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FRUITING BIOLOGY OF *STAPHYLEA PINNATA* L. (STAPHYLACEAE) IN THE REPUBLIC OF MOLDOVA

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Abstract

The study presents the results of the fruiting biology in the interaction with the environmental factors of the Staphylea pinnata L species, a rare species for the Republic of Moldova, protected by law (1998). At the European level, the species is included in the national red lists of Switzerland, France, the Czech Republic and Poland, while in Armenia and Ukraine, it is even included in the Red Cards with different degrees of endangerment. European bladdernut is a relict species with a fragmented distribution area and includes the Mediterranean, Central and East Europe regions. It grows under the canopy, in forest phytocenoses: of oak with lime and ash; of pedunculate oak with hornbeam. During the study, the morphometric parameters of the fruits and seeds of the european bladdernut were studied to determine the productivity of the species in different stations. The collected seed samples are to be preserved in the seed collection `Rare Plants of the Republic of Moldova`, within the research project `The safe conservation of the germplasm of rare plants from the Republic of Moldova` (24.80012.7007.08TC).

Key words*: Republic of Moldova, Staphylea pinnata L., fruiting biology, morphometry, rare species.*

INTRODUCTION

Staphylea pinnata L. – European bladdernut (Staphylaceae) (Figure 1) is a rare species for the territory of the Republic of Moldova, protected by the *Fund of State Protected Natural Areas Law* (LAW No. 1538, 1998). At the European level, the species is included in the national red lists of Switzerland, France, the Czech Republic and Poland (The IUCN Red List of Threatened Species). It is even included in the Red Books of Armenia and Ukraine, with different degrees of endangerment (Tamanjan et al., 2010; Mel'nik et al., 2009), while in Greece it is considered extinct due to industrial impact (Raus, 2006). The European bladdernut is a relict species with a fragmented distribution area which includes the Mediterranean Region, Central and South-Eastern Europe. The habitat of the species is represented by the thermophilic deciduous forests of Central Europe. In the spontaneous flora of the Republic of Moldova, it grows in the forest areas of the centre and north of the country as an understory in forest phytocenoses dominated by sessile oak (*Quercus petraea* (Matt.) Liebl.) with linden (*Tilia platyphyllos* Scop.) and ash (*Fraxinus excelsior* L.), but also by pedunculate oak (*Quercus robur* L.) with hornbeam (*Carpinus betulus* L.) and sycamore (*Acer platanoides* L.). It can also be occasionally found in beech forests (*Fagus sylvatica* L.) with hornbeam (*Carpinus betulus* L.), especially in the edges, clearings, along paths, avoiding the deep shade under their canopy. The European bladdernut is a light-loving plant, which usually grows in small groups with the predominance of vegetative individuals in the understory. On the slopes, in the upper half of the slopes with southwest and southeast exposure, where the density of the oak crown decreases to 0.5-0.6, the European bladdernut dominates in the undergrowth, and with a canopy closure of 0.3-0.4, it blooms and bears fruit abundantly. At the same time, in the conditions of the Republic of Moldova, the European bladdernut occasionally grows in the phytocenoses of dry forests of downy oak (*Quercus pubescens* Willd.) with European smoketree (*Cotinus coggygria* Scop.) and Cornelian cherry (*Cornus mas* L.), also it is a drought-resistant species that tolerates prolonged lack of precipitation (Gheideman, 1986).

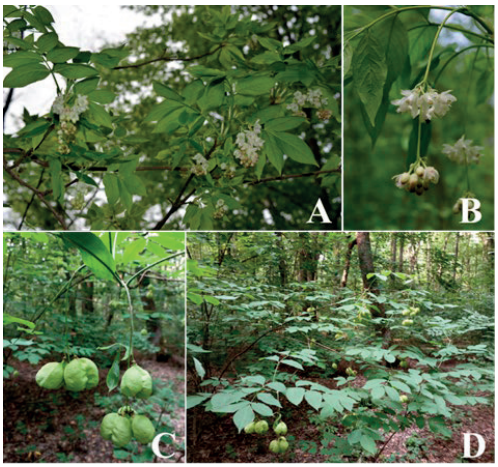

Figure 1. *Staphylea pinnata* L. in the "Dobrușa" Landscape Reserve, where: A, B – flowering phase; C, D – fruiting phase

