Overview of the arthropod fauna in the extreme southeastern Algeria: species richness in Tassili N’Ajjer National Park (Djanet, Algeria)

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ABSTRACT
The present study concerns arthropod populations in two different environments, cultivated and natural regions of Djanet. We conducted qualitative and quantitative surveys over two seasons (summer and winter). Three sampling methods were used: pitfall traps, sweep nets, and yellow pan traps. Overall, 4480 individual arthropods were captured representing 191 species, 4 classes, 21 orders and 106 families, distributed across four study sites, namely: Lokmane and El Mihane stations for the cultivated environment and Teghargharte and Iffoutten stations for the natural environment. A total of 112 species of arthropod species were captured by pitfall traps, with Hymenoptera accounting for 69% of the species. Sweep netting generated 65 species of arthropods, with Orthoptera accounting for 36% of the captures. Yellow pan traps led to the capture of 82 species of arthropods, with dipterans most attracted by this type of trap with a rate of 38%. The 17 species of Orthoptera that we captured in the region of Djanet belonged to 7 families and 2 orders, in which the species *Tridactylus variegatus* was the most abundant.

KEY WORDS
Arthropod species richness; Djanet, Cultivated and natural environment; traps.

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INTRODUCTION
The Tassili region of Algeria was elevated to national park status in July 1972, and was classified as a World Heritage Site by UNESCO in 1982. The cultural richness and diversity of its natural ecosystems allowed it to become a preserve for Man and the Biosphere in 1986 (O.P.N.T, 2006). In general, the diversity of fauna found in the Tassili is the result of climatic variation, which began at the end of the last glacial period (O.P.N.T, 2006).

For their place in the Saharan and oasis ecosystems, the arthropods constitute a good biological indicator; they form a large part of essential elements for nutrition availability for numerous animal species (Beddiaf et al., 2014).

Published studies concerning the entomofauna are numerous. For example, there have been studies of the Ghardaïa region (Chouihet & Doumandji-Mitiche, 2012), the region of Adrar (Sid Amar et al., 2012), the region of Tamenrasset (Kourim et al., 2011; Reggani, 2010), the Djelfa region (Souttou et al., 2011), and the region of Biskra (Achoura & Bel-
The second natural study site (Iffoutten station) was located about 4 km from the town center of Djanet, alongside the bed-river of the Edjeriou River (Fig. 5).

We used three sampling methods for arthropod sampling: pitfall traps, sweep nets and yellow pan traps.

Analyses

Species identifications were conducted using conventional taxonomical keys, including Perrier (1927, 1940, 1980) for the Hymenoptera, Coleoptera, Hemiptera and Diptera orders and Chopard (1943) for the Orthoptera.

For this study, we used two ecological indices of composition. We calculated Total Richness and Relative Abundance for the ecological indices of composition.

Total Richness (S) corresponded to the number of species found in a given sampling area (Ramade, 1984; Blondel, 1979). The relative abundance R.A% of a species was calculated by the formula:

\[
R.A \% = \frac{n_i}{N} \times 100
\]

Where \( n_i \) is the percentage of a given species, and \( N \) is the total number of individuals at a given site (Dajoz, 1971; Blondel, 1979).

RESULTS

The global survey of arthropods’ populations captured during two seasons of the year (summer and winter) made use of three sampling methods: pitfall traps, yellow pan traps and sweep net in the four studied stations show the presence of 191 representing 106 families, 21 orders and four classes (Table 1).

Total Richness

A total of 112 arthropod species were captured by the pitfall traps in the two environments (four stations). The two natural stations, Teghargharte and Iffoutten, were less rich with 18 and 38 species, respectively, compared to the other two cultivated stations, Lokmane and El Mihane, with 57 and 51 species, respectively.
Figure 1. Geographic situation of Djnet and localization of sampling stations. Figure 2. Lokmane Station.
Figure 3. El Mihane station. Figure 4. Teghargharte station. Figure 5. Iffoutten station.
The total number of arthropods species captured by the yellow pan traps was 82 species in the cultivated environment, within the two stations. We captured 39 species at the Lokmane station and 63 species at the El Mihane station.

