

BIOLOGICAL PARTICULARITIES OF SOME VARIETIES OF CORYLUS AVELLANA OF FOOD AND DECORATIVE IMPORTANCE

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ABSTRACT

This paper consists in the description of some hazelnut varieties from our country, used both in landscaping and for food properties.

INTRODUCTION

Corylus avellana L. (Hazelnut) is native to the Black Sea and Asia Minor Basins, from where it has spread throughout southern Europe, from the Balkan Peninsula to the Iberian Peninsula, as well as in North America, occupying an area of about 600,000 ha worldwide. The largest producer of hazelnuts is Turkey, followed by Italy, Iran, Spain, USA, and Azerbaijan. Turkey

has an area covered with hazelnuts of about 400,000 ha, and a production of 555,000 tons. Italy, with a total area of 68,233 hectares, produces about 110,000 tons, ranking second in world production. Hazelnut is grown on smaller areas in China, France, Georgia, Belarus, Romania, Poland (1,4,5).

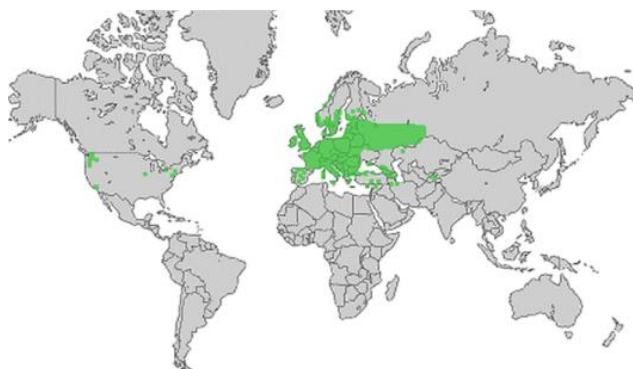


Figure 1. The distribution of hazelnut crop in the world (source: wilde-planten, 2015)

In Romania, the hazelnut is present in the spontaneous flora from all areas of the country, and in culture - especially in resorts and in several commercial plantations

developed in the last 7-8 years (Arges, Timis, Sibiu, Alba and Cluj) in 2016 occupying an area of 664 ha (4).



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Figure 2. The distribution of hazelnut crop in Romania

Hazelnut is a valuable species and it is a nutritious food due to its high content of proteins, vitamins, oils and mineral salts. Hazelnuts exceed walnuts by the content of main mineral substances (calcium, phosphorus, magnesium, manganese), are richer in vitamins B1 and B2 than walnuts. They also contain vitamins B5, E and PP, pantothenic acid, folic acid. The content of protein substances (12-28%), carbohydrates (12-22%), mineral salts (2.0 - 3.05%) places hazelnuts before

walnuts, and that of fats (52-69%) is even higher than in almonds. Being an important source of amino acids, it is an excellent tonic of the nervous system, cures anemia, contributes to strengthening the ability to concentrate, maintains the health of the cardiovascular system, strengthens coronary and myocardial vessel cells, reduces the risk of heart attack, has antiviral, anticancer, promotes interferon production of immune cells etc (2,3).

MATERIAL AND METHOD

Studies have been performed on the literature on the description of some

varieties of *Corylus avellana* introduced in culture and landscaping.

RESULTS AND DISCUSSIONS

Corylus avellana L. (Common hazelnut) is a component of the subshrub of boreal deciduous forests, in the mountains it rises up to 2000-2300 m, in the forest-steppe area it is accompanied by ordinary oak, in the thickness of shrubs, on the banks of rivers and lakes. It is the species that gave rise to the most varieties and represents the greatest economic importance.

Morphological features

Corylus avellana has a height of up to 4-5 m with leaves that fall in late autumn. It grows in the form of a shrub, with straight, slightly branched stems, but can also be a small tree up to 8-9 m. It reaches a longevity of 80-100 years. The

root is swivel-tracing. The crown is oval or flattened spherical. The shoots are strong, the leaves are large, of 8-12 cm length and 6-9 cm wide, green on the dorsal face and they are pubescent. It is a unisexual-monoecious plant, i.e. the hazelnut flowers are on the same plant, but the female and male ones are separated. The male ones are grouped in inflorescences called mint. Each cattail contains between 130 and 160 flowers. The female flowers are grouped 4-16 in glomerulus-like inflorescences. The average number of inflorescences is different for wild hazelnut and productive varieties, which vary between 1450 and 2850 units. It blooms until the leaves open (February-March, depending on the air temperature).



