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## **BIOLOGICAL VALUE OF ACTINIDIA FRUITS**

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Research of content of biologically active compounds in fruits of Actinidia and dynamics of ascorbic acid at different storage conditions are present in this article. Actinidia fruits before and after storage at the refrigerator exhibit antioxidant properties and are a valuable source of biologically active compounds.

***Keywords:** fruits of actinidia, biologically active compounds, storage.*

Fruits of actinidia used for prevention of disease, to satisfaction the daily needs of the human body in ascorbic acid enough to consume an 240 g cherries, 200 g apples, 150 g raspberries 20 g blackcurrant and only 3 – 5 g of actinidia enough [4]. However, information about optimal storage conditions of actinidia fruits and changes of their biological value not enough. Unlike kiwi, actinidia fruit very susceptible to dehydration and may be stored only up to 7 weeks [1].

**The aim** – to estimate content of biologically active compounds in fruits of actinidia and the quantity of their losses under different storage conditions.

**Materials and methods.** Fruits of actinidia by varieties Sentyabrska, Kievska hybridna and Purpuna sadova were harvested in September 2009 – 2011 season in M.M. Gryshko National Botanical Gardens of NAS of Ukraine, transported to the Department of technology of storage and processing of fruits and vegetables Uman national university of horticulture.

Fruits of each phonology varieties lay out in bulk of lined paper trays, weight – less than 5 kg and transported by road for 3 h at 20 ° C and 70 ± 5% RH to the laboratory, according to the rules transportation of goods, perishable. To determine the optimum shelf life of fruit in processing plants they stored under the temperature of 18 ± 2 ° C and 70 ± 5% RH.

After pre-cooling in refrigerator for about 12 – 14 hours at a temperature 0 ... + 1 °C, fruits lay on storage in containers: plastic boxes (~250 g per pack), which were placed in trays, in normal atmosphere (temperature 0 ... +1 °C, 85 ± 5% RH) – control; packets, which made from unstabilized polyethylene film of high pressure, thickness of 50 – 55 microns, 250 g per pack, which sealed and placed in plastic boxes. Duration of storage, under different conditions, was limit by mass loss and quality of fruits [6]. Vitamin content was determined by standard and known methods [5, 8, 10], the antioxidant efficiency by J.G. Bazarnovoy [2]. Statistical data processing was performed by analysis of variance [3].

**Results.** Fruits of Actinidia are characterized by relatively high content of ascorbic acid (AA), on average – 96,6 mg/100g, at the same time, fruit variety Sentyabrska content only 72,45 mg/100g, but in fruit variety Kievska hybridna – 134,05 g/100g (table).

#### Content of important biologically active compounds in Actinidia fruits

Variety	Mass fraction, mg/100g					Index of antioxidant efficiency
	ascorbic acid	β-carotene	squalen	phenol	tocopherol	
Sentyabrska (контроль)	72,45	0,40	20,57	470	8,16	3,0
Kievska hybridna	134,05	0,55	11,56	940	No ident	5,0
Purpuna sadova	92,40	0,72	16,98	580	-//-	5,5

Fruits of actinidia variety Purpuna sadova dominated the fruits of other varieties by β-carotene content, the red blushed variety accumulated it on 0,17 – 0,32 mg/100 g higher than other fruits.

Among other biologically active compounds actinidia was distinguished by the presence of natural unsaturated hydrocarbon – squalen, which belongs to the carotenoids, the recommended intake for an adult is about 0,4 grams per day [9]. Mass fraction of squalen in the fruits of actinidia was between 11,56 – 20,57 mg/100 g, consumption of 100 g of fruit can satisfy 2,9 – 5,1 % of its daily needs.

The highest contain of phenol compounds in fruits of variety Kievskaya hybridna, in fruits of varieties Purpurna sadova – at 1,62 times, Sentyabrskaya - 2 times less (table).

