

## THE VARIATION OF THE ASCORBIC ACID CONTENT FROM POTATO TUBERS DURING STORAGE, UNDER HOUSE CELLAR CONDITIONS

M. AVRAMIUC\*, L. FĂRTĂIȘ, Ioana HERGHELEGIU

*"Ștefan cel Mare" University of Suceava*

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**ABSTRACT:** This work pointed out the change of the ascorbic acid (vitamin C) content from potato tubers, stored for three months under apartment house cellar conditions. The ascorbic acid content from potato tubers has decreased by 26.23% (as compared to the ascorbic acid content determined at harvesting), after the first 30 days of storage, by 40% (as compared to the ascorbic acid content determined at 30 days of storage) after 60 days, and only by 10.5% (as compared to the ascorbic acid content determined at 60 days of storage), after 90 days of storage. After 90 days of storage, the initial content of the ascorbic acid from potatoes stored in wooden boxes has decreased by 60.38%. The ascorbic acid content from potatoes, stored in tightly closed glass jars, was less modified. Thus, the determinations carried out and reported at the same time intervals have shown that, after 30 days of storage, the values of the ascorbic acid content have decreased by 10.5%, after other 30 days, by 6.72% and after the last 30 days, by 4.46%. After 90 days of storage under these conditions, the initial content of the ascorbic acid from potato tubers was diminished by 20.22%. The greater the average temperature of the analysed interval was, the greater the diminution in the acid ascorbic content of stored potatoes was. By comparing the results of analyses carried out on potato tubers stored in wooden boxes and in tightly closed glass jars to potato tubers at harvesting, we found out that the diminution in the ascorbic acid content was much more reduced (about 20%) in the tubers kept in closed vessels, because, in that case, the storage conditions have limited the oxidation process of this biocatalyser.

**Key words:** ascorbic acid, potato tubers, storage, house cellar

**REZUMAT – Variația conținutului de acid ascorbic al unor tuberculi de cartofi în timpul depozitării în condiții neclimatizate.** Această lucrare evidențiază modificarea conținutului acidului ascorbic (vit. C) din tuberculii de cartof, depozitați timp de 3 luni în condiții

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\* E-mail: avramiucm@usv.ro

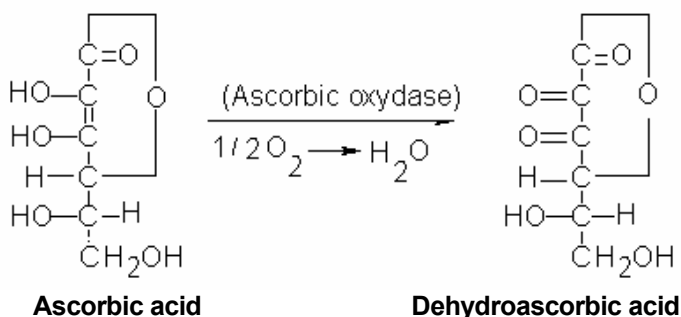
neclimatizate (boxă de bloc). Procentual, cantitatea de acid ascorbic a tuberculilor, după 30 zile de păstrare, s-a diminuat cu 26,23%, (față de cantitatea determinată la recoltare), după 60 zile, cu 40% (față de cantitatea determinată la 30 de zile de păstrare) și după 90 zile, cu doar 10,5% (față de cantitatea de vitamină determinată la 60 de zile). După 90 zile de la recoltare, conținutul inițial de acid ascorbic al cartofilor depozitați în lăzi s-a redus cu 60,38%. În cazul cartofilor păstrați în borcane de sticlă închise etanș, conținutul de acid ascorbic s-a modificat mai puțin. Astfel, determinările, efectuate și raportate la aceleași intervale de timp, au arătat că, după 30 zile de păstrare, valorile conținutului de acid ascorbic s-au diminuat cu 10,5%, după alte 30 zile, cu încă 6,72% și după ultimele 30 zile, cu încă 4,46%. După 90 zile de păstrare în aceste condiții, conținutul inițial de acid ascorbic al tuberculilor s-a redus cu 20,22%. Cu cât temperatura medie a intervalului analizat a fost mai mare, cu atât mai mare a fost și reducerea conținutului de acid ascorbic al tuberculilor depozitați. Comparând rezultatele analizelor efectuate la tuberculii păstrați în cutii de lemn și la cei păstrați în recipiente din sticlă (închise etanș) cu rezultatul analizei efectuate la recoltare s-a putut constata că descreșterea conținutului de acid ascorbic a fost mai redusă (cca. 20%) la tuberculii păstrați în vase închise, deoarece, în acest caz, condițiile de depozitare au limitat procesul de oxidare al acestui biocatalizator.

