Milkweed Growth and Insect Diversity in Relation to Elevation in an Iowa Landscape
(Ada Hayden Heritage Park, Ames, Iowa)

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NREM 380X: Field Ecology Research and Teaching

Introduction

Milkweed (*Asclepias* sp.) is an ecologically important plant, serving as a host for many species of insects (e.g., Monarch Butterfly, *Danaus plexipus*) that in turn provide ecosystem services (e.g., as pollinators)

We conducted a study to gain insight into ideal growing conditions for milkweed

Objectives

1. Determine the elevation at which milkweed is healthiest and most abundant

2. Record insect taxa associated with milkweed and to determine if they are a pollinating family

Hypothesis

Milkweed species will grow best in moist, wetland-like, low elevation conditions, then have greater suitability to host local arthropods because of the higher concentrations of organic matter break down and water access.

Indicated that higher elevation conditions will be dryer and have limited water movement and pooling. The lower elevation have a larger concentration of water pooling and will host more dead plant material and moisture

Method

Study Site

Our study was located at Ada Hayden Heritage Park in Ames, Iowa (Latitude 42.077270, Longitude -93.632610).). Our study foci were three elevations and two species of milkweed, *Asclepias syriaca* and *Asclepias tuberosa.*

Study Design and Data Collection

- Three elevation gradients from 270-275 m. sea level: High(275-274m), Medium (273-272 m), Low (271-270 m)
- Samples of *syriaca* and *tuberosa* were taken
- Data collected from the two milkweed species height, leaf size, internode length, flowering capability, seed dispersal capabilities, and present taxonomic composition of insects.

Data Analysis

- Averaged the data collected on milkweed elevation, growth form, and abundance
- Statistical insignificances in differences regarding elevation and milkweed growth shown by running linear regressions to find p-values through JMP in Results
- Identified insect families
- Elevational sample sizes (n) were determined by what individuals were present along the observed transect lines
- The length of the milkweed internodes were measured under the same criteria as the height and had no connection to the plant's elevation

Figure 1 Image of Ada Hayden, wetland view

Figure 2 Area of interest with transect line model at Ada Hayden Heritage Park, ArcGIS, ISU OrthoGIS

Results

• We observed 46 individual *Asclepias syriaca* and 22 individual *Asclepias tuberosa* across 3 levels of elevation **(Table 1)**

• There is an insignificant relation between different elevation gradients and the height, internode length, and leaf size between two species of milkweed

• There was no connection between the height of the plant and the elevation the individual plants with a p-value of 0.45 for *A. syriaca* and 0.37 for *A. tuberosa*

•The average leaf size of the two species at each gradient had no difference and remained consistent throughout the observation with a p-value of 0.42 for *A. syriaca* and 0.68 for *A. tuberosa*

•The internodes lengths held no significant difference between elevation gradients between the two species with a p-value of 0.45 for *A. syriaca* and 0.37 for *A. tuberosa*

•Recorded insect families appear to be rather split between being active pollinators and not active pollinators **(Table 2.0)**

Table 1 Average height, internode length, leaf size for the two milkweed species at three elevations within Ada Hayden Heritage Park

Species	Elevation	n	Average Height [cm] (St. Dev.)	P-value	Average Internode Length [cm] (St. Dev)	P-value	Average Leaf Size [cm] (St. Dev.)	P-value
Syriaca	Low (1)	12	101.5 (39.1)	0.45	5.29 (0.96)	0.53	14 (2.69)	0.42
	Medium (2)	24	100.8 (36.5)		4.79 (1.86)		15.08 (3.22)	
	High (3)	10	111.7 (32.0)		5.4 (1.71)		15.65 (2.81)	
Tuberosa	Low (1)	3	69.33 (8.02)	0.37	5.33 (4.62)	0.22	1.33 (1.15)	0.68
	Medium (2)	9	58.78 (9.00)		7.22 (3.27)		2.22 (1.48)	
	High (3)	10	62.3 (13.20)		6.9 (2.81)		1.35 (0.58)	

Table 2 Observed insects on two species of milkweed with families, common names, and pollinator status.

Family Name	Common Name	Active Pollinator
Acrididae	Grasshopper	Do not pollinate
Aphididae	Aphid	Do not pollinate
Coccinellidae	Lady Beetle	Pollinate
Ephemeroptera (Order)	Mayfly	Do not pollinate
Formicidae	Ant	Pollinate
Lygaeidae	Milkweed Bug	Pollinate
Pentatomidae	Stinkbug	Pollinate
Reduviidae	Assassin Bug	Do not pollinate
Syriphidae	Hover Fly	Pollinate

Figure 3 Monarch caterpillar

Discussion

- The relationship between milkweed abundance and health and elevation of low, medium, and high areas is shown in this experiment to have little or no correlation
- Since our hypothesis was not supported by our results, we wanted to see if there was any difference between the individual species on elevation
- Monarch Butterfly recently being listed as an endangered species, more concern for pollinators and the species itself
- If there is a difference in insect populations due to a loss of an important pollinator this would be another great research project. Since pollinators are important for agriculture purposes

References

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