AGRICULTURAL BIOLOGY,
2022, V. 57, Iss. 5, pp. 981-991
[SEL'SKOKHOZYAISTVENNAYA BIOLOGIYA]

ISSN 2412-0324 (English ed. Online)
ISSN 0131-6397 (Russian ed. Print)
ISSN 2313-4836 (Russian ed. Online)

UDC 634.13:631.527

doi: 10.15389/agrobiology.2022.5.981eng
doi: 10.15389/agrobiology.2022.5.981rus

CREATION OF HIGH-QUALITY VARIETIES OF COMMON PEAR (*Pyrus communis* L.) IN THE LOWER VOLGA REGION

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The authors declare no conflict of interests

Acknowledgements:
The work was carried out within the framework of state task No. 122020100448-6 "Creation of new competitive forms, varieties and hybrids of cultivated, woody and shrubby plants with high productivity, quality and increased resistance to adverse environmental factors, new innovative technologies in seed production and nursery with taking into account varietal characteristics and soil-climatic conditions of arid territories of the Russian Federation".
Received June 22, 2022

Abstract

Nowadays, the creation of high-quality pear varieties of different ripening behavior with early-, mid-, and late-season maturing is still relevant goal for breeders of the Lower Volga region. The long-term pome fruit breeding program, including pear breeding, is carried out in the Laboratory of breeding, seed production and nursery of the Federal Scientific Center for Agroecology, Land Reclamation and Protective Afforestation RAS. The parent forms involved in intervarietal and interspecific hybridization and targeted selection are mainly European varieties of high quality but low resistance to adverse climatic factors and local varieties of high resistance but poor fruit quality. As a result, new pears varieties were released, e.g., Dubovskaya rannyayya, Zimnyaya kubarevidnaya, Yubiley Korneeva, Nadazhda, Andreevskaya, Doktosxaya, Ordinata, Lavanda, Omega, Pamyat' Korneeva, Kapella, Raketa, Positivnaya, Fermata, Banketnaya, Versiya, Nectarnaya, etc. Fully ripened fruits were collected in certain parts of the tree (early-ripening varieties) or at storage sites (late-ripening varieties) to determine quality parameters. Fruits were weighed on a laboratory scale and measured with a ruler to determine the average and maximum fruit weigh and size. Fruit appearance was assessed visually on a five-point scor, taste — by tastings carried out as the fruit ripened, on a five-point scor. The juice concentration of soluble solids was determined refractometrically. The total acidity was assessed by titration of an aqueous extract with 0.1 N alkali solution, sugar content (sum of sugars, mono-, disaccharides) was estimated by Bertrand's method, pectin by carbazole method based on the interaction of carbazole with D-galacturonic acid, the vitamin C content by titration of oxalate extracts with Tillman's reagent (2,6-dichlorophenolindophenol). It was established that the largest fruits (250 g and more) were formed by the varieties Pamyat' Korneeva, Pozitivnaya, Kapella and Banketnaya. Since this trait is inherited from the parental large-fruited Olivier de Serre and Bakhmal cultivars, the new varieties, in addition to high commercial attractiveness, can be successfully used as sources in the creation of new large-fruited pear varieties of different ripening terms. The varieties Pamyat' Korneeva, Nektar, and Fermata with excellent dessert balanced taste (4.7-5 points) and attractive fruit appearance surpass standard varieties in these traits. The genetic sources of the high taste quality of these varieties were the ancestral cultivars Alexandrine Dulyar and Bere Gardi with an exquisite taste and pleasant aroma. These genotypes can also be involved in future breeding for exquisite taste and commercial quality of fruits. The content of sugars in the fruits varied from 8.9 to 15.5 %, with the highest amount for the varieties Doktorskaya (15.48 %), Fermata (14.03 %), Versiya (16.3 %), and Kapella (15.5 %). These varieties also had the most balanced taste due to the low acid content. Biochemical composition, in addition to taste and quality, determines fruit suitability for processing and as an improver of finished (processed) products. For these purposes, the varieties Ordinate, Raketa, Kapella, Versiya, and Fermata and the most suitable. Therefore, of the released pear varieties, the varieties Pamyat' Korneeva and Kapella outstand due to a complex of economically valuable features and are suitable not only for commercial production but also for further breeding program.

