Classification of Sweet Chestnut Varieties and Formsin Azerbaijan Republic

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Abstract. This article analyzes the breeding value of studying perspective varieties and forms of sweet chestnut in the Republic of Azerbaijan. Our route observation revealed significant variation in individual traits and ages of sweet chestnut trees in the Sheki-Zagatala region, as well as the presence of trees of varying ages. The oldest tree, for example, is approximately 300-500 years old. Although these trees are few in number, they continue to bear fruit and produce good yields. It was revealed that chestnut plants here vary not only in morphological but also in biological and economic traits.

Classification of sweet chestnut forms. Based on our surveys, we classified promising varieties and forms of edible chestnut:

- by yield;
- by productivity per 1 m^2 of crown projection;
- by kernel yield;
- by sugar and vitamin C content in the kernel;
- by disease and pest resistance;
- by ripening time.

Keywords: Classification of varieties and forms, Breeding importance, Variation, Chestnut, Ripening, Productivity, Fruit Yield, Kernel Yield.

1 Introduction

Characteristics of the economic value of edible chestnut varieties and forms. Azerbaijan's natural and economic conditions, namely the warm climate, the availability of irrigated and fertile land, and the large number of processing plants, favor the development of industrial horticulture [1, 2]. However, orchard yields vary significantly year after year due to various factors, primarily the periodicity of fruiting and the presence of older, low-yielding varieties and forms.

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Along with other conditions, the selection of new high-yielding varieties and forms with stable annual fruiting plays an important role in increasing the productivity and longevity of gardens.

There is a known large number (more than 500, according to P.A. Issinsky] and 1000 - according to F.L.Shepotiev) of edible chestnut varieties, which differ among themselves in the size and shape of the fruits, the color of the pericarp, the size and shape of the fruit scar, the taste and consistency of the kernel, the thickness of the skin, the ease of separating it from the kernel, etc. The presence of local names, the varietal composition of chestnut remains insufficiently studied.

There is a known large number (more than 500, according to P.A. Issinsky) and 1000 - according to F.L.Shepotiev, of varieties of sweet chestnut, which differ among themselves in the size and form of the fruits, the color of the pericarp, the size and form of the fruit scar, the taste and consistency of the kernel, the thickness of the skin, the ease of separating it from the kernel, etc. However, due to the insufficient determination of many of these signs, confusing synonymy and the presence of local names, the varietal composition of chestnut remains insufficiently studied.

Targeted breeding of the edible chestnut has been delayed due to the extensive, semi-spontaneous cultivation practiced in the past, particularly due to the lack of effective and simple vegetative propagation methods. In today's intensive grafted culture, there is an urgent need for breeding varieties. New varieties must meet stringent requirements and possess a combination of valuable economic traits: high productivity and quality, drought resistance, immunity, frost resistance, and be suitable for machine processing and harvesting.

Purposeful selection of the sweet chestnut has been delayed due to the extensive, semi-spontaneous cultivation practiced in the past, particularly due to the lack of effective and simple vegetative propagation methods. In today's intensive grafted culture, there is an urgent need for selection varieties. New varieties must meet high standards and possess a combination of valuable economic features: high productivity and quality, drought resistance, immunity, frost resistance, and be suitable for machine processing and harvesting.

The simplest and most accessible method of selection is the choice of valuable varieties from the local population. The variety to be sought should be high-yielding, produce fruit regularly, and be disease-resistant. Flowering is average. The fruits are large (10-15 g), attractive, with a high kernel yield (85-95%), thin and firm skin, and high protein, starch, and sugar content in the kernels. The variety should be characterized by a compact crown, early fruiting, drought resistance, and winter hardiness, among other characteristics.

The renowned scientist on nut crops, F.L.Shepotyev, particularly emphasized that large-fruited Azerbaijani chestnut varieties of national selection were of great value for the former Soviet Union.

2 Material and Method

The research was conducted based on generally accepted horticultural methodologies. In order to identify the form diversity, and especially large-fruited sweet varieties and forms of chestnut, we conducted a route observation of plantings of this plant in forestry enterprises and home gardens of the Balakan, Zagatala, Gakh, Sheki, Oghuz, Gabala and Ismayilli regions of Azerbaijan during 1982-1996 and 2000-2002.

