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FEATURES OF THE BIOTOPIC DISTRIBUTION OF SEPARATE SPECIES OF LAND MOLLUSKS IN DIFFERENT FUNCTIONAL ZONES OF URBOECOSYSTEM OF MELITOPOL

Functional zones, mollusk fauna, ecological condition, biodiagnostic, urban ecosystem, spatio-temporal dynamics

ОСОБЛИВОСТІ БІОТОПІЧНОГО РОЗПОДІЛУ ОКРЕМИХ ВИДІВ НАЗЕМНИХ МОЛЮСКІВ У РІЗНИХ ФУНКЦІОНАЛЬНИХ ЗОНАХ УРБОЕКОСИСТЕМИ МЕЛІТОПОЛЯ. Н.В. Йоркіна, А.К. Умерова. – У повідомленні представлені результати досліджень наземної малакофауни, які проводилися протягом двох років (весна 2017 р. – весна 2019 р.) в різних функціональних зонах урбоєкосистеми Мелітополя (транспортна магістраль, територія промислового об'єкта, зони житлового масиву та рекреаційна). У досліджуваних біотопах було виявлено 5 видів сухопутних молюсків: *Xeropicta derbentina* (Krynicky 1836), *Brephulopsis cylindrica* (Menke, 1828), *Monacha fruticola* (Krynicky, 1833), *Helix albescens* (Rossmässler, 1839), *Xeropicta krynickii* (Krynicky 1833). Більшість представників малакофауни вивчалася в польових умовах.

Виявлено, що сухопутні молюски можуть розглядатися в якості перспективних об'єктів біодіагностики екологічного стану ґрунтів антропогенно трансформованих урбоєкосистем, а також виступати важливими агентами зміни клімату. Крім того, важливо оцінити наслідки колонізації адвентивних видів сухопутних молюсків та їх впливу на аборигенні біоценози.

Встановлено, що сухопутна малакофауна урбоєкосистеми Мелітополя характеризується високою чисельністю і невеликою різноманітністю. Переважають адвентивні види – *X. derbentina*, *B. cylindrica*, *M. fruticola*. Незважаючи на те, що останній вид вважається кримським ендеміком, він добре адаптувався в урбанізованих біотопах на півдні Запорізької області. Визначено, що для біодіагностики стану антропогенно порушених біотопів доцільно використовувати закономірності просторово-часової динаміки поширення угруповань наземних молюсків.

ОСОБЕННОСТИ БИОТОПИЧЕСКОГО РАСПРЕДЕЛЕНИЯ ОТДЕЛЬНЫХ ВИДОВ НАЗЕМНЫХ МОЛЛЮСКОВ В РАЗНЫХ ФУНКЦИОНАЛЬНЫХ ЗОНАХ УРБОЭКОСИСТЕМЫ МЕЛИТОПОЛЯ. Н.В. Ёркина, А.К. Умерова. – В сообщении представлены результаты исследований наземной малакофауны, которые проводились на протяжении двух лет (весна 2017 г. – весна 2019 г.) в разных функциональных зонах урбоэко системы Мелитополя (транспортная магистраль, территория промышленного объекта, зоны жилмассива и рекреационная). В исследуемых биотопах было выявлено 5 видов сухопутных моллюсков: *Xeropicta derbentina* (Krynicky 1836), *Brephulopsis cylindrica* (Menke, 1828), *Monacha fruticola* (Krynicky, 1833), *Helix albescens* (Rossmässler, 1839), *Xeropicta krynickii* (Krynicky 1833). Большая часть представителей малакофауны изучалась в полевых условиях.

Выведено, что сухопутные моллюски могут рассматриваться в качестве перспективных объектов биодиагностики экологического состояния почв антропогенно трансформированных урбоэко систем, а также выступать важными агентами изменения климата. Кроме того, важно оценить последствия колонизации адвентивных видов сухопутных моллюсков и их влияния на аборигенные биоценозы.

Установлено, что сухопутная малакофауна урбоэко системы Мелитополя характеризуется высокой численностью и небольшим разнообразием. Преобладают адвентивные виды – *X. derbentina*, *B. cylindrica*, *M. fruticola*. Несмотря на то, что последний вид считался крымским эндемиком, он хорошо адаптировался в урбанизированных биотопах на юге Запорожской области. Определено, что для биодиагностики состояния антропогенно нарушенных биотопов целесообразно использовать закономерности пространственно-временной динамики распространения сообществ наземных моллюсков.

FEATURES OF THE BIOTOPIC DISTRIBUTION OF SEPARATE SPECIES OF LAND MOLLUSKS IN DIFFERENT FUNCTIONAL ZONES OF URBOECOSYSTEM OF MELITOPOL.

N.V. Yorkina, A.K. Umerova. – The work is devoted to the study of the terrestrial malacofauna, which were carried out for two years (spring 2017 – spring 2019) in different functional zones of the urban Melitopol ecosystem (the area of the transport highway, the territory of the industrial object, residential area, recreation area). In the studied biotopes 5 species of terrestrial mollusks were identified: *Xeropicta derbentina* (Krynicky 1836), *Brephulopsis cylindrica* (Menke, 1828), *Monacha fruticola* (Krynicky, 1833), *Helix albescens* (Rossmässler, 1839), *Xeropicta krynickii* (Krynicky 1833). Most of the representatives of the mollusk fauna were studied in the field.

It has been revealed, that land mollusks can be considered as promising objects of biodiagnostics of the ecological state of soils of anthropogenically transformed urban ecosystems, and also act as important agents of climate change. In addition, it is important to assess the effects of colonization of adventitious species of land mollusks for native biocenoses.