Brief description. Shrub 1.5-4 m tall. Brown, glabrous branches, with whitish striations, young green shoots, glabrescent. Conical-ovoid buds, green to reddish-brown. Opposite leaves, imparipinnate-compound, 25-35 cm long, long-petiolate, with 2-3 pairs of leaflets, the lateral ones subsessile, and the terminal leaflet petiolate. Leaflets 5-7, oblong-ovate to elliptical, 6-12 cm long and 4-5 cm wide, acuminate, on finely serrate margins, adaxially dark green, glabrous, abaxially green glaucous, glabrescent at the base, initially thin and fine, coriaceous at maturity. Inflorescence – pendent panicle, 7-14 cm long, composed of 7-18 (26) flowers. Flowers on type 5, bisexual, actinomorphic. Calyx composed of 5 sepals, petaloid, ovate to ovate-lanceolate, concretion at the base, white-ochroleucous, abaxial with shades of pink-reddish. Campanulate corolla, 5 petals, free, spatulate, white-ochroleucous, abaxially towards the apex, with shades of pink, subequal to the sepals. 5 stamens, subequal to the petals, golden yellow anthers. Ovary superior. 3-4 styles, concretions, stigmas capitate. Fruit – capsule, 2 (4) chambered, obovoid to spherical, swollen, vesicular, 3-4 cm long, with membranous walls, flexible even at maturity. 1-2 seeds in each lodge, subspherical, about 0.8-0.9 cm in diameter, light brown, glabrous, with a hard and shiny integument. Leafing occurs in early May, and by mid-month most plants are in flower. The fruits ripen and open in July-August.

Limiting factors. The main threats to *Staphylea pinnata* populations are habitat fragmentation through silvicultural works, poor forest management, introduction of non-native tree species, and tourism and recreational activities. These threats may cause changes in habitat quality and a future reduction in *Staphylea pinnata* populations.

Conservation measures. Conservation of the species' habitats, prevention of introduction of non-native species. *Ex situ* conservation in Botanical Gardens. Introduction into cultivation as an ornamental plant.

For the successful implementation of biodiversity conservation tasks, it is necessary to know the reproductive biology of species and the specific generative traits that, in interaction with a variety of environmental factors, ensure seed production. In rare species, the study of reproductive capacity is particularly important and allows the identification of optimal and limiting factors for the perpetuation of the species.

The essential characteristic of the individual - environment relationship includes ensuring the survival, perpetuation and, possibly, prosperity of the respective species (Stugren, 1982). The study of the biology of fruiting of *Staphylea pinnata*, in the 4 populations, was carried out in 2024 and included the establishment of the following indices: seed productivity (P_s); morphology, morphometry and mass (m_{100}) of the formed seeds.

MATERIALS AND METHODS

The present study was carried out based on the population of *Staphylea pinnata* L., a rare species for the territory of the Republic of Moldova. The working material consisted of the data collected in 2024. The exact location of the site was determined using the Garmin GPSMAP® 64s GPS model. The fruiting biology of *Staphylea pinnata* was analyzed from: Rososeni Forest, Briceni district (one population); "Călărașeuca" Landscape Reserve, Ocnița district (one population); "Dobrușa" Landscape Reserve, Șoldănești district (two populations) (Figure 2).

Population parameters were established on site according to accepted methods, and the detailed description is based on the live plants collected. The general distribution, chorology, ecology

and phytocenology of the species *Staphylea pinnata* were established by the authors, supported by data from the literature.