3 Results and Discussion.

Our route researches revealed significant variation in individual characteristics and ages of chestnut trees in the Sheki-Zagatala region, as well as the presence of trees of different ages. The oldest tree, for example, is approximately 300-500 years old. These trees are few in number, but they continue to bear fruit and produce a good yield. It was revealed that chestnut trees here vary not only in morphological characteristics but also in biological and economic characteristics.

A review of thousands of sweet chestnut trees revealed that the tree is represented by local, variegated populations, as well as by folk-selection varieties. Among these, it is possible to select high-yielding, large-fruited elite plants that need to be recognized and cultivated, breeding nut-fruit plantations.

Thus, it is necessary to create a selection base and move from the use of non-varietal material with low hereditary properties and commercial qualities to the use of high-quality varietal planting material.

3.1 Evaluation the form composition of sweet chestnut trees in Azerbaijan.

Based on data from the Statistical Committee of Azerbaijan [2], the area of chestnut plantations in Azerbaijan is given in Table 1 and Figure 1.

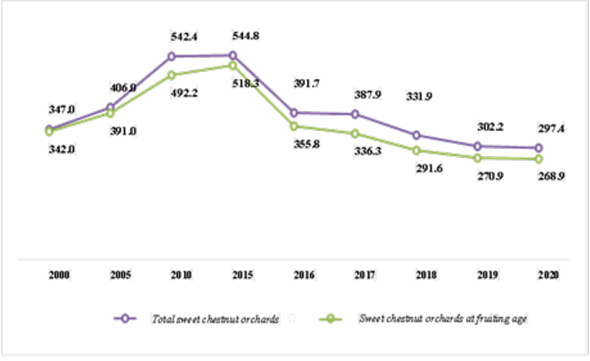

Fig. 1. Total chestnut orchards in Azerbaijan

As can be seen, the area of sweet chestnut orchards in the region has decreased over the years in terms of area and fruiting age. In the region, the dominance of chestnut plantations is in Gabala district. Thus, the area of chestnut orchards in this district has changed over the years as follows: For example, in the last five years - in 2020 it was 126.3 ha, in 2021 it was 103.3 ha, in 2022 it was 102.3 ha, in 2023 it was 120.3 ha and in 2024 it was 119.3 ha.

Table 1. Area of chestnut orchards by districts in the Sheki-Zagatala region, ha

Regions	Years				
	2020	2021	2022	2023	2024
Balakan	16,5	16,5	16,5	16,5	17,4
Gakh	13,0	13,0	13,0	13,0	13,0
Gabala	126,3	103,3	102,3	120,3	119,3
Oğuz	35,1	35,1	35,1	35,1	35,1
Shaki	27,0	27,0	27,0	3,5	3,5
Zagatala	70,0	70,0	71,0	71,1	71,1
Sheki-Zagatala	287,9	264,9	264,9	259,5	259,4

The total chestnut production by economic regions in our republic is given in Table 2. As can be seen from Table 2, the Sheki-Zagatala economic region has a higher production. However, in this economic region, sweet chestnut production in 2024 decreased by 46.5 tons compared to 2020 (609.7 tons) and amounted to 515.7 tons.

Table 2. Sweet chestnut production in our republic, tons

Regions	Years				
	2020	2021	2022	2023	2024
Mountainous Shirvan	6,0	6,0	6,0	5,0	3,0
Ganja-Dashkasan	0,1	0,0	0,0	0,0	0,1
Guba-Khachmaz	41,4	42,3	43,0	44,0	42,0
Sheki-Zagatala	562,2	528,2	588,9	539,0	515,7
Total	609,7	576,5	637,9	588,0	560,8

We have studied approximately 7,000 trees, of which 147 were selected for further study. However, some of these were subsequently excluded, and 72 forms and 10 varieties of folk selection were subjected to cameral analysis. These trees have analysis data spanning 5 to 10 years.

