

CHERRY PLUM (PRUNUS CERASIFÉRA) – SOURCE MATERIAL AND PROCESSED PRODUCTS

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Summary: Cherry plums are one of the most common types of primary drupes and used in the production of juices, kompot, sweets, jams, confiture.

In the catalog of plant varieties of Moldova there is no data on the species of cherry plum which can be used in production. Testing those varieties, from the point of view of agrobiolgy and chemical and technological characteristics, determines the direction of utilizing them in the secondary industry. Presently, there has appeared an interest in acids based on plants, which will allow to broaden their utility. This includes cherry plum, and will allow for these acids to be used in food products as natural acids (fruit nectar, berries and legumes, juices, sauces, condiments) in place of citric acid.

From the varieties of cherry plum presented for testing there have been produced juices and puree (semi-produced from cherry plum) which was used to produce fruit based condiments and sauces. As well as providing tasting qualities, the cherry plum puree also confers acidity to the product.

There were determined physicochemical indexes of fresh cherry plums and of their products, fabricated mostly in conformance with recipes and technologies used the food industry, but also with newly developed recipes.

Recommendations of rational use of new types of cherry plum, cultivated on experimental plots of IP IȘPHTA, have also been developed, as well as the recommendations for stabilizing and expanding the sphere of use of cherry plums in the food industry.

Key words: cherry plum, testing, variety, processing, specie characteristics.

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Below there are presented descriptions of the researched sorts of cherry plum and their biometric and physicochemical characteristics. Externally, depending on the sort, cherry plums are differentiated by colour, size and mass, with or without the separation of the pit from the flesh.

In the Konservnii rannii, Naidena, Chernomorskii and Selena sorts pits do not separate from the flesh. In sorts Karamelinii, Serenada, Chuk, Olenika, Tavricheskii they are separate. Depending on the sorts, the mass of a single cherry plum can be within the range of 9-22g. Small fruits are characteristic for the Konservnii rannii, Karamelinii and Tavricheskii sorts. The mass of the pit relative to fruit mass ranges

from 4,5% to 6,6%. Large sized pits are characteristics of the sort Chernomorskii (10%).

Table 1. Biometric and physico-chemical indexes of cherry plum sorts.

<p>Konservnirannii</p> 	<p>Spheric fruit, dark burgundy in colour, no fissures. Exocarp is smooth. Flesh is dark yellow, not succulent, soft. 30% of the fruits are not ripe, light red colour, hard flesh with a sour taste and light yellow in colour. The pit is small, not separated from the flesh (5,75% from the mass of the fruit). Faint smell. Median mass of the fruits is 9g, average length - 24,6mm, diameter - 25,1mm. Mass fractions, %: soluble substances - 11,2; total acidity, recalculated in malic acid - 1,93; total inverted sugar - 6,95; total reduced inverted sugar - 3,31; ascorbic acid, mg/100g - 5,67; pH - 2,95.</p>
<p>Chernomorskii</p> 	<p>The fruit is big, spheric, non uniform in colour, from green to red, not ripe, hard, average mass - 16,6g. Exocarp is glossy, no fissures. Flesh is yellow, succulent, sour taste, hard. Characteristic cherry plum smell. Pits are big, not separate. Average length - 30,7 mm, diameter - 30,4 mm. Mass fraction, %: soluble substances - 9,8; total acidity, recalculated in malic acid - 1,98; total inverted sugar - 6,95; total reduced inverted sugar - 5,60; total reduced inverted sugar - 4,91; ascorbic acid, mg/100 g - 1,64; pH - 2,83.</p>
<p>Karamelinii</p> 	<p>Fruit is of medium size, spheric, dark burgundy colour, tough and hard. 20% of the fruits are not ripe, light red in colour, with an sour taste. Exocarp is glossy, without fissures. The flesh is rose-yellow in colour, with a sour taste and no succulence. Characteristic smell. Pits are small, separate a little(6,25% from the mass of the fruit). Average length - 25,17 mm, diameter - 25,0 mm. Mass fraction, %: soluble substances - 13,6; total acidity, recalculated in malic acid, - 2,17; total inverted sugar 9,10; total reduced inverted sugar - 3,15; ascorbic acid, mg/100 g - 4,76; pH - 3,00.</p>
<p>Naidena</p> 	<p>The fruit is big, beautiful, tough, non uniform in colour, red-yellow, shape is oval, no fissures, with small bumps. Average mass - 22g. Flesh is yellow, succulent, hard. Sour taste, astringent. Faint smell of cherry plum. Pits are big, not separated from the flesh (6,6% of fruit mass). Average length of the fruits 36,1 mm, diameter - 32,0 mm. Mass fraction, %: soluble substances - 10,5; total acidity, recalculated in malic acid, - 1,83; total inverted sugar 6,57; total reduced inverted sugar - 6,23; ascorbic acid, mg/100 g - 4,76; pH - 2,98.</p>

