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DISTRIBUTION PECULIARITIES OF *OPUNTIA HUMIFUSA* (RAF.) RAF. WITHIN SEVASTOPOL AREABAGTIKOVA N.A.¹, BONDARYOVA L.V.², RYFF L.E.¹.

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Introduction

Opuntia humifusa (Raf.) Raf. is one of the preferable plants in landscape architecture. It belongs to a group of cactus with American origin, being protected in natural environment on origin land [42, 54], but tending to running wild in many regions of the world. For today there is information about widespread occurrence of this cultivar in Australia and South Africa. In Europe *O. Humifusa* is characterized as an invasive cultivar for Spain, Italy, France, Croatia, Switzerland, Germany, Bulgary [57,58]. On the territory of Russian Federation this running wild cultivar was registered in Northwest Caucasus [22, 23, 34, 35] and in the Crimea [1-2, 5-6, 10,13,14,24,25,27,31,37,40,41 etc.]. As to Sevastopol area data about naturalized opuntia populations was recorded in single publications [5-8, 10, 27, 40] and it can be found online as well [15,32].

O. humifusa was brought under cultivation in the beginning of XIX century by scientists of Nikitsky Botanical Gardens early in its term [1,5-7 and etc.]. Ecological and biological characteristics, that caused its introduction success, made it dangerous and alien cultivar in the Crimean flora after 200 years [5,6]. It is one of the most popular cactus cultivar in the Crimea, often reveals transformer characteristics being an ergasiophyte by introduction way and agrophyte by its adaptation level [5].

Nowadays biological invasions are considered as one of factors causing species diversity reduction [12, 16 and etc.]. Investigation of this problem is extremely urgent. At the same time *O. humifusa* distribution and effect on aboriginal phytocenosis of Sevastopol area were hardly studied. Thorough analysis of its spread peculiarities and dynamic behavior will make it possible to develop scientifically grounded recommendations in planting and population control of this invasive cultivar along the city line.

Objects and research methods

Sevastopol is situated in southwest of the Crimean peninsula, its total area makes 107,96 thousand ha. This region is characterized by diversity of geological, geomorphological, hydrographical and climatic conditions. Sevastopol is an area of different lithologic and stratigraphic complexes covering periods of Mesozoic and Neogene; they include sedimentary and volcanogenic formations [33]. Relief consists of gullies, deep valleys and canyons (Chernorechensky, Sukhorechensky and etc.) [21]. According to agroclimatic zoning [11] Sevastopol region covers seven climatic districts, which are characterized by dry and intermediately hot climate with mild winter. At the same time considerable differences in the coastal zone, intermontane kettles, lowlands and midlands are marked due to altitude above the sea level and prevailing wind effect, that determines temperature regime and rainfall distribution. The soil cover consists of some genetic soil types: brown, rendzina, brown mountain-forest soil, meadow brown, meadow and alluvial soils. The most popular soil type is carbonaceous subtype of brown soil of dry forests and bushes [19, 28].

According to the botanical and geographical zoning scheme, territory where researches took place belongs to Sevastopol region of Gornokrymsky district, its vegetation cover consists of low-stemmed forests and sibiljak (*Carpinus orientalis* Mill., *Quercus pubescens* Willd. and *Q. petraea* Liebl. (58% of the area) combined with herbaceous vegetative groups: steppes and savannahs. Light forests with *Juniperus excelsa* M. Bieb. occupy 8,5 % of the total territory and create the largest forest tracts in the Crimea, that determines the region specific [18,33]. Besides there are forests and open woodlands where mainly *Fraxinus excelsior* L., *Pinus brutia* Ten. and *Pistacia mutica* Fisch. et C.A. Mey. grow. Allocation of plant cover has a clearly defined zoning character [33]. Within residential area vegetation has been extremely changed due to anthropogenic factor. Concerning the studied region here are cenoses of following plant categories of ecologofloristic classification: *Quercetea pubescenti-petraeae* (Oberdorfer 1948) Jakucs 1960, *Festuco-Brometea* Br.-Bl. et R. Tx. in Br.-Bl. 1949, *Thero-Salicornietea* R. Tx. in R. Tx. et Oberdorfer 1958, *Festuco-Puccinellietea* Soó 1968, *Juncetea maritimi* Br.-Bl. (1931) 1952, *Asteretea tripolii* Westhoff et Beeftink 1962 in Beeftink 1962, *Bolboschoenetetea maritimi* Hejny in Holub et al. 1967, *Phragmito-Magnocaricetea* Klika in Klika et Novak 1941, *Crithmo-Limonietea* Br.-Bl. 1947, *Cakiletea maritimae* Tx. et Preising 1950, *Stellarietea media* R. Tx., Lohmeyer et Preising in R. Tx. ex von Rochow 1951, *Plantaginetea majoris* Tx. et Preising in Tx. 1950, *Artemisietea vulgaris* Lohmeyer, Preising et R. Tx. in R. Tx. 1950, *Onosmato polyphyllae-Ptilostemonetea echinocephali* Korzhenevsky 1990 [3, 9, 17, 36, 38, 49].