Keywords: *Pyrus communis* L., pear, fruits quality, biochemical composition, breeding, new

varieties

In fruit production, special requirements are imposed on quality [1, 2]. Most fruit crops which include pomes (apple, pear, etc.) are valued for the taste and attractive appearance of the fruit [3-5]. However, high-quality varieties should combine good or excellent taste and appearance of fruits with sufficient keeping quality (for varieties of late ripening), transportability, versatility of use, adaptability, and, besides, provide a high economic effect [6, 7].

Pear fruits have always been valued for their delicate balanced taste and harmonious combination of sugars and acids. However, most varieties with high taste scores of fruits have poor winter hardiness which limits their cultivation. Modern fruit varieties, including the common pear, are characterized by many qualitative traits which are determined by genotype and its realization under certain growing conditions and cultivation technology [8-10]. In different natural and climatic conditions, fruits have not only a definite color, the period of harvesting and consumer maturity, but also a specific biochemical composition that determines their specific taste and the potential for universal use [11, 12]. New varieties created under conditions different from growing conditions will almost always have qualitative characteristics other than those declared [13-15]. Therefore, it is extremely important to carry out assortment selection for certain cultivation conditions [16, 17].

For common pear (*Pyrus communis* L.), breeding programs are mainly aimed at improving fruit quality and resistance to adverse environmental factors. [18-20].

In pear breeding for fruit quality, various approaches and methods of hybridization are used, such as simple and complex crosses, intraspecific, distant hybridization, artificial mutagenesis, etc. [19, 21]. One of the modern approaches to the creation of new genotypes is the use of sources and donors of selectively valuable traits in programs in such a way as to achieve a combination of the main (donor) trait with other positive properties [19, 22, 23].

Pear fruits, depending on the variety and growing conditions, are up to 85% water, from 10 to 25% solids, from 8 to 15% sugar (mainly fructose, glucose and sucrose; quantitatively, depending on the variety, either glucose and fructose, or the disaccharide sucrose may predominate), from 0.05 to 0.5% acids (mainly citric and malic). Pear fruits also contain pectins and tannins [24, 25].

For the southern fruit growing zone of the Russian Federation, the model of a new variety of common pear must meet or exceed at least one of the following parameters: average fruit weight form 150-250 g (vs. 130-180 g for the best zoned varieties); fruit quality at 4.7-4.8 points (vs. 4.6 points), yield of 25-30 t/ha (vs. 20-25 t/ha) [4, 37, 43]. Recently, breeders have been faced with the task of creating varieties with the following fruit biochemical composition: 11-14% sugars, 0.2-0.5% acid, 8-12 mg/100 g ascorbic acid, 250-300 mg/100 g, P-active substances [20, 26].

For the first time in the conditions of the Lower Volga region, based on an assessment of the quality characteristics of the fruits of new varieties of common pear, we have identified the most valuable varieties for industrial cultivation and use in breeding.

The purpose of the work is to evaluate the quality indicators of new and promising varieties and hybrids of the common pear in the conditions of the Lower Volga region, to identify the sources of fruit quality traits.

Materials and methods. The studies were carried out in 1999-2020 at the Federal Scientific Center for Agroecology, Integrated Land Reclamation and Protective Afforestation RAS (FSC Agroecology RAS) in collection and breeding pear

plantations. The objects were new and promising varieties and hybrids of common pear bred at the FSC of Agroecology Dubovskaya rannyaya, Zimnyaya cubarevidnaya, Yubileinaya Korneeva, Nadezhda, Andreevskaya, Doctorskaya, Ordinata, Lavanda, Omega, Pamyat' Korneeva, Kapella, Raketa, Positivnaya, Fermata, Banketnaya, Versiya, Nectarnaya. The basis of breeding work to improve the assortment of pears in the Lower Volga region was the method of targeted intervarietal hybridization and subsequent selection using local adaptive and Western European varieties [8, 9].

