

Commodity Characteristics and Quality Assessment of Fruit and Berry Raw Materials and Products of Processing Thereof

Juliya Golubtsova

State Educational Institution of Higher Education
"Kemerovo Technological Institute of Food Industry (university)"
650056, Russia, Kemerovo, Stroiteley Boulevard, 47

Abstract

The carbohydrate composition of relevant fruits and berries has been determined in this study. The titrated acidity has been stated, which amounts to 0.3-1.6%. The qualitative composition of organic acids in relevant fruits and berries has also been determined. The content of vitamins has been identified. It is shown that below mentioned fruits and berries include such vitamins as thiamine, riboflavin, folacin, carotene and vitamin C. It is proved that the total amount of minerals or ash in the composition makes 0.2-0.54%. It has been established that macro-, micro- and ultramicroelements are found in ash composition. It has been designated that the content of toxic elements in the berries does not exceed the permissible level.

It is proved that the qualitative composition and the quantitative content of individual elements are different, which is due to their biological characteristics, species specificity, accumulated elements, and availability of soils with accessible forms of elements. It has been determined that the organoleptic method cannot be applied to identify the species when evaluating and identifying processed fruits and berries.

Keywords: fruit and berry raw materials, organoleptic parameters, titrated acidity, identification.

INTRODUCTION

Fruit and berry raw materials used in food production have a positive effect on the consumer properties of the finished product [1]. In particular, they favorably influence the organoleptic characteristics of finished products: taste, aroma, color [2]. In this case, their plant components act as natural dyes and fragrances. Thanks to the presence of biologically active substances, fruit and berry raw materials have a beneficial effect on the human body [3].

Commodity characteristics of fruit and berry raw materials: high nutritional and biological value, simplicity in preparation for further production, wide assortment of fruits and berries and products of processing thereof allow using them effectively in various food technologies, including technologies for obtaining dairy products [4].

The fruits and berries studied herein as plants with predominance of water in the composition do not have high-energy value: 100 g of the edible part give only 30-100 kcal [5]. The main calorogenic material in fruits and berries is digestible carbohydrates, which predominate in the dry residue. Fruit and berries are the most valuable in nutrition as a source of biologically active substances — vitamins, macro- and microelements, substances of specific action, dietary fibers [6]. Thanks to the presence of these groups of compounds, fruits and berries improve digestion, functioning of cardiovascular system, and nervous and emotional state of a person, that is why many fruits and berries are irreplaceable in nutrition. The average annual human need in fruits and berries is 7 kg [7].

First, fruits and berries are an effective source of various carbohydrates, including sugar, polyols, pectin substances, fiber, hemicellulose [8]. Digestible carbohydrates are called sugars, namely, glucose, fructose, sucrose because of their inherent sweet taste. The total

content of sugars is from 1.0 to 20%. Monosugars, glucose and fructose predominate therein. Many fruits and berries consist of the above in approximately equal quantities. The amount of sucrose (disaccharide) for the majority does not exceed 1% [9]. In raspberries, fructose is the most sweet and dietically valuable sugar, which is advisable to use in diets with reduced caloric content, as well as for nutrition of children and diabetics [10]. Pectin substances and fiber are polymers of carbohydrate nature, the human body does not digest them, but their physiological role is rather high. Pectin substances are a part of cells and non-cellular formations. These are derivatives of galacturonic acid [11].

METHODS

Pectins may be soluble and insoluble (protopectin). The ratio between soluble pectin and protopectin in fruits and berries varies in the process of growth, ripening and storage. Accordingly, the consistency changes become noticeable. Fruits and berries contain 0.2-1.8% of pectin substances with good gelling properties manifested with a certain ratio of pectic substances, sugars and acids.

All the raw materials studied herein have been examined for their organoleptic and physicochemical quality parameters according to the requirements of the relevant regulatory documents.

The samples are selected according to GOST 26313-84 *Fruit and vegetable processing products. Rules of acceptance, methods of sampling.*

The raspberries are evaluated for compliance with the GOST R 54691-2011.

Quality parameters of gooseberries are evaluated according to the GOST 6830-89.

Quality parameters of strawberries are evaluated in accordance with the GOST 6828-89.

DISCUSSION AND RESULTS

The carbohydrate composition of fruits and berries is presented in Table 1.

The titrated acidity and qualitative composition of organic acids of the fruits and berries are shown in Table 2; the content of vitamins is given in Table 3.