Based on analysis and observations, 28 of the best varieties and forms were selected, each possessing a range of economically valuable traits and suitable for production. A

description of the selected forms is provided below. Ashlyg. Discovered in the village of Boyuk-Pirelli in the Gabala district. The tree reaches 29 m in height, with a crown diameter of 15.9 m and a bole circumference of 7.1 m. The crown is very dense. The leaves are elliptical, averaging 18.5 cm in length. The apex is pointed, and the base is rounded. The petiole is 1.9 cm long. Mass ripening occurs in the first ten days of October.

The fruits are large and round. Each fruit weighs 12 g, measures 2.92 cm in height, 2.98 cm in width, and 1.8 cm in thickness. The skin is dark brown. The kernel separates easily from the skin, is sweet, and has a pleasant flavor. This variety is resistant to diseases and pests.

Form F-12. Found in the village of Ashagy Tala in the Zagatala district. The height of trees is to 21.5 m. Diameter of bole is to 4.1 m. The crown is very dense, with an average diameter of 15.3 m.

The leaves are elliptical, averaging 22.7 cm in length. The apex is pointed, and the base is rounded. The petiole is 1.6 cm long. This is an early-ripening variety. Full ripening occurs in the second ten days of September. The fruits are large. Each fruit weighs 9.1 g and has a volume of 15.3 cm^3. The skin is light brown. The kernel separates easily from the skin, is sweet, and has a pleasant flavor.

This variety is highly resistant to diseases and pests. *Form F-81.* Discovered in plantations in the Oghuz district. The height of trees is 27.5 meters. The crown is flat and medium-dense.

The diameter of crown is 15.4 meters, and the circumference of bole is 2.8 meters.

The leaves are obovate, long is 19 cm long and wide is 7.7 cm. The petiole length is 1.5 cm. The height of dentate of leaf is 0.4 cm.

Mass ripening occurs in the second ten days of September. The fruits are small, ovoid, and the skin is liver-colored. The fruit weight on average is 6.9 g, the height is 2.5 cm, the width is 2.8 cm, and the thickness is 1.6 cm. The kernel yield is 87%. The skin thickness is 1 mm. Distinguished by high resistance to diseases and pests. *Form F-16.* Discovered in the village of Yukhari Tala in the Zagatala district. The height of tress is 21.7 m. The crown diameter is 18.8 m. The diameter of bole is 2.3 m. The crown is spherical and medium-dense.

The leaves are oblong, leaf length is 16.2 cm and 4.5 cm wide. A petiole length is 2 cm. Full ripening occurs in early October. The fruits are round, with a light brown skin and a slightly rough surface. The average fruit weight is 11.2 g, the height is 2.4 cm, the width is 2.8 cm, and the thickness is 1.6 cm. The skin thickness is 0.9 mm. The fruit kernel is whitish and has a sweet flavor. The kernel yield is 90.7%. The number of fruits per 1 kg of bulk weight is 89 pieces. The fruits are characterized by good shelf life. This variety is resistant to diseases and pests. *Form F-23.* The tree was discovered in the village of Yukhari Tala in the Zagatala District. The tree is 18.5 m tall, with a crown diameter of 17.9 m and a trunk circumference of 4.1 m. The crown is spherical and moderately dense.

The leaves are lanceolate, leaf length is 20.7 cm and 6.6 cm wide. The tip is pointed and the base is rounded. The petiole length is 1.7 cm long.

The fruits are small, with a brown skin and a smooth, coarsely ribbed surface. The average fruit weight is 7.8 g, the height is 2.7 cm, the width is 2.6 cm, and the thickness

is 1.6 cm. The fruits ripen in full force in the first ten days of October. The yield per 1 m² of crown projection is 7.2 kg. The kernel yield is 79.5%. The average number of fruits per kg of bulk density is 128. The fruit has a very long shelf life – 5.5 months. Highly resistant to diseases and pests. *Form F-65.* Discovered in the village of Ashagy Tala of Zagatala District. The tree is 22.3 m tall. The crown diameter is 19.6 m. The trunk circumference is 4.1 m. The crown is broadly spherical and dense.

