



UPLAND HOLISTIC DEVELOPMENT PROJECT

Sustainable Upland Farming Activity: Sieving for Earthworms and Arthropods

Objective: To determine and compare the abundance and diversity of mesofauna (earthworms and arthropods) in the top soil of various sites as affected by differences in land use and types of plant cover. **This activity will be most appropriate for seasons and locations where soil moisture is adequate for the possible presence of mesofauna in the topsoil layer as extremely dry conditions will limit the likelihood of encountering soil fauna near the soil surface.**

Time rep: Approximately 45 minutes per evaluation site.

Materials: Empty sack, trowel, small hoe or other digging implement, measuring tape or rule, ¼ inch sieve, window-screen sieve, yellow future board, paper, pen or pencil for recording data, magnifying glass.

References: *Changing our Understanding of the Fertility of Tropical Soils: Nutrient Banks or Nutrient Access, A Proven Technology for Intensifying Shifting Agriculture: Green Manure/Cover Crop Experience Around the world*

Procedure: The presence and diversity of mesofauna (earthworms and arthropods) can be an indicator of soil health. For instance, in soils on which significant amounts of agricultural chemicals are used, farmers have noticed the disappearance of such soil fauna. The disturbance of soil microbes is assumed as well, considering the prolonged presence of crop residues in fields where chemicals are used, as opposed to more rapid decomposition in sites with no history of chemical application.

Another factor that can affect the presence and diversity of mesofauna is the amount of organic matter in the soil. Where might more soil organisms be found; in healthy forest soils or in degraded field soils with a high clay content? In soils under a thick cover crop or exposed soils?

Step 1 – select of evaluation sites

Consulting with UHDP staff, select 3 or 4 potential soil evaluation sites. These sites might differ according to land use (land where agricultural chemicals are used vs. land on which more sustainable agricultural practices are implemented). Or sites might be chosen according to differences in plant cover (forest soils vs. field cropped soils, cover cropped land vs. exposed soils). Or they might differ according to soil type (high organic matter soils vs. degraded, clayey

soils). Evaluation sites can either be within the UHDP center or on surrounding farms if soils on which agricultural chemicals are used are desired for evaluation (permission must be obtained from the landowners or caretakers first).

Step 2 – excavating soils

Select a site and measure off an area approximately 20x20 cm. Excavate and sieve separate layers separating. Start with the topsoil and leaf litter (about 1 – 10 cm deep). Using a trowel, small hoe, etc., begin carefully removing the soil from the designated area and depth, placing it on a white, empty sack. You may begin encountering larger organisms at this point, such as grubs and earthworms. As soon as you begin encountering each animal, record the type of mesofauna and subsequently the number of each of the type encountered. Naturally, you will not know all of the creatures you encounter. However, on a chart, develop your own classification key, using simple drawings or descriptions to keep each type of mesofauna encountered separate.

Begin transferring handfuls of soil from the hole or sack to be passed through the ¼ inch sieve (in order to remove larger dirt clods, stones, sticks, etc.) onto the yellow future board. Taking care not to cover the future board too deeply with a layer of sieved soil, take a closer look at the sieved soil to determine the presence and number of various types of mesofauna (for some you'll have to look very closely). Mike Ziess of CIDSE (Vietnam) recommends the yellow background as it makes it easier to spot the many mesofauna that are colored white. Once a batch of sieved soil has been examined closely, transferred another sample through the sieve and onto the future board for further evaluation.

Once the top 10 cm of soil has been sieved and soil creatures recorded, then do a deeper layer (10 – 20 cm). Keep records from the two soil layers separate. After the first site has been sieved, analyzed and recorded, conduct evaluations in two or three more sites, being sure to keep data from all three or four sites separate.

Step 3 – compile, analyze and compare data

Compile, analyze and compare data from the upper and lower layers from each site, noting which layer had more diversity and higher numbers of soil fauna. Likewise, process the data from each of the three or four sites, determining the differences in diversity and quantity of mesofauna in each location.

Questions: Overall, which layer (top or bottom) had the most diversity and quantity of mesofauna?

Which site had the most overall diversity and quantity? Which had the least? Was there much difference?

What are the factors at each site that you feel contributed to the findings?

Are the findings according to what you expected?