Sevastopol is an area of landscapes joint: Piedmont, the main Range and South Coast of the Crimea. As on Gryshankov G.E. conception four of five Mountain Crimea native zones were marked out: piedmont (three belts), mountain (three belts), mountain meadow yaila (one belt) and South Coast half subtropical (one belt) [33]. As a result of anthropogenic influence present landscapes of Sevastopol are a sophisticated combination of natural non-affected, constructive and derivative landscapes. This territory has got a highly landscaping diversity, where 59 types of locality were found out [33].

Researching of *O. Humifusa* allocation trend across Sevastopol region was carried out during route studies in 2012-2014. Each locality was investigated according to its area occupied by opuntia cenopopulation, number of clumps, morphological plant peculiarities, renewal way. Base characteristics of biotope were described as well (altitude above the sea, slope angle and its exposition, soil type, phytocenosis). Geobotanical inspection was carried out according to J.Braun-Blanquet approach [30,45]. Number of plants was determined on the ground of geobotanical description, made by authors, in accordance with a real classification of the Crimean [9,26,49] and European [56] vegetation. Syntaxon names are presented as on phytosociological nomenclature demands [61]. Taxons names correspond to the Crimean flora checklist [20].

Digital cameras Sony DSC-H1, Sony DSC-H7, Sony DSC-HX200 were applied for photographic surveying. Collected herbarium specimens were transferred to possession of NBG-NSC (Yalta), living plants are preserved in the succulent plant collection of Nikitsky Botanical Gardens.

Results and discussion

As a result of researches in Sevastopol region eight different by size *O. humifusa* localities were described. Their location is presented on the map-scheme (Fig.1). Data from literary sources about opuntia growth around vil.Orlovka [40] and verbal directions about its growth in Sarandinaki gully weren't confirmed during the field researches.