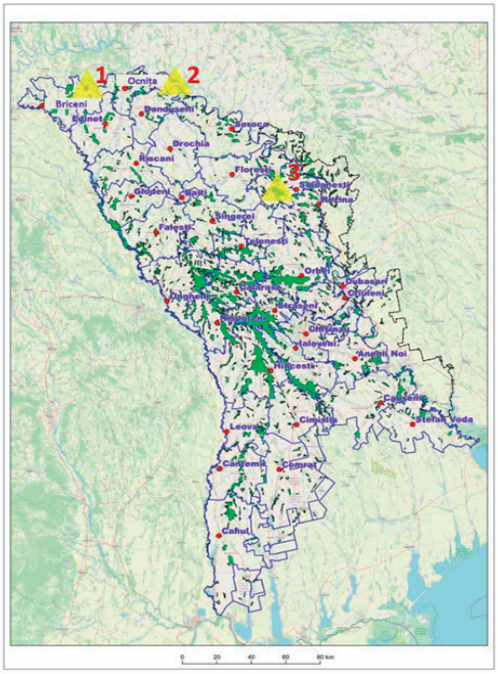

Figure 2. Geographic location of the *Staphylea pinnata* L. studied populations, where: 1 – Rososeni Forest, Briceni district; 2 – "Călărașeuca" Landscape Reserve, Ocnița district; 3 – "Dobrușa" Landscape Reserve, Șoldănești district

The climate of 2024 was characterized by a high thermal regime and a significant deficit of precipitation in the summer period. The average annual air temperature in the studied territory was 13.0-13.3°C (Table 1).

Table 1. Characterization of weather conditions in 2024

Average monthly air temperature (°C)													
*	Monthly												**
	1	2	3	4	5	6	7	8	9	10	11	12	
A	-1.6	5.3	5.6	12.9	16.0	21.5	23.5	23.1	18.9	9.8	2.5	0.9	13.3
B													
C	-0.6	6.4	6.9	14.5	17.1	23.1	25.7	25.3	20.0	11.4	3.7	2.0	13.0
Monthly and annual precipitation amount (mm)													
*	monthly												***
	1	2	3	4	5	6	7	8	9	10	11	12	
A	40	24	31	64	30	51	71	40	71	27	38	64	551
B	22	21	31	49	10	29	90	51	84	26	44	60	517
C	50	12	43	89	22	80	12	28	87	27	43	31	524

* A - Rososeni Forest, Briceni District; B - "Călărașeuca" Landscape Reserve, Ocnița District; C - "Dobrușa" Landscape Reserve, Șoldănești District
**average; ***annual

Meteorological data are taken from the Statistical Yearbook for 2024, National Bureau of Statistics of the Republic of Moldova.

The summer was hot and with a significant deficit of precipitation in the months of July-August, a period that coincides with the development and ripening of *Staphylea pinnata* fruits. The significant deficit of precipitation and the high thermal regime contributed to the occurrence of atmospheric and pedological drought in the region of the "Dobrușa" Landscape Reserve (July-August - 12-28 mm of precipitation). In the far northern districts such as Briceni and Ocnița (Rososeni Forest and the "Călărașeuca" Landscape Reserve), precipitation amounted to 40-70 and 50-90 mm, respectively.

The seed productivity coefficient, potential and real productivity of the study objects (4 populations of *Staphylea pinnata*) were studied in accordance with the "*Research Methodology of Plant Seed Productivity and Calculation Recommendations*" developed by I. Vajnagij (1974). Potential seed productivity was calculated based on the general quantity of seeds produced by the same unit (in our case the basic unit is the flower), the real one from the number of normally developed seeds, using the same unit of record (fruit). The seed productivity coefficient (C_{ps}) was determined by the ratio of the exponent of real seed productivity (P_{sr}) to that of potential productivity (P_{sp}) expressed in percentages, according to the formula:

$$Cps = \frac{Psr}{Psp} * 100\%$$

The morphological description of the seeds was compiled according to the terminology proposed by: "*Descriptive morphological atlas*" (Artjushenko, 1990); "*The Kew plant glossary*" (Beentje, 2016) and "*Polyglot Botanical Dictionary*" (Vaczy 1980). Biometric measurements were carried out according to the method proposed by G. Lakin (1990).

The mass of 100 seeds and their dry mass were determined in the *Research and Extension Center for Agriculture, Biodiversity, and Rural Development "GreenTech" (Technical University of Moldova)*. Seed lots (in three repetitions) were dried in an oven and the dry mass was determined by weighing with an analytical balance.