Fruits and berries are a source of mineral substances, which play an important role in metabolic processes. The total amount of mineral substances or ash in the composition makes 0.2-0.54%. Macro-, micro- and ultramicroelements have been found in the ash composition.

The qualitative composition and the quantitative content of individual elements are different due to their biological characteristics, species specificity, accumulated elements, and availability of soils with accessible forms of elements. In some cases, the mineral composition may help with identification of processed products and confirm their naturalness, but is not an objective criterion for the species identification of fruit and berry raw materials.

The content of the most important minerals in the fruits and berries is given in Table 4.

The quality parameters of raspberry are shown in Table 5.

Table 1 — The carbohydrate composition of certain fruits and berries, %

Type of Raw Material	Sugars		Pectin substances	Cellulose
	Total	Sucrose		
Wild strawberry	3.7-8.1	—	0.7-1.4	4.0
Raspberry	3.6-8.4	0.6	0.5-0.7	5.2
Gooseberry	5.2-13.5	0.3-0.87	3.64-11.0	2-3
Canker berry	8.0-20.0	—	1.8-2.7	4.0
Cherry	6-10.5	0.2-0.31	0.4-0.8	1.8
Banana	16-19	2.39	—	1.7-2.2
Kiwi	7-7.8	0.3-0.5	0.4-0.45	3.8

Table 2 — The titrated acidity and qualitative composition of acids

Type of Raw Material	Titrated acidity, %	Qualitative composition of acids
Wild strawberry	1.6-2.0	Citric, malic, chlorogenic acids and their derivatives, cumaric, salicylic, quinine acids
Gooseberry	1.5-3.8	Citric, malic, dihydroxysuccinic, succinic, phosphoric acids
Raspberry	1.3-2.1	Citric, malic, formic, salicylic, chlorogenic acids
Canker berry	0.9-2.5	Malic, phenolic acids
Cherry	0.5-0.8	Chlorogenic, ellagic, citric, malic, quinine, succinic, salicylic acids
Banana	0.3-0.4	Malic acid
Kiwi	0.6-0.8	Malic, citric, salicylic, chlorogenic and its derivatives

Table 3 — The content of vitamins in certain fruits and berries, mg/100 g

Type of Raw Material	Thiamine (B ₁)	Riboflavin (B ₂)	Folic acid (B ₆)	Nicotinic acid (PP)	β-carotin	Phyloquinone (K ₁)	Tocopherols (E)	Ascorbic acid (C)
Wild strawberry	0.03	0.05	13-0.25	0.3	0.03	0.2-0.4	0.3-0.9	20-55
Gooseberry	0.01	0.02	0.03-0.26	0.1	0.7-1.0	0.3-1.0	1.0	Up to 110
Raspberry	0.02	0.05-0.06	0.15-0.32	0.3-0.6	0.2-0.7	0.3-0.6	0.3-0.6	27-93
Canker berry	0.05	0.33-0.88	0.1-0.25	0.6	2.0-2.6	0.6-1.2	1.0-8.8	670-3800
Cherry	0.03	0.03	0.05	0.5	0.1	—	0.3	15
Banana	0.04	0.05	0.4	0.9	0.12	0.5	0.4	180
Kiwi	0.02	0.04	0.2	0.5	0.09	—	0.3	180

Table 4 — The content of the most important minerals in certain fruits and berries, mg/kg

Type of fruits or berries	Potassium	Sodium	Calcium	Magnesium	Phosphorus	Ferrum	Manganese	Cobalt	Molybdenum
Wild strawberry	30.8-160.0	18.0-22.1	27.9	13-18	23.0-103.6	12-103	10-28	0.03-0.052	0.06-0.085
Gooseberry	260	23	22	9	28	0.8	0.45	—	12 µg
Raspberry	24.9-220.0	23.4	37.1	12.4	37.0-88.9	16-69	5.2-25.8	0.06	0.004
Canker berry	23-51	5-6	16-28	6-8	13	24-115	2.2-2.4	—	—
Cherry	256	20	37	26	30	0.3-0.5	0.08	1 µg	10 µg
Banana	380-384	28-31	7-8	40-42	26-28	0.6	0.27	—	—
Kiwi	300	5	40	25	30-34	0.6-0.8	0.19-0.21	1.0	10 µg

