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Captura de insetos em pomares de goiabeira com armadilhas no solo

Capturing insects in guava orchard with soil trap

Captura de insectos en un huerto de guayaba con trampa de suelo

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Resumo

O desenvolvimento de equipamentos de captura de insetos, de modo a satisfazer a necessidade de técnicos e investigadores, é da maior importância para a obtenção de dados precisos sobre a população de insetos numa determinada área. A armadilha do solo é utilizada para se obter uma amostra do tamanho da população da macrofauna presente no solo. O objetivo do experimento foi capturar insetos de diferentes ordens com armadilhas no solo e verificar a constância das ordens de insetos na Área Experimental de Pomares de Goiabeira do Instituto Federal de Educação, Ciência e Tecnologia do Campus Sousa, Unidade II em São Gonçalo, Estado da Paraíba. Para isso, foram instaladas seis armadilhas de solo, dispostas em pontos estratégicos, com espaçamento de 30 m entre elas, em forma de triângulo. As armadilhas foram feitas de garrafas plásticas de 2 litros (PET) de refrigerante, cortadas ao

meio e com 10 cm de diâmetro e 15 cm de altura. Dentro de cada garrafa foram colocados 300 mL de água e duas colheres de sopa de detergente neutro para quebrar a tensão superficial da água. As principais ordens de insetos foram respectivamente, Hymenoptera com 100% do total das espécies coletadas nas armadilhas do solo; Neuroptera 66,66%, Orthoptera 33,33% e Diptera com 33,33%. Na experiência foi observada uma frequência constante, ou seja, aquelas presentes em mais de 50% das coletas, em particular a ordem Hymenoptera, com a espécie formiga vermelha (*Formica rufa*), seguida pela formiga leão (*Myrmeleon brasiliensis*).

Palavras-chave: armadilha; insetos; ordem de insetos; solo.

Abstract

The development of equipment for capturing insects, in order to meet the need of technicians and researchers, is of paramount importance to obtain accurate data on the population of insects in a given area. The soil trap is used in order to have a sample of the population size of the macro fauna present in the soil. The objective of the experiment was to capture insects of different orders with soil traps and to verify the constancy of the orders of insects in the Experimental Area of Guava Orchards of Federal Institute of Education, Science and Technology of Paraiba Campus Sousa, Unit II in São Gonçalo, Paraiba State. For this, six soil traps were installed, arranged in strategic points, with 30 m spacing between them, in a triangle shape. The traps were made of 2-liter plastic bottles (PET) of soft drink, cut in half and 10 cm in diameter and 15 cm high. Inside each bottle 300 mL of water and two tablespoons of neutral detergent were placed to break the surface tension of the water. The main orders of insects were respectively, Hymenoptera with 100% of the total species collected in the soil traps; Neuroptera 66.66%, Orthoptera 33.33% and Diptera with 33.33%. In the experiment, a constant frequency was observed, that is, those present in more than 50% of the collections, in particular the order Hymenoptera, with the red ant species (Formica rufa), followed by lion ant (*Myrmeleon brasiliensis*).

Keywords: trap; insects; insect order; soil.

Resumen

El desarrollo de equipo para capturar insectos, a fin de satisfacer las necesidades de los técnicos e investigadores, es de suma importancia para obtener datos precisos sobre la población de insectos en una zona determinada. La trampa de suelo se utiliza para tener una muestra del tamaño de la población de la macrofauna presente en el suelo. El objetivo del experimento fue capturar insectos de diferentes órdenes con trampas de suelo y verificar la constancia de los órdenes de insectos en el Área Experimental de Huertos de Guayaba del Instituto Federal de Educación, Ciencia y Tecnología del Campus Sousa de Paraíba, Unidad II en São Gonçalo, Estado de Paraíba. Para ello se instalaron seis trampas de suelo, dispuestas en puntos estratégicos, con un espacio de 30 m entre ellas, en forma de

triángulo. Las trampas estaban hechas de botellas de plástico de 2 litros (PET) de refresco, cortadas por la mitad y con un diámetro de 10 cm y una altura de 15 cm. Dentro de cada botella se colocaron 300 mL de agua y dos cucharadas de detergente neutro para romper la tensión superficial del agua. Los principales órdenes de insectos fueron, respectivamente, Himenópteros con el 100% del total de las especies recogidas en las trampas del suelo; Neuroptera 66.66%, Ortópteros 33.33% y Dípteros con 33.33%. En el experimento se observó una frecuencia constante, es decir, los presentes en más del 50% de las colecciones, en particular el orden Hymenoptera, con la especie de hormiga roja (*Formica rufa*), seguida de la hormiga leona (*Myrmeleon brasiliensis*).

Palabras clave: trampa; insectos; orden de los insectos; suelo.

