Oct 30, 2022

Macrofauna Occidental Farms

Forked from a private protocol

DOI
dx.doi.org/10.17504/protocols.io.rm7vzby75vx1/v1

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OPEN ACCESS

DOI: dx.doi.org/10.17504/protocols.io.rm7vzby75vx1/v1

Protocol Citation: C A Zuniga-Gonzalez, Conrado Ronaldo Quiroz Medina, Alvaro Jose Caballero Hernandez 2022. Macrofauna Occidental Farms. **protocols.io https://dx.doi.org/10.17504/protocols.io.rm7vzby75vx1/v1**

Protocol status: Working
We use this protocol and it's working

Created: October 22, 2022

Last Modified: October 30, 2022

Protocol Integer ID: 71698

Abstract

The protocol was divided into two phases, the first was the collection of the sample, and the second was the classification, coding, and storage of the extracted macrofauna populations. Subsequently, the indices of diversity and species richness, relative abundance, by functional groups were estimated. The sampling consisted of the extraction of 40 soil samples at a depth of 0-20 cm and 40 samples of litter on the soil surface of the 8 banana farms sampled and distributed in the municipalities of León and Posoltega, for a total of 80 samples collected, coded, stored and transported to the Entomology Laboratory of the Department of Agroecology, School of Agrarian and Veterinary Sciences of the National Autonomous University of Nicaragua, Leon.

Materials

1) Soil and litter samples were from 1 block of approximately 7026 m². Where an area of 1000 m² (50 m long x 20 m wide) was delimited in the center of the defined plot.
2) Wooden box with dimensions of 20 cm2 wide by 20 cm² long for the process of extracting the macrofauna in the litter and soil in the banana plantations.
3) Petri dishes
4) A 4x-400x stereo microscope
5) Bottles to separate each individual according to their origin, sample number, and biological classification
6) Records of the total number of fingers per ha with the help of the producer who provided us with the data according to the records kept on the farm.
7) Measuring tape

Before start

This protocol is part of the research untitled **Diversity of Functional Edaphic Macrofauna in *Musa acuminata x Musa balbisiana* (AAB) Agroecosystems, t**he sampling design was random and descriptive, it was divided into two phases, the first was the collection of the sample, and the second was the classification, coding, and storage of the extracted macrofauna populations. Subsequently, the indices of diversity and species richness, relative abundance, by functional groups were estimated.

12 **Phase 1**: Field: It includes steps 1, 2, 3, 4, 5: Following the methodology modified by Rousseaua in the cocoa plantations in Costa Rica and by Laurente in the Quenzalgual systems in agroforestry systems. (Rousseaua, Deheuvelsb, Rodriguez-Arias, & Somarriba, 2012; Rousseaua, Fonte, Téllez, van der Hoekc, & Lavelle, 2013)

4 **First Step: Delimitation of the Sampling Area**
Upon arrival at each farm, an area of 0.7 hectares established with banana cultivation was located and an area of 1000 m² (50m x 20 m) was delimited with a tape measure. This study plot was divided into 5 subplots each one of 10 m² x 20 m². Where a wooden frame with the dimensions of 20 centimeters long and 20 centimeters wide was used to mark the extraction point.

12 **Second Step: Litter removal process at ground level and soil from 0-20 cm**
Already put the wooden frame (20 cmx20cm) on the ground. We use a shovel to border the outside of the wooden frame to delimit the litter block and the soil column from 0 to 20 cm to obtain an approximate weight of 1 kilogram of soil; divided into two successive strata (leaf litter, 0-20 cm) each side was surrounded with plastic mesh so that soil fauna did not escape with the least possible disturbance.

12 **Third Step: Sieving of the litter-soil and separation of macrofauna**
The sieving (20 mesh x inch² sieve) of the litter and the soil volume of 0-20 cm was carried out with great care, manually separating the soil, clods, roots, twigs, and stones from the macrofauna found.

12 **Fourth Step: Manual collection of each insect and placement in airtight jars**
After separating the litter and soil from the macrofauna found in the sampling area. Each insect is taken and placed inside an airtight plastic jar with dimensions of 500 cubic centimeters in volume, labeled, coded, and preserved with 70% alcohol, and the worms are preserved with 4% formalin.

12 **Fifth Step: Transfer of samples to the laboratory**
The labeled and coded containers were transferred to the Entomology Laboratory of the Agroecology Department of UNAN-León, for proper identification. Protecting samples from the sun.

4.1 **Phase 2: Laboratory: Includes step 6:** Scientific Reference: The methodology of these Invertebrate Identification Manuals (Maes, 1998; King, 1984; Andrews & Caballero, 1990) was followed.

4.2 **Step Six: Identification of the Macrofauna in the Laboratory**
The collected individuals were quantified and identified by order, family, and gender with the help of invertebrate identification manuals in the Entomology Laboratory of the Department of Agroecology. The organisms were placed in a Petri dish and then observed with the help of a 4x binocular stereoscope, where the particular structures of each species were detailed. The

macrofauna includes all those organisms whose length is greater than 4 mm. Each individual was separated in a bottle according to its origin, sample number, and biological classification.

12 **Step Seven: Uses of macrofauna richness and diversity indices**

The diversity and richness of the species present in this study were analyzed using the following indices reported by the authors (Moreno, 2001; Rousseaua, Deheuvelsb, Rodriguez-Arias, & Somarriba, 2012; Zerbino, 2005):
Richness (number of species), DAFGA (RRID:SCR_003319) :
Relative abundance (Density number of individuals 1 m² for each species):
Functional Groups (Density number of individuals 1 m² for each species):
Shannon-Wiener Index (SW):
Margalef Diversity Index
Proportional abundance indices
Dominance indices:
Simpson index:
Equity indices:
Pielou index:

12 **Phase 3: Producer Consultation Yield of fruits per apple (number of fruits/ha)**

Eighth Step: Yield of fruits per hectarea

The total number of fingers per ha was recorded with the help of the producer who provided us with the data according to the records kept on the farm.