

QUALITY AND NUTRITIVE VALUE OF CITRIC FRUITS

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The citric fruits are for the Romanian consumer imported fruits, appreciated for their nutritive and dietary qualities, a source of vitamins and minerals with numerous curative properties. Their valorization is made in certain quality conditions according to the European standards. Up to delivery, they must be kept in specific conditions. After the adhesion to the EU, the assortment diversified and extended with citric species and breeds unknown before.

The quality of the citric fruits for fresh consumption is standardized for the Romanian consumers by SR 11084 from August 1996, which is drawn up in accordance with the European standard. This has as object 4 groups of fruits from this category: lemons, oranges, mandarins and grapefruits, with characteristic categories. The conditions of general acceptability refer to whole fruits, healthy, untouched by rot, without alterations, damages or deteriorations from frost, clean, without any visible traces of treatment, without abnormal exterior humidity, without smells and/or strange tastes. The fruits will have an adequate maturity degree and development that might allow transport and manipulations and will arrive to destination with a normal coloration.

For every three qualities are mentioned detailed characteristics and criteria. The calibration criteria are of the type of those existing for peaches and tomatoes meaning that over a certain caliber there is no correlation between diameter and quality.

For every kind of citric fruits are mentioned the origin, the alimentary and dietetic value and also the directions of transformation.

In this paper are discussed in the final part some conditions of handling and preservation, for every kind of fruit.

Keywords: *citric fruits, standardized valorization, offer of a new assortment.*

The quality of the citric fruits for fresh consumption is standardized for the Romanian consumers by SR 11084 from August 1996, which is drawn up in accordance with the European standard.

This has as object 4 groups of fruits from this category: lemons (*Citrus limonia* Osbeck), oranges (*C. sinensis* Osbeck), mandarins (*C. reticulata* Blanco – satsuma; Clementines; tangerines; wilking and hybrids of the species) and grapefruits (*C. paradisi* Mac – Farlane – white, pink, red and pomelos).

MATERIAL AND METHOD

The study relies on the citric fruits from the commercial offer existing in Iasi, both fresh and processed products. Most of assortments were traditionally known but there have also appeared other species or types of citric fruits. On account of a fundamental bibliographic material and in accordance with the existing standards we proceeded to the systematization and quantification of results to appreciate correctly the perspectives of this type of commerce with fruits in the conditions from Iasi.

RESULTS AND DISCUSSION

The conditions of general acceptability refer to whole fruits, healthy, untouched by rot, without alterations, damages or deteriorations from frost, clean, without any *visible* traces of treatment, without abnormal exterior humidity, without smells and/or strange tastes. The fruits will have an adequate maturity degree and development that might allow transport and manipulations and will arrive to destination with a normal coloration. They do not accept fruits that started to dry or have bruises or large scarred wounds.

Table 1

Minimum contents in juice and coloration of the citric fruits [17]

Species	Juice %	Coloration
Lemons of the breed Verdelli and Primofiore	20	Characteristic, the breed Verdelli may have an easily greenish coloration
Lemons of other breeds	25	They accept an easily greenish coloration and a minimum juice contents depending on origin and the moment of harvesting
Montreals and Satsuma	33	Typical for at least 1/3 fruit surface
Clementines and Ellendale	40	Typical for at least 2/3 fruit surface
Willing, Tangerines, other mandarins	33	Typical for at least 2/3 fruit surface
Oranges		Typical for the breed, they accept under 1/5 from the green surface depending on breed and period of harvesting
Thomson Navel and Tarroco	30	
Washington Navel	33	
Other varieties	35	
Grapefruit (pomelos)	35	Typical for the breed but they accept greenish fruits with a minimum contents of juice depending on area and period

There are 7 caliber scales for lemons (72-83, 68-78, 63-72, 58-67, 53-62, 48-57 and 45-52). There are 13 caliber scales for oranges (87-100, 84-96, 81-92, 77-88, 73-84, 70-80, 67-76, 64-73, 63-70, 60-68, 58-66, 56-63 and 53-60). There are 10 caliber scales for mandarins (35-63 and over), and 9 caliber scales for grapefruits (pomelos) (80-139).

For the extra category, the arrangement in regular layers in open or closed packings is compulsory. For category I they accept the presentation wholesale in open or closed packings and for category II they accept the wholesale delivery. They also admit individual packings of 5 kg at most for sale directly to consumers.

Oranges coming from China and India were brought in Europe by the crusaders and in the 16th century they reach Portugal and Spain. They have vitamins, minerals, and have a nutritive, tonic, anti-infectious and digestive effect, they fluidize blood, are diuretic and antifebrile. They are recommended in 28 internal disorders and have 3 external uses.