Table 5 — The quality parameters: Rubus idaeus (raspberry, Nagrada variety)

n = 5

Parameter	Characteristics and norms according to the GOST	Actual
Appearance, size and structure	Polythalamous berries — complex round-shaped or conical drupes, not adhering to lumps. They consist of a large number (30-60) of separate adnated drupes. Each berry is 7.5-12 mm. Some berries are small, spherical or elliptical separate with a drupe, having a pitlike surface.	The berries are spherical, round in shape, not stuck together in lumps. They consist of separate adnated drupes (48-60). Each berry is 9-17 mm. Comply with the requirements.
Color:		Crimson red
• surface	Greyish crimson	
• pulp	Pink	
• drupes	Dark yellow	
Smell	Specific, nice	Relevant nice
Taste	Sweet and sour	Mostly sweet
Humidity, max. %	15.0	13.0 ± 0.5
Mass fraction of total ash, max. %	3.5	1.5 ± 0.1
Mass fraction of blackened berries, max. %	8.0	4.0 ± 0.2
Mass fraction of berries stuck together in lumps, max. %	4.0	2.0 ± 0.5
Mass fraction of berries with non-separated pedicels and receptacles, max. %	2.0	0.5 ± 0.3
Mass fraction of crushed particles of berries passing through a sieve with a hole with the diameter of 2 mm, max. %	4.0	1.5 ± 0.5
Mass fraction of leaves and parts of raspberry stems, max. %	0.5	0.0
Mass fraction of extraneous bodies, max. %		
organic (berries and parts of other non-poisonous plants)	0.5	0.0
mineral (land, sand, pebbles)	0.5	0.0
Presence of poisonous plants and their parts	Not allowed	Absent
Presence of mould and rot fruits	Not allowed	Absent
Presence of stable foreign smell, which does not disappear after airing	Not allowed	Absent

Table 6 — The quality parameters: Ribes úva-crispa (gooseberry, Cooperator variety)

n = 5

Parameter	Characteristics and norms according to the GOST	Actual
Appearance	Berries are fully developed, sound and clean, without mechanical damages, damages by pests and diseases, and excessive external moisture.	Berries are developed, sound and clean, without mechanical damage, damages by pests and diseases, and excessive external moisture.
Color	Homogeneous	Homogeneous
Taste and smell	Inherent to this pomologic variety, without foreign smell and (or) taste	Sweet and sour
Ripeness level	Harvest	Harvest
Contents of berries by weight, max. %		
Mechanically damaged:		
At the point of shipment	3.0	1.5 ± 0.3
At the point of delivery	5.0	1.5 ± 0.2
With slight damage by powdery mildew	Not allowed	Absent
Impurities of vegetable origin by weight, max. %	0.3	0.1 ± 0.05

The quality of this variety complies with the appropriate GOST, the content of toxic elements in the raspberries does not exceed the permissible level (see Table 6), and the berry samples can be used for further research.

The data on gooseberry are given in Table 6. It has been determined that the gooseberry samples are typical in their form and color, the taste is sour-sweet and inherent to this variety and without foreign taste.

The content of toxic elements in the berries does not exceed the permissible level

The data on strawberry are given in Table 7.

It has been determined that the strawberry samples are typical in their appearance, color, taste and smell, and correspond to the highest grade. The content of toxic elements does not exceed the permissible level (see Table 7), and the berries can be used for further research.

The quality parameters of the canker berries are shown in Table 8.

The canker berry samples meet the respective GOST for all parameters and can be used for further research. The content of toxic elements does not exceed the permissible level

Table 7 — The quality parameters: *Fragaria* (perpetual strawberry, Berdskaya Early variety)

n = 5

Parameter	Characteristics	
	As per GOST	Actual
1. Appearance	Berries are fully developed, sound, fresh, ripe and clean, without mechanical damages and excessive external moisture, with or without peduncles, but with cups. Some berries may have no cup.	Berries are fully developed, sound, ripe and clean, without mechanical damages and excessive external moisture, with peduncles.
2. Taste and smell	Inherent to this pomologic variety, without foreign smell and (or) taste	Inherent, without foreign smell and taste
3. Berry color	Homogeneous	Homogeneous
4. Ripeness level	The same ripeness level	
5. Size by the largest transverse diameter, min. mm: • for fresh consumption • for industrial processing	25.0 25.0 (high grade) Not standardized (grade I)	29.0 ± 0.5 —
6. Contents of berries by weight, max. % mechanically damaged: at the point of shipment at the point of delivery damaged by pests and birds	2.0 (high grade), 5.0 (grade I) 5.0 (high grade), 10.0 (grade I) 2.0 (high grade) 3.0 (grade I)	1.0 ± 0.2 1.5 ± 0.5 1.0 ± 0.1