To determine the quality indicators, fully ripened fruits were selected in certain parts of the tree (early-ripening varieties) or in storage places (late-ripening varieties) in four repetitions [26, 27]. The average and maximum weight of one fruit was determined by weighing on a general purpose laboratory scale Radwag PS 1200.R2 (Radwag, Poland). Fruit size was determined using a measuring ruler. Appearance was assessed visually on a five-point scale, where 5 points mean that fruits are large, with beautiful color and regular shape, 1 point means that fruits are very poor, from 4 to 2 points are intermediate [27]. The taste of the fruits was evaluated according to the results of tastings carried out as the fruits ripened, on a five-point scale, where 5 is an excellent dessert taste, 1 is a very bad taste, the fruits are inedible.

The amount of soluble solids was determined in the juice refractometrically (IRF-454 B2M refractometer, OJSC Kazan Optical and Mechanical Plant, Russia) (GOST 28562-90. Moscow, 2010). The total acidity was assessed by titration of an aqueous extract of 0.1 N alkali solution (conversion factor for malic acid 0.0067, for citric acid 0.0064; an OHAUS ST3100-F benchtop pH meter with a separate electrode holder, a ST310 3-in-1 plastic serviceable pH electrode, OHAUS, China). A VLTE-310 laboratory balance (NPP Gosmetr, Russia), an LT-6 water bath (LabTex, China) (GOST 25555.0-82, paragraph 4. Moscow, 2010) were used.

The content of sugars (sum of sugars, monosugars, disaccharides) was determined by the standard method according to Bertrand, based on the reduction of the oxide form of copper to the ferrous form with invert sugar in Fehling's solution. The ferrous form of copper was converted into the oxide form with the help of ferric sulfate. The formed ferrous oxide was quantitatively determined permanganatometrically. Laboratory scales VLTE-210 (NPP Gosmetr, Russia), general-purpose laboratory scales Radwag PS 1200.R2 (Radwag, Poland), water bath LT-6 (LabTex, China) (GOST 13192-73) were used. Moscow, 2011).

Pectins were quantified by the carbazole method based on the interaction of carbazole with D-galacturonic acid. The pectin solution was acidified with sulfuric acid to pH 1.0-1.5. Then the pectins were precipitated with acidified rectified ethyl alcohol with a pH of 4.7-4.8. The formed precipitate was separated by centrifugation in a DSC-200D laboratory centrifuge (DIGI System, Taiwan) at a speed of 3000 rpm for 10 min and washed with acidified alcohol. The washed precipitate was hydrolyzed with concentrated sulfuric acid, a 0.2% alcohol solution of the carbazole reagent was added, and the optical density was measured at $\lambda = 535$ nm with a green filter (a spectrophotometer PE-5300VI, OOO Izmeritelnaya Tekhnika, Russia).

The vitamin C (ascorbic acid) concentration was determined by titration of oxalic acid extracts with Tillmans dye (2,6-dichlorophenolindophenol) using laboratory balances VLA-220C (NPP Gosmetr, Russia) and Radwag PS 1200.R2 (Radwag, Poland), a Precellys®24 homogenizer (Bertin Technologies, France), ST3100-F pH meter (OHAUS, China), magnetic stirrer (up to 2 L, 380 °C, 1600 rpm) (STEGLER, China; GOST 24556-89. Moscow, 2003).

Statistical processing of experimental data was performed according to recommendations [26] using Microsoft Excel and the STATISTICA 7.0 package (StatSoft, Inc., USA). Means (*M*) and standard deviations (±SD) were calculated.

