



Original article

# The population of *Crataegus ucrainica* (Rosaceae) in the Valley of the River Svydnya, Eastern Ukraine (Desna basin)

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## ABSTRACT

A new locality for *Crataegus ucrainica* in the ravine-valley system of the River Svydnya valley (Desna basin) near the town of Krolevecz (Sumy region) has been reported. This article presents the results of a study of *C. ucrainica* within the species' distribution. Based on a survey of the identified population, its ecological and coenotic features, and the ontogenetic state of the population are presented. The species is confined to areas with steep slopes, which are inaccessible for grazing, where clay deposits are exposed. The complexity of these ecotopes provides a good preservation of individuals in open meadows, forest edges, as well as in thickets of *Robinia pseudoacacia* and *Populus alba*. The coenotic affiliation of some individuals and thickets of this species to meadow-steppe, natural forest and spontaneous tree-shrub vegetation is noted. The state of the studied population in the Desna river basin is stable and sufficient for its preservation, its existence is due to the optimal hydrological regime of the slopes, which is associated with the presence of accumulated water at the bottom of valley s and a low groundwater level. The map shows the peculiarities of the distribution of the identified populations of *C. ucrainica* in Ukraine. A comparison of biotopes, ecotopes, soils, and vegetation types, in which populations of *C. ucrainica* in the area of their distribution are presented. Analysis of the seed products of this species according to analysis from different habitats allows us to assert the existence of favourable conditions for its distribution in the presence of optimal habitats.

KEY WORDS: Rosaceae, hawthorn or critical species, habitat ecology, natural distribution of species, protection, Ukraine

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## 1. Introduction

The genus *Crataegus* L. includes 300–1500 species (PHIPPS ET AL., 1990; TSVELEV, 2001). It is one of the most difficult aspects of the taxonomic family Rosaceae Juss. Species of the genus are distributed mainly in temperate regions of the Northern Hemisphere, mainly on the plains and river valleys, as well as in mountainous regions, where they

grow in thickets, less often in forests and steppe slopes. 28 species of *Crataegus* are listed in the flora of Ukraine (MOSYAKIN & FEDORONCHUK, 1999). The ability of species from the genus for active introgressive hybridization, the presence of polyploidy and apomixes, determines the high diversity of morphological types of individuals, which complicates the identification of species (TSVELEV, 2001; MEZHENSKA & MEZHENSKYI, 2013).

*Crataegus ucrainica* A. Pojark. 1939, Fl. SSSR, 9: 502, 441; POLETYKO, 1954, Ornamental shrubs of the USSR, 3: 547; FRANCO, 1968, Fl. Europ. 2: 75; BOSEK, 1975, Plants of the Bryansk region: 229; GEIDEMANN, 1986, Determinant of higher plants of the Moldavian SSR, ed. 3: 271. – *C. meyeri* auct./non Pojark.: CHRISTSEN, 1992, Syst. Bot. Monogr. 35: 59 pp.

Typus: Poltava region, Ukraine («prov. Poltava. Prope opp. Lybny, inter frutices»).

General distribution of the species: Central Europe (TSVELEV, 2001). The species is common in forest edges, among shrubs, sometimes in parks and gardens (TSVELEV, 2001).

Interest in the study of *C. ucrainica* is determined, by insufficient information about the boundaries of its range, the peculiarities of its distribution and the conditions of its growth in the territory of Ukraine and its conservation status. The species was described from Lubny, in the Poltava region (POJIARKOVA, 1939). It is indicated for Polissya (IVCHENKO, 1982) and mainly for the northern regions of the Forest-Steppe (KLOKOV, 1954; TSVELEV, 2001). These reports list other known areas of its distribution in Ukraine (Right-Bank and Left-Bank Forest-Steppe, Precarpathians, Western Polissya, Left-Bank Polissya) and from southern Belarus, as well as Moldova and Russia. This species is protected by the International Union for Conservation of Nature (WALTER & GILLET, 1998), it is a regionally rare species in Ukraine – Donetsk, Luhansk, Odessa, Sumy and Poltava regions (ANDRIENKO & PEREGRYM, 2012) and in Russia (BULOXOV & VELYCHKYN, 1998). Also this species has a specific value for use as greenery and the formation of a stable ecological city environment (SYTNIK ET AL., 2010; POTOTSKA, 2014). In addition to its decorative value *C. ucrainica* is used as a fruit and medicinal plant (MEZHENSKA & MEZHENSKYI, 2013).

