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Research Project

Bio 209

Bromeliads (Family Bromeliaceae) are a family of flowering plants native to tropical areas. There are over 2,000 species of Bromeliads, including the well-known Pineapple. The leaves of bromeliads grow in a tightly wrapped rosette to form a cistern at the base, which collects rainwater (See Fig 1). Many organisms use these water stores for various purposes and some of these plants are able to support entire ecosystems in their leaves. Many different kinds of invertebrates, such as insects, arachnids, worms and even some mollusks make use of these plants to survive. There are even some smaller vertebrates that use these plants as well. Some species of frogs, including the Red-Eyed Tree Frog and some Dart Frogs, both of which are relatively common in Belize but endangered throughout the world, have been known to lay eggs in these plants to keep them safe from predators.

Frogs rank among the most diverse rainforest animals, in color, shape and size. Frogs absorb water and oxygen directly through their permeable skins, therefore, they require ample moisture to survive, which is why they are most commonly found in humid or aquatic areas. The breeding season of most frogs is starts in late autumn or early winter and lasts until early spring. Tropical species generally begin breeding at the start of the rainy season, in early November/December.

For my research, I've decided to examine what organisms are living in the water cisterns of the bromeliads transplanted to the orange grove in Sibun, and to see whether these plants are able to support small vertebrates such as frogs.

## **Materials**

Pencil

Notepad

Forceps and/or a dissecting probe

Camera w/ Memory Card

Pipette

Several cups or other small containers (preferably with a lid, so they don't spill)

Petri dish

Microscope

## **Method**

- Locate a bromeliad growing on/near a tree. The larger the better, as they should be able to hold a significant amount of water.
- When you examine the Bromeliad, check to see if the leaves are wet, indicating a recent rainfall and a greater chance of water collecting in the plant.
- Starting at the base of the plant, gently pull the leaves down as far as possible without damaging the plant. If any organisms are found, collect them if possible or take a picture for reference. Then record in your notepad.  
NOTE: It may be a good idea to use forceps, your pencil, or a dissecting probe instead of your hands to examine the plant, as these plants can contain spiders and other potentially harmful arachnids or insects.
- Insert the pipette into the base of the leaf and drain the water and put into a vial or container.
- Repeat this procedure starting at the bottom of the plant and working your way towards the center.
- When you reach the center, you may need to get above the plant to see into the cistern. Try not to bend or adjust the plant as this could damage the root structure.
- Insert your pipette as far down into the cistern as possible and retrieve as much water as you can and place it in a cup
- Repeat procedure on at least 15 plants that contain water. If the plant appears dry, you may want to move on to a different one.  
NOTE: Try not to mix water samples from different plants. Use separate containers for each plant.
- After you're finished collecting samples, examine each under a microscope, recording your findings in your notepad. If frog eggs are found, be sure to place them and the water sample back in the same plant they came from. (you may have to look carefully, as frog eggs are quite small – about four of them can fit on a penny. See Fig 2)

## Results

Upon commencing my research, I discovered that there were fewer bromeliads than I expected in the orange grove that contained any significant amount of water, and many of them were much smaller than expected. I ended up with samples from 11 plants, a few short of my goal.

Insects:

3 separate colonies of ants, several larvae (about 14 total - probably those of mosquitoes),

Arthropods:

3 Crab Spiders, 1 Wolf Spider

Other:

In a few of the plants, I found several small, worm-like invertebrates, which I later determined were species of Nematodes

One plant contained a snail in its center. It was about 2 cm long and had a white, spiraled shell.

Unfortunately, I did not find any evidence of the bromeliads in the orange grove being used by frogs. I think this is due to the plants in the grove being quite young and small, most being able to hold no more than a few milliliters of water. I decided to examine a bromeliad I found near the station and a couple in the orchard near the Cave's Branch property which were much larger than those growing in the orange grove. As expected, the larger plants contained larger organisms.

- The plant found near the station had a large grasshopper (about 4 in), 3 beetles hiding within its eaves. As well as a colony of large, black ants.

- In the Bromeliads in the orchard, I found another Wolf Spider, about 3 cm in diameter, and several Damselflies.

- I also found a small lizard sitting in the center of a large bromeliad - possibly a type of anole, but it escaped before I could accurately identify it.

- The head gardener of the orchard said he has seen frogs around these plants, so it is highly possible they could be used for nesting.

Although I did not get the results I was hoping for, I do think it is possible for the bromeliads in the orange grove to support frogs and other such smaller vertebrates, if they were given enough time to grow large enough.

Figure 1



A bromeliad cistern

Figure 2



Dart Frog Eggs