Table 8 — The quality parameters: *Rosa majalis* Herrm (canker berry, Maysky variety)

n = 5

Parameter	Characteristics and norms for raw materials	
	Used as a medicine and in the food industry	Actual
1. Appearance	Sound, cleared from sepals and stems, false berries of various shapes: from globular, obovoid or oval to highly elongated spindle-shaped; the length of berries is 0.7-3 cm, diameter 0.6-1.7 cm. There is a small round hole or pentagonal area at the top of each berry. Berries consist of an overgrown receptacle (torus) and numerous nut-fruitlets inside the cavity. The berry walls are solid and fragile; the outer surface is shiny, matte more rarely, more or less wrinkled. Inside the berry is abundantly lined with long, very stiff bristly fuzzes. The nuts are small, oblong, with slightly shaped facets.	Sound, from spherical to oval, the length of berries is 1.8-3.2 cm, diameter 0.8-1.8 cm. There is a small round hole at the top of each berry. It consists of torus and nut-fruitlets in the cavity. The walls are solid; the outer surface is shiny and wrinkled. Inside the berry is lined with long and stiff bristly fuzzes. The nuts are small, oblong, with slightly shaped facets.
2. Color: berries nuts	From orange-red to brownish-red Light yellow, sometimes brownish	Orange-red Light yellow
3. Smell	Inherent to this raw material, without foreign smell	Inherent, without foreign smell
4. Taste	Sweet and sour, slightly astringent	Sweet and sour, slightly astringent
5. Humidity, max. %	15.0	12.0 ± 0.5
6. Mass fraction of ascorbic acid, min. %	0.2	0.4 ± 0.01
8. Mass fraction of total ash, max. %	3.0	1.0 ± 0.1
9. Mass fraction of other plant parts (pieces of twigs, leaves, sepals and stems), max. %	2.0	0.5 ± 0.1
10. Mass fraction of blackened, burnt, damaged by diseases or pests berries, max. %	1.0	0.3 ± 0.1
11. Mass fraction of crushed particles of berries, including nuts, passing through a sieve according to TU 23.2.2068 with holes of 3 mm diameter, max. %	3.0	1.0 ± 0.5
Mass fraction of immature berries (from green to yellow color), max. %	5.0	1.0 ± 0.5
12. Mass fraction of extraneous bodies:		
organic (parts of other non-poisonous plants), max. %	0.5	Absent
mineral (land, sand, pebbles), max. %	0.5	Absent

The quality parameters of the cherry used for research are shown in Table 9. It has been determined that the cherry samples correspond to the commercial grade I according to their quality; they have typical shape and color; the content of toxic elements does not exceed the permissible level

The quality parameters of the bananas used for further research are shown in Table 10. The bananas have been examined after ripening, i.e. eating-ripe; Extra variety, produced in Ecuador. The data show that the banana samples correspond to the commercial grade extra, the content of toxic elements does not exceed the permissible level

The quality parameters of the kiwi are shown in Table 11. It has been determined that the kiwi samples are of the highest grade and can be used for further research.

The content of toxic elements does not exceed the permissible level (Table 12)

Table 9 — The quality parameters: Prunus fruticosa (steppe cherry, Altai Swallow variety)

n = 5

Parameter	Characteristics	
	As per GOST	Actual
1. Appearance	The berries are typical in form and color for this pomologic variety (grade I). The berries are typical and atypical in form and color for this pomologic variety (grade II).	The berries are typical in form and color for this pomologic variety.
2. Ripeness level	The berries have the same ripeness level, but they are not green and not overripe (grade I). The berries may have different same ripeness levels, but they are not green and not overripe (grade II).	The berries have the same ripeness level
3. Size by the largest transverse diameter, min. mm	15 (grade I) Not standardized (grade II)	17.0 ± 0.5
Including for small-fruited varieties (Vladimirskaya, Samarkand, Rastunya, Kartuliabali, Shubinka), as well as for steppe and Nanking cherry	12 (grade I) Not standardized (grade II)	

