>	100	14.35	93.7	8.15	91.4

The soluble dry matter, compared to the value at the time of harvest, represents at the end of storage 97.2% for variant V<sub>1</sub>, being with 3.5% lower for variant V<sub>3</sub>.

Total sugar at the end of storage represents 97.2% at V<sub>1</sub> experimental variant of the harvest value and only 93.7% at V<sub>3</sub> experimental variant.

From the data presented it results that the fruits cold storage immediately after harvesting (V<sub>1</sub>) are superior in terms of chemical components and as such had a higher nutritional value than the pre-stored fruits (V<sub>2</sub> and V<sub>3</sub>).

Weight loss varies with temperature and relative humidity in the storage space (Sugar, 2007). Thus, the highest losses were recorded at V<sub>3</sub> because higher temperatures and lower humidity during the pre-storage period speeds the processes of respiration and perspiration, so after 100 days of storage the difference between weight loss in V<sub>3</sub> compared to V<sub>1</sub> was 1.76%. On average, the weight loss recorded was 3.24% at V<sub>3</sub>, 2.98% at V<sub>2</sub>, 1.48% at V<sub>1</sub>.

Damage losses were also higher in V<sub>3</sub> and lower in V<sub>1</sub> as the susceptibility of pears to disease attack increases as they mature. On the other hand, microorganisms find optimal conditions for multiplication during the pre-storage period.

#### 4. CONCLUSIONS

Cure pears harvested at the optimum time and stored within 24 hours of harvest, are generally better preserved, compared to the fruits pre-stored for 15 days at a temperature of 9-12 °C.

The losses registered after 100 days of storage are on average by 7.3-14.1% lower, and the qualitative depreciations by 5.2-12.3%.

Pears harvested 14 days earlier than the optimum time, behave better when stored if stored for 7 days at 9-12 °C.

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