

Morphological and Environmental Conditions of New Record Earthworm *Octolasion cyaneum* in Al-Diwaniyah City/Iraq

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ABSTRACT

Background and Objective: *Octolasion cyaneum* is considered an invasive species. It is endogenous and digs into the upper layers of the soil and rarely appears on the surface. It prefers to live inside the soil, but it reaches the soil level to obtain its food. The aim of this research is to describe the morphological character of earthworm *Octolasion cyaneum* and to identify the environmental conditions suitable for its living in southern Iraq, specifically in the city of Diwaniyah, Iraq. **Materials and Methods:** The 70 samples were collected from random locations by excavating and sorting from the location of study in Al-Diwaniyah City in October, 2022. The samples were collected by digging the soil to a depth of 20-25 cm with a shovel and placed in plastic containers with a length of 9 cm and a width of 16 cm. **Results:** Earthworms of the type *Octolasion cyaneum* (Savigny, 1826) were found near the banks of rivers. It is also found under stones, burrowing tree trunks and near riverbeds 14. The body is cylindrical and the back area becomes octagonal, its length is 65-140 mm and the diameter is 6-8 mm. **Conclusion:** Some physical and chemical properties of the soil were studied in which this type of worm lives, including temperature, pH, moisture, electrical conductivity, potassium and nitrogen.

KEYWORDS

Octolasion cyaneum, endogenous earthworm, environmental conditions, morphological characteristics, Al-Diwaniyah City

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INTRODUCTION

A significant reservoir of biodiversity, soil supports a variety of key processes and offers modest ecological services. As a natural resource that supports the operation of terrestrial ecosystems and offers ecosystem services, soil organisms play a significant role in ecosystems and their evolution¹. Earthworms live, multiply and diversify in all parts of the Earth except for extremely dry desert regions, poles and glaciers². Darwin (1809-1882) was the first to refer to earthworms and their importance before the Geological Society in 1837³. Earthworms are considered to be of the Oligochaeta⁴. Their cylinder-shaped body is segmented by inter-segmental grooves from the head to the anus, the body cavity was filled with coelomic fluid and on the outside, they have tiny setae or short bristles⁵. Earthworms play in mixing soil layers with organic matter. It helps to spread through the soil. In addition, allows plants to access the nutrients they retain and



enhances soil fertility⁶. *Octolasion cyaneum* is considered an invasive species, endogenous and digs into the upper layers of the soil and rarely appears on the surface, it prefers to live inside the soil, but it reaches the soil level to obtain its food^{7,8}. Therefore, the study area is economically dependent on agriculture, there are no extensive studies on the abundance of earthworms and their importance. Thus, the aim of this research is to describe the morphological character of earthworm *O. cyaneum* and to identify the environmental conditions suitable for its living in southern Iraq, specifically in the City of Diwaniyah, Iraq.

MATERIALS AND METHODS

Study of area: Al-Diwaniyah is an area located in Southern Iraq, where all the administrative and governmental institutions of the province are located and it is considered one of the best agricultural areas in Iraq and the Euphrates River passes through this city. The soil of Al-Qadisiyah governorate is characterized by having a pH value ranging between (8.7-8.5) and the conductivity value was high due to the quality of irrigation water with high salinity, while the calcium carbonate range was high due to the soil's content of organic matter⁹. It has indicated that there is a discrepancy in soil moisture values in Al-Qadisiyah City as a result of influence of a group of factors, the most important of which are the climate, natural vegetation cover, agricultural practices by farmers and the lack of use of the agricultural cycle¹⁰.

Collecting samples: The 70 samples were collected from random locations by excavating and sorting from location of study in Al-Diwaniyah City (31°59'05.1"N 44°55'21.44"E). The study was started from October, 2022 to May, 2023. The samples were collected by digging the soil to a depth of 20-25 cm with a shovel and placed in plastic containers with a length of 9 cm and a width of 16 cm. Earthworm and soil samples were transferred to the laboratory for diagnosis and analysis.

Analysis of the physico-chemical properties of the soil: Soil tests were performed. The pH value was measured by using pH meter, (PyroScience GmbH, Germany) temperature, electrical conductivity and soil moisture were measured and nitrogen and potassium were estimated¹¹.

RESULTS AND DISCUSSION

The original habitat of the *Octolasion cyraneum* worm is Europe and it prefers soils with a pH of 5.5-8^{12,13}. It is found on the banks of rivers, in plowed and sandy fields and forest soils. It is also found under stones, burrowing tree trunks and near riverbeds¹⁴. The body is cylindrical and the back area becomes octagonal, its length is 65-140 mm and the diameter is 6-8 mm¹⁵. Its color is white and lacks pigmentation. Its body contains four pairs of setae. From the front, the clitellum extends over segments 33-28 in the form of a saddle. The segment before the mouth, prostimium, is epilobic¹⁴. The samples were sent to Al-Mustansiriya University, College of Science, Department of biological Sciences for diagnosed by morphological identification according¹⁵ (Fig. 1).