**Cuvinte cheie:** acid ascorbic, tuberculi de cartof, depozitare, condiții neclimatizate

## INTRODUCTION

The vitamins content of food raw materials can be negatively influenced by certain factors. Among these factors, the industrial and culinary processing methods have a remarkable importance, such as cutting, grinding, scalding, boiling or adding chemical substances, which may result in an important hydro- and liposoluble vitamins loss (Banu et al., 2003).

The storage conditions can also influence the level of some vitamins from food raw materials, sometimes, resulting in significant decreases of the biocatalysers concentration from food products (Adrien and Petit, 1970; Banu et al., 2003). In case of the ascorbic acid (vitamin C), the diminution in this vitamin concentration in the vegetable products is due to the presence and the activity of the ascorbic oxidase. This enzyme contains copper and it is widely spread within plants, catalysing the ascorbic acid oxidation at the dehydroascorbic acid (Neamțu, 1997; Avramiuc, 2002):



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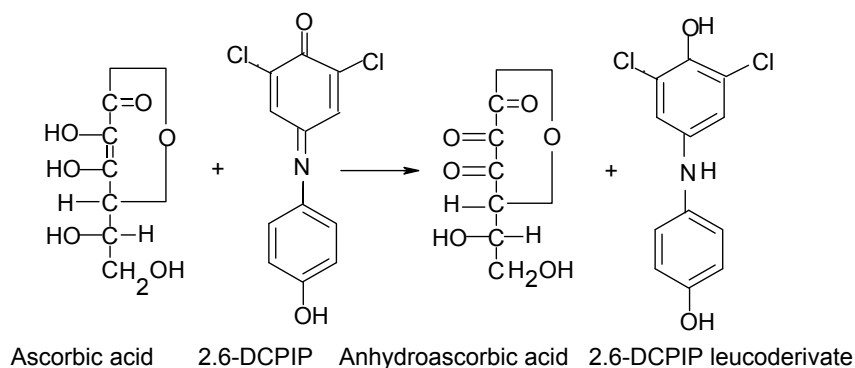
The aim of this work was to study the possible variations of the ascorbic acid content from potato tubers, stored for three months under house cellar conditions.

### MATERIALS AND METHODS

The biological material was represented by red potato tubers belonging to the Sucevița Variety. Potatoes were harvested on 12<sup>th</sup> of September 2005 and were stored for two hours after harvesting in an apartment house cellar, in wooden boxes. Potato samples were also stored in tightly closed glass jars, to prevent the air penetration.

Daily, the air temperature was registered at 12 p.m. and the arithmetical mean of each decade was calculated.

Every ten days, the acid ascorbic content from potato tubers was determined through a method based on the reduction of 2,6- dichlorophenolindophenol, (2,6- DCPIP) to the leucoderivate of 2,6- DCPIP, by ascorbic acid:



### RESULTS AND DISCUSSION

The mean values of the content in ascorbic acid of potato tubers, determined after harvesting, and at certain time intervals (10 days), during the 3 months of study in the storage period, are presented in *Table 1*.

As seen in *Table 1*, the ascorbic acid content from the tubers kept in wooden boxes has registered an obvious diminution in the first 60 days (from 18.30 to 8.10 mg%) and a much more reduced one in the last 30 days (from 8.10 to 7.25 mg %). The ascorbic acid from potato tubers has decreased by 26.23% (as compared to the ascorbic acid content determined at harvesting) after the first 30 days of storage, by 40% (as compared to the ascorbic acid content determined at 30 days of storage) after 60 days and by only 10.5% (as compared to the ascorbic acid content determined at 60 days of storage), after 90 days of storage. After 90 days of storage, the initial content of the ascorbic acid from potatoes kept in wooden boxes was reduced by 60.38%.