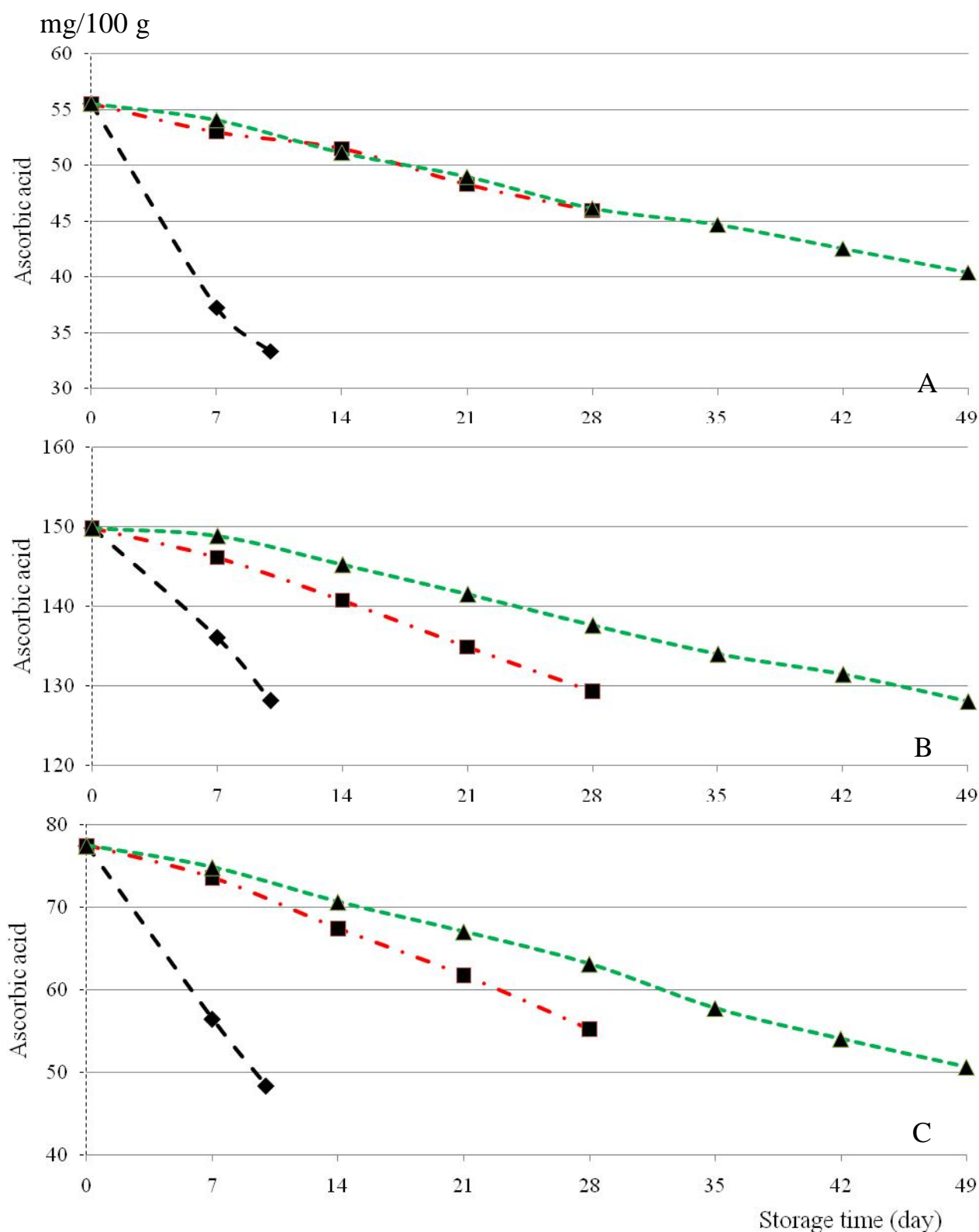
Advantage of fruit actinidia varieties Sentyabrskaya is the presence of highly effective antioxidant – tocopherol (8,16 mg/100 g). The consumption of 100 g of fruit can satisfy half of the daily adult needs in this vitamin [9].

Among the biologically active compounds of fruits ascorbic acid is most important and has an antioxidant efficiency. The level of index of antioxidant efficiency ranged from 3,0 to 5,5 units, the biggest it in fruits varieties Purpurna sadova and Kievskaya hybridna, significantly less – Sentyabrskaya.

It is well known, that storage of fruits different cultures conduct the decreases of content of AA [7]. Dynamics of ascorbic acid at different storage conditions show, that the mass fraction of ascorbic acid decreased during storage as expected (Fig.). Fruit stored under the temperature  $18 \pm 2$  ° C and  $70 \pm 5$  % RH lose from 14,5 to 40,0 % of AA, the greatest loss found in fruit variety Sentyabrskaya.

AA were significantly affected by choice of package and storage conditions. Cold temperature storage at  $0 \dots +1$  ° C,  $85 \pm 5$  % RH effectively delayed loss of AA of fruit compared to fruit held at  $18 \pm 2$  ° C and  $70 \pm 5$  % RH, without packing loss of biological value reached to 13,7 – 28,7 %, and with using plastic packets – 14,5 – 34,7 % (Fig.).