The water content is the difference between the fresh mass (m_{fr}) and the dry mass (m_{usc}). The percentage of water in the seeds (C_{um}) was calculated by applying the formula:

$$C_{um} = \frac{C_{um}\,(g)}{m_{fr}} * 100\%$$

The map regarding the location of the studied populations on the territory of the Republic of Moldova was developed using the free open-source application QGIS (*GIS – Geographic Information System*).

RESULTS AND DISCUSSIONS

Description of the studied populations of *Staphylea pinnata* L.

The European bladdernut population in the Rosoșeni forest (48°21'23.4"N 27°00'09.1"E), grows on a slightly inclined slope with uniform relief, with eastern exposure, altitude 262 m, in a natural-fundamental stand consisting of *Quercus robur* L. with *Cerasus avium* (L.) Moench and *Tilia tomentosa* Moench. The shrub layer is represented by *Staphylea pinnata* L., *Viburnum lantana* L., *Cornus mas* L., *Corylus avellana* L., *Rhamnus cathartica* L. and *Euonymus verrucosus* Scop. The degree of coverage of the herbaceous layer is 60-80% with the representtative species such as: *Pulmonaria obscura* (Dumort), *Veratrum nigrum* L., *Carex brizoides* L., *Potentilla alba* L., *Digitalis grandiflora* Mill., *Asarum europaeum* L., *Campanula trachelium* L., *Melampyrum nemorosum* L., *Aegopodium podagraria* L., *Lilium martagon* L. Soil type: gray forest soil (Ursu et al., 2022).

In the "Dobrușa" Landscape Reserve, *Staphylea pinnata* L. grows in stands dominated by *Quercus petraea* (Matt.) Liebl. with *Fraxinus excelsior* L., *Tilia cordata* Mill. and *Carpinus betulus* L. Among the scattered tree species encountered are *Quercus robur* L., *Acer campestre* L., *Acer platanoides* L. and *Prunus avium* L. The seeds were collected from 2 well-developed populations with an abundance of 20-25% (Sfeclă, 2024).

The first population is located in the "*Dobrușa Mică*" forest, plot 15H (47°48'896"N 28°39'498"E) and grows on a slightly inclined North-East facing slope, at an altitude of 294 m. The grove is formed by *Quercus petraea* (Matt.) Liebl. with *Fraxinus excelsior* L. and *Carpinus betulus* L. The shrub layer is predominantly represented by *Staphylea pinnata* L. accompanied by other species such as *Cornus mas* L., *Crataegus monogyna* Jacq. and *Viburnum lantana* L. The herbaceous layer is well-developed with a coverage of 40-60%, and among the dominant species we can mention: *Veronica hederifolia* L., *Corydalis cava* (L.) Schweigg. & Körte, *Anemonoides ranunculoides* (L.) Holub, *Arum orientale* M.Bieb., *Stellaria holostea* L., *Carex brevicollis* DC., *Carex pilosa* Scop., *Hypericum hirsutum* L., *Dactylis glomerata* L., *Scopolia carniolica* Jacq. Type of soil are grey forest soil (Ursu et al., 2022).

The second population is in the "*Rădi*" forest, plot 31H (47°49'367"N 28°36'945"E) positioned on a North-East facing slope with an inclination of approximately 30°, the altitude between 266-294 m. The main tree species that make up the stand are *Quercus petraea* (Matt.) Liebl., *Fraxinus excelsior* L., *Acer campestre* L., *Carpinus betulus* L. and *Tilia cordata* Mill. The understory is formed by *Staphylea pinnata* L. with an abundance of 20-30%. The herbaceous layer is made up of the following predominant species: *Corydalis solida* (L.) Clairv., *Corydalis cava* (L.) Schweigg. & Körte, *Galium aparine* L., *Stellaria holostea* L., *Geranium robertianum* L., *Lunaria annua* L. The soil type is gray forest soil (Ursu et al., 2022).