1. Introduction

The use of traps is an easier and less costly method for insect surveys (Melo et al., 2001). The soil trap is used for the purpose of having a sample of the population size of the macro fauna present in the soil. The traps, commonly used, are based on traditional North American models, standardized by the American Society of Entomology, (Silveira Neto, 1989). In Brazil, these devices have been used since 1964.

The study of insect diversity according to which the situation is known of preservation or degradation of an environment, since these animals are important bioindicators of environmental quality. In addition from this, it is possible to identify changes in environments, caused by natural factors or anthropic people by analysing diversity and insect fauna abundance (Lima Filho, 2014).

According to Almeida et al. (1998), the soil trap is especially designed for insects that walk on the ground due to flight disability or habitat preference. This includes a variety of immature forms of insects, such as beetle and diptera larvae, but also winged adult insects such as Collembola, Protura, Diplura, Archaeognatha, Zygentomo, and Formicidae, adults with wings of some groups, such as Sciaridae and Phoridae (Diptera), and other arthropods, such as mites, spiders, symphiles, diplopods, etc. The soil traps consist basically of a plastic container buried at ground level, with liquid to kill and preserve the collected insects. Parr and Chown, (2001), point out that the diameter of the trap interferes with the efficiency of capture and it is recommended that traps of the same size should always be used in different locations.

The type of soil and vegetation cover, as well as the time and regional scale, are important factors that determine the composition and richness of the collected insects (Petillon et al., 2006). According to Antoniolli et al. (2006), the greatest problems

encountered in soil fauna sampling is the fact that the organisms live in the most different layers of the soil profile, which makes its collection difficult. Usually the population counting methods are destructive of the study area, which is not desirable when working with experimental areas. The objective of the experiment was to capture insects of different orders with soil traps and to verify the constancy of the orders of insects in the Experimental Area of Guava Orchards of Federal Institute of Education, Science and Technology of Paraiba Campus Sousa, Unit II in São Gonçalo, Paraiba State.

2. Material and Methods

The study was conducted in the Experimental Area of Guava Orchards of Federal Institute of Education, Science and Technology of Paraiba Campus Sousa, Unit II in São Gonçalo, Paraiba State. For this, six soil traps were installed, arranged in strategic points, with 30 m spacing between them, in the shape of a triangle. The traps were made of 2-liter plastic bottles (PET) of soft drink, cut in half and with 10 cm in diameter and 15 cm in height, keeping their opening at the level of the soil surface. Inside each bottle 300 mL of water and two tablespoons of neutral detergent were placed to break the surface tension of the water. The collected insects were packed in plastic containers.

The soil traps were made with pet bottles, these were buried in the soil, keeping their opening at the level of the soil surface. The study area is located in the irrigated perimeter of the District of São Gonçalo, located 15 km from the city of Sousa. The relief forms found in the region range from flat, soft to wavy, predominating in the irrigated perimeter area, the sedimentary covers, represented by alluvium, while the predominant natural vegetation is the hyperxerophilous caatinga, characterized by plants of variable size arboreal or shrubby and xerophyllous character, with a large amount of thorny, cactus and bromeliad plants.

In the Experimental area where the study was carried out, it is cultivated with guava trees. The average annual rainfall recorded in the irrigated perimeter region is around 894 mm, with the rainy season extending from January to May. The average annual temperature is 27 °C, with a minimum of 22 °C and a maximum of 38 °C. The average annual evaporation is 3.056.6 mm.

3. Results and Discussion

In the survey conducted in the Experimental Area of the Guava Orchard of the of Federal Institute of Education, Science and Technology of Paraiba Campus Sousa, orders of respective importance for the environment were collected. The following tables show the results of the soil traps installed in the area.

Table1. Trap One.

Insects	Number of insects	Orders
Red Ant	50	Hymenoptera
Lion Ant	3	Neuroptera
Mosquito	12	Díptera
Ant greets	16	Hymenoptera
Fruit fly	8	Díptera

Table 2. Trap two.

Insects	Number of insects	Orders
Red Ant	28	Hymenoptera
Lion Ant	12	Neuroptera

All the collection techniques tend to be more or smaller, selective. To heal this difficulty, one should then use different techniques to collect more diversity and quantity (Marchiori, 2015). To standardize the collections, some common procedures are necessary, such as select areas in reservations or stations ecological or research stations, which have not yet been, significantly, changed by man and presenting the minimum logistic infrastructure; have transport facilities use the same techniques, even number of equipment, same collection effort and counting on a team of personnel trained to set the traps and triage the material.

Table 3. Trap thre.

Insects	Number of insects	Orders
Red Ant	20	Hymenoptera
Lion Ant	2	Neuroptera
Cricket	1	Orthoptera
Grasshopper	1	Orthoptera

Table 4. Trap four.