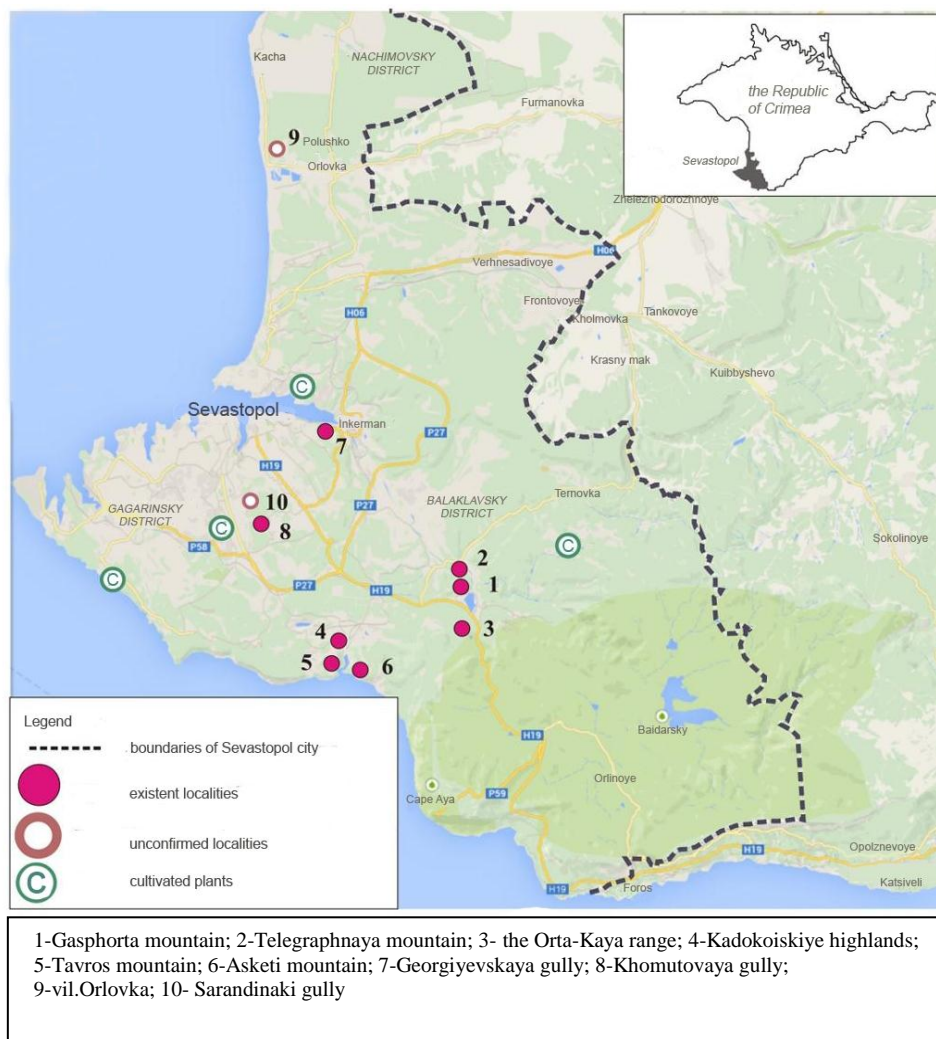


Fig.1 Map-scheme of *Opuntia humifusa* allocation in Sevastopol region

Base characteristics of opuntia biotopes and cenopopulations spread across different localities of Sevastopol are presented in table 1.

Table 1
Characteristic of *Opuntia humifusa* (Raf.) Raf. localities along the city line of Sevastopol

Locality (1)	1	2	3	4	5	6	7	8
Common projective plant cover, %	50 – 90	35 – 70	70 – 75	50 – 90	40 – 90	40 – 90	40 – 60	50 – 80
<i>Opuntia</i> projective cover, %	10 – 40	10 – 60	5 – 30	40 – 75	30 – 50	25 – 30	5 – 10	<5
Number of clumps in a locality (2)	+++	+++	+	+++	+++	+	+	+
Renewal characteristic (3)	v,s	v,s	v,s	v,s	v,s	v	v	v
Bearing fruits characteristic (4)	p	p	a-p	p	p	a	a	A
Biotope characteristic								
Locality area, m ²	5000	7000	1 – 30	3000 – 5000	from 1 till 1000	10	100	5
Slope angle, degree	0 – 20	10 – 35	0 – 10	20	25	10	0 – 5	0 – 5

Locality (1)	1	2	3	4	5	6	7	8
Slope exposition, degree	135	100, 180 – 200	15 – 20	90	150	180	10	180
Altitude above the sea level, m	205 – 210	30 – 45	185	49	20 – 50	318	85	125
Soils (5)	B, JCh	B, JCh	B, JCh	B, JCh	B, JCh	B,B	B, SCh	B, JCh
Class of vegetation (6)	<i>Q.pub.-petr.</i> <i>Art.v.</i> <i>K.-Cor.</i>	<i>Q.pub.-petr.</i> , <i>F.-Br.</i> <i>K.-Cor.</i>	<i>Q.pub.-petr.</i> <i>F.-Br.</i> <i>K.-Cor.</i>	<i>F.-Br.</i> <i>K.-Cor.</i>	<i>Q.pub.-petr.</i> <i>F.-Br.</i> <i>K.-Cor.</i>	<i>Q.pub.-petr.</i>	<i>F.-Br.</i> <i>K.-Cor.</i>	<i>F.-Br.</i> <i>Art.v.</i>
Modern anthropogenic effects (7)	G, L, AE	AE	AE, F, R	F, G, L	L, B	R,L,F	R ?	G, R
Area exploitation before	+	+	?	+	+	?	+	+

Notes.

1. Localities site: 1- Gasportha mountain; 2 – Telegraphnaya mountain (villages Khmelnitskoye, Chernorechiye); 3 – the Orta-Kaya range, “Toropova dacha”; 4 – the Kadikoiskiye Highlands, 5 – Tavros mountain; 6 – Asketi mountain (Balaklava); 7 – Georgiyevskaya gully; 8 – Khomutovaya gully, “Maksimova dacha” (Sevastopol).

