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Seasonal variation of earthworm density in the Sahara desert: a case study of the Oasis Agrosystem of Guerrara, Algeria.

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Introduction

Oasis ecosystems are considered among the most important agro-systems of the arid and Saharan zones, which include high-potential areas for date palm cultivation and biodiversity. The literature shows the earthworms' impact on soil functions

. It is, therefore, evident that further research into earthworm ecology in the oasis agro system is still required.

Considering the climate conditions in the Sahara environments, we hypothesized that seasonal fluctuation affects earthworm density in the oasis agro systems.

In the current work, the seasonal abundance of earthworms has been studied through an inventory study of soil fauna in an extreme environment (i.e., the Sahara oasis agro system).

Materials & Methods

• Study area

The study was conducted once a month in January, April, July, and November of 2019 in a traditional palm grove in the Guerrara oasis, south Algeria, which is characterized by a hyper-arid climate and alluvial soil.

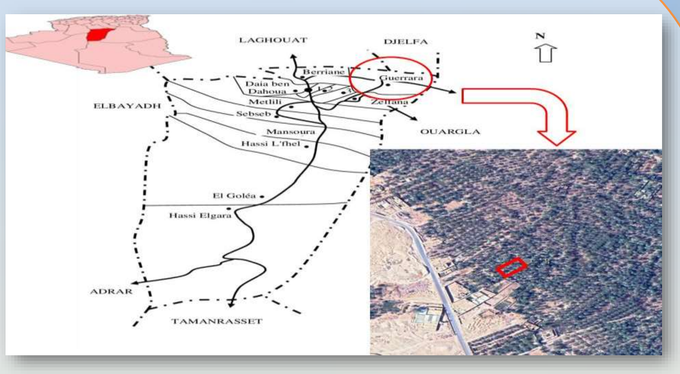

Fig 1. Map of Guerrara Oasis, Algeria; showing sampling unit.

• Sampling Methods and Analysis

Collected specimens by digging replicates soil monoliths (25 x 25 x 30 cm) and hand sorting were preserved in 70% ethanol for identification using taxonomic keys.

Fig 2. sampling method of Earthworms (TSBF)

- **Soil moisture** was expressed as a percentage of the oven-dry weight of the soil samples after drying at 105° C overnight.
- **analysis of variance & Pearson correlation** were carried out to test the significant difference of earthworm population and soil moisture in different seasons, software PAST was used.

Results & Discussion

The existence of earthworms previously unknown in the oasis Agro system of GUERRARA, Algerian Sahara, has been discovered & identified by Professor Faiza MARNICHE at the laboratory of zoology of the National Veterinary School.

Recent finding on Earthworms in the oasis agro system of Guerrara

Fig 3. ***Lumbricus Terrestris*** (Linnaeus, 1758)

Lumbricus Terrestris (Linnaeus, 1758) was the only species of earthworm found in this habitat.

Earthworms population in different seasons

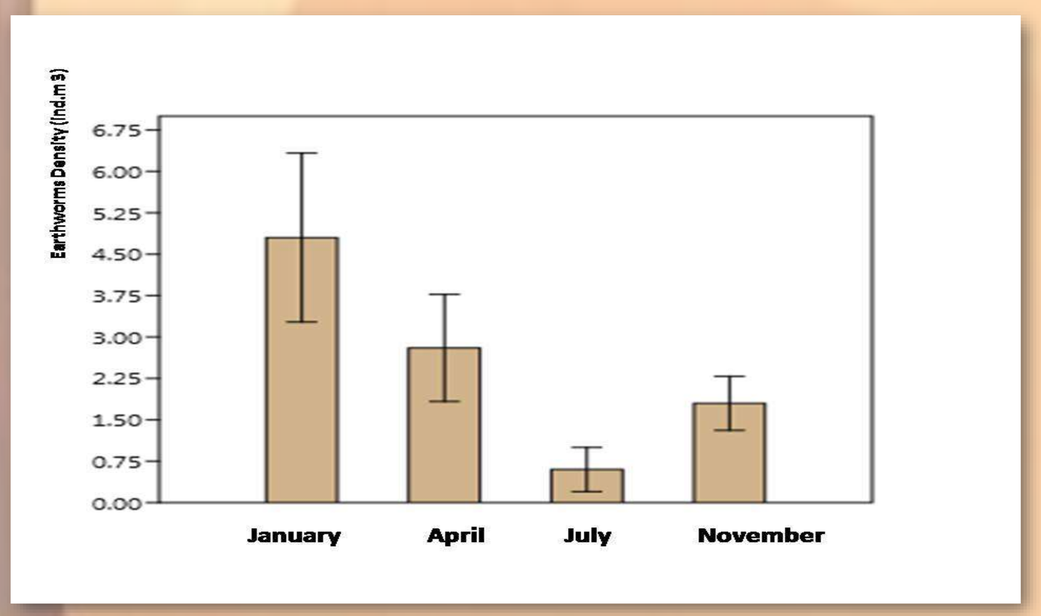

Fig 4. Seasonal variation in the population density of earthworms in the Oasis Agro-system of Guerrara.

The species had the largest and lowest population densities in January and July, respectively. The statistic test shows that Earthworm population density varied significantly among the seasons ($F_{3, 43} = 3.23, P < 0.05$) and ranged from **0.6 worms /0.018m^{-3}** to **4.8 worms /0.018m^{-3}**.

Earthworms population density and soil moisture

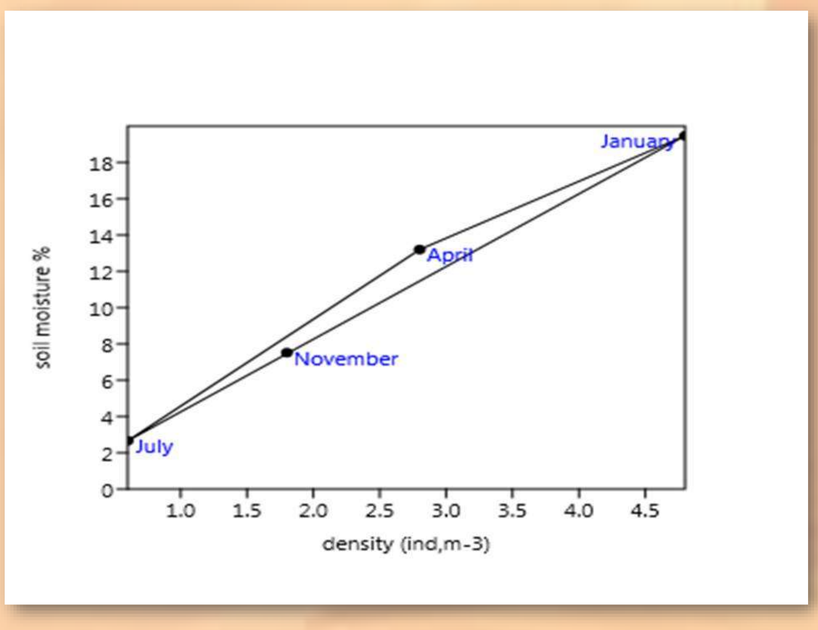

Fig 5.The relationship between earthworm population density and soil water content in the Oasis Agro System, Guerrara

The abundance of earthworms was positively correlated with soil moisture **(r = 0.993)**.

Conclusions

- The sole earthworm species detected in this ecosystem was *Lumbricus Terrestris,*
- The present experiment's results imply that seasonal changes affect the density of earthworms in the Guerrara oasis.
- Based on the sensitivities of earthworms to climate changes, we may conclude that oasis agro systems are major ecosystems in arid and Saharan environments.