Microarthropod Diversity in Temperate Bog and Forest Soils

INTRODUCTION

Soil is a complex matrix of inorganic and organic particles, air, and water. Soil fauna of varying scale live within this matrix and play a vital role in decomposition, nutrient regeneration and soil structure. Soil microarthropods are one group of soil fauna. Amazingly diverse and abundant, they are one of the most species rich communities in forest ecosystems. Within this group are representatives of most trophic levels, making them functionally as well as biologically diverse.

Bog - forest habitat

Plant communities are strongly linked to soil microarthropod communities. Plants contribute energy to the soil food web through the litter layer. Plants also benefit from microarthropod activities such as nutrient turnover and regulation of microbe populations. As presence, diversity and relative abundance of microarthropods is known to vary greatly between (and within) different terrestrial biomes, they are a good study organism for understanding of plant ecology.

Soil sampling

In this activity, soil cores were sampled from temperate coniferous forest and bog locations. Differences in plant community composition were expected to be reflected in soil microarthropod communities.

Bog sampling location

Soil cores were sampled and stored in 5 cm X 5 cm PVC pipe pieces. Intact cores are recommended for use in the extractor instead of grab samples as they increase extraction efficiency. Microarthropods were extracted from samples using a modified high gradient extractor. Plant communities above each sampling location were described. Abiotic measurements such as soil temperature, moisture, pH and organic content were determined using representative samples from each area.

High-gradient extractor

The modified high-gradient extractor was constructed based on instructions provided in "Soil Invertebrates." This is an easy-to-assemble student unit at a low cost. It incorporates a combination of sorption and filtration systems, uses a gravity-fed system, and readily adapts several sample sizes. The system is designed so that it can be used with a cold room set at 10°C to ensure a high temperature and moisture efficiency. Microarthropods are extracted from samples following a variation in the microtopographical gradient similar to vegetation.

RESULTS

After extraction, soil microarthropod samples were counted and sorted into groups using UBC Biodiversity Research Centre keys. Microwell plates were used to help keep track of samples.

Abundance and diversity

Comparisons of abundance and diversity can be made between the bog and forest communities. This allows for discussions around soil and plant interactions and the concept of beta diversity.

CONCLUSION

This activity enhances comprehension of plant ecology and forest and bog ecosystems. During certain times of the day or seasons of the year, there is little apparent animal activity in the bog or forest. This activity allows students to take a closer look and understand that there is actually a huge amount of activity occurring underground.

Introducing the concept of functional roles can lead to a deeper understanding of contemporary concepts such as ecosystem services. Beta diversity can help students understand how we can assess and look at environmental change, whether natural or man-made.

REFERENCES

7. Srivastava, D. S. Mites and Other Microarthropods. Protocols: Is Diversity A

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