Results. Work on the selection improvement of the common pear in the Lower Volga region began in the 1950s by breeders V.A. Korneev, R.V. Korneev and L.K. Zhukova. At the initial stages, various varieties of pear were studied and forms valuable for further breeding were identified [8, 9]. From the beginning of the 1980s to the present, the Federal Scientific Center for Agroecology of the Russian Academy of Sciences (until 2016 at the Nizhne-Volzhsky Research Institute of Agriculture) continues to work on the selection improvement and variety study of fruit crops (including the common pear) of various origins [8, 9, 12].

For an objective characterization of a promising variety, a number of qualitative features are evaluated: fruit marketability (size, taste, one-dimensionality), chemical and technological characteristics (biochemical composition), as well as suitability for processing, storage and transportation. It is known that the qualitative characteristics of fruits are a varietal trait that is controlled polygenically [23, 27, 28]. The agro-climatic characteristics of the year and growing conditions can have a significant impact on the variation of quality indicators. In this regard, for an objective assessment of quality, long-term (four or more years) studies and at least five years of fruiting are required.

1. Fruit parameters in promising varieties and hybrids of common pear (*Pyrus communis* L.) bred by the Federal Scientific Center of Agroecology RAS (Dubovka, Volgograd Province, 1999-2020)

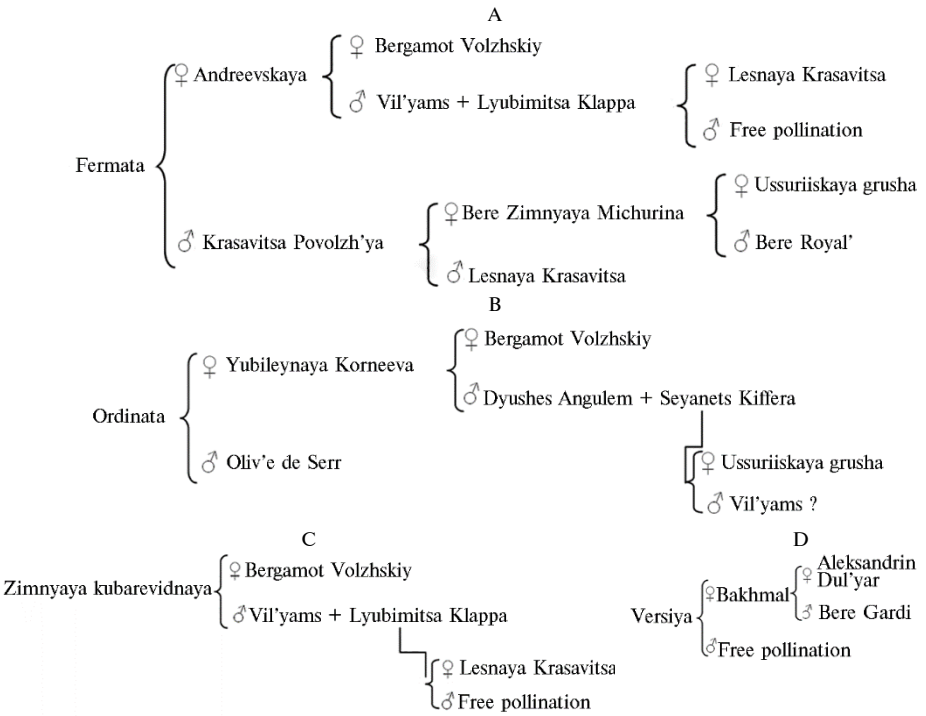
Variety	Parameter				
	appearance, score	taste, score	colour	shape	ripening period
Dubovskaya rannyaya, st	4.5	4.5	Yellow red	Broad pear-shaped	Summer
Nadezhda	4.4	4.4	Gree yellow	Conical	Late summer
Zonal'naya	4.5	4.5	Yellow green	Broad pear-shaped	Early autumn
Doctorskaya	4.5	4.5	Brown yellow	Conical	Early autumn
Andreevskaya	4.5	4.5	Yellow green	Broad pear-shaped	Autumn
Lavanda	4.6	4.5	Yellow	Elongated pear-shaped	Autumn
Fermata	4.8	5.0	Green yellow	Elongated pear-shaped	Autumn
Yubileinaya Korneeva, st	4.3	4.3	Yellow green	Broad pear-shaped	Autumn
Kapella	4,5	4,5	Red yellow	Broad pear-shaped	Autumn
Pamyat' Korneev	4,6	4,6	Green yellow	Broad pear-shaped	Autumn
Raketa	4,5	4,5	Yellow green	Conical	Autumn
Banketnaya	4,5	4,5	Yellow green	Rounded	Autumn
Positivnaya	4,5	4,5	Yellow green	Elongated pear-shaped	Late autumn
Nectarnaya	4,6	5,0	Yellow green	Conical	Late autumn
Omega	4,4	4,4	Yellow green	rounded	Late autumn
Zimnyaya kubarevidnaya, st	4,4	4,4	Red-yellow	Kubariformnaya	Winter
Ordinate	4,4	4,4	Yellow green	Flat-rounded	Winter
Versiya	4,5	4,5	Brown yellow	Broad pear-shaped	Winter