Table 10 — The quality parameters: Músa paradisiaca (bananas, Extra variety)

n = 5

Parameter	Characteristics and norms for the grades		Actual
	extra	grade I	
Appearance	The fruits are of the same pomologic variety. The fruits in bunches are solid, fresh, clean, sound, developed, unrefined, without remains of flowers, with well-shaped ribbed lateral facets. The crown is green; its slices are smooth, sound, not overdried.		The fruits are of the same pomologic variety. The fruits in bunches are solid, fresh, clean, sound, with well-shaped ribbed lateral facets. The crown is green; its slices are smooth, sound, not overdried.
Taste and smell:	Specific smell of ripe bananas, taste sweet, without foreign taste and aroma.		Specific taste, sweet, without foreign taste and aroma.
Ripeness level:	When cutting the fruits, the milky juice exudes. The fruits are eating-ripe, with greenish-yellow or yellow coloring of the peel, but not overripe, dense, rounded, with cream pulp.		When cutting the fruits, the milky juice exudes. The fruits are eating-ripe, with yellow coloring of the peel, but not overripe, dense, rounded, with cream pulp.
Size of the fruits:			
— by the largest transverse diameter, cm	3.0-4.0		3.0 ± 0.3
— by the length, min. cm	20.0	19.0	21.0 ± 1.2
Number of fruits in a bunch, pieces	4-8	4-9	7.0 ± 1.0
Number of bunches in a packing unit, pieces	15-18	14-18	17.0 ± 0.9
ALLOWABLE VARIATIONS			
The content of bananas with deviations from the established sizes shall not exceed:			
— by the diameter for 0.5 cm, max. %	2.0	5.0	1.0 ± 0.2
— by the length for 1.0 cm, max. %	3.0	5.0	2.0 ± 0.7
Surface damage to the skin that does not affect the pulp, mechanical and caused by agricultural pests on a fruit with the total area max. cm ²	1.0	2.0	0.5 ± 0.02
Berries with latex stains (spots), max. %:			
— the area below 10 cm ²	Not limited		0
— the area over 10 cm ²	1.0	2.0	0
Broken fruits with skin tears at the stalk, deep cuts, strong pressure, cracks, when the pulp is affected by anthracnose, fusariosis, sigatoka disease; decayed, rotten, stained, 3-4 degrees chilled, frozen, crushed, with strong damage by agricultural pests (skin ulcers, deep red spots of thrips), overripe with dark brown, black or spotty skin color	Not allowed		Absent

Table 11 — The quality parameters: Actinidia deliciosa variety (kiwi)

n = 5

Parameters	Characteristics and norms for the commercial varieties			Actual
	high grade	grade I	grade II	
Appearance	The fruits are fresh, clean, sound, eating-ripe, well-formed, without stem, not overripe, without damage by insect pests and diseases, without excessive external humidity, typical form and color for this pomologic variety			The fruits are fresh, clean, sound, eating-ripe
	Minor skin defects that do not affect the quality are allowed.	The fruits may have slight defects of shape, but without warts and deformities; with slight color or skin defects with the total area max. 1 cm ² ; with small traces from the removed labels in the form of longitudinal lines; without bumps.	The fruits may have defects in shape, color or skin in the form of insignificant overcast cracks or scratched/torn tissue with the total area max. 2 cm ² ; with small traces from the removed labels; with small bumps or minor dimples	Without damage by pests and diseases, prolate oval form, green color
Taste and smell	Inherent to this pomologic variety, without foreign smell and taste			Inherent, without foreign
Internal structure	The pulp is firm, juicy, elastic, without damage			The pulp is firm, juicy, elastic, without damage
The ratio of the minimum diameter to the maximum one of a fruit measured in the cross section, min.	0.8	0.7	Not standardized	1.0 ± 0.1
Weight of a fruit, min. g	90.0	70.0	65.0	91.0 ± 2.5
Ripeness level	Homogeneous	Homogeneous	Homogeneous, berries may have different ripeness level, but not overripe	Homogeneous
Mass fraction of soluble solids, min. %	15.0			17.7 ± 0.8
Mass fraction of fruits with deviations from the standardized weight over 10%, max. %	Not allowed	5.0	10.0	—
Mass fraction of fruits with slight defects in shape and color, with minor dimples or bumps, max. %	Not allowed	5.0	10.0	1.0 ± 0.5
Mass fraction of fruits with superficial skin defects with the total area max. 1 cm ² , max. %	Not allowed	5.0	10.0	—
Mass fraction of fruits with skin defects in the form of overcast cracks or scratched/torn tissue with the total area max. 2 cm ² , max. %	Not allowed	Not allowed	5.0	—
Mass fraction of wilted, soft, watery, overripe, mouldy, rotten, insect-damaged fruits; with mechanical damage; with damaged pulp; with excessive external humidity, max. %	Not allowed			Absent
Mass fraction of adnated fruits, max. %	Not allowed			Absent