It has been established, that the land malacofauna of the Melitopol urban ecosystem is characterized by high numbers and small diversity. Adventive species predominate – *X. derbentina*, *B. cylindrica*, *M. fruticola*. Despite the fact that the latter species was considered to be endemic to the Crimea, it was well adapted to the urbanized biotopes in the south of Zaporozhye region. It was determined that for biodiagnostics of the state of anthropogenically disturbed biotopes, it is advisable to use the patterns of the spatio-temporal dynamics of the distribution of communities of terrestrial mollusks.

Modern studies indicate that the transformation of natural biotopes in urban ecosystems occurs not only due to the influence of anthropogenic factors, but also as a result of the mass distribution of adventitious species of land mollusks. Invasive species play a significant role in the biological pollution of urban ecosystems and pose a potential threat to native flora and fauna (Gural-Sverlova, 2013; Kramarenko, 2014; Yorkina, 2016). On the other hand, urbanist species are well adapted to existence under conditions of moisture deficiency, and their shells are involved in the processes of soil formation and the calcium cycle (Zhukov, 2009). In the course of phenetic-conchiometric studies of populations of terrestrial malacofauna, it was revealed that animals adapt to macroclimatic conditions in different regions due to a change in the average color intensity of shells. Thus, it has been shown that mollusks with light-colored shells are less sensitive to both the action of high temperatures and sharp fluctuations in the external temperature. Therefore, an increase in the proportion of mollusks with light colored shells (as compared with darker individuals of this species) may be a consequence of climatic selection (Gural-Sverlova, 2013).

Thus, land mollusks can be considered as promising objects of biodiagnostics of the ecological state of soils of anthropogenically transformed urban ecosystems, and also act as important agents of climate change. In addition, it is important to assess the effects of colonization of adventitious species of land mollusks for native biocenoses (Adamova, 2019).

Materials and methods

For two years (spring 2017 – spring 2019), terrestrial malacofauna were studied in different functional areas of the urban Melitopol ecosystem. The collection, fixation and determination of land mollusks was carried out according to generally accepted methods (Gural-Sverlova, 2012). Most of the representatives of the mollusk fauna were studied in the field.

To account for land mollusks, experimental sites were established in the following biotopes: the area of the transport highway (46°49'00.0" N, 35°22'51.1" E), the territory of the industrial object (46°50'48.4" N, 35°23'28.5" E), residential area (46°53'09.2" N, 35°20'36.7" E), recreation area (46°52'15.3" N, 35°25'00.9" E). The study site consisted of 105 sampling points located within the 7 transects of 15 points each. The distance between the points was 1.5 m. During 2017–2019 years the following events were carried out: a quantitative account of land mollusks (manual method of collection) from the site of 0.25×0.25 m; measurement of electrical conductivity and temperature using a HANNA HI98331 conductometer, measurement of grass height and litter, geobotanical description of the vegetation of each functional area. A total of 10.044 specimens of land mollusks were collected.

In the studied biotopes, 5 species of terrestrial mollusks were identified: *Xeropicta derbentina* (Krynicky, 1836), *Brephulopsis cylindrica* (Menke, 1828), *Monacha fruticola* (Krynicky, 1833), *Helix albescens* (Rossmässler, 1839), *Xeropicta krynickii* (Krynicky, 1833).

Results and discussion

The most common mollusk was *X. derbentina*. 7819 copies of this species were found. Representatives of *B. cylindrica* were significantly less – 1117 copies, and *Monacha fruticola* – 854 specimens. 181 copies of *X. krynickii* were found. Significantly smaller numbers were noted among representatives of *H. albescens* – 73 specimens. Thus, the dominant group among the land mollusks of the urban ecosystem of Melitopol is *X. derbentina*. Also an important role in the community is played by *B. cylindrica* and *M. fruticola*.

During the study period, the number of *X. derbentina* varied depending on seasonal factors and biotopic features. The largest number of this species was recorded in the recreation zone (97.5 ex/m²), the smallest – in the zone of an industrial object (13.2 ex/m²). The maximum values of the *X. derbentina* population density were noted in July–August (106.8 ex/m²). In September, a decrease in the number of juveniles compared with May was revealed.

The results of the study of the ecological parameters of the *B. cylindrica* mollusk populations allowed us to track the spatial-temporal dynamics of the distribution of this species. Thus, the highest rates of population density were noted in late May – early June. In May, the peak population density in the recreational zone was 125.3 ex/m². Among them, more than 90% are juvenile individuals. A decrease in the population density was recorded in July of 40.5 ex/m². The minimum density of the population of *B. cylindrica* was in the zone of the transport highway.

The number of *M. fruticola* also varied during the season of activity. The largest number of this species was recorded in the area of the residential area in late May – early June (84.6 ex/m²), the smallest – in the zone of an industrial facility in late September (7.2 ex/m²).

The number of *H. albescens* is relatively stable throughout the entire study period and averaged 2.7–3.4 ex/m². This species was recorded in the recreational zone and on the territory of the residential region, and was not found in anthropogenically transformed biotopes.

The largest number of *X. krynickii* was noted in the recreation zone (17.5 ex/m²), the smallest – in the motorway zone (3.7 ex/m²). The maximum values of the density of the *X. derbentina* population were noted in July – August (30.6 ex/m²). In Autumn a decrease in the number of this type of mollusks was recorded.

Thus, the land malacofauna of the Melitopol urban ecosystem is characterized by high numbers and small diversity. Adventive species predominate – *X. derbentina*, *B. cylindrica*, *M. fruticola*. Despite the fact that the latter species was considered to be endemic to the Crimea, it was well adapted to the urbanized biotopes in the south of Zaporozhye region. It was determined that for biodiagnostics of the state of anthropogenically disturbed biotopes, it is advisable to use the patterns of the spatio-temporal dynamics of the distribution of communities of terrestrial mollusks.

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Рекомендує до друку
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