

# PRELIMINARY ESTIMATION OF THE INFLUENCE OF *CYDALIMA PERSPECTALIS* INVASION ON THE SPECIES COMPOSITION AND STRUCTURE OF EARTHWORM POPULATION (OLIGOCHAETA: LUMBRICIDAE, ACANTHODRILIDAE) IN THE RANGE OF *BUXUS SEMPERVIRENS* (WESTERN CAUCASUS)

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The earthworm fauna and population structure in Colchic ecosystems of the southern slope in the Western Caucasus were studied. First, in May 2013 we have sampled earthworms of the forest communities. This research was repeated in 2018 after *Buxus sempervirens* L. destruction by *Cydalima perspectalis* Walker (Lepidoptera, Crambidae). Altogether 13 earthworm species were registered in the soils of original *B. sempervirens* phytocenose and derived phytocenoses of the Western Caucasus. Endemicity of earthworms in the study area was higher than in most regions of Russia. The earthworm samples in 2013 and 2018 were similar in species composition, but differed in terms of dominant species. The structure of the earthworm population in the soils of the secondary phytocenoses has become closer to the earthworm communities of the other forests in the Western Caucasus. Analysis of the relative position of taxocenes in 2013 and 2018 space NMDS model, allows to put forward a hypothesis about the reduction of their total “ecological niche” after the disappearance of *B. sempervirens*. We believe that a broader “ecological niche” in 2013 is associated with a greater mosaicism (diversity) of the worm habitat formed by boxwood communities.

**Keywords:** *Buxus sempervirens*, invasion, successions, earthworms, taxocene, vegetation, Western Caucasus.

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## Introduction

Earthworms are saprophages and less mobile animals prevailing in abundance and biomass in most terrestrial ecosystems [Markert, Breure, Zechmeister, 2003; Karlen et al., 2008; Blouina et al., 2013]. The composition and abundance of the earthworms are often used for habitat characteristics [Gilyarov, 1965; Pfiffner, Mader, 1997; Paoletti, 1999; Kingston, 2001; Blakemore, Paoletti, 2006; Paoletti et al., 2007; Lavelle et al., 2007, 2016; Peigné et al., 2009; Paoletti et al., 2013; Falco et al., 2014; Le Bayon, Bullinger-Weber, Schomburg, 2017]. Earthworms can be considered as bioindicators, since they are most studied as compared to other invertebrates. However, some aspects, such as the effect of changing the edifier of the phytocenosis on the composition and structure of the earthworm population, have been less stud-

ied, as they require a long period of time and well-executed geobotanical descriptions of plant communities [Scheffer, Achterberg, Beltman, 1984; Vsevolodova-Perel, Sizemskaya, 2007; Morrison, Bohlen, 2010; Vsevolodova-Perel, Sizemskaya, Kolesnikov, 2011; Hlava, Kopecký, 2013; Geraskina, 2016; Sizemskaya, Vsevolodova-Perel, 2017].

The recent environmental catastrophe is the loss of natural populations of the species from the *Buxus* genus in Europe and the Asian part of the Caucasus due to the invasion of the box tree moth, *Cydalima perspectalis* Walker (Lepidoptera, Crambidae) [Leuthardt, Glauser, Baur, 2013; Nacambo, Leuthardt, Wan et al., 2014; Colchis boxwood..., 2016]. The blight was first registered in Western Europe in the late 1990s, in Turkey and Georgia in 2010, in Russia (Krasnodar region, Adygea) and Abkhazia in 2012-2015

when it started to destroy native *Buxus* stands [Gorgiladze et al., 2011; Leuthardt, Glauser & Baur, 2013; Mitchell, Chitanava, Dbar et al., 2018]. The invasion of *C. perspectalis* into the territory of Russia, Abkhazia, Georgia and Turkey caused the extinction of all natural populations of *Colchis* boxwood (*Buxus sempervirens* L. (= *Buxus colchica* Pojark).

*B. sempervirens* is a relict protected species, an edificator and subedificator of phytocenoses within the unique Colchic ecosystem, which is over 15 million years old [Kolakovskiy, 1961; Mitchell et al., 2018]. There is a unique microclimate of higher humidity and low-level illumination in the forests with *B. sempervirens*; and the vegetation cover is characterized by simplified structure of the grass layer up to its total reduction [Grossheim, 1936]. We suggest that the disappearance of *B. sempervirens* in the existing ancient ecosystem will result in a number of changes in its composition, structure and functioning. The increase of insolation of the soil cover and changes in the hydrological regime of the biogeocenoses can be registered.

Earthworms are key species, or ecosystem engineers [Jones et al., 1994; Lavelle et al., 1997; Tiunov et al., 2006; Holdsworth et al., 2007], and they are important components of the soil systems. Therefore, it is necessary to reveal how the plant succession will affect the population of earthworms, as this will lead to a change in the soil population as a whole.

In this study, we compare of earthworm taxocenoses in the soils with *B. sempervirens* covers and after disappearance of *B. sempervirens* from the woody-shrub layer of Colchic ecosystems in the southern slope of the Western Caucasus.

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