Table 12 — The content of toxic elements in relevant fruits and berries

Raw Material	Element			
	Pb	As	Cd	Hg
Raspberry	0.023	Below 0.02	0.011	Below 0.00002
Gooseberry	0.029	Below 0.02	0.012	Below 0.00002
Wild strawberry	0.030	Below 0.02	0.013	Below 0.00002
Cherry	0.075	Below 0.04	Below 0.01	Below 0.00002
Canker berry	0.040	Below 0.04	Below 0.01	Below 0.00002
Banana	0.030	Below 0.03	Below 0.005	Below 0.00002
Kiwi	0.030	Below 0.03	Below 0.005	Below 0.00002
Allowable level as per Sanitary Regulations and Standards 2.3.2.1078-01, mg/kg	Max. 0.4	Max. 0.2	Max. 0.03	Max. 0.02

Table 13 — The identification parameters for certain fruits and berries

Fruits, berries	Shape, size, number of fruits (berries) in a stem, flower, etc.	Presence of wax coating, skin or pulp coloring	Some features of the internal structure	Consistency	Taste and smell
Gooseberry, <i>Cooperator</i> variety	The berries are spherical or broadly elliptical, with a diameter of 13-15 mm	Green, yellow, reddish or purple, with well-shaped fibers	Numerous seeds in the pulp	Juicy	Sweet and sour
Raspberry, <i>Nagrada</i> variety	Spherical and round-conical polythalamous drupes in the thyroid-paniculate brushes	Crimson red	A berry is easily separated from the receptacle, hollow inside	Juicy	Predominantly sweet, aromatic
Wild strawberry, <i>Berdsкая Early</i> variety	Long-conical, egg-shaped berries up to 10 mm in diameter, developed from the receptacles	Bright red with glossy surface color and slightly lighter pulp	Sepals are easily separated from the berries	Juicy	Sweet and sour, strong flavor
Canker berry, <i>Rosa canina</i> variety	Jar-shaped and globular berries (torus), developed from the receptacles	From orange-red to ruby and dark purple	9-26 stony pubescent seed pods inside, developed from pestles	Dense	Sweet and sour, delicate aroma
Cherry, <i>Altai Swallow</i> variety	Globular shape	Dark purple	A berry is easily separated from the drupe	Juicy	Sweet and sour, aromatic
Bananas, <i>Extra</i> variety	The fruits with well-shaped ribbed lateral facets. The crown is green, its slices are smooth, sound, not overdried; 4-8 fruits in a bunch	Yellow skin, pulp cream	The pulp is not blackened, uniform cream color	Dense	Sweet, aromatic
Kiwi, <i>Actinidia deliciosa</i> variety	Oval, without dark spots on the surface, the skin is tightly attached, the weight is from 65 to 90 g.	Uniform skin color	Numerous seeds in the pulp	Juicy	Sweet and sour

The data show that the examined fruit and berry raw materials meet the quality requirements of the relevant regulatory documents and can be used for further research and species identification.

While carrying out the commodity valuation, the purpose of identification is to determine and confirm the authenticity of a particular variety and product description, as well as compliance with certain requirements or information indicated on the marking and/or shipping documents (TR TS 022/2011). For fruit and berries, the most important is assortment (species) identification, i.e. determining the product description by assortment.

While examining certain fruits and berries, the main purpose is to confirm the compliance of the properly identified products with the requirements of relevant regulatory documents for quality and safety and, therefore, suitability for direct use.

The set of parameters regulated by the normative documents and applied for examination includes mostly the organoleptically determined ones: appearance, size, presence of minor and critical defects, including damages

by microbiological and physiological diseases. In some cases, their taste and smell are regulated (see Table 13). No clear criteria for evaluating these parameters are set, which results in subjectivity.

CONCLUSION

Certain botanical characteristics are used as criteria to identify herbaceous plants. These criteria are organoleptical, and the expert should have sufficient experience for an unmistakable recognition of *the species* and *varieties* of fruit and berries. First, it is the appearance of that vegetative part of the plant, which is intended for consumption. Attention should be drawn to the state of the surface (smooth, pubescent, ribbed, etc.), skin color, internal structure, petioles of leaves, and the shape of the leaves themselves, etc.

However, the organoleptic method cannot be applied to identify the species in the case of evaluation and identification of processed fruits and berries.

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