The leaves are lanceolate, length 23.8 cm and 6.0 cm wide. The petiole length is 2.3 cm long. The apex is pointed, and the base is wedge-shaped. Mass ripening occurs in the second ten days of September. The shelf life of fruits is 7 months in the pit. The fruits are ovoid, with a light brown skin and a rough surface. The average fruit weight is 9.5 g, the height is 2.9 cm, the width is 3.4 cm, and the thickness is 1.9 cm. The kernel separates easily from the skin, is medium-sweet, and has a pleasant flavor. The kernel yield is 84.5%. The number of fruits per 1 kg of bulk mass is 105, i.e., not large.

No diseases or pests' infestations were observed.

Form F-96. This form was discovered in chestnut plantations in the village of Gum, Gakh District. The tree grows up to 24.4 m tall. The crown is broadly oval and dense. The crown diameter is 20.5 m, and the trunk circumference is 2.5 m. The leaves are lanceolate, averaging 22.7 cm in length and 6.8 cm in width, respectively. The apex is acute, and the base is cordate. The petiole length is 1.9 cm. Mass ripening occurs in the second ten days of September. The fruits are large, averaging 11.4 g in weight, 2.8 cm in height, 3.4 cm in width, and 1.9 cm in thickness. The skin is light chestnut brown, 0.9 mm thick. Although the kernel is difficult to separate from the skin, the nut has good flavor. The kernel yield is 88.3%, with 88 fruits per kg of bulk density. The fruits have a good shelf life (they can be stored for eight months). They are resistant to diseases and pests.

Form F-104. This variety was discovered in the village of Vandam in the Gabala District. The tree grows up to 28.5 m tall. The trunk circumference is 3.2 m. The crown is flattened and rounded, very dense. The leaves are elliptical, 21.9 cm long and 7.1 cm wide. The apex is pointed and the base is cordate. Mass ripening occurs in the second ten days of October.

The fruits are round, with a dark chestnut skin color and a slightly rounded apex. The average fruit weight is 6.0 g, the height is 2.7 cm, the width is 2.9 cm, and the thickness is 1.7 cm. The skin thickness is 0.9 mm. The kernel yield is 76.6%. Fruit quality is very good, and the kernel separates easily from the skin. The kernel is creamy and has a sweet flavor. The average yield is 167 kernels per kilogram of bulk mass. This variety is resistant to diseases and pests. *Form F-156.* Found in a garden plot in the village of Kalajuk, Ismailly District. The height of tree is 34.2 meter, with a flat, spherical, and very dense crown. The crown diameter is 29.5 m, the trunk circumference is 4.9 m. The leaves are elliptical, 28 cm long and 7.7 cm wide. The petiole length is 1.6 cm. The height of dentate of leaf is 0.4 cm. Full ripening occurs in the middle of the third ten-day period of October.

The fruit is ovoid, the skin is grayish-brown, the base of the hilum is small, and the apex is rounded with a pointed tip. The average fruit weight is 4.6 g, the height is 2.6 cm, the width is 3.5 cm, and the thickness is 2.1 cm. The kernel yield is 88.9%. The fruit quality is very good, and it separates easily from the skin. It is slightly susceptible