The population of *Staphylea pinata* L. from the "Călărașeuca" Landscape Reserve (48°24'25"N 27°50'29"E), grows on a slope with a North-East exposure, in a natural stand formed mainly by *Quercus robur* L., *Carpinus betulus* L., *Acer platanoides* L. The shrub species are represented by: *Staphylea pinnata* L., *Corylus avellana* L., *Cornus mas* L., *Cornus sanguinea* L., *Viburnum lantana* L., *Euonymus europaeus* L., H*edera helix* L. The herbaceous layer is made up of: *Phyllitis scolopendrium* L., *Polypodium vulgare* L., *Asplenium trichomanes* L., *Urtica dioica* L., *Hepatica nobilis* Mill., *Stellaria holostea* L., *Lunaria rediviva* L., *Asarum europaeum* L., *Pulmonaria officinalis* L., *Galanthus nivalis* L., *Galium aparine* L., *Aegopodium podagraria* L., *Anemonoides ranunculoides* L., grows on gray forest soil (Ursu et al., 2022).

Seed productivity. One of the most important stages of an individual's development is reproduction. Seed productivity is an indicator of the stability of the plant population and its perpetuation. This notion was introduced by I. Vajnagij (1973) and constitutes one of the

important criteria for assessing the viability of a plant in specific living conditions. In the methodical indication for studying seed productivity, I. Vajnagij (1990) stated some rules, such as: highlighting seed productivity proceeds differentially; when calculating ovules and seeds, the elementary unit of seed productivity is determined; the calculation of ovules and seeds is carried out on the same elementary units.

In the present study, the elementary unit of calculating the seed productivity used was the flower/fruit. Dickison (1986) mentions that in *Staphylea pinnata*, the number of ovules in each carpel can be up to eight, but very rarely more than one matures. When calculating the potential seed productivity (P_{sp}), the maximum potential value was used – 8 ovules in a carpel and 4 carpels in the fruit, respectively, P_{sp} for the elementary flower unit is 32.

Table 2 presents the data obtained on the potential (P_{sp}) and real seed productivity (P_{sr}), as well as the seed productivity coefficient (C_{ps}) of *Staphylea pinnata* under different seasonal conditions, in 2024.

Table 2. Seed productivity of *Staphylea pinnata* L. under the conditions of the Republic of Moldova

Population origin		No. of fruit lodges	No. of seeds in the box	No. of seeds in fruit (P_{sr})	Maximum number of ovules in fruit (P_{sp})	Seed productivity coefficient (C_{ps})
The European bladdernut population from the Rosoșeni forest (48°21'23.4"N 27°00'09.1"E)	*min.-max.*	1-3	0-2	1-4	32	6.696
	arith mean	2.429	1.111	2.143		
	dispersion	0.571	0.693	0.901		
	standard dev.	0.756	0.832	0.949		
	coef. of var.	31.126	74.912	44.299		
	standard error	0.202	0.196	0.254		
	confid. interval	0.396	0.385	0.497		
Population No. 1 of European bladdernut from the "Dobrușa" Landscape Reserve (47°48'896"N 28°39'498"E)	*min.-max.*	1-4	0-2	1-5	32	6.137
	arith mean	2.889	1.111	1.964		
	dispersion	0.861	0.575	0.925		
	standard dev.	0.928	0.758	0.962		
	coef. of var.	32.122	68.256	48.952		
	standard error	0.309	0.179	0.182		
	confid. interval	0.606	0.350	0.356		
Population no. 2 of European bladdernut Landscape Reserve "Dobrușa" (47°49'367"N 28°36'945"E)	*min.-max.*	1-4	0-2	1-4	32	7.872
	arith mean	2.833	1.143	2.519		
	dispersion	0.697	0.629	0.567		
	standard dev.	0.835	0.793	0.753		
	coef. of var.	29.465	69.372	29.897		
	standard error	0.241	0.173	0.145		
	confid. interval	0.472	0.339	0.284		
The population of European bladdernut from the "Călărașeuca" Landscape Reserve (48°24'25"N 27°50'29"E)	*min.-max.*	1-4	0-2	1-5	32	8.594
	arith mean	2.231	1.000	2.750		
	dispersion	0.859	0.667	1.065		
	standard dev.	0.927	0.816	1.032		
	coef. of var.	41.547	81.650	37.531		
	standard error	0.257	0.226	0.211		
	confid. interval	0.504	0.444	0.413		