After ordering the findings of *C. ucrainica*, mostly from the territory of the Left Bank Forest-Steppe, the only population in the literature was the one on the pine-forest terrace of the Dnieper in the city strip of Kyiv which consisted of two separate fragments (in the villages of Bykivnya and Chervonyj Xutir) (BORTNYAK & LYUBCHENKO, 1987). The authors of the publication give a description of the habitat on an area of about 3 hectares and note a fairly good condition for the individuals, and their abundant flowering and fruiting. Our repeated searches for individuals of *C. ucrainica* in these forests did not locate this population. In the spring of 2017 only three individuals of the species were found, in a rather depressed state, from the previously described population in part of the pine forest between the former village Chervonyj

Xutir and the village of Bykivnya. It is obvious that with the development of the city, deforestation and construction of the subway, this population had almost been completely lost.

Adverse habitat conditions were confirmed by the fact that one of the individuals was of a fairly low height (130 cm) and in the generative phase of development.

According to the results of our previous studies (NIKITCHUK ET AL., 2016; SHEVCHYK ET AL., 2017a,b; SHEVCHYK & SOLOMAKHA, 2018), the populations of this species are confined to places with water-resistant layers (clay, loam) in the soil profile for deep roots. After studying each individual local population, it became possible to compare them by habitat, soil type and vegetation type.

## 2. Study area

The area studied belongs to the Krolevecz-Glukhiv district of the Sumy slope in the upland region of the Eastern Ukrainian in the Forest-Steppe zone and represents the western slopes of the Middle Russian upland, which has been washed away in the process of landscape genesis (POPOVA ET AL., 1968).

The surface of the territory, in the boundaries of the locality, is strongly eroded, with a slight slope towards the side of the River Desna corridor. The predominant heights are 140–180 m. The fragmentation of the territory is associated with the presence of river valleys, ravines, gullies, suffusion basins, etc.. The oldest rocks, which are exposed in valleys, ravines and gullies, are deposits of the Cretaceous period, represented by chalk, marl and sand. There are Quaternary deposits overlapping the Cretaceous, represented by loess, loess loam, aeolian (ancient alluvial) and alluvial sands, in some places there are glacial and fluvio-glacial deposits (siltstones, boulder loams, sands). Ravine-beam landscapes are formed on the Cretaceous, Paleogene-Neogene basement in grey podzolic and washed away sod-weak- and medium-podzolic clay-sandy soils under herbaceous moisture-loving formations and sparse forests (POPOVA ET AL., 1968). The general climatic indicators correspond to the region and fluctuate a little within these limits taking into account microclimatic differentiation. The total radiation is 3900 MJ/m<sup>2</sup>,  $\Sigma t$  of the period of active vegetation reaches (starting with  $> + 10^{\circ}\text{C}$ ) 2500–2600 $^{\circ}\text{C}$ , the amount of precipitation varies, during the growing season, up to 400 mm, the hydrothermal coefficient is 2.0–1.3 (LYPYNsky ET AL., 2003). Microclimatic differentiation of the habitats is due to the upland relief and the nature of the surface of wide-undulating and

hilly-beam loess plains. Hydrological parameters are also due to the general elevation and geological substrate. Due to the increased relief, the groundwater level is significantly reduced, but the good water holding capacity of loess sediments significantly increases the intensity of soil moisture, which directly affects the formation of vegetation (TOLSTOUXOVA, 2006). The soil cover is extremely diverse due to the dismemberment of the terrain, climatic parameters, nature of the vegetation and paleogeographic conditions. The eroded areas are dominated by light grey and dark grey podzolic soils, mainly in loess. On the border with the moraine-sandy plain (North West) sod-slightly podzolic sandy and clay-sandy soils with oak-pine forests have developed. Much of the land is ploughed. The vegetation is dominated by oak-pine and linden-oak-pine forests. Significant areas are represented by agrophytocoenoses on the site of former forests. Significant massifs in floodplains are occupied by meadows and lowland swamps (VERNANDER, 1986).

