A Survey of Galls & Leaf Miners in Dominica, West Indies

Jessi Sutton, Angel Chappell, & Caitlin Grant

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Dr. James Woolley & Dr. Thomas Lacher

Abstract

Plants infested with leaf miners and galls were collected from 6 localities on Dominica. Five species of plants from five families were found to be mined, and three species of four families were galled. Members of the family Rubiaceae were found to be most susceptible to both leaf miners and galls. Neither leaf miners nor gall-forming insects were reared, but 2 species of parasitoids were recovered. Representative photos of mines and galls are provided**.**

Introduction

Many plants are affected by galls and leaf miners caused by organisms such as bacteria, fungi, and insects. Although these organisms generally do not cause significant injury or kill the plant, they can be particularly damaging to food or ornamental plants worldwide due to the fact that plants can become weakened or aesthetically unfavorable. There are two types of galls, one being the multiplication of plant cells to create the nutrient sink due to viruses, bacteria, fungi, and nematodes, and the other being the plants reaction from being stung by an insect depositing eggs and the larvae feeding internally on the plant tissue. Leaf mining found on plants is caused by the larvae of an insect borrowing internally through plant tissue feeding on the cells of the plant. The most common types of insects to emerge from galls and leaf mines are the larvae of Diptera, Lepidoptera, and Coleoptera. In this study, we wanted to survey which plants have a higher indication of galls and leaf miners, as well as attempt to rear out any larvae that were present in our samples collected in Dominica, West Indies.

Materials & Methods

We collected galls and leaf miners from May 26 through June 6, 2011 from several locations on the island of Dominica: Springfield Estate, Mt. Joy, Morne Trois Pitons National Park (trail to Middleham Falls & Emerald Pool), Morne Diablotin National Park (Syndicate Nature Trail), and near Pont Casse (see table for exact locations). At each location, we would search for plants with galls or leaf mines. Once we located a sample we would label a paper bag with the date and photo exposure number, take a photo of the plant (Kodak C813, Samsung PL210, Canon A1200, & Nikon D300), as well as the bag showing the number, and place the infested leaves in the bag. Next, we would record a GPS location (Magellan GPS & Garmin etrex Legend H-WS84 standard) and add the data to the bag. The samples were taken back to the lab and photos were taken of the galls and leaf mines, after which we placed the paper bag into a larger, plastic bag and hung them out on a clothesline. On June 8, 2011, all bags were visually checked for insect emergence. The intention was to preserve and identify any emergent insects. Plants were identified using *Wild Plants of the Eastern Caribbean*, *Caribbean Wild Plants & Their Uses*, *Dominica Nature Island of the Caribbean*, and a herbarium.

Results

Sample #	Date collected	Gall or Leaf miner	Collection Site	Family	Species	Insects present in sample?
1	5/26	Leaf miner	Springfield Estate-Mt. Joy	Rubiaceae	Unknown	No
2	5/26	Gall	Springfield Estate-Mt. Joy	Unknown	Unknown	No
3	5/26	Gall (fungal)	Springfield Estate-Mt. Joy	Unknown	Unknown	No
4	5/27	Leaf miner	Morne Trois Pitons Natl. Park-trail to Middleham Falls	Rubiaceae	Gonzalagunia hirsute	Yes
5	5/27	Leaf miner	Morne Trois	Unknown	Unknown	No

			Pitons Natl. Park-trail to Middleham Falls			
6	5/27	Leaf miner	Morne Trois Pitons Natl. Park-trail to Middleham Falls	Araceae	Anthurium acaule	No
7	5/28	Leaf miner	Springfield Estate	Rubiaceae	Gonzalagunia hirsute	No
8	5/28	Gall	Springfield Estate	Unknown	Unknown	No
9	5/28	Gall	Springfield Estate	Sterculiaceae	Theobroma cacao	No
10	5/28	Leaf miner	Springfield Estate	Rubiaceae	Gonzalagunia hirsute	No
11	5/28	Gall	Springfield Estate-Mt. Joy	Lauraceae	Unknown	Yes
12	5/28	Gall	Springfield Estate-Mt. Joy	Rubiaceae	Psychotria uliginosa	No
13	5/28	Gall	Springfield Estate-Mt. Joy	Unknown	Unknown	No
14	5/28	Leaf miner	Springfield Estate-Mt. Joy	Lauraceae	Unknown	No
15	5/28	Gall	Springfield Estate	Unknown	Unknown	No
16	5/30	Leaf miner	Morne Diablotin Natl. Park-Syndicate Nature Trail	Unknown	Unknown	No
17	5/31	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Unknown	Unknown	No
18	6/1	Gall	Morne Trois Piton Natl. Park-Emerald Pool	Fabaceae	Aeschynomene sensitiva	No
19	6/1	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Cyclanthaceae	Asplundia rigida	No
20	6/1	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Unknown	Unknown	No
21	6/1	Gall	Morne Trois Piton Natl. Park-Emerald Pool	Unknown	Unknown	No
22	6/1	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Unknown	Unknown	No
23	6/1	Leaf miner	Morne Trois	Rubiaceae	Psychotria	No

