

Foraging of Host Plants by Butterflies on Dominica, Lesser Antilles

By: Alejandra Mendez

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Abstract:

Two of the most common butterflies seen at Archbold Tropical Research and Education Center, Springfield, Dominica, were the Little Yellow (*Eurema venuste*) and the Tropical Checkered Skipper (*Pyrgus oileus*). A pair of each species were captured and pinned. The two were observed over several days to study their foraging behavior. A chart was used while manually observing and tallying which flowers the butterflies landed on. Pictures were also taken of butterflies feeding as well as videos. The two butterfly species showed significantly different preferences for their flower species.

Introduction:

Dominica is home to 55 species of butterflies, with only 2 being endemic (Green et. al., 2002). The fauna varies among different parts of the island due to the Caribbean islands being volcanic in origin, meaning the fauna available are “samples” of the mainland. Dominica is the last stop butterflies stop at during immigration, first going through Central America through Cuba, Hispaniola, Puerto Rico, and then the Lesser Antilles (Stiling, 1986).

Butterflies in Dominica are important to the environment as they are anywhere else in the world. They are a main key to the success of flowers and other fauna because pollination is necessary for flowers to spread and grow. However, certain areas of Dominica have higher abundance of certain species of butterflies based on the plants available. I studied patterns of flower usage of the two common species: *Eurema venuste* and *Pyrgus oileus*.

Materials and Methods:

Materials needed for this experiment were: net, plastic Tupperware, Ethyl acetate, Kimwipes, data chart, clipboard, and measuring tape.

First, observations were made for the first week to determine where the best location for this experiment would be. The criteria included a reasonable number of flowers and different butterflies. The best area to observe the butterflies was at the former estate, Mt Joy, Archbold Tropical Research Center and Education Center, Springfield.

Specimens were collected by first catching them in the net, breaking their thoracic muscles, and placing them in a Tupperware container with Kimwipes protecting each butterfly. The butterflies were spread out that night and left in a cabinet to dry for two days. Identification of these butterflies was determined using two sources, *Field Guide to the Butterflies of Springfield Plantation* (Bedgood, T., 2001) and *Butterflies of the West Indies and South Florida* (Smith, et. al. 1989). One of the plants was identified using a previous experiment done in Dominica, *A Study of Butterfly-Flower Associations on Dominica* (Manago, et. al. 2006).

Observations were made for three days on Mt. Joy to determine which flowers the butterflies preferred. Times observed were different each day, some days with more time than others based on weather conditions. The areas of the flowers were measured using a measuring tape and the number of each species of flowers was counted.

On the first day, videos were taken of the feeding behavior. Two tripods were used to record an area with flowers for a day. The videos averaged to 7 minutes for each recording. Meanwhile, photographs were taken of butterflies landing on flowers. The recordings were analyzed, tallying up which species of butterflies landed on which

flowers. Feeding on the flower was not necessary for it to be counted. As long as the butterfly landed on the flower, it was tallied.

It was decided the best method to tally butterfly landings would be to manually observe the butterflies and tally each landing on the flowers. For the next two days, I made observations and tallied them using a chart made to mark which flowers the butterflies landed on. After all the observations were done, the number of flowers in each area measured was counted.

Using Excel, charts were made replicating the data on the chart. Using the areas measured and the number of flowers in each, the density in each plot could be determined and butterfly preferences could be clearly seen.

Results:

The two most common butterflies on Mt. Joy were the Little Yellow (*Eurema venuste*) and the Tropical Checkered Skipper (*Pyrgus oileus*). The flowers each of these seemed interested were the *Besleria petiolaris* (yellow flower), *Oxalis varrelieri* (pink flower), and *Petiveria alliaceae* (blue flower on a long stem).

May 31, 2013 1-3 pm	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	0	1
<i>Oxalis varrelieri</i>	0	1
<i>Petriveria alliaceae</i>	0	17

***Table 1.** This chart describes the observations seen in the videos recorded the first day. It also should be taken in consideration the weather was raining on and off, with few moments of sunlight.

May 31, 2013 1-3 pm	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	1	5
<i>Oxalis varrelieri</i>	0	4
<i>Petriveria alliaceae</i>	1	10

***Table 1.1.** This table shows butterflies taken by observation/photographs on the same day as Table 1.

June 1, 2013 3:30-4:15pm	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	2	18
<i>Oxalis varrelieri</i>	1	6
<i>Petriveria alliaceae</i>	2	24

***Table 2.** Weather was sunnier with sprinkles every now and then.

June 2, 2013 9:35-10:25am	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	N/A	N/A
<i>Oxalis varrelieri</i>	16	3
<i>Petriveria alliaceae</i>	5	50

***Table 3.** It should be noted that this morning, *Besleria petiolaris* (yellow flowers) were all closed, so N/A was placed instead of a zero. The weather was sunny with few clouds.