N o t e. Dbovskaya rannyaya, Yubileinaya Korneeva, and Zimnyaya kubarevidnaya are standards for early-ripening, mid-ripening, and late-ripening varieties, respectively.

The study of the qualitative characteristics of pear fruits (Table 1) allowed us to identify the most popular large-fruited varieties with fruits weighing more than 180 g, which turned out to be mostly late-ripening, i.e., Zonalnaya, Doktorskaya, Kapella, Pamyat' Korneeva, Banketnaya, Positivnaya, Nectarnaya, Zimnyaya kubarevidnaya, Versiya. Additionally, these forms exceeded the standard varieties in fruit size. Of the early-ripening varieties, not a single variety was included in the large-fruited group.

Among the large-fruited varieties, forms with very large fruits were distinguished, namely, Pamyat' Korneeva, Pozitivnaya, Kapella, Banketnaya (see Table 1). These varieties inherited the trait of large fruit from parental forms, the varieties Bakhmal and Olivier de Serre with very large fruits. The trait is controlled

polygenically and almost always manifests itself in a part of the offspring, and therefore new varieties, along with their parental forms, can also serve as a source of the large-fruited trait when creating new varieties [29-31].



Pedigree of varieties Fermata (A)**, Ordinata** (B)**, Zimnyaya kubarevidnaya** (C)**, Versiya** (D) **based on genealogical analysis** (FSC Agroecology RAS, Dubovka, Volgograd Province, 1999-2020).

For the new varieties Fermata, Pamyat' Korneeva, and Nektarnaya, the most attractive appearance and a harmonious, dessert taste of fruits was characteristic. Their assessment of fruit appearance varied from 4.6 to 4.8 points, taste characteristics from 4.6 to 5.0 points (see Table 1). In the varieties Pamyat' Korneeva and Nectarnaya, the source of high palatability of the fruit was the ancestral forms, the varieties of European origin Alexandrin Dulyar and Bere Gardi which conveyed good taste and exquisite aroma. The Fermata variety inherited the attribute of dessert taste and rich aroma from its parent forms Williams, Clapp's Favorite and Forest Beauty (Fig., A) [19]. These varieties also significantly exceeded the standard varieties in taste and external characteristics.

Statistical analysis showed (Table 2) that among the varieties of early fruit ripening, the Doktorskaya variety had the highest average fruit weight (182.6 g), and the minimum values were noted in the Nadezhda variety (121.3 g) (see Table 2). In varieties with fruits of medium ripening, the leader was Banketnaya (222.1 g; this value was the highest among all the varieties studied). The minimum indicators of fruit size among the entire studied assortment were observed in the Fermata variety (102.7 g). In varieties with fruits of late ripening, the best indicator was recorded in the variety Pozitivnaya (194.1 g), the minimum in the variety Ordinata (149.1 g). The average fruit weight varied from 102.7 to 222.1 g depending on the variety. The standard deviation of the coefficient of variation did not exceed 10%, which indicates a slight variability of the values. The accuracy of the experiment was kept within acceptable limits.