### 3. Materials and methods

The object of the research was the population of *C. ucrainica*, found in the ravine-beam system, located between the villages of Bezkrivne, Svydnyia

and Krolevecz (Sumy region) in 2017–2018. Complete geobotanical descriptions were performed in the studied localities. According to the method of BRAUN-BLANQUET (1964), the coenotic confinement of the species was analyzed (SOLOMAKHA, 2008). Taxon names are given according to “Vascular Plants of Ukraine. A Nomenclatural Checklist” (MOSYAKIN & FEDORONCHUK, 1999). Morphometric characteristics of separate individuals were provided according to the methodological approaches described in the literature (LETUKHOVA, 2014). The ontogenetic status of the found individuals of *C. ucrainica* was evaluated by the methods proposed by SMIRNOVA ET AL. (1990).

To survey the ravine-beam system for the presence of the species, priority areas in the branches of ravines were determined, where edaphic conditions were the most favorable for its existence. Space images (Fig.1) from Google Earth Pro were used to determine such places. The GPS coordinates of the individuals were taken using the GPS Status & Toolbox program (GPS Status & Toolbox).

Herbarium specimens of *C. ucrainica* from the identified sites were transferred to the herbarium of the Taras Shevchenko National University of Kyiv (KWU) and the National Herbarium of Ukraine (Kyiv, M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine) (KW).

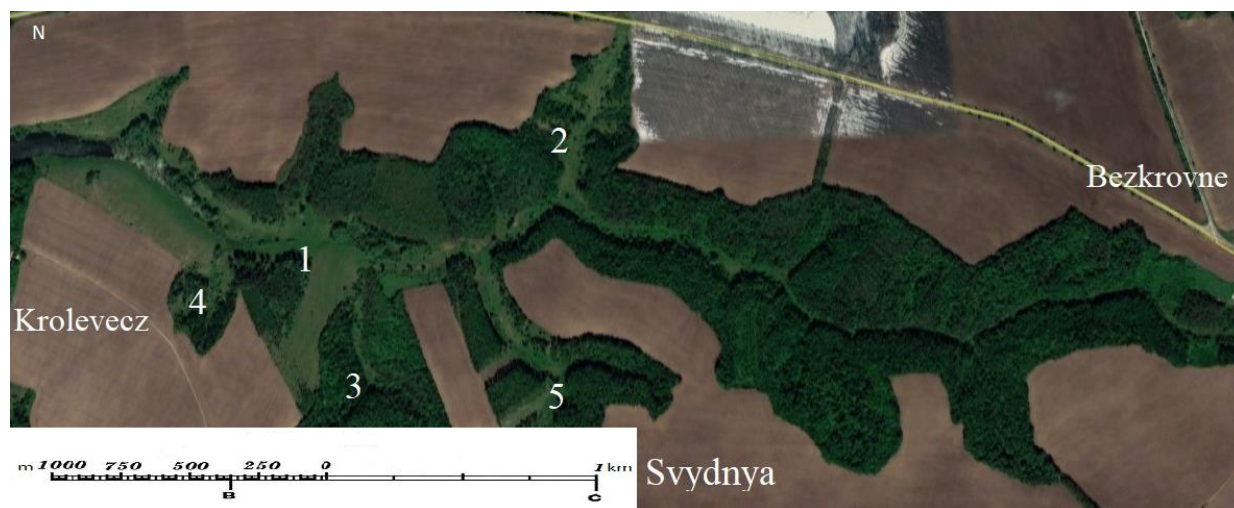


Fig. 1. Growth of *C. ucrainica* in the studied areas (№ 1–5) in the beam system in the valley of the River Svydnyia between the villages of Bezkrivne, Svydnyia and Krolevecz (Sumy region) (space photograph)

### 4. Results

The article analyzes the distribution of *C. ucrainica* using the analysis of herbarium, materials of scientific publications, and the peculiarities of its distribution in the identified new habitats within the natural area for this species (NIKITCHUK ET AL., 2016; SHEVCHYK ET AL., 2016, 2017a,b; SHEVCHYK & SOLOMAKHA, 2018).

The investigated previously localities (NIKITCHUK ET AL., 2016; SHEVCHYK ET AL., 2017; SHEVCHYK & SOLOMAKHA, 2018) confirmed the typicality of the morphotype of *C. ucrainica*. The next population that we studied was in the valley of the River Svydnyia. One of the largest populations of *C. ucrainica* in Ukraine according to the results of our research exists under the conditions of ravine-beam systems that open at the mouths of beams. During the

field work attention was paid to the search for the species in the areas that, according to our forecasts, have the most favourable set of factors for the existence of the species, in particular meadows, edges of forests and sparse forest areas (Fig. 1).