2. Number of clumps in a locality: + single (1-5); ++ - numerous (6-50); +++ - over 50 clumps.

3. Renewal characteristic: v – vegetative; s – seed.

4. Bearing fruits characteristic: a – average (1-3 fruits on a section); p – plentiful (5-12 fruits).

5. Soil: B, JCh – brown, rubbly, on Jurassic limestone; B, SCh – brown, rubbly, on saratian limestone; B, C – brown, on conglomerates.

6. Plant class: *Q.pub.-petr.* – *Quercetea pubescentis-petraea*; *F.-Br.* – *Festuco-Brometea*, *Art.v.* – *Artemisietea vulgaris*, *K.-Cor.* – *Koelerio-Corynephoretea*.

7. Type of anthropogenic effect: G – grazing, L – littering, AE – unauthorized excavation, F – fire, R – recreation, B – disorder of the plant cover as a result of building.

Almost all localities were exploited with various economical purposes (according to the evidences). The economical activity was changing gradually or stopped for a long period. During the Crimean war (1853 - 1856) on Telegraphnaya mountain there was an optical telegraph station belonged to the Italian army, not far from vil.Kadykoj and Kadikojskiye Highlands (today it`s Kadykovka, a part of Balaklava district, Sevastopol city) military base of the British Expeditionary corps was situated, Georgiyevskaya gully was in use by the French and English armies. In the beginning of XX century Tavros mountain and Khomutova gully were the location of country cottages, both slopes were terraced. In XIX century Khomutova and Georgiyevskaya gullies were quarried. But only one locality Gasportha mountain was noted as a place of *O. Humifusa* planting during Italian cemetery reconstruction in 1882 [27,39]. Origin of *O. Humifusa* spread in other localities is still unknown.

Various sorts of opuntia were brought to Europe from America in the end of XV and by middle of XIX century it had got a widespread over European collections and gardens. In VII – XVIII centuries they started cultivation of the opuntia in South Africa and Australia, in XX century most sorts became invasive in South Africa and Australia, countries of Central and Western Europe [48,50,51,57,58]. Most probably *O. Humifusa* was carried in Sevastopol due to foreign soldiers during the Crimean war regardless of introduction works of Nikitsky Botanical Gardens. They could plant it as an easy growing ornamental evergreen plant on military burial areas or cultivate it with nutritional and medicine purposes. Useful properties of this opuntia cultivar were approved by modern scientists [47].

Study of opuntia growing in different cenopopulations of Sevastopol region made it possible to reveal some peculiarities in the species morphology and biology under conditions of secondary natural habitat. *Opuntia humifusa* is characterized by diffusive and contagious

allocation in phytocenoses; either a single plant or its group can form clumps from 1-3,5m across diameter, created by related specimens with vegetative and generative origins. In time some clumps can join and create dense growth.

O. Humifusa plants grow on the ground surface or rise 5-10 sm above it. Articulated shoots consist of flat and pulpy segments (cladodes). The leaves are small, pulpy, round a little pointed 03, - 0,5 sm by length and about 1 mm by thickness; they develop in areolas at the beginning of vegetative and generative plant shoots and soon fall off. Segments have various form: flat, from almost round (2-8sm across diameter) till inversely egg-shaped ((5)7 – 10(15) sm by length, (3)5 – 6(7) sm by width, 0,5 – 0,8 sm by thickness; their color is light green or subdued green, often with diametrically rugose surface (fig.2, 3). Oval areolas with light grey stands of wool are up to 4 in one diagonal row. A number of glokhidiums in areolas is not very large, irregularly spaced on a crescent-shaped place at the top of areola, along the perimeter or by bunches along the areola; its length is 1-2 sm, but close to the lower segments their number and length increase; glokhidiums are fawn-colored. Barbs, as a rule, are absent; they are located at the top of the segment and along its border (fig.3). Flowers of opuntia are bright yellow or lemon-colored (Fig.4), petals are orange at the bottom, 2-3 sm with ovary, 7-8 sm across diameter. Its blossoming occurs from the end of May till the middle of June. Fruits ripen in October – November. Having ripened most of fruits fall off, but late set fruits often stay on the plant during the whole winter till the next blossoming period. Fruits form is various from almost round pear-shaped till oblong top-shaped (fig.2:4), but fruit form of the same plant is quite stable, that proves genetic determinancy of this characteristics. Fruit size depends upon inherited peculiarities and environmental conditions; they can range significantly: from 2 till 5 sm by length (average size 3-3,7sm) and from 1-2,3 across diameter (on average 1,4 – 1,7sm) in the thickest part. The fruit top is a little foveate (deeping size is 2-3 sm). 10 fresh fruits weight 30-60 g. Fruit color ranges from grey-pink till purple and bordeaux; pulp color is various as well from light-pink till dark pink or pink-purple. Fruits are eatable, pulpy, sticky sweet or sour-sweet. Each fruit contains 5-40 seeds (av.14-17). A plant consisting of 20-25 segments can bear till 70-100 fruits. In some populations (Gasphorta mountain, Kadykoiskiye Highlands) proliferous fruits were found out (Fig.2:5). The seed characteristics: comparatively big-sized, 3,8 – 5,0 mm across diameter; 2,4 – 2,6 mm by thickness; grey and beige-colored; rounded kidney-shaped, slightly flattered with a narrow border (fig. 2:6); successful sprouting in Sevastopol environment.