Fruit color is an important commodity and aesthetic characteristic of the variety. The fruits of most of the varieties studied had a greenish-yellow color as

the main color. Integumentary coloration was either completely absent or present in the form of a small red blush. When studying new and promising varieties, the brightest color was formed on the fruits of the varieties Dubovskaya rannyaya (yellow with a red blush on most of the fruit), Kapella (yellow with a bright carmine blush on half of the fruit), Doktorskaya (bright yellow with a brown-rusty color on most of the fruit). parts of the fruit), Versiya (golden-orzhavlennaya).

2. Statistical parameters of the fruit weight of promising pear (*Pyrus communis* L.) varieties of the FSC Agroecology RAS (Dubovka, Volgograd Province, 1999-2020)

Variety	min	max	*M*	Q_1	*Me*	Q_3	±SD	Accuracy, %
Varieties of early fruit ripening								
Dubovskaya rannyaya, st	109.0	150.0	128.5	115.0	130.0	140.0	1.13	0.38±0.08
Nadezhda	85.0	151.0	121.3	108.0	125.0	141.0	1.23	0.40±0.25
Zonalnaya	106.0	215.0	176.5	164.0	180.0	191.0	1.21	0.28±0.06
Doctorskaya	95.0	215.0	182.6	177.0	192.0	200.0	1.07	0.27±0.06
Varieties of medium ripening fruit								
Andreevskaya	109.0	181.0	139.5	115.0	130.0	153.0	1.20	0.35±0.07
Lavanda	75.0	180.0	110.0	81.0	109.0	120.0	1.32	0.44±0.09
Fermata	80.0	150.0	102.7	87.0	92.0	123.0	1.24	0.48±0.01
Yubileinaya Korneeva, st	89.0	160.0	118.4	98.0	109.0	145.0	1.24	0.42±0.09
Kapella	125.0	320.0	217.3	148.0	208.0	260.0	1.40	0.22±0.05
Pamyat' Korneev	175.0	350.0	221.8	180.0	200.0	250.0	1.28	0.22±0.05
Raketa	122.0	180.0	152.2	128.0	148.0	176.0	1.18	0.32±0.07
Banketnaya	115.0	313.0	222.1	166.0	233.0	261.0	1.38	0.22±0.05
Varieties of late fruit ripening								
Positivnaya	115.0	285.0	194.1	135.0	185.0	285.0	1.43	0.25±0.05
Nectarnaya	132.0	217.0	175.5	140.0	180.0	207.0	1.22	0.28±0.06
Omega	115.0	195.0	164.5	150.0	161.0	185.0	1.18	0.30±0.06
Zimnyaya kubarevidnaya, st	108.0	214.0	167.1	134.0	172.0	198.0	1.29	0.29±0.06
Ordinate	105.0	195.0	149.1	112.0	143.0	187.0	1.27	0.33±0.07
Versiya	126.0	195.0	161.0	142.0	166.0	190.0	1.18	0.30±0.06

Note. min, max — minimum, maximum values of indicators, *M* — mean value, Q1, Q3 — quartiles, *Me* — median, SD — standard deviation.

One of the characteristic features of the variety is the ripening period of the fruit. The varieties with late ripening fruits that can be stored for a long time are of the greatest value. Among the studied varieties with fruits of late-autumn and winter terms of consumption and a long storage period, three were distinguished: Winter kubariform, Ordinata and Versiya. This trait is controlled polygenically and is inherited from parental or grandparental forms [27]. Genealogical analysis showed the probable heredity of the trait in the Ordinata variety from parental and grandparental varieties Olivier de Serre and Kieffer Seedling, which have fruits of late ripening (see Fig., B) [19, 21, 32]. Varieties Versiya and Zimnyaya kubarevidnaya did not have direct parental forms with late ripening fruits, but there was an unknown paternal variety (or group of varieties) potentially capable of transmitting the trait of late fruit ripening (see Fig., C, D) [19].