At the floor of the main valleys (the area number 1; Fig. 1) is a grazed pasture. Single generative and pregenerative individuals of *C. ucrainica* are absent. Since the width of the floor in the widest place reaches 100 m, the transition between the actual slope and the valley floor is sharp; the bottom of the valley is heavily grazed, so under such conditions the species is not able to recover. Its restoration occurs at the foot of the slopes. On the floor of the main valley,

in the middle of the grazed pasture, there is a separate group (20 individuals) of different ontogenetic states, forming a continuous «patch» up to 7 m wide, which grows on thick loess alluvium formed by landslides from the top sections of the valley or rain, such a substrate provides moisture retention. Restoration of the species in this place is complicated by frequent landslides, as a result of which the seedlings are silted up by alluvium. The process takes place in the southern part of the patch, where the light intensity is highest and the siltation is lowest due to the fact that shear flows are directed from the northern slopes of the valley. The general division of ontogenetic states of all identified individuals of *C. ucrainica* growing in this ravine-valley system is presented in Fig. 2.

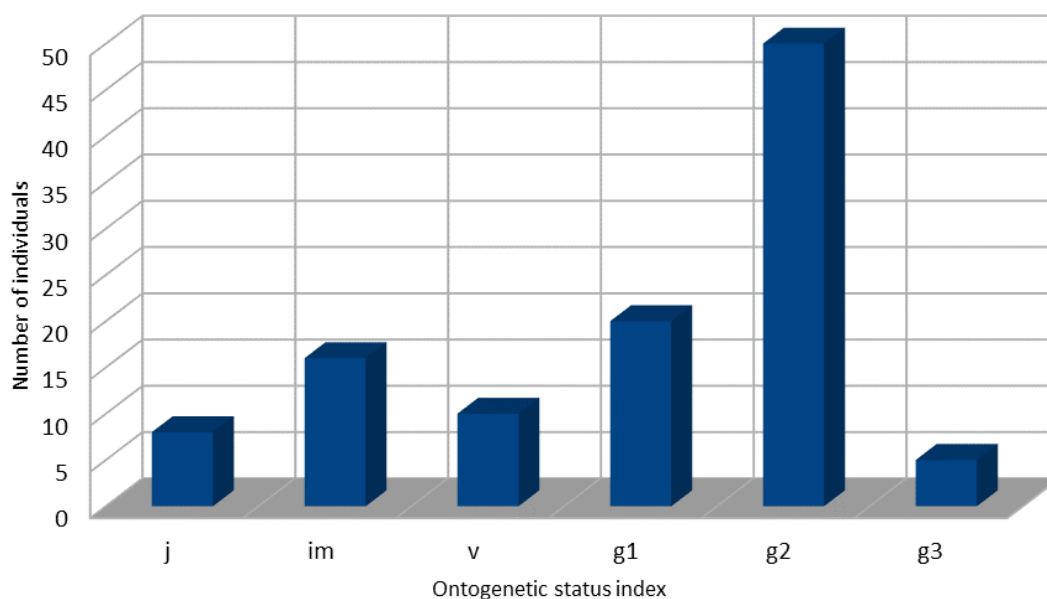


Fig. 2. Ontogenetic structure of the *C. ucrainica* population (between the villages of Bezkrivne, Svydnyia and Krolevecz)  
Note: Reduction of ontogenetic status (index): j – juvenile, im – immature, v – virgin, g1 – young generative, g2 – mature generative, g3 – old generative

Area number 2 (Fig. 1), the length of which from the beginning to the transition point in the main valley reaches 500 meters, 60 individuals were found of *C. ucrainica* in different ontogenetic states. The the individuals in the extreme south west grow at a distance of 200 m from the top of the ravine branch. The most common habitat in this part of the system were meadows (involving about 20 individuals) and margin communities (about 40). The oldest trees form a group on the edge of the valley branch on the border with the agrofield. On the floor of the valley is a sedge swamp with a clay bottom, on which grow single specimens of *Salix cinerea* L.

The north eastern exposure of the slope of this valley branch is more humid, and here *C. ucrainica* existed mainly in meadow communities. Individuals

are clearly more branched with dense crowns than in marginal localities.

