RESEARCH ON THE QUALITY OF ORGANICALLY GROWN FRUIT VARIETIES

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RESEARCH ARTICLE

Abstract

The quality of fruit for fresh or processed consumption differs according to the genetic characteristics of the varieties, the cultivation technology applied and the soil and climatic conditions prevailing in the year in question. Quality can be assessed based on the quality indicators determined by organoleptic and laboratory methods. Studies carried out on organically grown varieties have revealed their sensory quality and physico-chemical properties.

Keywords: organic farming, quality indicators, organoleptic and laboratory analysis methods, cherries, sour cherries, raspberries, apples.

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INTRODUCTION

Applied conventional agriculture is an energy-intensive, costly system for society, with undesirable effects on the environment, causing pollution and reduced soil fertility, and contamination of both plant products and groundwater with pesticides and nitrates. The destructive effects of conventional agriculture are manifold. In spite of this, conventional agriculture has made it possible to achieve high quality and efficient production.

At the end of the 1980s, the Common Agricultural Policy gave organic farming a special role by promoting quality crop products and environmentally friendly farming practices.

Organic farming is similar to the term "biological agriculture" used by other EU Member States. This type of agriculture produces organic or bio products that are cleaner, with fewer pesticides and chemicals, more suitable for human metabolism, in harmony with environmental conservation and sustainable development.

Organic farming must be understood as an integral part of sustainable agricultural production and as a viable alternative to traditional approaches to agriculture.

This type of agriculture respects nature's self-regulating systems, is a production method that integrates traditional knowledge with scientific progress, avoids the use of pesticides, herbicides, synthetic fertilisers, growth hormones, antibiotics and genetically modified organisms, and uses techniques that favour the creation of sustainable ecosystems that reduce pollution.

In recent years, organic farming has also been on the rise in our country. One of the advantages of our country for the development of this sector of agriculture are the clean soils, which have not been intensively cultivated, as it is known that this type of farming requires the application of chemical treatments to both soil and plants. These clean soils are predominantly distributed in rural areas, where people have treated their soils and crops using traditional methods.

Promoting this concept is also one of the key conditions for the development of organic farming to make consumers aware of the advantages of organic products so that they are willing to pay a higher price for clean products whose quality is guaranteed by an inspection and certification system.

Organic farming and integrated farming aim to produce quality agricultural products. This quality is expressed through nutritional and hygienic value and chemical composition.

The quality of a product is represented by the totality of useful characteristics that can be observed, measured or compared with a given standard, and is the result of a production process that is reflected in the consumption process. In this respect, two notions are emerging: production quality and product quality, which are inseparable.

As a result, the quality of a finished product is the result of the use of valuable biological material, subjected to a cultivation technology appropriate to the species and variety, followed by preservation, conditioning and processing operations specific to the finished product.

The most important characteristics for the assessment of horticultural products' quality are: authenticity and uniformity of the variety, characteristics of the internal and external appearance of the products (shape, size, taste, aroma, colour, consistency and firmness of the flesh, degree of ripeness, state of health, presence or absence of stalk, etc.). A number of laboratory methods are also used to help determine the quality of the products. The laboratory methods consist of a series of specific physical, chemical, mechanical and microbiological determinations, as well as many verification tests on the behaviour of horticultural products during harvesting, transport, packaging, storage or industrial processing.

Organoleptic methods consist of determining certain properties that are perceived when examining the product using the human senses: taste, sight, smell, touch. The most relevant organoleptic properties are the taste and aroma of the fruit, the juiciness and consistency of the flesh, the appearance and colour of the skin and others, depending on the species analyzed.

Laboratory methods can be used to detect a number of chemical indicators that are not laid down in state standards: refractometric index, ascorbic acid content, titratable acidity, refractometric index/ titratable acidity ratio, starch content in apples and other species-specific indicators.

Horticultural products obtained through organic farming are healthier, more ,,natural,, and although sometimes they do not have an impeccable commercial appearance, consumers are willing to offer a higher price for the organic value of the products (Ardelean A., 2009, 2013, 2015, Beceanu, 1994, 1998, 2002, Beceanu et al., 2000, 2003, Gherghi 1981,1983,1984, Potec 1967, 1985, Burzo et al., 1984, 1986, Marca, 1987, 2004).