<p style="text-align: center;">Chuk</p> 	<p>Fruit is big, spheric, hard. Exocarp is not uniform in colour, part red part yellow, smooth, consistent, with a thick layer of pruinescence. Average mass is 15,6g. Flesh is yellow, sweet, a bit sour, not succulent, uniform. Faint smell of cherry plum. Pits are small, separate a little (6,05% of fruit mass). Average length of the fruits – 31,1 mm, diameter – 30,3 mm. Mass fraction, %: soluble substances - 11,2; total acidity, recalculated in malic acid, - 1,83; total inverted sugar 7,28; total reduced inverted sugar - 7,22; ascorbic acid, mg/100g – 2,90; pH - 2,92.</p>
<p style="text-align: center;">Selena</p> 	<p>Fruit is of medium size, round, slightly flat. Exocarp is bright yellow, with roze spots, uniform, no pruinescence, with a sour taste. Average fruit mass - 13,5g. Flesh is bright yellow in colour, with a sweet slightly sour taste, succulent. Weak characteristic cherry plum smell. The taste is reminiscent of wild plums. The pit is small, slightly separated (5,0% of fruit mass). Average length of the fruits – 27,0 mm, diameter – 28,4 mm. Mass fraction, %: soluble substances - 11,2; total acidity, recalculated in malic acid - 2,10; total inverted sugar 7,12; total reduced inverted sugar - 6,88; ascorbic acid, mg/100 g - 1,45; pH - 2,90, diameter – 28,4 mm.</p>
<p style="text-align: center;">Serenada</p> 	<p>Large sized fruit, round, slightly flattened, hard, consistent. 50% of the fruits are large, round, dark burgundy in colour, with a fine consistency. Flesh is roze-yellow, succulent, with a sour slightly sweet taste. 50% of the fruits yellow-red, with red spots and fissures. Fruit is small, hard, with no pruinescence. Flesh is yellow, not succulent, with an acidic taste. Taste and smell are slightly pronounced. Pits are small, separate a bit (4,5% of the fruit mass). Average fruit mass - 20,0g. average length – 32,3 mm, diameter – 33,1 mm. Mass fraction, %: soluble substances - 16,6; total acidity, recalculated in malic acid, - 1,97; total inverted sugar 9,15; total reduced inverted sugar - 7,41; ascorbic acid mg/100 g - 5,4; pH - 3,00.</p>
<p style="text-align: center;">Olenika</p> 	<p>Medium sized fruit, oval in shape, slightly flat, dense and hard. Skin is yellow-red, part roze, with a faint layer of pruinescence. Flesh is yellow, a bit succulent, consistent, with a sour taste. Taste and smell are pronounced, characteristic of plums. Pits separate slightly from the flesh (5,2% of fruit mass). Average fruit mass - 19,2g, average length – 34,5mm, diameter – 31,0mm. Mass fraction, %: soluble substances - 12,0; total acidity, recalculated in malic acid, - 2,28; total inverted sugar 7,98; total reduced inverted sugar - 7,73; ascorbic acid, mg/100 g - 3,26; pH - 2,90.</p>


<p>Tavrisheskii</p> 	<p>The fruit is of medium size, oval in shape, slightly flattened, dense. Skin is yellow-red, non uniform in colour, thin, easily chewable. Flesh is yellow-red, with spots, not succulent, with a sour taste and a smell characteristic of cherry plums. Pits are slightly separated from the flesh (5,5% of fruit mass). Average fruit mass – 12,5 g, average length – 25,8mm, diameter – 26,8 mm. Mass fraction, %: soluble substances - 13,6; total acidity, recalculated in malic acid, - 2,10; total inverted sugar 6,42; total reduced inverted sugar - 6,94; ascorbic acid, mg/100 g - 2,88; pH - 1,86.</p>
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Table 1 presents the results of the research regarding the determination of physicochemical characteristics of cherry plum sorts. The data in the table indicates that solid contents of early, medium and late sorts of cherry plum from 9,8 to 13,6%, depending on the sort. The following sorts have an increased amount of solids - Selena, Karamelinii, Tavrisheskii – 13,6%. According to acidity, the sorts can be classified into 2 groups: with acidity of 2,10 - 2,28 % (Olenika, Selena, Karamelinii, Tavrisheskii), and with lower amounts of 1,83 - 1,98 % (Konservnii rannii, Naidena, Chernomorskii, Serenada, Chuk). This data means that all mentioned sorts of cherry plum can be used as acidifiers. The total contents of sugar in cherry plum vary from 5,60 to 9,15 %, with a predominance of reducing sugars (80,98 - 99,04 %) in Naidena, Chernomorskii, Serenada, Selena, Chuk, Olenika, Tavrisheskii sorts. The amount of ascorbic acid is negligible in all sorts.

Table 2. Physicochemical indices of fresh cherry plum.