			Piton Natl. Park-Emerald Pool		urbaniana	
24	6/2	Leaf miner	Near Pond Casse	Unknown	Unknown	Yes
25	6/5	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Melastomataceae	Miconia furfuracea	Yes
26	6/5	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Rubiaceae	Psychotria urbaniana	No
27	6/5	Gall	Morne Trois Piton Natl. Park-Emerald Pool	Unknown	Unknown	No
28	6/5	Leaf miner	Morne Trois Piton Natl. Park-Emerald Pool	Unknown	Unknown	No

Springfield Estate-Mt. Joy
N 15.31559 W 61.36324
Elev: 507 m

Morne Trois Pitons Natl. Park-trail to Middleham Falls
N 15.34925 W 61.34048
Elev: 724 m

Springfield Estate
N 15.3466 W 61.37344
Elev: 364 m

Morne Diablotin Natl. Park-Syndicate Nature Trail
N 15.52399 W 61.42014
Elev: 541 m

Morne Trois Piton Natl. Park-Emerald Pool
N 15.39900 W 61.31209
Elev: 415 m

Near Pont Casse
N 15.2156 W 61.2114
Elev: 518 m

On June 8-9, each plant was inspected thoroughly and identified. We found that galls and leaf miners more commonly affected some plants. One of the families,

Rubiaceae, was affected the most compared to other plants we collected. Examples of plants that were infested within this family are *Gonzalagunia hirsute*, *Psychotria uliginosa*, *Psychotria urbaniana*. We found three samples of leaf mining tracks on *Gonzalagunia hirsute*, one gall sample on *Psychotria uliginosa*, and two samples of leaf mining on *Psychotria urbaniana*. Another common family found with both galls and leaf miners was the Lauraceae, though we were unable to determine the genus and species of these particular plants. We collected one sample each from the following families: Araceae (*Anthurium acaule*), Sterculiaceae (*Theobroma cacao*), Fabaceae (*Aeschynomene sensitiva*), Cyclanthaceae (*Asplundia rigida*), and Melastomataceae (*Miconia furfuracea*). The samples from Sterculiaceae and Fabaceae had galls and from the families Araceae, Cyclanthaceae, and Melastomataceae had leaf miners. We reared a few insects with our samples, which appear to be related to the gall or leaf mining activities. On sample 24, we found a gall fly (Cecidomyiidae). This was most likely a coincidence as this was a leaf miner sample. On sample 4, we found a parasitic Hymenopteran from the family Eulophidae, subfamily Entedoninae, a group that commonly attacks leaf miners. On sample 11, we also found a parasitic Hymenopteran from the family Braconidae. We have reason to believe that these appearances were more than just coincidental because they are known to parasitize leaf miners. On sample 25, we found a weevil (Curculionidae) that is possible associated with the window-like mines found on the leaves.

Discussion

The plants from family Rubiaceae seemed to be attacked by leaf miners far more often than any other family. About half of our indentified samples were from this family.

This may be because these plants were found in nearly every location we collected. Rubiaceae shows a much higher frequency of leaf miner attacks as opposed to galls.

We are still unsure as to which insects are making these mines and galls. Although we witnessed emergence holes on our samples, we did not succeed in rearing out any insects. We did, however, find parasitic Hymenopterans which indicate that whatever was making the mines hadn't been gone for long.

Aside from the unsuccessful rearing attempts, we faced other difficulties with this study. A major complication involved the documentation of the samples in that we didn't have enough photos displaying the key characteristics used to identify the plants, such as flowers or fruits.

We did manage to formulate an efficient system for managing our samples. The labeling consisted of the date and the location the sample was collected. Then each sample was assigned a number in order to facilitate organization of our specimens.

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