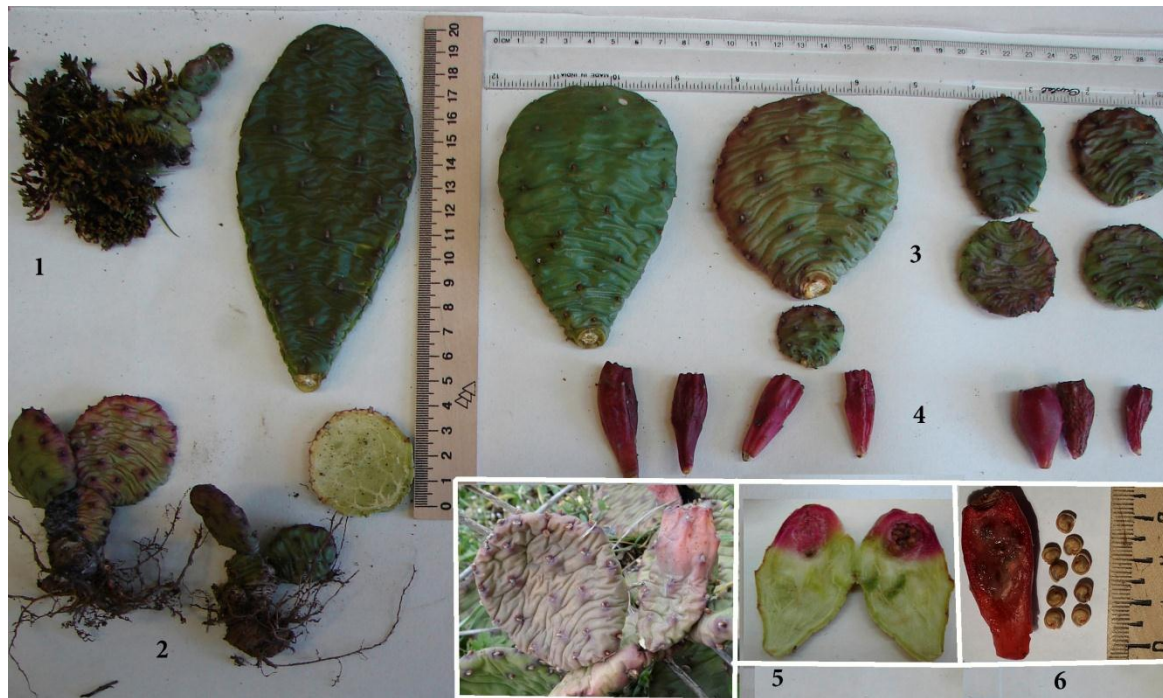


Fig.2 Morphological characteristics of *Opuntia humifusa* plants from cenopopulations growing on Telegraphnaya mountain within outskirts of vil.Khmelnitskoye and Gasportha mountain within outskirts of vil.Oboronnoye

1 – seed origin plants; 2 – vegetative origin plants; 3 – cladode (segments); 4 – fruits; 5 – proliferous fruits, 6 – seed and fruit in section

Morphological parameters of described plants modify according to environment. In open biotopes the most part of cladodes has a rounded shape and small size (on average 5-6cm across diameter). Plants blossom and fructify intensively (on average 7-10 flowers and the same number of fruit on a segment). As a rule fruits are numerous, ripening simultaneously, rounded pear-shaped 2,5 – 3,5 sm by length and 1,7 – 1,8 sm across diameter; correlation of the length and diameter is 1,2 – 1,6. In close herb assemblages or under tree and bushes crown segments become much longer till 11 – 15cm, have inversely egg-shaped form and narrowed at the bottom. Blossoming and fruit-bearing process is marked out only on some segments which have about 1-4 fruit sets on average. Fruits have a long form 3,2 – 4,5 sm by length and 1,5 – 1,8 sm across diameter, correlation of length and diameter is 2,1:2,6. It's a common case to meet still green fruits in November – February..