MATERIAL AND METHOD

The determinations were carried out from June to August 2023 on cherry, sour cherry black, white and red currant and raspberry varieties.

The following varieties were used in the trials: Stella cherry variety, Nana cherry variety, Opal raspberry variety, Blanka Premium white currant variety, Rolan red currant variety and Deea black currant variety.

The fruit was harvested in the last decade of June for cherry, in early July for sour cherry and raspberry and in July-August for currant.

The crop was grown in the organic version in a private garden.

The main indicators analyzed for fresh samples refer to soluble dry matter content, total titratable acidity and vitamin C content.

Sampling was carried out on the day of sampling. Thus, fruit samples were collected from several specimens, located at the edge of the row as well as from the middle of the row. From each selected specimen fruits were collected from different branches with different exposure to light.

Both organoleptic and chemical determinations were carried out for the varieties analyzed.

The soluble dry matter was determined refractometrically directly in the field with the portable Zeiss refractometer for fresh products, so that the optimal time of harvesting was also determined based on this value.

The total titratable acidity was determined as follows: for fresh products, they were macerated, strained and titrated with sodium hydroxide solution with the known factor, in the presence of phenophthalein as a colour indicator.

Vitamin C content was determined by iodometric method. Thus, from the average sample, 15 g of the product to be analyzed is weighed on the analytical balance, which is then moistened with 2 g of quartz sand and 10 ml of metaphosphoric acid until a homogeneous paste is obtained. The mixture is transferred to a 50 ml volumetric flask and made up to the mark with metaphosphoric acid. The mixture is then filtered and 10 ml is used for analysis. Two further titrations are carried out.

Titration of the standard ascorbic acid solution: in an Erlenmeyer flask place 10 ml ascorbic acid, 20 ml distilled water, two drops of

1 M hydrochloric acid solution, 15 drops of 1 % starch solution. Titrate with iodine solution until the colour changes to violet-blue (V).

Titration of the sample to be analyzed: the working technique is the same as that described above with the addition that the standard solution of ascorbic acid is replaced by 10 ml of filtrate sample. The titration is also carried out with iodine solution until the colour changes to violet-blue (V1).

Vit. C mg/ 100 g product = 10 x V1 x 5 / V x m x 100

RASPBERRIES TRANSLATED IN 2018

RESULTS AND DISCUSSIONS

Chemical analyses carried out on cherry, sour cherry, raspberry and currant varieties showed the average values shown in Table 1.

Table 1

Quality indicators (average values)

Crt. no.	Species (Sample mean)					
	Cherry	Sour cherry	Raspberry	Black currant	White currant	Red currant
Sample weight	200	200	200	200	200	200
S.U.S. %	19,5	13,5	11,5	11,2	9,0	11,0
Total titratable acidity malic acid g/%	0,5	1,57	1,73	1,56	1,5	1,7
Vit. C	9,5	11,2	24,3	49,9	49,0	45,0

The fruit with the highest soluble dry matter content was obtained in both stone fruit species, 19.5% in cherries and 13.5% in sour cherries. The lowest soluble dry matter content was found in white currant fruit (9 %). The highest vitamin C content was found in black currant fruit (49.9 mg/ 100 g fresh product). Blackcurrant fruit also has the highest vitamin C content compared to stone fruit and raspberry species.

Raspberry fruit has a significant vitamin C content (24.6 mg/ 100 g fresh product).

The total titratable acidity ranges from 0.5 to 1.73 g/% malic acid, indicating a balanced sugar/acidity ratio, with the fruit having a sweet-sour taste, more acidic for the cherry and currant fruit.

From the analysis of the determined indicators, it is concluded that the fruit of all species are qualitatively suitable for both fresh consumption and industrialization, showing a balance of sugar-acidity content. Also, with their significant vitamin C content, the fruit is a vitaminizing and antioxidant support for the body.

Along with the qualitative reception of the raw material, its sensory properties are also analyzed. Organoleptic methods consist of determining these properties, which are perceived when the raw material is analyzed using the sensory organs (taste, smell, sight, touch). In order to assess the quality of cherry, sour cherry, raspberry and currant fruit, representative samples of the variety analyzed are taken. To this end, we have taken 100 g samples for each variety analyzed. The cherry and sour cherry varieties belong to the category of highly perishable species, having a thin skin, which makes them sensitive to external environmental factors (low humidity, temperature variations), with a shelf life of 3-4 days. The sensory characteristics of the cherry and sour cherry varieties analyzed are as follows: fruit size, consistency and juiciness of the flesh, taste, fruit aroma, adherence of the stone to the flesh, flesh/stone ratio. Fruit with a harmonious and balanced, sweet-sour, pleasant taste, without astringency (or fine astringency in sour cherries) or excessive acidity, and with a favourable sugar/acid ratio are considered suitable.