The balanced taste of fresh fruits is determined by the biochemical composition, which is also related to varietal characteristics and is inherited [27, 33]. However, depending on the climatic conditions of the year of cultivation, the content of sugar, solids and acid in the same varieties may vary.

For technical processing, pear varieties with high acidity (more than 0.35%) and tart taste are better suited. From sweet-fruited varieties with a dessert taste, practically no high-quality canned food is obtained [23, 27]. Among the studied pear varieties, the Andreevskaya (0.37%), Fermata (0.47%) and Omega (0.39%) varieties are most suitable for the manufacture of canned compotes (Table 3).

Pear juice with a high content of mono- and polysaccharides glucose, fructose and sucrose in Western countries serves as a raw material for the production of flavored juices and wines [21, 34, 35)]. The most suitable for these purposes are varieties with a total sugar content of more than 12% and an acid content of

less than 0.3%. In new pear varieties Doktorskaya, Kapella, Raketa, Ordinata and Versiya, which have a high content of sugars in the juice and a low amount of acid, the fruits can also be suitable for adding flavorings and taste improvers to juices of other fruits and berries (see Table 3).).

3. Fruit biochemical composition of promising pear (*Pyrus communis* L.) varieties of of the FSC Agroecology RAS (M±SD, n = 10; Dubovka, Volgograd Province, 1999-2020)

Variety	Dry matter, %	Sugar, %	Titratable acids, %	Sugar acid index	Vitamin C, mg/100 g wet weight	Pectin, % dry weight
Varieties of early fruit ripening						
Dubovskaya rannyaya, st	14.1±0.4	11.1±0.1	0.2±1.70	50.5±12.0	3.2±0.9	5.6±0.48
Nadezhda	13.8±0.4	11.2±0.1	0.2±1.60	46.7±11.9	4.1±0.9	6.2±0.5
Zonalnaya	15.2±1.1	11.7±0.01	0.1±0.40	83.6±2.1	3.7±0.4	6.5±0.5
Doctorskaya	21.3±1.0	15.5±0.02	0.3±0.90	53.4±2.8	3.8±0.4	6.8±1.1
Varieties of medium ripening fruit						
Andreevskaya	16.7±0.5	9.1±0.5	0.4±0.10	24.5±5.2	7.9±3.0	7.4±1.2
Lavanda	16.9±0.5	9.2±0.6	0.1±0.02	82.1±13.3	7.4±0.4	8.1±1.3
Fermata	17.9±0.3	14.0±1.4	0.5±0.04	29.8±1.8	4.1±0.3	4.5±0.4
Yubileinaya Korneeva, st	12.6±0.6	8.9±1.7	0.1±0.02	127.1±21.2	3.8±0.8	7.4±1.2
Kapella	18.7±0.4	15.5±1.0	0.3±0.01	55.5±3.1	2.6±0.3	8.1±1.3
Pamyat' Korneev	17.5±1.8	10.9±0.9	0.3±0.10	35.0±10.4	3.1±6.7	5.9±0.8
Raketa	18.8±1.2	13.0±1.4	0.3±0.10	48.3±14.6	3.8±0.5	8.1±1.3
Banketnaya	18.2±0.2	11.9±1.4	0.3±0.01	44.1±13.9	4.0±0.1	6.5±1.0
Varieties of late fruit ripening						
Positivnaya	18.4±0.8	13.9±1.4	0.4±0.02	33.0±2.9	3.6±0.4	6.5±1.1
Nectarnaya	17.6±0.3	11.8±1.8	0.4±0.10	33.6±1.3	3.8±0.5	6.8±1.2
Omega	15.6±0.5	9.2±0.1	0.4±0.10	26.0±5.8	3.2±0.2	6.9±1.2
Zimnyaya kubarevidnaya, st	14.4±1.3	10.8±1.5	0.2±0.10	63.5±22.7	4.6±2.1	6.9±1.2
Ordinate	18.1±0.8	12.6±1.4	0.3±0.10	50.4±11.0	3.8±0.7	7.3±1.1
Versiya	19.6±0.3	16.3±0.6	0.2±0.02	67.9±2.8	3.0±0.2	6.2±1.0
LSD_{05}	0.85	0.6	0.013		0.21	0.34

