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Estimación poblacional del abejorro Bombus ephippiatus en Neverías, Sierra de Cacoma, Jalisco

Population Estimate of the Bumblebee Bombus ephippiatus in Neverías, Sierra de Cacoma, Jalisco

Estimativa populacional do zangão Bombus ephippiatus em Neverías, Sierra de Cacoma, Jalisco

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Resumen

El objetivo de este estudio fue intentar descubrir la población de abejorros *Bombus ephippiatus* en Neverías, parte de la Sierra de Cacoma, Jalisco. Para ello, se recolectaron abejorros a lo largo de un año en una misma área por un lapso de una hora. Dos personas estuvieron a cargo de esta labor, quienes utilizaron los mismos protocolos de captura cada mes durante un año. Entre los resultados, se capturaron desde 1 hasta 75 obreras de *Bombus ephippiatus*, desde una hasta ocho reinas y desde 1 hasta 10 zánganos. Es de destacar que se encontraron abejorros *Bombus ephippiatus* en pocas cantidades, en los meses de enero, febrero, abril, mayo y julio, lo cual significa que en estos meses no es viable realizar capturas,

mientras que, por el contrario, los meses de agosto, septiembre, octubre, noviembre, diciembre y marzo sí resultaron viables para emprender esta práctica.

Palabras clave: abejorros, *Bombus ephippiatus*, captura, Neverías, Jalisco.

Abstract

The objective of this study was to try to discover the population of *Bombus ephippiatus* bumblebees in Neverías, within the Sierra de Cacoma, Jalisco. For this, bumblebees were collected throughout a year in the same area for a period of one hour. Two people were in charge of this work, who used the same capture protocols every month for a year. Among the results, from 1 to 75 *Bombus ephippiatus* workers, from one to eight queens, and from one to nine drones were captured. It is noteworthy that *Bombus ephippiatus* bumblebees were found in few quantities in the months of January, February, April, May and July, which means that in these months it is not feasible to capture, while, on the contrary, in the months of August, September, October, November, December and March were viable to undertake this practice.

Keywords: bumblebees, *Bombus ephippiatus*, capture, Neverías, Jalisco.

Resumo

O objetivo deste estudo foi tentar descobrir a população de abelhas Bombus ephippiatus em Neverías, parte da Serra de Cacoma, Jalisco. Para isso, abelhas foram coletadas ao longo de um ano na mesma área por um período de uma hora. Duas pessoas foram responsáveis por este trabalho, que usaram os mesmos protocolos de captura todos os meses durante um ano. Entre os resultados, foram capturados 1 a 75 operárias de Bombus ephippiatus, 1 a 8 rainhas e 1 a 10 zangões. Ressalta-se que os zangões Bombus ephippiatus foram encontrados em poucas quantidades nos meses de janeiro, fevereiro, abril, maio e julho, o que significa que nesses meses não é viável a captura, enquanto, ao contrário, nos meses de agosto , setembro, outubro, novembro, dezembro e março foram viáveis para realizar essa prática.

Palavras-chave: abelhas, Bombus ephippiatus, captura, Neverías, Jalisco.

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Introduction

Bombus bees are social insects, they are distributed in different regions of Mexico and due to their large size they are excellent for pollinating different crops (Lozier, Hines and Cameron, 2012). In total, 25 species of Bombus have been differentiated in the country. And the most common is the Bombus ephippiatus. Although they are a viable option for commercial use and to avoid the introduction of non-native bumblebee species that could generate an ecological imbalance if they get out of control, there are still not many studies on the biology of Bombus ephippiatus (Ambriz, Rosales and Sandoval, 2020; Fuentes and Madrid, 2003).

Another ecological imbalance in Mexico has to do with the immense deforestation of forests and jungles as a result of the opening of new areas for agriculture, livestock and large real estate or tourist projects, whose urbanization is accelerated, which destroys nesting sites and feeding of many native bees (Quezada and Ayala, 2010).

The Bombus ephippiatus bumblebees are distributed from northern Mexico to western Panama, and due to their feeding and survival nature, they can be found above 800 m a.s.l. n. m. (Ayala 2009).

Bombus ephippiatus is a bumblebee that is characterized by the fact that tergites 3-5 have reddish hairs on the sides. The body size of the queen of this species is approximately 1.6 cm to 2.0 cm, while the workers show a size of 1.0 cm to 1.5 cm and the males from 1.2 cm to 1.5 cm. Bumblebees are used to pollinate crops, mainly greenhouse crops. The species Bombus ephippiatus is considered the most widely distributed in Mexico, so, as already mentioned, it would be a good option for commercial use and thus avoid the introduction of exotic species. (Montemayor y Madrid, 2003).

In Mexico, as in other countries, the way to capture bumblebees is simple. Once a nest is located, boxes are placed and left there for at least one day to catch all those who are foraging and favor the rest of the catch. Another way to capture them is with a net at the moment the bumblebees come out to eat (forage) (Salvarrey, 2012).

This case study arose from the need to know the bulk population of the bumblebee Bombus ephippiatus in Neverías, which is found in the Sierra de Cacoma, Jalisco. To do this, bumblebee collections were made in the same area once a month, starting on August 10, 2019 and ending in July 2020, for a period of one hour. This work was carried out by two people, who used the same capture protocols every month for a year.

General objective

- For one year, capture Bombus ephippiatus bumblebees in Neverías to estimate their population.