The achievement of real seed productivity is in direct accordance with environmental factors. The number of seeds formed in a fruit varies from 1 to 5 and it presented variations in the averages of different origins. The highest real seed productivity 2.75 was recorded in the seeds of population from the Călărașeuca Landscape Reserve, the lowest – 2.143 in the population from the Rosoșeni forest. Of the four provenances studied by *Staphylea pinnata*, the highest seed productivity coefficient (C_{ps}) was recorded in the population from the "Călărașeuca" Landscape Reserve (8.594%) and population no. 2 from the "Dobrușa" Landscape Reserve (7.872%), followed by the seeds of population from the Rosoșeni forest (6.696%) and population no. 1 from the "Dobrușa" Landscape Reserve (6.696%).

In general, the fact that European bladdernut fructified and developed seeds in all the populations studied demonstrates its flexibility

and the provision of generative multiplication under various stationary conditions.

Seed biology. Generative self-propagation of a species ensures the presence of individuals at different ontogenetic stages within the population, which directly leads to its ecological stability. The continuity of the species and the exchange of generations take place through the seed. In the morphological description of the seed, such indices as: size; shape; surface of the tegument and location of the hilum are important. The seeds of European bladdernut are uniform and do not present distinctive taxonomic characters. Well-developed seeds were selected for the morphological description. They are oval-elongated, brown in colour, shiny, with a smooth surface. The cross-section along the entire length is circular. The seeds of European bladdernut are structured in: tegument 0.7-1.45 mm thick, endosperm and embryo. The circular hilum, light brown in colour, 2.69-4.24 mm in diameter. The endosperm is solid and friable. The embryo is positioned apically.

Seed size is an important feature of plant life history, related to the mechanisms of dispersal, germination, survival and reproductive success. There are several macro- and microevolutionary studies on seed size that have demonstrated a reduced specific and even generic variability (Leishman et all, 2000). A correlation of plant distribution with seed size and global environmental conditions is also demonstrated. Species with larger seeds grow in tropical forests and their size decreases sharply in species that make up non-forest vegetation.

The size and weight of *Staphylea pinnata* seeds are presented in Table 3 and vary little depending on the provenance.

Table 3. Morphometry and weight of *Staphylea pinnata* L seeds

Population origin		Morphometric indices						Quantitative indices		
		L, mm	W, mm	Th, mm	L/W	Sk-Th, mm	Hil ⌀, mm	m_{fr}, g	m_{usc}, g	C_{um}, %
The European bladdernut population from the Rosoșeni forest	*min.-max.*	9.06-11.21	9.27-10.85	7.83-8.98	0.935-1.152	0.77-1.16	2.69-3.24	21.67-22.066	20.309-20.689	6.240-6.280
	arith mean	10.006	9.738	8.139	1.030	0.942	3.029	21.868	20.499	6.260
	dispersion	0.532	0.184	0.114	0.006	0.017	0.041	-	-	-
	standard dev.	0.730	0.429	0.338	0.079	0.129	0.202	-	-	-
	coef. of var.	7.293	4.402	4.148	7.630	13.672	6.668	-	-	-
	standard error	0.231	0.136	0.107	0.026	0.043	0.067	-	-	-
	confid. interval	0.452	0.266	0.209	0.051	0.084	0.132	-	-	-
Population No. 1 of European bladdernut from the "Dobrușa" Landscape Reserve	*min.-max.*	9.27-10.47	9.74-10.51	8.12-8.85	0.932-1.006	0.77-1.45	3.12-4.24	22.556-23.23	21.119-21.734	6.370-6.453
	arith mean	9.652	10.060	8.412	0.960	0.967	3.501	22.938	21.465	6.421
	dispersion	0.054	0.075	0.061	0.001	0.051	0.109	-	-	-
	standard dev.	0.233	0.274	0.247	0.033	0.226	0.331	-	-	-
	coef. of var.	2.416	2.728	2.935	3.449	23.333	9.451	-	-	-
	standard error	0.078	0.091	0.082	0.011	0.075	0.110	-	-	-
	confid. interval	0.152	0.179	0.161	0.022	0.147	0.216	-	-	-
Population no. 2 of European bladdernut Landscape Reserve "Dobrușa"	*min.-max.*	9.04-10.56	9.51-10.38	7.63-8.78	0.909-1.067	0.77-1.14	3.37-4.08	21.806-23.357	20.448-21.871	6.228-6.362
	arith mean	9.450	9.774	8.072	0.967	0.981	3.623	22.699	21.266	6.313
	dispersion	0.292	0.080	0.082	0.003	0.045	0.073	-	-	-
	standard dev.	0.540	0.283	0.286	0.057	0.213	0.270	-	-	-
	coef. of var.	5.719	2.893	3.540	5.891	21.678	7.458	-	-	-
	standard error	0.180	0.094	0.095	0.019	0.071	0.090	-	-	-
	confid. interval	0.353	0.185	0.187	0.037	0.139	0.177	-	-	-
The population of European bladdernut from the "Călărașeuca" Landscape Reserve	*min.-max.*	8.18-10.19	9.12-10.49	7.64-8.61	0.852-1.005	0.76-1.07	3.09-4.16	22.75-25.74	21.347-24.191	6.167-6.017
	arith mean	9.141	9.692	8.103	0.944	0.892	3.412	24.519	23.031	6.072
	dispersion	0.345	0.271	0.114	0.004	0.012	0.136	-	-	-
	standard dev.	0.587	0.521	0.338	0.061	0.110	0.369	-	-	-
	coef. of var.	6.424	5.372	4.172	6.443	12.288	10.809	-	-	-
	standard error	0.196	0.174	0.113	0.020	0.037	0.123	-	-	-
	confid. interval	0.384	0.340	0.221	0.040	0.072	0.241	-	-	-