The orange juice has a mineralizing, diuretic, laxative, anti-scorbutic, anti-hemorrhagic, anti-infectious, antitoxic effect, is a muscular and nervous system tonic, a vascular protector, blood thinner, a regenerator of tissues and teguments reinforcing the natural capacity of the body for defense. The main therapeutic indications are: anemia, asthenia, intellectual overwork, demineralization, growing, convalescence, senescence, dyspepsia, intoxications etc.

Lemons originating from India, introduced by Arabs in Sicily, after 1000, spread all over Europe after 1450, taken from Arabs (*limun*). They have vitamins and are diuretic, vermifuge, digestive, anti-microbial, bactericide and antiseptic. Moreover they stimulate the formation of leucocytes, erythrocytes; they are antifebrile, have anti-sclerotic, anti-scorbutic properties, fluidize blood, are depurative and favor the pancreatic, gastric and hepatic secretions. There are 54 recommendations for internal use and 24 for external use both for prevention and cure. As therapeutic recommendations due to the volatile oil, lemons may be used in digestive and respiratory infections, good effects are also obtained in hepatic disorders.

In the lemon skin the contents of ascorbic acid is higher than in juice (163 mg per 100 g). In biotherapy, lemons are used for their numerous effects on the good functioning of the human body: they are alkalinizing, diuretic, anti-anemic, haemostatic, hypotensive, uricolytic, anti-gout, anti-sclerotic, anti-febrile, anti-rheumatism, vermifuge and anti-venomous. The lemon juice fluidizes blood, activates the white blood cells to defend the body, prevent obesity, has a tonic effect on the heart, vessels and nerves, stimulates the gastro-hepatic and pancreatic secretions. According to Favier, (1995) fruits have 89% humidity, 3% glucides, 2,1% fibers, 0,2% minerals (K, Ca, P, Mg), vitamin C 52 mg%, small quantities of B complex.

Grapefruit coming from China (2200 BC), imposed itself very late for consumption (19th century Florida – USA, 20th century Italy, Spain, Cyprus), due to its bitter taste. It is used to treat overwork, intoxications, vascular diseases, nutrition diseases, lung diseases, hypertension, and virosis. [6]

The grapefruit juice is appetizer, tonic, refreshing, anti-hemorrhagic, depurative, a hepatic protector, a cleaner of the gallbladder and the urinary tract, thinner of blood and a vascular protector. It is indicated especially in the therapy of the following disorders: anorexia, tiredness, dyspepsia, intoxications, arthritis, capillary fragility, gall disorders, hepatic disorders, febrile states, lung disorders, impotence, and senescence. The fruits contain vitamin C in proportion of 37 mg%

Mandarins were introduced in Europe at the beginning of the 19th century [7]. They come from China, and tangerines from S-E of Asia. They are recommended to prevent degenerative diseases, stress, dental disorders, infections,

vascular diseases, hepatic disorders and convalescence. They are considered a sedative of the nervous system since they contain bromine. [12]. Fruits have 87% humidity, glucides over 10%, minerals almost 0,2%, vitamin C 41 mg% and vitamins from the B group. [6]

Table 2

Chemical composition of the citric fruits [1, 10,13, 7]

Chemical components	oranges	lemons	grapefruit
Humidity (water) (%)	87,5	86 – 88	89,0
Proteins (%)	0,9	0,5 – 0,9	0,9
Mono-glucides (%)	7,5	3,0	6,5
Total glucides (%)	8,4 – 9	3,6 – 5	7,4 – 9
Cellulose (%)	1 – 1,4	1,3	0,2 – 0,7
Citric acid (g)	1,3 – 2,5	5,7 – 8	1,7
Ash (%)	0,5	0,5	0,5
Sodium (mg)	13	2 – 11	13
Potassium (mg)	130 – 197	95 – 163	130 – 190
Calcium (mg)	30 – 34	40 – 87	12 – 23
Magnesium (mg)	13	12	8 – 12
Phosphor (mg)	15 – 23	10 – 22	8 – 18
Iron (mg)	0,3	0,3 – 0,6	0,1 – 0,5
B Complex (mg)	0,1	-	0,1 – 0,6
Vit. PP (mg)	0,2	-	-
Ascorbic acid (C) (mg/100g)	30 – 100	30 – 100	32 – 60
Energetic value (Kcal)	38	31	23 – 35
Other mineral constituents (µg)	boron, iodine, copper, chlorine	boron, copper, chlorine, zinc	
Other organic constituents (µg)	citral, limonene β cryptoxantine	limonene	licopen, quercirtine

Table 3

Chemical composition of the citric fruits [1, 8, 10,13, 7, 2]

