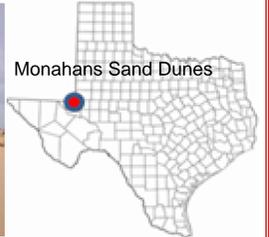




Habitat associations of a Jerusalem cricket (Stenopelmatus monahansensis) at the Monahans sand dunes in western Texas

Roberto Miranda, Wilber Gutierrez; SOWER Scholars, Samuel Discua and Scott Longing
Department of Plant and Soil Science, Texas Tech University, Lubbock, TX



Abstract

The Monahans sand dunes in western Texas are home to a unique diversity of arthropods and other animals. The Jerusalem cricket (Stenopelmatus monahansensis) is an endemic species known to occur within this dune system. Changes to groundwater and plant communities on the dunes are potential threats to this species. The objective of this study was to determine habitat associations of S. monahansensis across different types of vegetation and dune structure. In June 2014, a total of 18, 20 meter transects were established in six different types of vegetation and dune structure: coppice dunes, low shin oak (Quercus havardii), mixed vegetation, open depositional dunes, Panic grass (Panicum havardii) dominant, and remnant seeps. In each transect, 5 pitfall traps spaced evenly were used to collect S. monahanensis. Pitfall trap captures from each transect were collected monthly from June to August 2014. Data will be analyzed as a randomized complete block with repeated measures design. Results from this study will help determine habitat associations of S. monahansensis and data will be subsequently used to estimate the potential habitat of the cricket based on vegetation structure.

Introduction

The Jerusalem Cricket Stenopelmatus monahansensis, is a rare species endemic to the Monahans Sandhills State Park of Texas. Changes to groundwater and plant communities on the dunes are potential threats to this species. These factors are harmful because they modify the sand below which the cricket larvae grow, increase aridity and drought episodes that reduce dune-stabilizing vegetation, and increase eolian sedimentation. Jerusalem Crickets are essential to this ecosystem because they are herbivorous and therefore contribute to the balanced structure of plants existing in the sand dunes of Monahans. The objective of this study consists of identifying, through pitfalls traps, the distribution and occurrence of the Jerusalem Cricket in six different habitats currently in existence in Monahans in order to determine their preferences and thus provide conservation efforts to maintain the species' key role in this ecological and biological ecosystem.

Figure 1. Jerusalem Cricket (Stenopelmatus monahansensis)



Acknowledgments

We thank James Cokendolpher for his technical assistance in the Natural Science Research Lab at the Texas Tech Museum..

Funding provided by the Texas Parks and Wildlife Department Texas Horned Lizard License Plate Fund and the State Wildlife Grant Program.



Materials and Methods

Study Sites: Eighteen 20 meter long linear transects were established during June-August 2014 at the Monahans Sandhills State Park, in six different types of vegetation: open depositional dunes, low shin oak (Quercus havardii), remnant seep, mixed vegetation, coppice dune and panicum dominant (Panicum havardii) (Figure 3).

Trapping Materials: Five pitfalls traps (Figure 2), spaced five meters apart were placed in each transect. Propylene glycol was used as the killing and preservation agent in the trapping containers.

Sample Processing: Samples were collected on June 21st, July 12th, July 31st and August 16th and transported to the Natural Science Research Lab at the Texas Tech Museum for processing. Samples were then sorted in the Bayer Plant and Soil Science Lab to identify and count the number of Jerusalem crickets found in each sample.

Data analysis: Data was analyzed as a randomized complete block with repeated measures design using SAS 9.4 (PROC GLM) and a significance level of 0.05.

Figure 2. Setting pitfalls traps in the field



Figure 3. Vegetation types sampled at the Monahans Sand Dunes System



Results

Table 1. Total number of specimens captured by habitat

Table with 3 columns: Habitat, Total, and %. Rows include Open depositional (121, 30.87%), Panicum dominant (73, 18.62%), Mixed vegetation (58, 14.80%), Remnant seep (54, 13.78%), Coppice dune (44, 11.22%), and Low shin oak (42, 10.71%).

Table 2. Total number of specimens captured by date

Table with 3 columns: Date Collected, Total, and %. Rows include 6/21/2014 (74, 18.88%), 7/12/2014 (111, 28.32%), 7/31/2014 (99, 25.26%), and 8/16/2014 (108, 27.55%).

Figure 3. Stenopelmatus monahansensis collected by habitat type

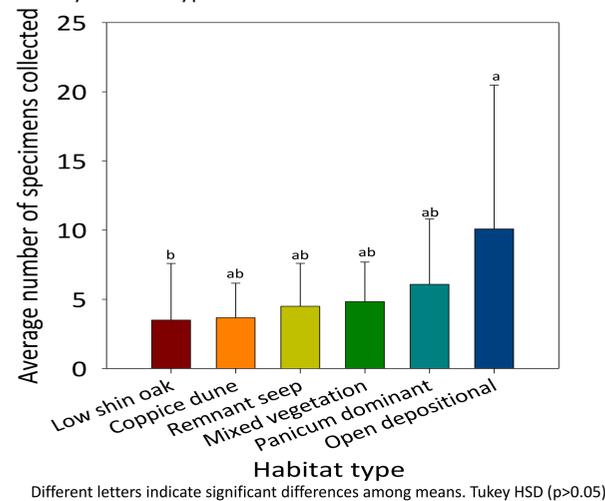
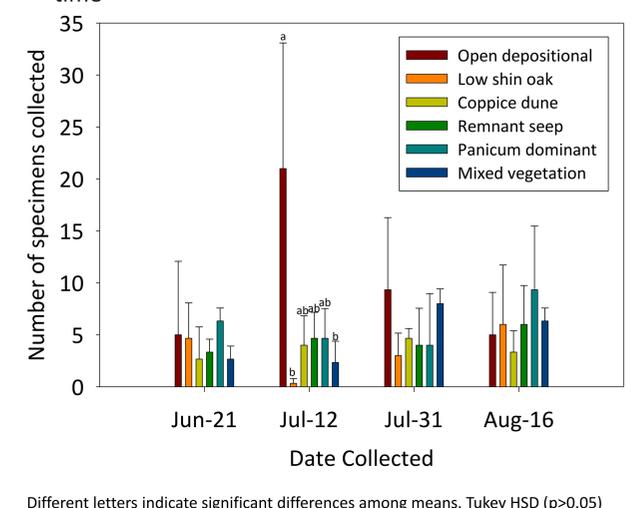


Figure 4. Stenopelmatus monahansensis collected by time



Conclusions and Future Work

- Habitat type: We found that the Open Depositional habitat type had the highest number of S. monahansensis and low shin oak and coppice dunes had the lowest. However, due to the high standard error of the data only open depositional and low shin oak were significantly different.
The only significant differences found for specimens captured by date and habitat were for the specimens collected in July 12, 2014. The majority of the specimens captured in that date were in the open depositional habitat and where immature stages of the cricket. By this information we can infer that the females prefer open depositional conditions habitat to lay their eggs and migrate to other types of habitats.
More studies are needed to determine the physical and biological factors occurring in the Open Depositional Habitat. They must be related to sand moisture, absence of predators, habitat structure among others.

References

- Stidham, T.A. and Stidham, J.A. 2001. A new species of Jerusalem cricket (Orthoptera: Stenopematidae) from Texas. Southwestern Entomologist 26: 221-226.
Longing, S.D. Discua, S.A. and Cokendolpher, J.C. 2014. Surveys and Habitat Assessment of Endemic Insects at the Monahans Dune System. Final Report.