Among the investigate actinidia fruits, fruits of variety Kievskaya hybridna had the highest vitamin C-value and the lowest it losses during storage. Decreasing the amount of vitamin C when stored without packets was on 13,7 %, and in polyethylene packets – 14,5 %. Content of AA in actinidia fruits after storage at  $0 \dots +1$  ° C for 28 days was 46 ... 130 mg/100 g, and in the same conditions for 49 days with packing in packets – 40 ... 128 mg/100 g.



**Fig. Dynamics of ascorbic acid in fruits of Actinidia different varieties and at different storage conditions (2009 – 2011 seasons)**

- A - Sentyabrskaja; B – Kievskaja hybridna; C – Purpuna sadova**
- ◆ - without cooling, temperature plus 18 ± 2 °C
- ■ - in the refrigerator, temperature 0 ... plus 1 °C (control)
- ▲ - in the refrigerator, package, temperature 0 ... plus 1 °C

**Conclusion.** Antioxidant effectiveness of Actinidia fruit caused by containing ascorbic acid,  $\beta$ -carotene, squalen, phenol compounds, tocopherol and ranged from 3,0 to 5,5 units.

Fruits of Actinidia, at harvest and after cold storage, is a valuable source of biologically active compounds, such as ascorbic acid (40 - 130 mg/100 g), exhibit antioxidant efficacy and they can be considered products that enhance the protective properties of the human body to harmful environmental factors.

### References

1. Ferrandino A. Chemical composition of Actinidia deliciosa fruits as influenced by harvest date and storage period / Ferrandino A., Guidoni S. // Acta Hort. – 1999. – № 498. – P. 313 – 318.
2. Базарнова Ю.Г. Исследование антиоксидантной активности природных веществ / Ю.Г. Базарнова, К.Ю. Полякова // Хранение и переработка сельхозсырья. – 2009. – № 3. – С. 31 – 37.
3. Доспехов Б.Д. Основи наукових досліджень у плодівництві, овочівництві, виноградарстві та технології зберігання плодоовочевої продукції / Б.Д. Доспехов. – К.: Навчально-методичний кабінет МінВузу України. – 1992. – 364с.
4. Меженский В. Витаминный реликт / В. Меженский // Огородник плюс. – 2010. – №3. – С. 10 – 15.
5. Методи технохімічного контролю у виноробстві: за ред. Гержикової В.Г. – Сімферополь: Тавріда, 2002. – 206 с.
6. Методические рекомендации по хранению плодов, овощей и винограда (организация и проведение исследований) / [Дженеев С.Ю., Иванченко В.И., Дженеева Э.Л. и др.]; под ред. С.Ю. Дженеева и В.И. Иванченко. – Ялта: Институт виноградарства и вина «Магарач», 1998. – 152 с.
7. Найченко В.М. Особенности биологии плодов косточковых и ягодных культур как основа технологии из длительного хранения: дис. ... доктора с.-х. наук: 06.01.07, 05.18.03 / Найченко В.М. – Кишинев, 1988. – 472 с.

8. Плешков Б. П. Определение витамина С йодометрическим методом / Б.П. Плешков. Практикум по биохимии растений. – М.: Колос, 1976. – 254 с.

9. Рекомендуемые уровни потребления пищевых и биологически активных веществ: МР 2.3.1.1915 – 04, утв. Главным госуд. сан. врачом руководителем Федеральной службы по надзору в сфере защиты прав потребителей и благополучия человека 2 июня 2004 г. – М., 2004 – 46 с.

10. Фрукти, овочі та продукти їх перероблення. Метод визначання вмісту каротину. ДСТУ 4305:2004 на заміну ГОСТ 8756.22-80. – К.: Держспоживстандарт, 2004. – 10 с.

## **БИОЛОГИЧЕСКАЯ ЦЕННОСТЬ ПЛОДОВ АКТИНИДИИ**

**Калайда К.В.**

Представлены результаты исследований содержания биологически активных веществ в плодах актинидии и динамика аскорбиновой кислоты, при различных условиях хранения. Установлено, что плоды актинидии как до, так и после хранения в холодильнике проявляют антиоксидантные свойства и являются ценным источником биологически активных веществ.

*Ключевые слова:* плоды актинидии, биологически активные вещества, хранение.

## **БІОЛОГІЧНА ЦІННІСТЬ ПЛОДІВ АКТИНІДІЇ**

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Представлені результати досліджень вмісту біологічно активних речовин у плодах актинідії та динаміка аскорбінової кислоти, за різних умов зберігання. Встановлено, що плоди актинідії як після збирання урожаю, так і при зберіганні в холодильнику виявляють антиоксидантну дію і є цінним джерелом біологічно активних речовин

*Ключові слова:* плоди актинідії, біологічно активні речовини, зберігання