The content of ascorbic acid, the fruits of almost all varieties of common pear are not rich. The varieties bred by the FSC Agroecology RAS were no exception. On average, the content of ascorbic acid in their fruits ranged from 2.6 mg/100 g (Kapella) to 4.6 mg/100 g (Zimnyaya kubarevidnaya). However, the fruits of Andreevskaya and Lavanda cultivars had a higher content of ascorbic acid, 7.9 and 7.4 mg/100 g, respectively (see Table 3).

By the amount of pectin substances, pear fruits are inferior to apple fruits. In the fruits of the studied varieties, the content of pectin substances varied in the range of 4.5-8.1% per dry weight. The highest content was recorded in the fruits of the Lavanda, Kapella, and Raketa varieties (see Table 3).

An analysis of the matrix of paired correlation coefficients showed that the resulting value is most closely related to varieties of early ripening, for Nadezhda, it was a close correlation between acidity and sugar (r = 0.71, p = 0.021), Doctorskaya a close relationship between the sugar-acid index and sugar (r = 0.80, p = 0.005), dry matter and vitamin C (r = 0.79, p = 0.006), for Dubovskaya rannyaya (st) a close relationship between acidity and sugar acid index (r = 0.73, p = 0.016). Among the mid-ripening varieties, the Fermata variety stood out which has a moderate relationship between the acid and sugar amount (r = 0.67, p = 0.034), sugar-acid index and acid (r = 0.64, p = 0.044), vitamin C and sugar-acid index (r = 0.69, p = 0.028) and a close correlation between the sugar-acid index and sugar content (r = 0.76, p = 0.012). Among the late-ripeningvarieties, the leader was the Nectarnaya variety with a close correlation between the sugar-acid index and dry matter; sugar-acid index and sugar; vitamin C and acidity (r = 0.74, p = 0.014), and the Ordinata variety with a close relationship between the sugar-acid index and dry matter (r = 0.85, p = 0.001); sugar-acid index and acidity (r = 0.78, p = 0.008). The rest of the studied varieties had either a weak correlation, or it was absent.

Thus, at the FSC Agroecology RAS, the breeding of common pear resulted in the creation of new forms with high fruit quality parametersm including both taste and consumer qualities, due to the biochemical composition and technological characteristics of the fruits. The study of new pear varieties revealed forms that most fully meet modern requirements for the quality characteristics and biochemical composition. In terms of fruit size, varieties Pamyat' Korneeva, Pozitivnaya, Kapella and Banketnaya with fruits weighing more than 200 g stood out. These varieties serve as sources of large-fruited traits combined with high taste, and a balanced biochemical composition. In addition to these varieties, Fermata and Nektarnaya stood out in terms of taste characteristics and attractive appearance. For processing, based on the data on the biochemical composition of fruits, the most suitable varieties are Andreevskaya, Fermata and Omega, and the varieties Doktorskaya, Kapella, Raketa, Ordinata and Versiya as improvers of juice products. The best new pear cultivars with high fruit quality are obtained from the parental forms Lyubimitsa Clapp, Forest Beauty, Olivier de Serre and Bakhmal. According to the complex of economically valuable traits, the varieties Pamyat' Korneeva and Kapella stood out.

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