Insects	Number of insects	Orders
Red Ant	20	Hymenoptera
Ant greets	3	Hymenoptera
Cricket	1	Orthoptera

Table 5. Trap five.

Insects	Number of insects	Orders
Red Ant	10	Hymenoptera
Ant greets	2	Hymenoptera

The increase in the population of this group of insects in a forest stand, which can be detected by the use of ethane traps, suggests that the trees are under stress, which generates conditions for the attraction of these insects. Implement projects of this type of equipment, which propose cheap, efficient and practical traps, or even jobs to evaluate the conditions of

use of this equipment, are information sought in research concerning on the improvement of the monitoring steps of insects (Carvalho and Trevisan, 2015).

Table 6. Trap six.

Insects	Number of insects	Orders
Red Ant	22	Hymenoptera
Lion Ant	6	Neuroptera

The Constancy of these insects was also calculated using the following formula (Silveira Neto et al., 1976): C (%) = P/N.100, where C= constancy of the species, expressed in percentage, P= number of collections containing the species, N= number of collections performed. Among the main orders of insects the predominant ones were respectively, Hymenoptera with 100% of the total of species collected in the soil traps; Neuroptera with 66.66%; Orthoptera 33.33% and Díptera 33.33%. The red *Formica rufa* ants corresponded to the most constant group of insects in the study area (Figure 1).

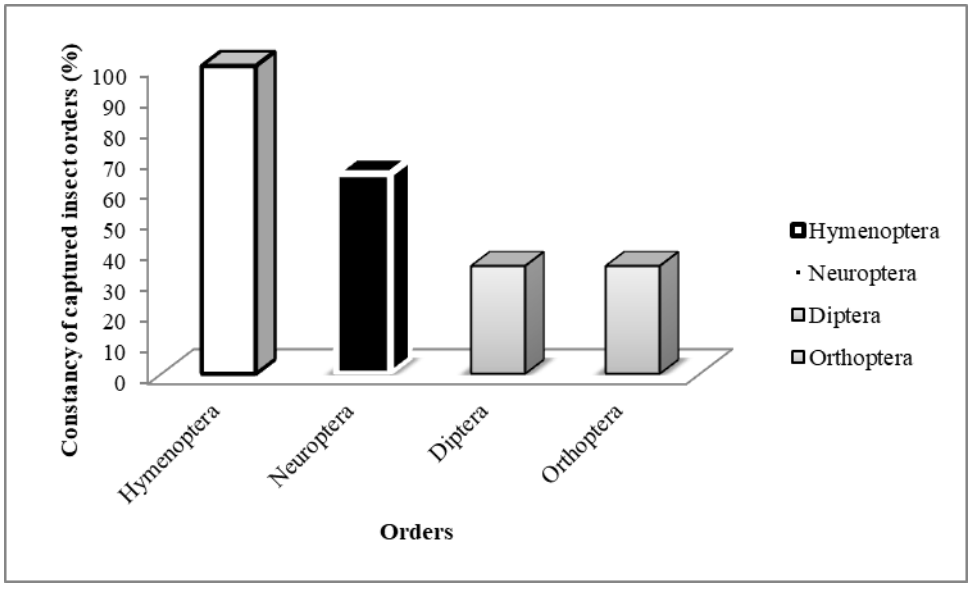

Figure 1. Constancy of insect orders captured with soil traps.

According to Silveira Neto et al. (1976), constancy is characterized in: constant species: those present in more than 50% of the collections; accessory species: those present

from 25% to 50% of the collections; accidental species: those present in less than 25% of the collections. In this work, we verified a constant frequency, that is, those present in more than 50% of the collections, in particular, the order Hymenoptera, with the species of Red Ant (*Formica rufa*), followed by Lion Ant (*Myrmeleon brasiliensis*).

The number of insects collected is also related to the collection method used, since insects that have a greater mobility on the soil surface are more susceptible to capture in soil traps. Soil traps are a passive collection method, dependent on the insect activity, which provides a rough estimate of the total number of species in a community, besides being a simple and inexpensive methodology for ecological studies, (Tonhasca Júnior, 1993).

4. Conclusions

From the results obtained in the present work, we observed that the main orders of insects were respectively, Hymenoptera with 100% of the total of species collected in the soil traps; Neuroptera 66.66%, Orthoptera 33.33% and Diptera with 33.33%. In the present work, a constant frequency was verified, that is, those present in more than 50% of the collections, in particular, the order Hymenoptera, with the species of Red Ant (*Formica rufa*), followed by Lion Ant (*Myrmeleon brasiliensis*).

Insect monitoring is a relevant activity in the sanity assessment process of forest stands, as well as in ecological studies. To know the relations and the diversity of insects associated to the cultures is fundamental for ecological studies and integrated pest management. One of the ways to know this diversity is to perform population surveys using traps.

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