Raspberry fruits belong to the category of excessively perishable fruits, so it is recommended to keep them for 1-2 days under refrigerated conditions. In raspberries, the size and colour of the fruit, its taste and aroma and

the ease of removal from the stalk were analyzed. The intensely coloured red fruits with a sweet-sour taste and a pronounced aroma are positively appreciated. Poorly coloured, sour fruits and those which have lost their turgidity and have a soft texture due to overripening are considered unsatisfactory.

The following characteristics were analyzed for currant varieties: berry size, which differs according to variety, and berry arrangement on the rachis. Those at the base of the rachis are larger than those at the top. The consistency of the flesh is assessed by analyzing 10 to 20 berries, pressing them by hand and tasting them. Grapes with firm, compact, crunchy flesh are appreciated. Grains with a soft, too firm (unripe) consistency are judged negatively. The juiciness of the flesh is assessed by tasting. Taste 20 to 30 beans of each variety. Those with juicy or adequately juicy flesh are judged to be suitable. Grains with poorly or excessively juicy flesh (overripe), with flesh lacking juiciness or dry are considered unsatisfactory. The taste of the berries is judged by tasting and is the basic characteristic in the organoleptic assessment of a variety. Grapes with a harmonious and balanced, sweet-sour, pleasant taste with a slight astringency and a balanced sugar-acidity ratio are appreciated positively. Grapes with a flavour that is not expressive, unbalanced, too sour or too astringent are considered unsatisfactory. The aroma of the berries is given by volatile substances specific to the species and variety. Grapes with a strong, nutty aroma specific to currants are considered suitable and those with no aroma or unpleasant smell are considered unsuitable. The colour of the flesh is assessed visually and is characteristic of the species and variety. Bright red berries with a slightly translucent appearance are positively appreciated in the red variety. Pale red or green berries, suggesting a low degree of ripeness (scorch), are not acceptable. In the white currant variety, berries with a translucent pale yellow colouring are positively assessed and green or white berries are not accepted, denoting the stage of scorching. Blackcurrants are favoured if the berries are black and shiny. Brownish-greenish berries are not accepted, indicating the stage of rot. Freshness refers to the degree of turgidity and the lively (fresh) appearance of the berries. The fruit must be freshly harvested, as it is an excessively perishable species. Raw material with a wrinkled appearance, which often also shows loss of cell juice, is not accepted. Ease of removal from the rachis is judged by the tactile detachment of the berries. Easy removal of the berries indicates that the raw material has reached technological maturity. If the technological maturity is exceeded, the berries are detached from the rachis directly in the plantation, which leads to significant yield losses. The state of health is assessed visually and indicates the extent to which the berries are attacked by diseases and the presence of impurities and traces of pesticides on the berries. Clean raw material is accepted, free from traces of disease or pesticides. Raw material affected by one or more species of micro-organisms is not accepted for fresh consumption and processing.

CONCLUSIONS

From the study of the main quality indicators of organically grown fruit the following conclusions can be drawn:

- The highest soluble dry matter content is found in cherry and sour cherry fruit and the lowest in white currant fruit.
- Blackcurrant fruits had the highest vitamin C content, particularly the blackcurrant variety.
- All varieties of fruit have acidity, which is reflected in the sour taste of the fruit, more intense in cherry and currant fruit.
- Fruits of all species are qualitatively suitable for both fresh consumption and industrialization, with a balance of sugar-acidity content. The significant vitamin C content of the fruit also provides the body with vitamin and antioxidant support.
- The sensory analysis carried out on the fruit highlighted the characteristics that should be analyzed for each species and variety, and presented both their positive and negative aspects.
- These values of chemical composition and organoleptic determinations carried out on organically grown fruit are characteristic of the species and variety and are directly influenced by the soil and climatic conditions and the cultural work applied to the crop in the year of production under study.
- Further research is recommended on the quality of organically grown horticultural products compared to conventionally grown ones.

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