The results obtained from the sampling area near the river were pH value(7.73). It turns out that the soil of the study sites was basic and this study agreed with Domínguez *et al.*¹⁶ in an analysis study of the physicochemical characteristics of Iraqi soil. The study also agreed with Alam *et al.*¹⁷. Soil pH, one of the most routine measurements made, is used to interpret chemical reactions, nutrient availability and rates of many biological processes. The pH is a key variable that affects all other properties of an ecosystem. Regarding the moisture content of the soil was 34%. Climate has a fundamental role in soil moisture, as most of the climate of the soils of central and Southern Iraq is characterized by having low moisture content in summer, but good moisture content in winter and this was consistent with Hameed *et al.*¹⁸ in calculating the moisture and salinity index in Iraqi soils. The physical and chemical tests for the study site were studied including pH, soil moisture, temperature, EC, nitrogen and potassium.

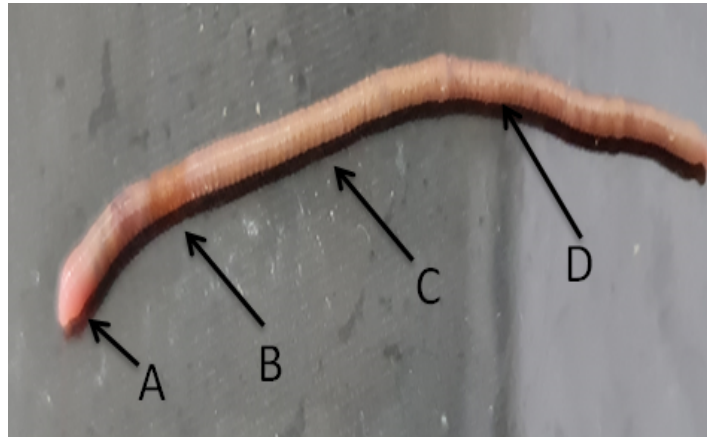


Fig. 1: Morphological study of *Octolasion cyaneum*

A: Prostimum B: Clitellum C: Setea and D: Segments

It is recorded as 7.73 ± 0.06 , $34.30 \pm 0.20\%$, $26.00^\circ\text{C} \pm 1.00$, $2371.67 \mu\text{S}/\text{cm} \pm 0.58$, $1124.333 \text{ mg}/\text{kg} \pm 0.577$ and $4703.03 \text{ mg}/\text{kg} \pm 1.70$ receptively.

The temperature was (26°C). Soil temperature is one of the foundations of climate studies because it has a significant impact on soil porosity and the activities of microorganisms and plants¹⁹. The current study was consistent with Gao and Shao²⁰ and it is the main source of soil temperature in solar radiation. Soil temperature varies seasonally and daily, which may result from changes in radiant energy and energy changes occurring at the soil surface. Temperature is of great importance in the abundance and distribution of earthworms, as earthworms prefer tropical and subtropical regions with a temperature of ($25\text{-}35^\circ\text{C}$), where high temperatures lead to the decomposition of organic materials and thus earthworms feed on them²¹. The electrical conductivity value was high, reaching ($2371.67 \mu\text{S}/\text{cm}$) and this is due to the presence of salts in the soil²².

The presence of earthworms increases the concentration of nitrogen in the soil, reaching the level of nitrogen in the study area ($1124.333 \text{ mg}/\text{kg}$)²³. The potassium concentration in the study area was ($4703.03 \text{ mg}/\text{kg}$). Increasing potassium in soil containing earthworms through the production of vermicompost makes the soil fertile and rich in organic matter^{24,25}.

CONCLUSION

The study concludes that the earthworms of the type *Octolasion cyaneum* (Savginy, 1826) were found near the banks of rivers. It is also found under stones, burrowing tree trunks and near riverbeds. The body is cylindrical and the back area becomes octagonal, its length is 65-140 mm and the diameter is 6-8 mm. To classify earthworms and identify them, one can rely on morphology and anatomical classification. The *O. cyaneum* prefers soils with a pH of 5.5-8 on river banks and in plowed and sandy fields and it prefers moist soil. The presence of earthworms increases the percentage of nitrogen and potassium in the soil.

SIGNIFICANCE STATEMENT

Octolasion cyaneum is considered an invasive species and it is endogenous. The aim of this research is to describe the morphological character of earthworm *Octolasion cyaneum* and to identify the environmental conditions suitable for its living in Southern Iraq, specifically in the City of Diwaniyah. *Octolasion cyaneum* (Savginy, 1826) was found near the banks of rivers. Some physical and chemical properties of the soil in which this type of worm lives, include temperature, pH, moisture, electrical conductivity, potassium and nitrogen. Further studies are recommended for more morphological and environmental studies of this earthworm.

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