A small number of trees growing in the forest are represented by individuals of the generative state in a sparse young birch-poplar forest with cereals in the grass layer.

Gentle slopes of this spur are used for grazing due to the proximity of the location to the villages (there are signs of weeding grasses) and other agricultural needs. In general, the vegetation here is meadow with a predominance of cereals and grasses on the slopes and sedges on the floor. The floor of the spur is partially passable, so it is used as a road for transporting hay, while part of the slopes is used for haymaking. The upper parts of the slopes are not available for regular grazing due to the steepness of the slope, which creates optimum conditions for the existence of *C. ucrainica*.



Young individuals can gain a foothold on the slope in meadow communities due to the lack of direct competition with other shrubs. During the surveys of the slopes, there were signs of linear erosion and fresh deposits of clay. The periphery of the whole valley is surrounded by a field. Our research also covers the beginning of the valley, where the lake is located in the direction of Krolevetz, but no individuals of *C. ucrainica* were found in this area. In the studied spurs *C. ucrainica* plants occur singly and in groups of 2–3 individuals. One of the most important conditions for the existence of the population in this location is the use of meadows for grazing and haymaking, which helps to stabilize the meadow and meadow-steppe vegetation and limit afforestation.

In area № 3 (Fig. 1) there was a sedge swamp at the floor of the spur, and the opposite slopes have different degrees of afforestation. A group of four individuals of *C. ucrainica* was observed on less forested margins. Above the slope on the border of the field and the forest there is a well-lit transition zone up to 3 m wide, within which the species has restored – three immature individuals of *C. ucrainica* were found here. We made a soil cut 1.2 m deep here and the thickness of the black humus fertile layer was 1 m. with black earth soils on washed, redeposited loamy rocks. Below the hawthorn bush, at a distance of 3 m down the slope, surface wastewater, due to erosion by rain and melt water from the slopes, contributes to the accumulation of deluvial rocks. Due to precipitation, such reserves are replenished with moisture, capillary flows of water rise up and can feed the top sections of the valley. As a result of this action, moisture-loving plants grow on the tops of the slopes.

In area № 4 (Fig. 1) (south western exposure of the slope) on the margin of a sparse birch-poplar forest, two single specimens of *C. ucrainica* were found, located at a distance of 100 m from each other. Both trees grow on a steep slope.

The spring of 2017 was unfavourable in the Forest-Steppe of Ukraine for production of a large number of fruits. However, in the studied population of *C. ucrainica* (between the villages of Bezkrivne, Svydnyia and Krolevetz) most of the generative plants were characterized by an abundant harvest (3–10 fruits in the shield), while in others – 1–3 fruits. Probably in this place the peculiarities of the microclimate of the ravine-valley system (more warming of the slopes compared to the plains)

contributed to the production and ripening of the fruit. The opposite slope was completely overgrown with poplar-birch forest. Such a difference in the opposite slopes almost always occurs: with one meadow, another forested, or one one forested at the bottom of the slope, and the other only at the top of the slope. There is a re-establishment of vegetational cover (demutation) succession on the site of former pastures. The swamp at the floor of this spur is similar to the previous one, this part of the system, like the previous one, is not used for grazing.

In area № 5 (Fig. 1). *C. ucrainica* grows singly or in small (2–3 individuals) groups. As in some previous areas, the slopes of the valley have different degrees of afforestation. Individuals of *C. ucrainica* grew in this area on meadows and edges of forests.

Individuals of *C. ucrainica* are common on steep (up to 30°) slopes and tops of valleys. In general, according to the EUNIS classification (ONYSHCHENKO, 2016), this type of meadow habitat in which *C. ucrainica* exists within the studied valley system is defined as E 2.1 and is protected in accordance with EU Directive 92/43 and in accordance with Resolution IV of the Berne Convention – 37.2, and is also included in the list of Emerald Habitats (DIDUKH ET AL., 2011).

In addition to *C. ucrainica*, another species of dicotyledon hawthorn with relatively large fruits grows in the studied ravine-valley system. We define this species as *C. rhipidophylla* (= *C. pseudokyrstostyla* Klokov). Individuals of this species are of the same type in habitats, fruit yield is high, shrubs are relatively tall, lush, viable, but their number is smaller compared to *C. ucrainica*, there are about 15 individuals.