Specific objectives

- Identify the place and techniques for capturing Bombus ephippiatus bumblebees in order to capture them once a month for a year.
- Capture bumblebees in Neverías once a month for a year.
- Separate, identify and count the bumblebees that were captured once a month for a year and thus estimate the population of bumblebees in Neverías, part of the Sierra de Cacoma, Jalisco.

Materials and methods

The study was carried out in Neverías, which is located in the Sierra de Cacoma, Jalisco, at 2200 m a.s.l. n. m. The coordinates of this place are the following: north 19.8562°, east -104.444°, south 19.8349° and west -104.487° (Rockefeller, 2021). Firstly, the area was monitored and queens were searched for. Normally, the search is carried out in spring because this is the time when they come out of their diapause; For this reason, trying to capture them at the end of summer is avoided, since it is the period in which their diapause begins. This occurs in Bombus impatiens bumblebees; in Bombus ephippiatus diapause is not required, so you can find them almost all year round (Hernández 2004).

Bombus ephippiatus bumblebees were captured, both queens and drones and workers. It should be noted that the same capture protocols were used each month for a year to know

the number of these pollinating insects. In the end, 1 to 75 Bombus ephippiatus workers were captured, while 1 to 8 queens and 1 to 10 drones were captured.

Results

Table 1 below shows the results of the bumblebees that were captured in Neverías. These collections were made month after month by two people for a period of one hour; they began on August 10, 2019 and ended in July 2020. Once the bumblebees were captured, they were placed in a bottle with 70% alcohol for conservation.

Once in the laboratory, the specimens were separated and the queens, workers and males were counted; in the same way, another insect was counted if it was collected.

Tabla 1. Captura de abejorros *Bombus ephippiatus* en Neverías

10 de agosto del 2019	10 de septiembre del 2019	11 de octubre del 2019
8 reinas *B. ephippiatus*	7 reinas *B. ephippiatus*	1 reina *B. ephippiatus*
9 zánganos *B. ephippiatus*	3 zánganos *B. ephippiatus*	10 zánganos *B. ephippiatus*
12 obreras *B. ephippiatus*	34 obreras *B. ephippiatus*	75 obreras *B. ephippiatus*
	1 abeja	1 abeja
10 de noviembre del 2019	10 de diciembre 2019	10 de enero 2020
1 reina *B. ephippiatus*	3 reinas *B. ephippiatus*	2 reinas *B. ephippiatus*
2 zángano *B. ephippiatus*	18 obreras *B. ephippiatus*	2 zánganos *B. ephippiatus*
10 obreras *B. ephippiatus*	1 macho *B. ephippiatus*	1 obrera *B. ephippiatus*
	2 insectos	
10 de febrero 2020	10 de marzo 2020	10 de abril 2020
1 reina *B. ephippiatus*	1 reina de *B. ephippiatus*	9 obreras *B. ephippiatus*
1 obrera *B. ephippiatus*	11 obreras *B. ephippiatus*	2 zánganos *B. ephippiatus*
	9 zánganos *B. ephippiatus*	
	3 abejas	
	1 insecto no identificado	
10 de mayo 2020	10 de junio 2020	10 de julio 2020
7 obreras *B. ephippiatus*	10 obreras *B. ephippiatus*	11 obreras *B. ephippiatus*
	1 zángano *B. ephippiatus*	1 zángano *B. ephippiatus*
	1 abeja	

Fuente: Elaboración propia

Discussion

These results do not fully coincide with those reported by Salvarrey (2012). This author made the captures of it in the field during the spring because apparently that is when more Bombus atratus and Bombus bellicosus bumblebees are located, due to the flowering that is found at that time; In this investigation, however, only in the month of March were a considerable number of Bombus ephippiatus bumblebees found, while very few were found in the following spring months.

Also Yoon, Lee, Hwang and Park (2010) suggest that bumblebees be captured in spring because they are found more frequently in that season. In the same way, Salvarrey, Arbulo, Santos and Invernizzi (2013) mention that it is better to capture fertilized queens in spring, since they come out of hibernation and that is when they are found more frequently and other bumblebees, but in this investigation they were not found. so many queens or bumblebees in general. As here, Plischuk, Skevington, Haramboure, Kelso, and Lange (2018), after capturing the bumblebees B. bellicosus, B. opifex, B. pauloensis, and B. bellicosus, preserved them in ethyl alcohol 70 %.

Research by Evans, Burns and Spivak (2007), Velthuis and van Doorn (2006) found that it is best to capture bumblebees in spring because that is when they are found in greatest numbers; although in this investigation they were not found in great quantity. Heinrich (2004) and Goulson (2003) also mention that more workers were captured in spring than at other times of the year; here, once again, only in the month of March were they found more frequently than in the rest of the spring.

Conclusion

The results found in this investigation serve to affirm that after capturing bumblebees month after month for a year in Neverías, Sierra de Cacoma, Bombus ephippiatus bumblebees were found in few quantities in the months of January, February, April, May and July, which means that in these months it is not feasible to capture, while in the months of August, September, October, November, December and March it was feasible to carry out this practice.

Future lines of research

- Capture of Bombus ephippiatus bumblebees in El Agua del Saúco, in the municipality of Techaluta, to determine their incidence in the population.
- Comparison of the population incidence of bumblebees Bombus ephippiatus in Neverías and in El Agua del Saúco, Techaluta, to make captures in the best season of the year.
- Research on how to massively reproduce bumblebees under laboratory conditions in a device for mating insects (bumblebees).

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