to diseases and pests. *Form F-161.* Plants of this form are found in nature reserves in the Zagatala region. The tree reaches 30 m in height, with a spherical, sparse crown. The crown diameter is 16.3 m, and the trunk circumference is 1.9 m.
The leaves are oblong, 23 cm long and 7.6 cm wide. The apex is acute, and the base is wedge-shaped. The leaf tooth height is 0.5 cm, and the petiole length is 1.9 cm.
Full ripening occurs in the first ten days of October.
The fruits are medium-sized, ovoid, with a dark chestnut-colored skin and a smooth surface. The average fruit weight is 9.1 g, with a height of 2.5 cm, a width of 3.4 cm, and a thickness of 1.8 cm. The skin thickness is 0.8 mm. The kernel yield is 83.1%. The kernel is yellowish-whitish, with a sweet taste. The average number of fruits per 1 kg of bulk mass is 110. Very resistant to pests and diseases. *Form F-177.* Plants of this form are found in the Zagatala and Gabala districts. The tree reaches a height of 26.8 meters. The crown is broadly oval and dense. The crown diameter is 19.6 meters. The trunk circumference is 4.3 meters. The leaves are obliquely lanceolate, averaging 24 cm in length and 7.5 cm in width. The petiole is 2.5 cm long. The apex is acute, and the base is wedge-shaped. Full ripening occurs in the third ten days of September.
The fruits are medium-sized, weighing 9.4 g, measuring 2.6 cm in height, 2.9 cm in width, and 1.6 cm in thickness. The peel is 1.0 mm thick. The kernel, comprising 89.7% of the fruit's weight, has a pleasant flavor but is difficult to separate from the peel. The peel is dark chestnut brown and thick. The fruit density per kg of bulk mass is 106 pieces. Fruits have a good shelf life – they can be stored in the pit until the end of April. Resistant to diseases and pests. *Form F-295.* This form of sweet chestnut was discovered in the Gabala and Oguz districts. The tree reaches a height of approximately 30.5 meters. The crown is dense, with a diameter of 19.5 meters and a trunk circumference of 7.0 meters.
The leaves are lanceolate, with leaf length and width averaging 16.8 cm and 6.0 cm, respectively. The apex is acute, and the base is wedge-shaped. The petiole length is 1.3 cm. Fruit ripening begins in the second ten days of October. The fruits are medium in size, weighing 7.3 g each, uniform in size, and round in shape. Height 2.3 cm, width 2.6 cm, thickness 1.7 cm. The skin is light brown and thin. The kernel separates easily and has excellent flavor. The yield of kernels per 1 kg of bulk mass is 137 pieces. The average kernel yield is 84.9%. The fruit has good shelf life – in the pit, the fruit will last for about three months. This variety is very resistant to diseases and pests.
Form F-314. This form of sweet chestnut was discovered in the village of Jar in the Zagatala district. The tree height is 28 m, the trunk circumference is 4.4 m. The crown is very dense, with a diameter of approximately 20.7 m. The leaves are oval, the leaf length is 23.6 cm and 8.2 cm wide. The leaf tip is pointed, and the base is cordate. The petiole length is 1.6 cm. Mass ripening occurs in the third ten days of October. The fruits are large, mostly spherical, with a chestnut-colored skin and a smooth, coarsely irregular surface. The average fruit weight is 8.5 g, height is 2.5 cm, width is 2.3 cm, and thickness is 1.6 cm. The average kernel yield is 87.8%. The average number of fruits per kg of bulk mass is 118. The kernels are white-yellow and have a sweet flavor. The fruit has a good shelf life – in the pit, the fruits can be stored until early May. Resistant to diseases and pests.

Classification of sweet chestnut forms. Based on our research, we have classified promising varieties and forms of sweet chestnut:
- by yield;
- by productivity per 1 m^2 of crown projection;
- by kernel yield;
- by sugar and vitamin C content in the kernel;
- by disease and pest resistance;
- by ripening time.