Having investigated almost all localities it hasn't been found any barb on the plant segments. But in a cenopopulation on Telegraphnaya mountain along with typical *O. humifusa* plant, which shoots don't have barbs, there are some plants having barbs. Barbs are strong and straight, till 2,5 – 3 sm by length, white and yellow colored with a dark top, located on the upper areolas in one instance. Segments of these plants are oval, thicker in comparison with segments of barbless plants growing next to them under the same conditions (Fig.3). In our opinion, these specimens can be referred to the close taxon *O. pollardii* Britton et Rose, which is sometimes [44] considered as synonym with *O. humifusa*, but mostly it is distinguished as a separate species [46,53,55,59,60] or a subspecies of *O. humifusa* subsp. *pollardii* (Raf.) Majure [52]. Plants with such characteristics weren't found out in any other locality of Sevastopol city and the Crimean peninsula in general, moreover they are not presented in the succulent collection of Nikitsky Botanical gardens. To clarify points of taxonomy and origin of non-typical form opuntia plants in area of Telegraphnaya mountain, extra investigations are necessary, including genetic studies.



Fig.3 Morphological peculiarities of *Opuntia humifusa* plants from cenopopulation on Telegraphnaya mountain within outskirts of vil.Khmel'nitskoye
A – plant habit view (12.04.2014); B,C – blooming (19.06.2014) and deflored (25.06.2014) plants;
D – seeds (26.01.2015)

Biology of the same cultivars in different condition has some distinctions. A vegetative renewal, blossoming and bearing fruits are noted in all cenopopulations, but in spite of a high seed productivity, sprouts and juvenile specimens are revealed in small number and only in 5 localities (see table 1, fig. 2:1; fig.4). Obviously, there is a tendency of weak seed sprouting and considerable plant death rate on different stages of ontogenesis, probably caused by dry conditions and high temperature of soil surface.

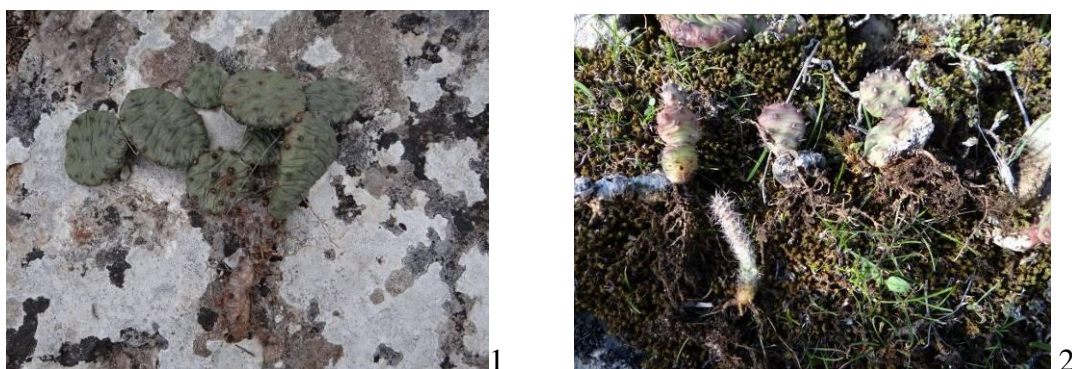


Fig.4 *Opuntia humifusa* plants with seed origin
1 – immature specimen, Tavros mountain; 2 – sprouts and juvenile specimens, Kadykoiskiye Highlands

