RESEARCH ON THE APPLES QUALITY MARKETED IN THE MOLDOVA AREA FROM THE PHYSICO – CHEMICAL AND SENSORIAL POINT OF VIEW

CERCETĂRI PRIVIND CALITATEA MERELOR COMERCIALIZATE ÎN ZONA MOLDOVEI DIN PUNCT DE VEDERE FIZICO CHIMIC ŞI SENZORIAL

MURARIU Otilia Cristina[1], IRIMIA L.M., ANGHEL Roxana[1], MURARIU F.[1]
e-mail: otiliamurariu@yahoo.com

Abstract. *The main purpose of this study was to identify the assortment of apple varieties traded in Moldova and an radiography performing on the products quality in terms of physico-chemichal and sensorial properties. The biological material is represented by 8 varieties of apple (Generos, Golden Delicious, Jonagold, Granny Smith, Starkimson, Florina, Jonathan şi Idared) purchased from different supermarkets or markets. The physico-chemichal analysis consisted on determination of dry powder, water, sugar and vitamin C content, titrable acidity, maturation degree by starch hydrolisis and diameter, weight and firmness of apples. Research findings indicated that apples marketed in autumn come mainly (65%) from internal production while the imported apples representing 35%. Fruits folding is mostly in bulk (62,5%), the difference being found in the retail packed in bags or polythene bags, cardboard boxes and crates alveolar plates of wood or cardboard. The results obtained for apples firmness reveals that Starkimson (17,45 UP/5 sec), Granny Smith (20,45 UP/5 sec),Jonathan (20,45 UP/5 sec) şi Generos varieties (25,85 UP/5 sec) are distinguished by a low consistency and a degree of maturation advanced, results that are consisistent with the degree of starch hydrolysis where the values range between 9R to 10R projecting over the state of supramaturation for this varieties. Therefore, it is believed that the produsts of this varieties are not suitable for long term storage being indicated the trade on markets or on processing units of apple in short term.*
Key words: *apples, Moldova, physico-chemichal and sensorial properties*

Rezumat. *Scopul principal al cestui studiu a vizat identificarea varietăţilor sortimentale de mere comercializate în zona Moldovei precum şi efectuare unei radiografii asupra calităţii acestui produs sub aspect fizico-chimic, fitosanitar şi senzorial. Materialul biologic este reprezentat de 8 soiuri de mere (Generos, Golden Delicious, Jonagold, Granny Smith, Starkimson, Florina, Jonathan şi Idared) prelevate din diferite supermarketuri şi pieţe. Analizele fizico-chimice efectuate au constat în determinarea substanţei uscate solubile, a conţinutului de apă, glucide şi vitamina C, a acidităţii titrabile, a gradului de maturare prin hidroliza amidonului precum şi a diametrului, greutăţii şi fermităţii merelor luate în studiu. Rezultatele cercetărilor au indicat că merele comercializate toamna (septembrie-noiembrie), provin cu preponderenţă din producţia internă (65%), cele importate reprezentând 35%. Desfacerea fructelor se face cu precădere în vrac în proporţie de 62,5%, diferenţa fiind regăsită în domeniul retail ambalată sau preambalată în pungi sau de*

[1] University of Agricultural Sciences and Veterinary Medicine of Iasi, Romania

polietilenă, cutii din carton cu platouri alveolare şi lăzi din lemn sau carton. Rezultatele obținute pentru fermitate relevă faptul că soiurile Starkimson (17,45 UP/5 sec), Granny Smith (20,25 UP/5 sec), Jonathan (20,45 UP/5 sec) și Generos (25,85 UP/5 sec) se evidențiază printr-o consistență a pulpei scăzută și un grad de maturare avansat, rezultate ce sunt în concordanță cu gradul de hidroliză a amidonului unde valorile au variat între 9R și 10R, reliefându-se starea de supramaturare pentru aceste soiuri. Prin urmare, se consideră că produsele ce aparțin acestor soiuri nu se pretează pentru un termen lung de păstrare fiind indicată comercializarea spre piata sau către unitățile de prelucrare a merelor în termen scurt.
Cuvinte cheie: mere, Moldova, proprietăți fizico-chimice si senzoriale

INTRODUCTION

In Romania the apple culture have pedoclimatic conditions very favorable for the obtaining of high quality productions. Once with Romania's accession to the European Union, the requirements related to the product quality have been harmonized with the European standards to facilitate commerce, on one hand and to increase the life standard at the same standards. To obtain a superior quality, besides the technological processes applied in the orchard, the fruit must be valorized according to an adequate technology that might allow the maintaining of quality at high levels from harvesting until the delivery to the consumer (Irimia, 2013; Beceanu and Chira, 2003).