**Table 1- The acid ascorbic content from potato tubers, at certain time intervals since the harvesting date**

| Potato samples | mg Acid ascorbic % |         |         |         |         |         |         |         |         |         |
|----------------|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                | Harvesting         | 10 days | 20 days | 30 days | 40 days | 50 days | 60 days | 70 days | 80 days | 90 days |
| TWB            | 18.30              | 16.70   | 15.65   | 13.50   | 12.63   | 10.28   | 8.10    | 7.50    | 7.36    | 7.25    |
| TGJ            | 18.30              | 18.05   | 17.52   | 16.38   | 16.25   | 15.80   | 15.28   | 15.10   | 14.85   | 14.60   |

TWB = potato tubers stored in wooden boxes;

TGJ = potato tubers stored in glass jars;

Harvesting = analysis made in the harvesting day;

10...90 days = analysis made at 10...90 days since the harvesting date

The ascorbic acid content from potatoes kept in glass jars (without air access), was less modified. Thus, the determinations conducted and reported at the same time intervals have shown that, after 30 days of storage, the values of the ascorbic acid content have decreased by 10.5%, after other 30 days, by 6.72% and after the last 30 days, by 4.46%. After 90 days since harvesting, the initial content of ascorbic acid from potato tubers has diminished by 20.22%.

*Table 2* presents the mean storage temperatures of tubers kept in wooden boxes and glass jars, while *Figures 1 and 2* reproduce the values of mean storage temperatures and the values of the acid ascorbic content from the potato tubers stored in wooden boxes (*Figure 1*) and glass jars (*Figure 2*).

**Table 2 - The mean storage temperatures of tubers during the studied period (90 days)**

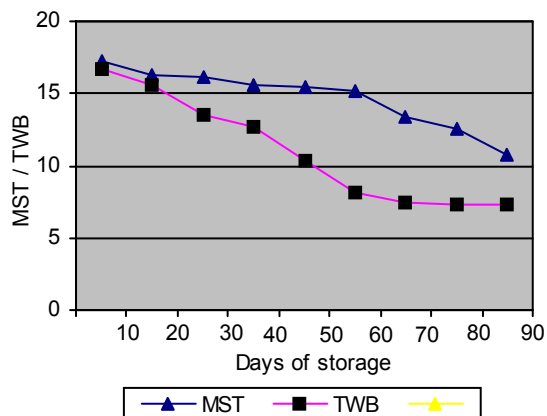
| MST | Time interval |            |            |            |            |            |            |            |            |
|-----|---------------|------------|------------|------------|------------|------------|------------|------------|------------|
|     | 1-10 days     | 10-20 days | 20-30 days | 30-40 days | 40-50 days | 50-60 days | 60-70 days | 70-80 days | 80-90 days |
|     | 17.3°C        | 16.3°C     | 16.2°C     | 15.6°C     | 15.5°C     | 15.2°C     | 13.4°C     | 12.6°C     | 10.8°C     |

MST = mean storage temperature

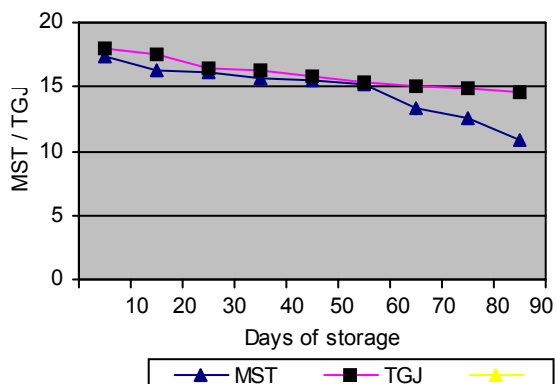
As seen above, the most reduced mean temperatures were found within the interval 60-90 days (*Table 2*), when the values of the acid ascorbic content have decreased the least (*Figures 1 and 2*).

Vitamin C is unstable in the presence of oxygen, its oxidation depending on pH and temperature (the oxidation increases proportionally to the temperature rising until 60°C) and on the presence of heavy metals (Banu et al., 2003).

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**Fig. 1 - The mean storage temperatures (MST) and the ascorbic acid content from tubers stored in wooden boxes (TWB)**



**Fig. 2 - The mean storage temperatures (MST) and the ascorbic acid content from tubers stored in glass jars (TGJ)**

## CONCLUSIONS

The determination of the acid ascorbic content from some potato tubers, stored under house cellar temperature and moisture conditions, pointed out, during the 90 days of study, a diminution by over 60% in this content. The more the mean temperature of studied interval, the more the diminution of acid ascorbic content was.

By comparing the values of the ascorbic acid from potato tubers stored in wooden boxes and glass jars (without air access) to those of the ascorbic acid determined two hours after potato tuber harvesting, we have noticed that the decrease in ascorbic acid content was much more reduced (about 20%) in the tubers kept in closed vessels, because, in that case, the storage conditions have limited the oxidation of this biocatalyser.

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