The total number of arthropods species collected by the sweep net technique was 65 species in the cultivated environment, from both stations. These stations were similar to each other with respect to the number of species present, with 34 species for Lokmane station and 38 for El Mihane station.

### Relative Abundance

Relative Abundance of Arthropod orders captured by pitfall traps during two seasons of the year is shown in figure 6.

Relative Abundance of Arthropod orders captured by pitfall traps by each station during two seasons of the year is shown in Table 2.

Relative Abundance of Arthropod orders captured by sweep net during two seasons of the year in two station is shown in figure 7.

Relative Abundance of Arthropod orders captured by sweep net during two seasons of the year in each station is shown in Table 3.

Relative Abundance of Arthropod orders captured using the yellow pan traps during the two seasons of the year is shown in figure 8.

Relative Abundance of Arthropod orders captured by the yellow pan traps during two seasons of the year in each station is shown in Table 4.

### DISCUSSION

We collected a total of 112 species at the four study sites during two seasons of the year, with 57 species from Lokmane station, 51 species from El Mihane station, 18 from Taghrarte station and 38 species from Iffoutten. We note that Lokmane station is the richest in the cultivated environment and Iffoutten is the richest in the natural one. Also, we note that the cultivated habitats are more species rich than the natural environments. This may be related to denser vegetation, the availability of water, and a more moderate temperature, which may have created a less stressful environment compared to the harsher conditions in the natural environment. The natural environment is xeric, with little vegetation and is dominated by a single plant species, *Calotropis procera*, a giant milkweed.

A previous study of the Laghouat region found a total richness of 55 species in an apple orchard and 45 species along the riverbed of M’zi (Saoudi & Thelidji, 2007). These results are similar to those reported here. In contrast, our findings are higher than those found by Reggani (2010) in two cultivated environments in Tamenrasset where only eight species were collected using the same techniques.

Our results show that Hymenoptera are the most abundant order in the four studied stations. We
is in the second most abundant group with a rate of 46.96% at the Lokmane station, and 6.2% at the El Mihane station. However, studies by Chennouf (2008) in the Ouargla region, and Chouihet & Doumandji-mitiche (2012) in the Ghardaïa region, showed coleoptera to be the second most abundant group. Conversely, Dipterans are relatively rare with a rate of 2.54% at El Mihane station, and 1.07% at Lokman station.

**CONCLUSIONS**

The current Arthropodofauna study was con-
Conducted in the region of Djanet in two different environments (cultivated and natural), at a total of four stations (two stations for each environment): Lokmane and El Mihane stations for the cultivated environment, and Teghargharte and Iffoutten stations for the natural environment. This study was conducted over two seasons, summer and winter. Three sampling methods were used during the two seasons, namely: pitfall traps, sweep nets and yellow pan traps.

The pitfall trap method generated a collection of 112 arthropod species for the region. The Insecta class was the most abundant at the four stations with 10 species represented, including: Cataglyphis bombycina and Anthicidae sp. which were the most frequently captured species using this method. A
total of 2726 individuals were captured with pitfall traps during the summer and 694 individuals were captured during winter. Lokman station was ranked first with respect to the number of individuals captured by pitfall traps compared to the other stations. Hymenoptera and Entomobryomorpha orders were the most captured in the four stations using this method with relative abundance rates of 68.67% and 13.33% respectively.

The yellow pan trap method generated a total of 82 arthropod species. This method was used only in the two cultivated stations of Lokman and El Mihane. Dipterans were the most frequently captured group using this method with a rate of 40%. It is noteworthy that most of the individuals captured using this method were at El Mihane station.

The sweep net method was only used at the two cultivated stations. This sampling method allowed us to collect a large number of Orthoptera species (e.g. Ochrilidia gracilis), Coleoptera species (e.g., Adonia variegata) and Hemiptera species (e.g. Nysius sp.).

REFERENCES