Previously, we had organized all known finds in the Left-Bank Forest-Steppe (NIKITCHUK ET AL., 2016), and also described the populations we found during 2015–2017 at the mouth of the River Ros (SHEVCHYK ET AL., 2016), on the island of Shelestiv in the Kaniv Nature Reserve (SHEVCHYK ET AL., 2017a), in the Mezyn NNP (Desna floodplain) (SHEVCHYK & SOLOMAKHA, 2018) and in the Sejm Regional Landscape Park (SHEVCHYK ET AL., 2017b). The ordering of all studied habitats allowed us to reflect their general distribution (Fig. 3). We compiled a description of the populations of the species in Ukraine (Table 1).



Fig. 3. Distribution of *C. ucrainica* localities in the territory of Ukraine according to the results of own research: 1 – in the delta of the River Ros (Cherkasy region); 2 – on the island of Shelestiv in the floodplain of the Dnieper (Kaniv Nature Reserve, Cherkasy region); 3 – on the pine terrace (on the interfluvium of the Desna and the Dnieper, Kyiv); 4 – in Mezyn National Nature Park (Chernihiv region); 5 – in a valley system near the town of Krolevecz (Desna river basin, Sumy region); 6 – in the floodplain of the River Sejm (Sejm Regional Landscape Park, Sumy Region); 7 – in the floodplain of the River Sula (Poltava region, locus classicus)

Table 1. Characteristics of all known populations of *C. ucrainica* in Ukraine according to the results of our own research

Population	Locality	Ecotope	Soils	Type of vegetation	The presence of a layer
Delta of the River Ros	delta area with <i>Salicetea purpurea</i> community with features of anthropogenic transformation (elements of production infrastructure, recreation)	flowing valley, 700 m long, flooded during heavy rainfall	weakly formed sod-pizolisty on alluvial, deluvial and technogenic deposits	floodplain poplar and willow forests	layer of loam at a depth of 0.7–0.9 m
Shelestiv island	floodplain border communities of rare shrubs	level areas with shallow depressions up to 0.5 m	poorly formed sod, sod-podzolic	shrubs standing far apart	layers of loam at a depth of 0.5–1.0 m
Mezyn NNP	meadow-steppe areas with thickets of shrubs, forest edges of mixed forests	ecotone between the Desna floodplain and its native right bank	washed away black earth and grey forest on forest-like loams	margins of mixed forest, meadows	deposits of chalk at a depth of 0.3–0.4 m
Interfluvium of the Desna and the Dnieper (Kyiv) (disappeared)	pine terrace, pine and oak forests	thickened area with shrubs, with depressions covered by the sea	sandy sod-podzolic	mixed forest	probably waterproof clays
Poltava region, <i>locus classicus</i>	areas of floodplain meadows	reduction with pronounced ancient depressions of surface water runoff; unsinkable meadows	sod-gley	meadows	subsoil of clay deposits
Ravine- valley system near Krolevecz	meadow-steppe and wooded slopes of valleys	parts of slopes with hollows of surface water runoff; moistened places at the bottom of the valleys	meadow-turf	margins of deciduous forests, meadows	subsoil of clay deposits
The River Sejm is flooded	areas of floodplain meadows	walls and floor of half-destroyed trenches during the war	meadow-turf	meadows	subsoil of clay deposits

## 5. Discussion

Our first finding of the mass distribution of *C. ucrainica* was discovered during routine floristic surveys of the banks of the River Dnieper in the Middle Dnieper (SHEVCHYK ET AL., 2016). On the identified morphological features plants of this species are quite different from nearby *C. rhipidophylla*. In particular, they have, barrel-shaped, slightly pubescent fruits which are larger in size. In addition, they are characterized by specific pubescence of their petioles, peduncles, leaf blade, axes of inflorescences and shoots of growth of the current year. In the presence of one, less often – two styloids, all fruits have two stones. In general, most morphotypes are diagnosed as *C. ucrainica* (KLOKOV, 1954). In the genus system, it belongs to the typical section *Crataegus* (*Oxyacanthae* Loud.) of the series *Ambigua* Pojark., which unites nine species and CHRISTENSEN (1992) synonyms *C. ucrainica* together with several related Crimean species (*C. eriantha* Pojark., *C. stankovii* Kossyich, *C. aurica* Pojark.) and with *C. meyeri* Pojark., indicating a possible ancient hybridogenic origin of the latter.