Having summarized all data it's possible to conclude, populations of wild *O. humifusa* are found mainly in southwest of Sevastopol region in biotopes of two types. The first type is in localities № 1-6: Gasphorta and Telegraphnaya mountains, the Orta-Kaya range, the Kadykoiskiye, Highlands, Tavros and Askety mountains (table 1, fig.1,5). They are situated on western spurs of the main Crimean mountain range (on the Balaklava Highlands) in hypsometric scope from 20 – 320 m above the sea level on the upper Jurassic rocks – limestone and occasionally conglomerates, on watersheds and by watershed surface, on

abrupt and middle angled prominent and ladder-shaped slopes of different expositions, mostly of southern rhumbs, as a rule well-illuminated, in juniper and oak light forests on the rock and stone expositions and skeletal carbonaceous variations of brown soils. It is well-known, a big concentration of the limestone of Main mountain range, connected with their metamorphic characteristics, determines peculiarities of soil forming process, water regime and surface flow of water [28]. Limestone fracturing degree causes accumulation of a strong thick layer with stony and detritus weathering products at the bottom of rocks and cliffs, also screes are common phenomenon on slopes, gravitational flows and other factors, which obviously forward favorable conditions for cladodes establishment and seed renewal of *O. humifusa*.

Cenopopulations of localities № 1-6 (see table 1) occupy area from several till seven thousand of square meter with opuntia projective cover from 5 till 75%. On the slopes of Tavros mountain there are seven different by area groups. Population size is determined due to favorable for cactus growing areas and probably occurrence term of this invasive cultivar there.

The most typical habitat for *O. Humifusa* in Sevastopol region is ecotone zone covered by melkozyom or a thin layer of skeletal soil between rock expositions of the upper Jurassic limestone and glacis or middle-angled slopes with well-developed soil cover, where petrophyt-steppe and forest vegetation grows. As a rule this zone is occupied by plants of phytocenoses of *Alyssso alyssoidis-Sedetalia* Moravec 1967 order *Sedo-Scleranthenea* (Br.-Bl. 1955) Dengler in Dengler et al. 2003 subclass *Koelerio-Corynephoretea* Klika in Klika et Novák 1941 class. A distinctive feature of the assemblages is a succulent considerable role in their floristic structure and projective cover that certifies favorable characteristics of such ecotopes for this living form. In phytocenoses of *Alyssso-Sedetalia* order, succulent family Crassulaceae J. St.-Hil. dominates, but obviously for Cactaceae Juss. cultivars and *Opuntia* genus particularly these conditions are quite congenial.



The Kadykoiskiye Highlands



Tavros mountain



The Orta-Kaya range (by Svyrina S.A.)



Asketi mountain



Gashorta mountain



Khomutovaya gully



Telegraphnaya mountain



Georgiyevskaya gully

Fig. 5 *Opuntia humifusa* in different localities of Sevastopol region

At the bottom of the slopes where opuntia segments occur due to gravitational process and sometimes establish, its cenopopulation is a part of other phytocenoses: petrophyte

steppes of *Festuco-Brometea* class with prevailed *Bothriochloa ischaemum* (L.) Keng. and *Asphodeline lutea* (L.) Rchb. or forest and light forest phytocenoses of *Quercetea pubescenti-petraeae* class including juniper light forests belonged to the union *Jasmino-Juniperion excelsae* Didukh, Vakarenko et Shelyag 1986. In extremely damaged plant cenoses typical cultivars of *Artemisietea vulgaris* class is considerably marked out. Moreover in these phytocenoses besides aboriginal cultivars, invasive ones of the Crimean flora are frequently found [4] : *Ailanthus altissima* (Mill.) Swingle и *Rhamnus alaternus* L. Here due to lack of illumination and competition with arboreal and bush breeds and large polycarpic herbage, characteristics of specimens vitality in *O. Humifusa* populations are lower: their blossoming is not so intensive, less fruits and seeds, not all fruits ripen completely. Populations within Asketi mountain possess the worst vital parameters, probably because of considerable altitude above the sea level and peculiarities of the underlying rocks – conglomerates with a low-level of water permeability in comparison with limestone rocks; all these factors create not quite favorable hydrothermal conditions for opuntia.

Another biotope including localities № 7 and 8 (Georgiyevskaya and Khomutova gullies) (table 1, fig.1,5) is situated in the piedmont zone on the true altitude 85 – 125 m. This biotope is presented by glacises of gullies inside of Sarmatian limestone deposits, covered by more or less well-developed rendzina or brown soils. Specific characteristic of soil-forming geological material is clayey gravelly texture of soil, not high consistency and stable alkali reaction [28]. Vegetative cover was formed by petrophytes and typical stipa-fescue steppes, belonged to *Festuco-Brometea* class. Opuntia populations are small-sized on this area, they don't occupy large territories and possess low projective cover, the blossoming and bearing fruits is not so intensive, only vegetative propagation is noted. To our opinion, such vital parameters of area caused by competition with components of steppe phytocenoses first of all, by considerable isolation of these assemblages for alien cultivars and probably less favorable edaphic and climatic condition for opuntia growing.