MATERIAL AND METHOD

Biological material is represented by eight varieties of apples: Generos, Golden Delicious, Jonagold, Granny Smith, Starkrimson, Jonathan, Florina and Idared. These were taken from different areas specialized trade (hypermarket, supermarket, market) from Iasi. Analyzes and determinations were performed on a total of 10 samples, denoted by H1 - H3 - varieties from the hypermarket (Auchan) S1 - S3 - varieties of supermarket (Kaufland); and P1 - P4 - varieties from fruit and vegetable markets in Iasi. Research method consisted of: market diversity research; physico-chemical analyses (titratable acidity, soluble solids, the degree of starch hydrolysis, the content of L-ascorbic acid); organoleptic analysis method and analysis points of the product with marketing standard (Regulation (EC) NO. 1221/2008). Total titratable acidity (TA) was determined by colorimetric method; soluble dry matter (SUS%) was determined by refractometry, the degree of hydrolysis of starch (HA) was determined by the colorimetric method with iodine in potassium iodine and the L-ascorbic acid content (vit. C) was achieved by titrimetric method.

RESULTS AND DISCUSSIONS

Results regarding the diversity study of commercial offer: The research results show that in the autumn (September to November), apples predominate (Figure 1) are from internal production (62.5%) as opposed to imports (37.5%). The varieties were well represented: General, Golden Delicious, Jonagold, Granny Smith, Strakrimson, Jonathan, Florina and Idared. Variety Jonagold and Golden Delicious, were among the best represented species as found both in hypermarket, supermarket and fruit and vegetable markets.

In the market regime, the predominant packaging method was packing in bulk (62.5% of species). The supermarket and hypermarket, varied types of packaging from cardboard boxes with a specific number of apples (Granny Smith), simple cardboard boxes (Golden Delicious) to packaging in cardboard boxes with alveolar plates. In the supermarket and hypermarket products, packaging, specify variety, country of origin, quantity, quality, price, and size sometimes (Hui et al., 2006).

The results of organoleptic analysis

Quality evaluation of apples by organoleptic examination and points method revealed the following aspect: the varieties sampled in hypermarket, supermarket and the market falls into class I, with scores between 69.48 pts. (Jonagold) or 84.87 points. (Idared). The most appreciated varieties by oganoleptic points were Golden Delicious (S2 - 77.11 pts.), Florina (79.21 pts.) Starkrimson (80.61 pts.) and Idared (84.87 pts). The Jonagold variety (H3) didn't meet the requirements of apple shape and appearance (scab presence of Venturia inaequalis), earning the lowest score (69.48 pts.) (Fig. 1).

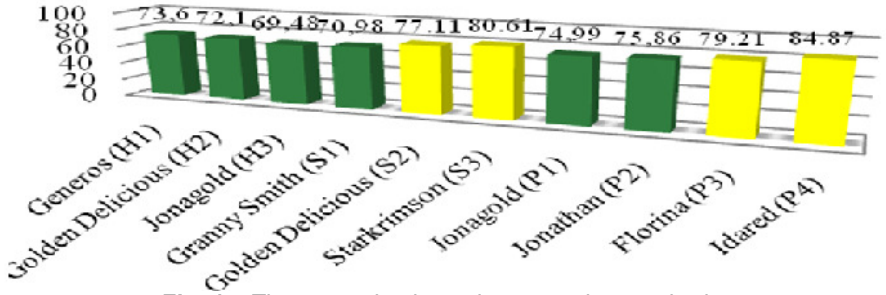

Fig. 1 – The organoleptic analyses – points method

The results of physico-chemical analyses

The titratable acidity (g/l malic acid) is an maturation indicator, of freshness, health status and an important indicator of fruit taste. The values of acidity are hight before firstfruits level is high and deficient on supramaturation. Malic acid is an organic acid with the largest share in the fruits of apple, its content being correlated with titratable acidity (Nour et al., 2010).