Sort of cherry plum	Mass fraction, %				Ascorbic acid, mg/100g	pH	Exocarp resistance to puncture, kg/mm ²
	soluble substances	total acidity, recalculated in malic acid	Inverted sugar				
			total	reduced			
Konservnyy ranniy	11,2	1,93	6,95	3,31	5,67	2,95	1,2
Naydena	10,5	1,83	6,57	6,23	4,76	2,98	3,0
Chernomorskiiy	9,8	1,98	5,60	4,91	1,64	2,83	2,5
Karamel'nyy	13,6	2,17	9,10	3,15	4,76	3,00	1,7
Serenada	13,6	1,97	9,15	7,41	5,64	3,00	-
Selena	11,0	2,10	7,12	6,88	1,45	2,90	-
Chuk	11,2	1,83	7,29	7,22	2,90	2,92	-
Olen'ka	12,0	2,28	7,98	7,73	3,26	2,90	-
Tavrisheskiy	13,6	2,10	8,42	6,94	2,88	1,86	-

Note: (-) – not determined

As the result of technological research there was a tasting of experimental samples of products based on cherry plum.

Goal of the tasting procedure: Evaluate organoleptic qualities of preserved foods based on cherry plum - kompots, nectar and sauces.

Subject of the tasting procedure: Preserved cherry plum puree based foods - kompots and sauces. Cherry plums were harvested on experimental plots of the Scientific and Practical Institute of Horticulture and Alimentary Technologies.

19 experimental samples were presented:

1. Cherry plum kompot, Chernomorskiy
2. Cherry plum kompot, Chuk
3. Cherry plum kompot, Naydena
4. Cherry plum kompot, Selena
5. Cherry plum kompot, Serenada
6. Cherry plum kompot, Karamel'nyy
7. Cherry plum kompot, Tavrisheskiy
8. Cherry plum kompot, Olen'ka
9. Cherry plum and carrot condiment SU= 30,1 %
10. Pumpkin and cherry plum condiment with barberry SU= 28,6 %
11. Pumpkin and cherry plum condiment SU= 29,8 %
12. Pumpkin and cherry plum condiment with coriander SU=26 %
13. Cherry plum condiment with garlic, Naydena SU=30 %
14. Cherry plum condiment with garlic, Karamel'nyy SU=28,4 %
15. Cherry plum condiment with garlic, Chernomorskiy SU=34 %
16. Cherry plum condiment with garlic, Olen'ka SU=34,4 %
17. Cherry plum condiment with garlic, Tavrisheskiy SU=33 %
18. Cherry plum condiment with garlic, Chuk SU=31 %
19. Carrot, ziziphus and cherry plum nectar, SU=18,4 %

Tasting results:

Average scores of cherry plum samples are presented in the following diagram.

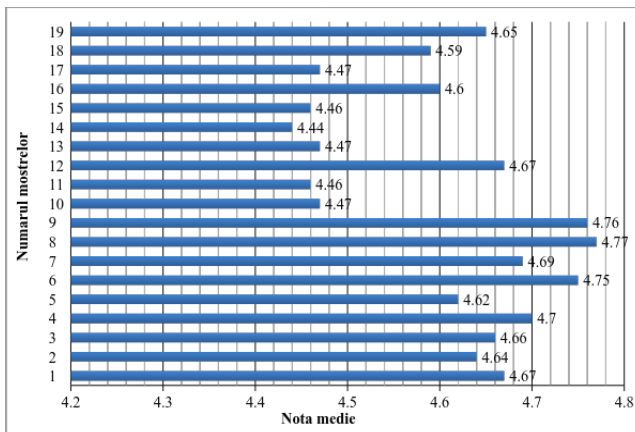


Fig. 1. Average scores of cherry plum samples (Vertical - sample number, horizontal - average score)

All experimental samples obtained high scores. The highest scores were given to samples with pumpkin, carrot and garlic.

Cherry plum kompots were evaluated by using a 5 point system, with scores of 4,44 - 4,67 and condiments got scores of 4,62 - 4,77.

It needs to be mentioned, that almost all of the fruits in the kompots, upon separation from the syrup, don't hold their form because of thin skin. Thus, despite their good tasting a visual qualities, such sorts are not advised to be used in kompots and juices.

It would be rational to utilize acidic cherry plum as puree bases for nectars, condiments, sauces, especially blended with other less acidic raw products, such as pumpkins, carrots, which contain an important amounts of carotenoids. This research allows for obtaining products with an increased biological value, and the use of such products in amounts of 100 g will satisfy the daily need for β -carotene. Such products are juices, kompots, sweets, jams, confiture.

The technical documentation drafted above and used for the production of different kinds of preserved foods (kompots, marinades, sweets, purees) requires updating at the moment. It is recommended to use aromas of citrus, rose, vanilla and others. To obtain such properties that insure good quantities of vitamin C, carotenes, provitamin A and potassium it is advised to use cherry plum purees mixed with apple, peach, pumpkin, carrot and buckthorn in the production of alimentary products.

Conclusion:

1. 9 sorts of cherry plum, cultivated on experimental plots of IP IŞPHTA, were researched. Physicochemical and technological characteristics were determined for each sort, as well as specific instructions of utilizing cherry plum based puree in blends with other raw materials with lower sourness to produce purees, nectars, sauces and condiments.
2. There were developed recommendations concerning the rational use of new sorts of cherry plum cultivated on experimental plots of IP IŞPHTA, and also recommendations on stabilizing and expanding the sphere of use of cherry plums in the food industry



Fig. 2. Samples of preserved foods made from cherry plum.