L – length; **W –** width; **Th** – thickness; **L/W –** ratio between length and width; **Sk-Th** – skin thickness; **Hil ⌀** – hil diameter; **m_{fr}, g** – fresh mass; **m_{usc}, g** – dry mass; **C_{um}, %** – moisture coefficient.

Seeds with larger parameters (length/width) are characteristic of European bladdernut populations from the "Dobruşa" Landscape Reserve (Table 3). Based on the mass of 100 seeds, the provenance from the "Călărașeuca" Landscape Reserve proved to be the most productive, demonstrating a reserve of nutrients accumulated in the endosperm superior to the other European bladdernut provenances.

Determining the water content of seeds is an extremely important test, as it provides information on the accumulated nutrients, the potential for harvesting, cleaning and planting, as well as for long-term storage of seeds (Copeland and McDonald, 2001). A small change in the water content of seeds can have a large effect on the storage life of seeds. Accurate determination of water content is essential to make fairly accurate predictions regarding the storage potential of seeds (Hanson, 1985). Ellis R.H. et al. (1990), in the process of researching the relationship between water content and seed longevity, came to the conclusion that seeds containing less than 10-11% water, are more long-lived. The water content of the European bladdernut seeds is within the limits of 6.16-6.37% (Table 3). Seed samples collected from *Staphylea pinnata* with the provenances mentioned in the work were preserved in the Germplasm Collection: "*Rare Plants from the Republic of Moldova*" of the National Botanical Garden (Institute) "Al. Ciubotaru", USM.

CONCLUSIONS

This study highlighted the need to research the fructification biology of rare species both in the context of germplasm conservation and for the analysis of the variability of the seed productivity within different populations with specific seasonal conditions.

Analysis of seed productivity of the studied populations demonstrated a significant variation from 6.1% (Population no. 1 from the "Dobruşa" Landscape Reserve) to 8.5% (Population from the "Călărașeuca" Landscape Reserve), under different climatic conditions, especially the amount of precipitation in the key months for the fructification process, which leads us to conclude that the real seed productivity is directly influenced by the specific conditions of the growing season.

The variation of morphometric indices and seed mass of *Staphylea pinnata* depending on the provenance highlights the ecological adaptability of the species.

The seeds collected from the "Călărașeuca" Landscape Reserve were distinguished by superior morphometric indices to the other European bladdernut populations and lower humidity coefficient, suggesting that they accumulated a greater amount of reserve substance. This provenance is the most suitable as a source of seeds used for species multiplication and conservation strategies in germplasm collections.

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