Usually, as for our previously surveyed localities in Ukraine, the largest number of individuals of this locality were in the generative phase of development; the population does not attenuate, because there are young generative individuals, the number of old generative individuals is insignificant, and the subsenile stage is absent. It is possible that subsequent surveys of ravine-valley systems in this area will reveal populations with a different type of ontogenetic structure.

It is possible that in the system of ravines and gullies of this region there is another, more mature (in age) aspect, the maternal population, or this is derived from the population in the floodplain of the River Desna, which is located 40 km to the north. There is a high probability that this population of *C. ucrainica* is the only regional one along with that of Mezen. It is also possible that in the system of ravines and gullies of this region there are several loci with a similar distribution of ontogenetic states. Since this habitat, as well as the entire ravine-valley network of the area, formed in the early postglacial period, we can assume that the species has existed here for a long time, migrates in systems of valleys and ravines at a time when there is a favourable habitat and in this case, the search for a specific maternal population may be ineffective. After repeated surveys (May 8, 9, 2018) of ravine-valley systems directly adjacent to the studied one, no new populations of the species were

found, but only one habitat of a single old generative tree was found on the floor of one of the spurs.

Important for *C. ucrainica* is the presence of suitable habitat, where there will be minimal competition for light and favourable conditions for consolidation in the initial stages of ontogenesis. Probably, *C. ucrainica* can be found in addition to the Forest-steppe and in other natural areas, where historically there were conditions suitable for its growth, which do not exclude the necessary habitats. Today, according to the results of our own research, only one population is known in the territory of the Left-Bank Polissya in the Mezyn National Nature Park (NNP).

According to the results of the analysis of the distribution map (Fig. 3), which coincided with the results of processing the herbarium data, it is possible to define a certain concentration of identified localities in the northern part of the Left Bank Forest-Steppe, and from the data in Table 1 this shows a fairly wide phytocoenotic amplitude of this species in the presence of a mandatory element for its existence – waterproof layers of clay, loam or other deposits with similar properties.

The optimum existence of this species corresponds to certain stages of succession, in particular from the stage of groups of therophytes to the bush stage. The obvious optimum of coenopopulations of this species is the stage of perennial turf cereals. Significant factors in the stabilization and long-term existence of these stages are cattle grazing and haymaking. When the need for these processes in the area disappears, the slopes and floor of the valley may become forested, and the hawthorn is likely to disappear within 20–30 years.

The similarity of ecological, anthropogenic conditions and spatial proximity allows us to unite the studied local population into a single regional population with those previously described (local populations 4, 5, 6, see map in Fig. 3). Obviously, these areas are the only geocomplex whose conditions are optimal for the existence and restoration of the species in such coenotic conditions.

## 6. Conclusions

The existence of the studied populations is due to the diversity of ecotopic and biotope conditions in this region, namely, the high water content of the slopes due to the presence of accumulated atomic water at the bottom of the valleys, which rise in capillary pores to the slopes, where we observed growth of *C. ucrainica*.

Also important are: 1) the presence of plant communities representing the corresponding stages of succession, namely those that are intermediate between forestless groups to sparse forests, in which this species has a modern phytocoenotic optimum; 2) the presence of cattle grazing, which is a restraining factor in the development of forest vegetation and contributes to the spread of seeds of this species; 3) the absence of special conditions that may arouse interest in industrial or other intensive economic uses of areas with the growth of this species, also contributes to the preservation of its populations.

Thus, the growth of *C. ucrainica* in this location demonstrates the savonoid nature of this species, as the best conditions for the existence of the individuals observed in open habitats resembling elements of the savonoid complex. Today the population is stable and has a strong recovery potential due to optimal habitat conditions and a visually high fruit yield. In general, based on the assessment of the behavioural strategy of the dendroflora species of the region, this species can be attributed to the explanatory type.

The authors also note that the following studies may show a more widespread distribution of Ukrainian hawthorn in the ravine-valley systems of the valleys of the left-bank tributaries of the River Desna. The localities we have identified in the spurs of the Middle Russian Upland (Chernihiv and Sumy regions) are promising areas for the creation of nature protection facilities, the main purpose of which will be the protection of this species.

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