Titratable acidity values showed a hight variability for the 8 varieties of analyzed apple, oscillating in the range of 0.14 (mg malic acid/100 g) lower bounded for Starkrimson variety . and upper of 0.73 (mg malic acid/100 g) for Granny Smith, values that fall into those mentioned in the literature (0.2-0.9) from other authors except Starkrimson variety that show inferior values. The higher values of acidity are responsible for the astringent taste characteristic of the variety Granny Smith.

The starch content of fruits and structo-textural firmness is in perfect correlation, meaning that the extent of starch hydrolysis determin the fruit firmness decreases. Thus, are highlights the Jonagold and Florina varieties with a higher of starch percentage (5R - Jonagold and 7R - Florina) which shows higher values for firmness (39.77UP/5 sec. and 36 UP/5 sec.) showen that these varieties are suitable for storage and their sale in winter season. The apples that present reached full maturity belong on Idared varieties (10R and 16,25 UP/ 5 sec) and Starkrimson with (17.25 UP/ 5 sec. and 9R) indicated that they must be sent on processing.

Dry powder content of varieties studied, varies between 8.52% (Idared) and 15.06% (Golden Delicious). High levels of soluble solids were recorded and Granny Smith (13.96%) and Jonathan (14.86%).

Mean of soluble solids content was 12.65%, which means that apples were marketed for fresh consumption only. Although the variety Idared obtained the lowest soluble dry matter (8.52%), according to organoleptic analysis results, it was most appreciated variety in terms of taste (16.75 pts.). Unlike the variety Golden Delicious (15.06%) with a score of only 11.87 points. varieties Florina (13.86%) and Jonathan (14.86%) were noted as sweet varieties.

Soluble solids (SUS%) is an indicator of apples sugar content and sweet taste. The amount of soluble solids expresses the degree of maturation, freshness and fruits health. Being a climacteric fruit, apple maturation continues after his storage placing by starch hydrolysis, with the decreasing of dry matter after subtracting the respiration process.

The S.U.S. content of investigated varieties, ranging from 8.52% (Idared) to 15.06% (Golden Delicious). High levels of soluble solids were recorded on Granny Smith varieties (13.96%) and Jonathan (14.86%).

The vitamin C content of apple giving rise to the antioxidant properties of the fruit, the values ranges from 1.67 mg / 100 g for Golden Delicious apple varieties (H2) and 42.15 mg / 100 g on Granny Smith. The high levels of Granny Smith apples variety may be due to treatment with L-ascorbic acid by different methods, before the placed of commercial distribution. Similar proportions of vitamin C were noted in the Strakrimson (3.08 mg vit.C / 100 g apple) and Generic varieties (3.43 mg vit.C / 100 g apple). High levels of L-ascorbic acid were obtained on Idared varieties, the vit. C content range from 8.36 mg / 100 g to 11.44 mg / 100 g for Florina apple). Small quantities of vitamin C may be due to the metabolic processes carried out in storage.

CONCLUSIONS

Conclusions showed the need for this type of studies in the context of research activity at national level and mainly world level as well as the trend to promote a healthy diet.

The research releaved that the six analysed varieties (Generos, Golden Delicious, Granny Smith, Starkrimson, Jonathan and Idared) are not suitable for long term storage being indicated the trade on markets or on processing units of apple in short term. The Jonagold and Florina varieties may be comercilized later.

The high levels obtained for Granny Smith apples variety may be due to treatment with L-ascorbic acid by different methods, before the placed of commercial distribution.

REFERENCES

1. **Beceanu D., Chira A., 2003** - *Tehnologia produselor horticole. Valorificarea in stare proaspata si industrializare*. Editura Economica, Bucuresti.
2. **Hui Y.H et al., 2006** - *Handbook of fruits and fruit processing*. Editura Blackwell, USA, UK, Australia.
3. **Irimia L.M., 2013** - *Controlul și expertiza produselor calității legumelor, fructelor și produselor derivate*. Editura Ion Ionescu de la Brad, Iași.
4. **Nour Violeta et. al., 2010** - *Compositional Characteristics of fruit of several (Malus Domestica Borkh.) cultivars*, Not. Bot. Agrobot., Cluj 38(3), pp.228 - 233.