June 2, 2013 1:50-2:55pm	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	16	4
<i>Oxalis varrelieri</i>	6	3
<i>Petriveria alliaceae</i>	7	22

Table 3.1. I went back out the same day to confirm my hypothesis that maybe the *Besleria petiolaris* are closed earlier in the day. Going in the afternoon and seeing them open further confirmed this thought. The weather was sunny with few clouds.

AM + PM Observations	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	19	28
<i>Oxalis varrelieri</i>	23	17
<i>Petriveria alliaceae</i>	15	123

***Table 4.** Summarizes the total observations, including both morning and evening.

PM Only	Little Yellow (<i>Eurema venuste</i>)	Tropical Checkered Skipper (<i>Pyrgus oileus</i>)
<i>Besleria petiolaris</i>	19	28
<i>Oxalis varrelieri</i>	7	14
<i>Petriveria alliaceae</i>	10	73

Table 5. Because only one morning was observed, the PM total was separated to make sure AM observations do not skew the results.

Area A	2m X 2m [number of flowers]	Density [flowers/M ²]
<i>Besleria petiolaris</i>	79	19.75
<i>Oxalis varrelieri</i>	8	2
<i>Petriveria alliaceae</i>	17	4.25

***Table 6.** Simply explains the number of flowers in Area A and the density of each flower.

Area B	1m X 1m [number of flowers]	Density [flowers/M ²]
<i>Besleria petiolaris</i>	0	0
<i>Oxalis varrelieri</i>	15	15
<i>Petriveria alliaceae</i>	0	0

***Table 7.** Area B contained primarily *Oxalis varrelieri*.

Flower * Butterfly Crosstabulation

Count

		Butterfly		Total
		Skipper	Yellow	
Flower	Blue	123	15	138
	Purple	17	23	40
	Yellow	28	19	47
Total		168	57	225

***Table 8.** Total use of the three flower species by the two species of butterfly.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.802 ^a	2	.000
Likelihood Ratio	41.832	2	.000
N of Valid Cases	225		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.13.

***Table 9.** Results of the Chi-Square test of independence of Table 8.



***Image 1:** *Pyrgus oileus* feeding on *Oxalis varrelieri*.



***Image 2:** *Pyrgus oileus* feeding on *Petriveria alliaceae*.



***Image 3:** Pinned *Eurema venuste*.



***Image 4:** *Eurema venuste* feeding on a flower fallen from a *Petriveria alliaceae*.



***Image 5:** *Besleria petiolaris*.

Discussion

The Chi-Square analysis of the combined data indicated highly significant results, indicating that one or both butterflies have strong host plant preferences.

Although *Pyrgus oileus* and *Eurema venuste* did select the three types of flowers available, the data showed some interesting results. *Pyrgus oileus* was more selective of *Petiveria alliaceae* than any of the other two flowers. On the other hand, *Eureme venuste* showed no preference and chose the three flowers fairly evenly.

I first thought *Pyrgus oileus* chose *Petiveria alliaceae* because that flower was more common (see Table 6). This would make sense, except I did note that there are more *Pyrgus oileus* than *Eureme venuste*. This means *Pyrgus oileus* would be competing more for the same resource, so why aren't they the ones less selective than *Eureme venuste*? That is the question that remains at the end of this experiment.

This year was one of the rainiest years on record in Dominica, which made this project difficult to conduct. Butterflies typically hid during the rain, but many flew when the sun

came out. Even under cloudy conditions not many butterflies came out compared to sunny parts of the day. Observations had to be rushed to meet the deadline, so consistency for the time of day was uneven.

Future observations can be done to further explain these observations, such as how does the time of day affect foraging? Why is *Pyrgus oileus* more selective if there are many more of them than *Eureme venuste*?

Conclusion

Butterflies on Mt. Joy have adapted to certain flowers. *Pyrgus oileus* selects *Petiveria alliaceae* despite there being more of them. *Eureme venuste* is less selective and chooses *Besleria petiolaris*, *Oxalis varrelieri*, and *Petiveria alliaceae* fairly even, despite there being less of them. Weather and time of day affects foraging behavior, but butterflies have learned to adapt and still thrive well.

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