Chemical components	Mandarins	Clementines	Satsuma	Kumquat
Humidity (water) (%)	88,5		85,17	80,85
Proteins (%)	0,8	1,0	0,81	1,88
Mono-glucides (%)	8,1 - 10		2,40	9,36
Total glucides (%)	8,6	9	10,58	
Cellulose (%)	0,6		1,8	
Ash (%)	0,5		0,38	0,52
Sodium (mg)	12		2	10,0
Potassium (mg)	110 - 155	177	166	186,0
Calcium (mg)	27 - 35	30	37	62
Magnesium (mg)	11	10	12	20
Phosphor (mg)	14 - 17	21	20	19
Iron (mg)	0,1	0,1	0,15	0,86
B Complex (mg)	0,1	0,2	0,15	0,12
Vit. PP (mg)	0,2	0,6		
Ascorbic acid (C) (mg)	38	48,8	26,7	43,9
Energetic value (Kcal)	38	47	53	71
Other constituents	limonene, β cryptoxantine	Folic acid, vit. E	pantothenic a., vit. E, A	pantothenic a., vit. E, A

Satsuma, come from Japan (16th century), are perfumed citric fruits, very sweet, without seeds, with a succulent pulp and the fruit skin has a bright orange color. They are rich in sugars, represent a source rich in vitamin C and have a high contents of mineral substances. [2]

Kumquat (*Fortunella japonica*, kumqua = orange yellow in South Chinese) comes from South China (Canton) has small, orange yellow fruits that may be consumed fresh (with skin) or as jams, marmalades, stews, crystallized fruits, fine liqueurs, juices, nectars and even marinades. They may be kept only a few days at the room temperature or in casseroles wrapped in plastic sheets for about 15 days, at 10⁰C. In Romania they are very expensive. [2]

Limequat (hybrids *Citrus x Fortunella*) differs from kumquat by the green color, more intense flavor and the higher contents in vitamin C, but it has lesser glucides.

Table 4

Chemical composition of the citric fruits [10]

Quantity (g/1 piece of fruit)	Kcal	Lipids	Proteins	Glucides	Fiber
Orange	62	0,2	1	12,2 /15	3,1
Mandarin	37	0,2	1	7,5 /9	1,9
Canned mandarins (1 mug)	154	0,3	1	39 /41	1,8
Pink or red grapefruit (1/2 med)	52	0,2	1	8,5 /13	1,9
White grapefruit (1/2 med)	39	0,1	1	8,6 /10	1,3
Lemon (only juice)	12	0	tr	1,1 /4	0,2
Green lemon (only juice)	10	tr	tr	0,6 /3	0,2
Orange juice (1 mug)	112	2	2	20,8 /26	0,5

In the world people consume, in fresh or processed state, other numerous species of citric fruits such as citron (*C. medica*), the bitter orange (*C. aurantium* syn. *amara*), lime (*C. aurantifolia*), the trifoliolate lemon (*Poncirus trifoliata*) etc.

Oranges and mandarins are rich in beta cryptoxanthine, a pigment from the family of carotenoids that may stop the development of certain tumors. The pink and red grapefruit contain lycopene, another pigment that may protect the human body against prostate cancer and other forms of cancer.

All citric fruits contain limonene, some compounds that neutralize certain carcinogenic chemical substances. [10]

Table 5

Temperatures recommended for the frigorific storage of the citric fruits [15]

Type of citric fruits	short storage		medium storage		long storage	
	No. of weeks	t ⁰ C	No. of weeks	t ⁰ C	No. of weeks	t ⁰ C
Green lemons	6	10..17	6...12	13...14	13...14	12...16
Mature	4	8...17	4...6	10...14	6...8	2...5
Valencia Oranges	4...6	2...12	6...8	2...10	8...16	2...3
Navel Oranges	2...4	4...12	6	2...10	8...12	2...3
Mandarins, Clementines	2	8...17	3	6	4	4...8
Satsumas	1...2	10...12	3	6...8	8	4
Grapefruit	4	8...15	4...6	8...12	6...12	8...12

Storage of the citric fruits is standardized (STAS R 9127/13). The introduction of fruits in the storehouse must be effectuated within 24 hours from their reception in good conditions of quality. They accept only certain breeds for storage.

The storage temperature is 10-18°C, depending on the species, at an optimum relative humidity of 85-90% and a recirculation coefficient (the volume of air re-circulated in one hour as compared to the volume of the empty storehouse) of 25-50. They will take care so that there should not accumulate a volume of CO₂ higher than 0,2 – 1%. During storage there may appear cryptogamic diseases (7 are more frequent) and physiopathies (in a potential number of 4). [16]

CONCLUSIONS

The citric fruits represent an important assortment for demand and offer of fresh and processed products existing throughout the year in the important commercial units from Iasi. Besides the known traditional assortment, in the commerce of Iasi there have appeared completely new assortments, breeds and even species belonging to the group of citric fruits. A part of this offer is not standardized in terms of the consecrated notions of citric fruits.

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