Figure 3. The hazelnut

Hazelnut is characterized by diogamy (the discrepancy between the time of flowering of female and male flowers). This phenomenon is of particular importance in ensuring pollination, because the hazelnut is usually self-sterile (incompatible). The inconsistency (diogamy) of flowering is manifested by two types: proterandry - maturation of stamens before stigmas within the same flower; progeny - the development of the pistil before the stamens and homogamy - the female and male flowers bloom together. Pollination is anemophilous, with the help of wind.

The fruit is a monocarpic achene, also called pseudonucca, popularly hazelnuts, 2-4 in a common-wrapper, with superior taste qualities (5,6).

Ecological requirements

The common hazelnut, being a native species, does not have high demands on heat. It withstands temperatures above -25°C , and during flowering at -10°C (with the difference between varieties). Temperatures of $3-4^{\circ}\text{C}$ are very favorable for flowering, and those below 10°C are unfavorable for pollination. During pollination it needs low air humidity and low wind, which ensures pollination. Therefore, areas with semi-shade, wet, with southern, eastern or south-eastern exposure are the most favorable. After starting in the vegetation, temperatures below -1°C cause the shoots to freeze and can compromise the harvest.

The optimum temperature for hazelnut growth and fruiting is $23-27^{\circ}\text{C}$. Light requirements are moderate.

Southern exposures can anticipate flowering, which can cause frost loss. In hilly areas the best results are obtained on slopes with south-western or south-eastern exposure. In the steppe areas where the insolation is strong, north-eastern, north-western and even northern exposures are preferred.

The common hazelnut has quite high requirements for humidity, needing at least 700 mm of precipitation annually, especially in the months of vegetation, the highest requirements being in May-July. In very dry and hot periods it needs irrigation to ensure fruiting.

Having a very strong root system, it can capitalize on the most varied types of soil, except for those that are salty and with stagnant water. It has a great capacity to adapt to the soil reaction, being able to capitalize on soils with a pH between 5.5 and 7.8. The best growths are made on fertile, aerated, well-drained soils, which drain water well and are rich in organic matter.

Among the most productive varieties in our country are: Cozia, Ennis, Romavel, Uriășe de Vâlcea, Halle.

Corylus avellana - Cozia - variety of Romanian origin, with plants of medium vigor. It has an average number of root suckers / plant. It can be easily driven with monotulpine. It blooms quite early (January-February) and is of the protogynous type. It is early, produces a lot and constantly. The fruit is large or very large, round - compressed. The kernel has a randament of 46.1%. The ripening of the fruits takes place in the first decade of September. It has good

resistance to low winter temperatures and it is resistant to bacteriosis and other diseases. High production, large fruits and their quality recommend it for plantations in more southern and western areas, under irrigation conditions, if the annual rainfall is below 700 mm. It multiplies in relatively small quantities (700-1,500 plants / year), equivalent to 1-2 ha of intensive plantations.

Corylus avellana - Romavel - variety of Romanian origin, with plants of great vigor. It flowers late (late February-early March) and it is homogamous. It quickly produces fruits very well and constantly. The fruit is medium to small in size (2.8 g), roundly compressed. The randament of the kernel is 49.51%. The ripening of the fruits is early, in the second decade of August. The variety is resistant to frost, bacteriosis and hazelnut spider. The variety is recommended for all favorable cultivation areas, under irrigation conditions. It multiplies annually in the amount of 1,500-2,000 plants, corresponding to the establishment of 2-3 ha of intensive plantations.

Corylus avellana - Arutela - new variety of Romanian origin, with high vigor plants, with a medium number of root suckers and easy to drive with monotulpine. It blooms early (late January - early February) and it is homogamous. It is early, productive, with constant fruiting. The fruit is small (2.3 g), globular in shape. Exocarp - of medium thickness, but which breaks easily. The randament of the kernel is 50.0%. It is disease resistant, but prefers warmer areas in the south, where a good result is obtained under irrigation conditions. It multiplies quite a bit: 200-600 plants / year, but can be expanded (5.6).