By yield: F-210. Exceptionally productive form. Full fruiting potential is realized. Resistant to canker diseases and a high kernel yield of 92.2%.
The fruits are large (14.5 g).
F-125. High-yielding form, virtually disease-resistant, drought- and frost-resistant. Fruit weight is 6.2 g, kernel yield is 89.2%.
F-134. A high-yielding form with above-average canker resistance. Fruit weight is 18.5 g, skin thickness is 1.0 mm, and kernel yield is 92%.
F-235. An exceptionally large-fruited and high-yielding variety. It is resistant to diseases and pests. Fruit weight is 21.3 g, with 47 fruits per kg of bulk density. Skin thickness is 1.6 mm. Kernel yield is 90.2%. The starch and protein content of the fruits is very high – 64.8% and 9.2%, respectively.
By productivity per 1 m^2 of crown projection: F-173. Trees of this form were found in old plantings in the village of Yukhari Tala, Zagatala District. The trees reach a height of up to 28 m. The crown diameter is approximately 14.9 m, and the trunk circumference is 3 m. The crown is rounded and moderately dense.
The yield per 1 m^2 of crown projection is 8.9 kg, while in the control variant, the Ashlyg variety yielded 7.6 kg.
The fruits are large, averaging 12.8 g in weight, 2.3 cm in height, 2.4 cm in width, and 1.7 cm in thickness. The fruit shape is round. The skin is chestnut-colored and thin; the kernel separates very easily and has good flavor. The kernel yield is 81.5%, with a waste-to-kernel ratio of almost 1:4. The number of fruits per 1 kg of bulk density is 78 pieces.
By kernel yield: F-117. The tree is medium age. The kernel makes up an average of 93.7% of the fruit weight, with a maximum of 95.9%, and average fruit weight of 10.1 g. The yield is average (100.2 kg), with high disease and pest resistance.
Gara Khanlyg. The average kernel yield is 92.1%, with a maximum of 94.3%. The fruit weight is 10.5 g, the skin is thin, and the yield per tree is 107.8 kg. It is completely resistant to pests and diseases.
By sugar and vitamin C content in the kernel: F-103. The sugar content in the kernel is 19.3%, the fruits are medium (8.8 g), the kernel yield is 81.2%, and the yield is average. It bears fruit regularly.
The vitamin C content in fresh fruits is high – 62.2 mg%.
F-181. The tree is 70 years old. The fat and vitamin C content of the kernel is 19.1% and 61 mg%, respectively. The fruit is small (4.2 g). The kernel yield is 81.7%. The yield is average. Not affected by diseases and pests.
By disease and pest resistance. F-305. Long-term observations have shown that it is completely resistant to diseases.

The fruits are small (7.9 g), the kernel yield is 74.1%. The yield is low.
F-55. This is immune form. Fruit weight is 10.8 g, skin thickness is 0.9 mm, kernel yield is 82%, and the yield is average – 103.6 kg.
F-49. Not affected by diseases, even in years favorable for fungal development. The fruits are medium-sized (25 x 30.2 x 21.6 mm). The yield is low, with a kernel yield of 84%.
F-66. The tree is also completely free of diseases and pests. The fruits are small and attractive, with a kernel yield of 89%, but the yield is below average.
By ripening time: F-77. Leaf buds open 26 days later than the earliest varieties and 10-15 days later than the rest of the tree. Pistillate flowers bloom 27 days later than the early varieties and 9-13 days later than the rest of the tree. The tree appears healthy, with a medium-high yield of 109.7 kg.
F-157. The tree blooms and flowers at the same time as F-314. Disease and pest resistance are low. Fruits weigh 8.5 g, the skin is 0.9 mm thick, and the kernel content is 84.2%. The yield is average.
Basic information about chestnut shapes is given in Table 3.
Table 3. Main economic indicators of sweet chestnut varieties

Forms	The height of trees, m	Diameter of bole, m	Diameter of crown, m	Form of leaf	Length of leaf, sm	Length of petiole	Fruit weighs, g	Kernel yield, %	Ripening of varieties
F-12	21,5	4,1	15,3	elliptical	22,7	1,6	9,1		early-ripening
F-81	27,5	2,8	15,4	obovate	19	1,5	6,9	87	early-ripening
F-16	21,7	2,3	18,8	oblong	16,2	2	11,2	90,7	early-ripening
F-23	18,5	4,1	17,9	lanceolate	20,7	1,7	7,8	79,5	early-ripening
F-65	22,3	4,1	19,6	lanceolate	23,8	2,3	9,5	84,5	early-ripening
F-96	24,4	2,5	20,5	lanceolate	22,7	1,9	11,4	88,3	early-ripening
F-104	28,5	3,2		elliptical	21,9		6	76,6	medium-ripening
F-156	34,2	4,9	29,5	elliptical	28	1,6	4,6	88,9	medium-ripening
F-161	30	1,9	16,3	oblong	23	1,9	9,1	83,1	early-ripening
F-177	26,8	4,3	19,6	lanceolate	24	2,5	9,4	89,7	early-ripening
F-295	30,5	7	19,5	lanceolate	16,8	1,3	7,3	84,9	medium ripening
F-314	28	4,4	20,7	oval	23,6	1,6	8,5	87,8	medium ripening

A large-fruited form (*Castanea sativa L. f. maxima*). Numerous specimens have been recorded. Air-dried fruit weight is 15-25 g. The shape of the cupula spines is short-stellate-spiny, the thickness of the fruit skin is 1.0-1.6 mm, the kernel is large, beautiful,

tasty, accounting for 87-92% of the nut weight. Productivity is high, fruit drop is not observed, resistance to diseases and pests is low.