Perhaps other landscapes of Sevastopol territory are not quite favorable for opuntia as well. In this way location of cenopopulation, on border with steppe zone where winters are more severe, in addition to anthropogenic factor (building of a cottage village) could make a contribution to the population vanishing, that was known before by literature sources from village Orlovka outskirts [40].

No matter that at present most of well-developed cenopopulations in Sevastopol region are marked out in degraded cenoses, characterized by different invasion level, otherwise an ability to adapt alien cultivars in their composition, invasion of *O. Humifusa* into natural phytocenoses represents considerable danger for keeping of vegetative cover parameters in general and populations of certain rare and protected cultivars. Almost in all cenoses it competes with being in need of protection *Asphodeline lutea* in the Crimea. Moreover spreading of opuntia can cause decreasing and even vanishing of cenopopulations, typical for these cenoses cultivars, included into Red Data Book of Russian Federation [29], such as *Paronychia cephalotes* (M. Bieb.) Bess., *Genista albida* Willd., *Iris pumila* L., *Anacamptis pyramidalis* (L.) Rich., *Asphodeline taurica* (Pall.) Endl., endemic taxons of the Crimean flora as well (*Stipa eriocaulis* Borb. subsp. *lithophila* (P. Smirn.) Tzvelev, *Dianthus marschallii* Schischk., *Satureja taurica* Velen., *Asperula supina* M. Bieb. subsp. *caespitans* (Juz.) Pjatunina, *Veronica taurica* Willd. subsp. *taurica*).

Conducted researches permitted to find out, that opuntia plants growing in Sevastopol region got over geographical, ecological and biological barrier, possess highly adapted abilities, in most localities have highly vital parameters, clumps size reaches 1,5 – 3,5 m across diameter, in places create unbroken growth. The highest invasive potential was revealed in cenoses with lighted plant cover on well-drained, but regularly moistened by precipitation or condensate moisture steep slopes and glacises of southeast or southern

exposition on altitudes 30-200 m above the sea level in juniper light forests and petrophyte steppe phytocenoses. In both cases, intended and random introduction of *O. humifusa* into favorable conditions will result its spreading and adaptation in other places in Sevastopol area, partly in juniper light forests in Baidarskaya valley, Rodnoye and Rezervnoye villages, in petrophyte and steppe cenoses of Fiolent cape territory and other places of the Gerakleisky peninsula.

Conclusions

1. At present eight localities of *O. humifusa* were found out in Sevastopol region: on Gasforta, Telegraphnaya, Tavros, Asketi mountains, Orta-Kaya mountain range, Kadykoiskiye Highlands, in Georgiyevskaya and Khomutovaya gullies.
2. *Opuntia* cenopopulations are found in biotopes of two types: on upper Jurassic rocks in juniper light forests in cenoses of *Koelerio-Corynephoretea*, *Festuco-Brometea* and *Quercetea pubescenti-petraeae* classes and on Sarmatian limestone in steppe phytocenoses of *Festuco-Brometea* class. Conducted biomorphological and populational researches revealed the first mentioned biotype is more favorable for *O. humifusa* growth.
3. *O. Humifusa* plants in the investigated region have higher vital parameters. All researched populations keep up blossoming, bearing fruits and vegetative propagation, in five localities seed propagation is marked out.
4. An additional study is essential to specify taxonomic location and origin of some atypical forms of *O. Humifusa* in Sevastopol region.

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Bagrikova N.A., Bondareva L.V., Ryff L.E. Distribution peculiarities of *Opuntia humifusa* (raf.) Raf. within Sevastopol area // Works of the State Nikit. Botan. Gard. – 2014. – V. 139 – P. 29 – 42.

This work presents data about distribution of *Opuntia humifusa* (Raf.) Raf. within Sevastopol territory. During this research eight localities were described, the characteristics of the plant morphological parameters and some biological features were revealed. Analysis of the current status of the populations, description of various communities with opuntia permitted to determine its highest status of naturalization and refer it to the transformer cultivars. This species successfully self-renews by vegetative and seed ways and trends to further dissemination.

Key words: *invasive cultivars, Opuntia humifusa, Sevastopol, the Crimean peninsula.*