Corylus avellana - Giants of Valcea - variety of Romanian origin, of medium vigor, with a spreading port and few root suckers. It can be easily driven with monotulpine. It blooms in the middle period (February-March) and it is homogamous with a tendency towards protandria. The variety is very productive and bears fruit constantly. The fruit is very

large compared to all foreign varieties (4.9 g). The randament of the kernel is 48.5%. Maturation occurs in the first decade of September. It is resistant to frost and disease, very productive (5,6).

Corylus avellana - Halle - is a very productive variety, obtained by the German pomologist Buttner G.C., in 1788, with late ripening, the fruits ripen towards the end of September. Variety grown in most European countries for resistance to low temperatures and disease. The fruits are very large, on average 3.8 g, grouped 2-3 at a time, with a short envelope, with 40-45% core and easy to harvest. The shape is spherical-elongated, dark brown at harvest. The taste is good, ideal for fresh consumption, kept for the winter or in various dishes. Fruit production is high, on average 3-4 t / ha at full fruiting (after the 4th - 5th year after planting). The plant is vigorous, reaches a height of 3-4 m, forms erect shoots. Fruiting is early, it has a tendency to dredge (root shoots) especially in the early years. Late flowering, late February - early March (5.6).

Corylus avellana - Ennis - variety of US origin, with high vigor plants and few root suckers. It is easily managed with monotulpine. It blooms in the middle to late period (late February - March) and it is homogamous with a tendency to protogyny. It produces a lot and constantly. The fruits are very large (4.5 g) and round. The randament of the kernel is 48%. Maturation occurs in the second decade of September. It is resistant to frost and tolerant to some diseases. It multiplies only by grafting, in very small quantities. It is recommended in areas favorable to hazelnut cultivation, in irrigation (5,6).

Also, in the arrangement of green spaces can be used successfully horticultural forms, which are highlighted by the color of the foliage, with deeply lacinate leaves or with shoots and strongly twisted branches. Ornamental varieties: Contorta, Aurea, Pendula.

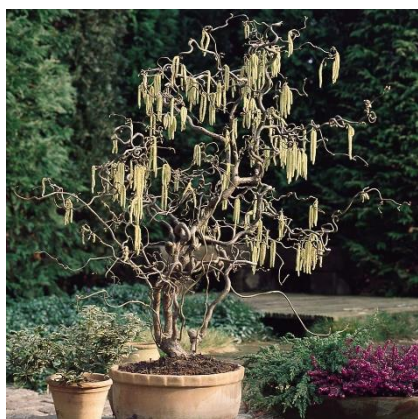
Corylus avellana - Contorta - shrub that reaches 4 m in height and grows by

about 20 cm per year. Twisted shoots (like a corkscrew) have a decorative and interesting appearance, especially in winter and spring, when they develop abundant yellow inflorescences (popularly called catkins). It prefers sunny or semi-shaded areas. Branches are often used in dried flower arrangements.

Corylus avellana - *Aurea* - is distinguished by its bright yellow leaves (when small), which with age change color to yellow-green. It reaches about 4 m in height. It grows by about 20 cm per year. It grows well on any type of soil, if it is provided with sufficient moisture. It prefers sunny or shady areas. It is

recommended for planting in gardens and urban green spaces, as a color accent.

Corylus avellana - *Pendula* - weeping shrub with a dome-shaped crown. It grows up to 3-5 m, more in width than in height. At first, the branches grow vertically, but over time they bend sharply and fall down. It grows by 20-40 cm per year. The leaves, inflorescences - popularly called catkins and fruits are very similar to those of ordinary hazelnut. Regular pruning after flowering contributes to the formation of a denser crown. Prefers sunny or shady areas and fertile soil (5,7).



Contorta



Aurea



Pendula

Figure 4. Ornamental varieties (source: <https://futureforests.ie/products/corylus-avellana>)

CONCLUSIONS

The hazelnut is often found in Romania in the wild in the whole hilly and submountain areas. Less widespread as a crop, however, it has to be expanded because it occupies a small space, requires little care, bears fruit every year, and fruits are rich in fats (50-70 percent),

protein substances, carbohydrates, salts minerals and vitamins. Currently, through the development programs of the fruit sector, through projects financed by the structural funds, an attempt is made to stimulate the diversification of crops. Hazelnuts are among the eligible crops.

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