An early-ripening form. Several specimens have been recorded. One of the earliest, form F-305, has already been described; it ripens on September 6-10.

Perspective varieties and forms of sweet chestnut. Based on the results of a comprehensive study of identified landrace varieties and forms of sweet chestnut in the Sheki-Zagatala region, we selected seven varieties for propagation and subsequent introduction into production, including the Ashlyg variety, Gara Khanlyg, and five forms: F-125, F-210, F-134, F-77, and F-235 (Fig. 1).

The Ashlyg variety is mid-season, mid-flowering, and medium-yielding. Full ripening of the fruits occurs in late September. The nuts are large. The kernel yield is 85%. The fruits contain up to 16.2% sugar and up to 8.0% protein. Pollinators: F-210, F-235, F-12, F-117.

The F-125 form is late-ripening and late-flowering. Fruit ripening begins in mid-late October. The fruits are medium-sized. Kernel yield is 89.2%. The nuts contain an average of 16.6% sugar, 7.6% protein, 61.0% starch, and 2.9% fat.

Pollinators: Gara Khanlyg, F-103, F-181.

The F-210 form is mid-season, early-flowering, and high-yielding. Fruit ripening begins in mid-late September. The nuts are very large in both size (approximately 26.3 cm3) and weight (14.5 g). The kernel yield is very high (92.2%) due to the thin shell and heavier mass of the clean kernels. The nuts contain an average of 15.3% sugar, 8.7% protein, and 2.3% fat.

Pollinators: F-235, F-12, F-181.

The F-134 form is mid-late ripening, mid-flowering, and high-yielding. Full fruit ripening occurs 5-7 days earlier than the Gara Khanlyg variety. The nut size is similar to the F-210 variety (28.3 cm3), but the kernels are heavier (an average of 54 nuts per 1 kg of bulk density, compared to 83 for the Ashlyg variety). The kernel yield is very high (92.0%) due to the heavier mass of the clean kernels. The nuts contain an average of 15.1% sugar, 8.9% protein, 63.9% starch, and 2.2% fat. This variety is similar to marrons.

Pollinators: Ashlyg, F-210, F-12, F-117.

The F-77 form is late-ripening, late-flowering, and productive. Full ripening occurs in the middle of the third ten-day period of October. In terms of fruit yield per hectare, it approaches the high-yielding F-235 variety. The fruits are medium-sized. The kernel yield is 83.1%. The fruits have the highest sugar and fat contents – 17.8% and 3.4%, respectively.

Pollinators: F-210, F-235, F-12, F-117.

The F-235 form is early-ripening, early-flowering, and productive. Full ripening occurs in the first ten days of September. Nut volume approaches that of marron (32 cm3). Kernel yield is up to 90.2%. The fruits have the highest starch and vitamin C content – 64.8% and 53.91 mg%, respectively.

Pollinators: F-210, F-103, F-117, F-18.

The Gara Khanlyg variety is mid-late-ripening, late-flowering, and productive. Full ripening occurs in mid-October. The fruits are large (10.5 g). Kernel yield is good (92.1%).

The fruits contain 16.0% sugar, and their vitamin C content is close to the best, the same as the F-125 variety (49.53 mg%).
Pollinators: Ashlyg, F-134, F-210, F-103.
After examining thousands of sweet chestnut trees, it was discovered that the chestnut tree is represented by local, variegated populations, as well as by folk-bred varieties. Among these, it is possible to select high-yielding, large-fruited elite plants that should be recognized and cultivated, organization nut-fruit orchards.

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