

Statement of Problem

If deerweed is fenced off from the rabbit population with a fence of chicken wire, then the deerweed will grow to be far healthier and larger than their unprotected counterparts.

Efficiency of Chicken Wire in Preventing Audubon Cottontail Rabbit Herbivory of Deerweed



Results

Unfenced Mann-Whitney						Fenced Mann-Whitney					
Mann-Whitney Rank Sum Test, February 12, 2013, 4:19:40 PM						Mann-Whitney Rank Sum Test, February 12, 2013, 4:23:33 PM					
Data source: Data 1 in Richard.Hu.JNB						Data source: Data 1 in Richard.Hu.JNB					
Normality Test:	Failed	(P = 0.050)				Normality Test:	Passed	(P = 0.365)			
Group	N	Missing	Median	25%	75%	Group	N	Missing	Median	25%	75%
U Dec 1	20	0	25966.834	5286.548	88387.888	U Dec 1	20	0	28344.439	20000.164	52159.983
U Jan 19	20	0	56066.004	9349.772	122322.82	U Jan 19	18	0	56364.885	22579.412	90477.868
Mann-Whitney U Statistic=	226.000					Mann-Whitney U Statistic=	137.000				
T = 384.000	n(small)= 20	n(big)= 20	(P = 0.490)			T = 394.000	n(small)= 18	n(big)= 20	(P = 0.214)		

Analysis of the data was conducted through use of the Mann-Whitney Rank Sum Test. Both the fenced data and the unfenced data yielded the same results, stating that the difference in median values between the two groups is insufficient to prove any statistical correlation between plant volume and time. Thus, the chicken wire fencing method of protection for deerweed is proven to be relatively unsuccessful, as results are not significant enough to exclude the possibility of random sampling errors.

Introduction

The Palos Verdes Blue butterfly, *Glaucopsyche lygdamus palosverdesensis*, is currently considered by many as the rarest butterfly species in the world. Considered extinct at one point after heavy destruction of habitat at Hess Park, the species was later rediscovered at the Navy Fuel Depot. The butterfly is now under heavy preservation and restoration efforts, and it has very specific requirements for its habitat. Deerweed, *Acmispon glaber*, and rattlepod, *Astragalus trichopodus*, are the two specific host plants that the butterfly requires to be able to reproduce successfully, as the larvae of the species depend on these two plant species to feed on, and to grow and develop. Thus, the survival of these two host plant species is essential to the sustenance of the blue butterfly. Pupae of the butterfly are highly expensive to raise and maintain, at around \$25.00 each, so financial matters could be managed with far greater frugality if host plants were to survive at a greater consistency. The most recent habitat restoration for the Palos Verdes Blue butterfly is being conducted at the Linden H. Chandler Preserve, where volunteers transplant and maintain a habitat of *Acmispon glaber* and *Astragalus trichopodus* monthly until the release of the butterflies in February. The project is currently plagued with rabbit herbivory of the deerweed, hindering the project's development greatly. Currently, the Palos Verdes Peninsula Land Conservancy employs a preventive measure of covering the plant in nylon mesh tubing, but the effectiveness of this method is unsatisfactory, in broader terms. In order to better preserve the habitat for the eventual release of the blue butterfly, other methods of prevention of greater efficiency against herbivory of animals, rabbits in particular, are highly valuable assets. Thus, this project proposes a method of fencing, constructed from chicken wire, to deter rabbits from entering and sabotaging the project. If successful, the restoration efforts of the Palos Verdes Blue butterfly and its habitat could be greatly amplified and far greater results could be achieved, generating a larger population of the endangered species and aiding in its restoration to the area on site and in the world.

Methods and Materials

Materials:
 60 feet of 19 gauge chicken wire
 wire cutters
 metric tape measure
 colored flag markers (10 red, 10 orange)
 40 deerweed samples

Methods:

1. Chicken wire is cut into three-foot sections, and the open ends are twisted together to form a cylindrically shaped fence.
2. Materials are gathered on site at Linden H. Chandler Preserve.
3. Colored markers are labeled 1-40 and randomly placed inside deerweed samples.
4. Deerweed is transplanted with no regards to marker color.
5. Deerweed with red flags are fenced in with a preassembled fence; fences are secured with a solid ramp of dirt.
6. Plant height, plant radius, and otherwise unusual observations are made on a weekly basis. Pictures are taken as well. Data collection begins in mid-November and ends in early February.
7. Fencing is removed and reestablished during volunteer events.
8. Data is compiled, and canopy volume is calculated by averaging the radii and estimating a cylindrical volume. Standard deviation is plotted for each experimental group.



Conclusions

The chicken wire fencing method of protection for deerweed is proven to be relatively unsuccessful, as results are not significant enough to exclude the possibility of random sampling errors. Further, a correlation between other growth of other greenery and herbivory of deerweed can be observed. It can be inferred that lower levels of maintenance are necessary during the Spring and Summer seasons, where plant growth is abundant, and that efforts should be focused on the more barren, dry climate of late Autumn and Winter. Finally, the lack of significant reduction in plant herbivory for fenced plant samples indicates that the herbivore responsible is potentially includes the local species of gopher. In order to more effectively protect deerweed from herbivores, the possibility of other herbivores must be taken into account and addressed. Wire netting could be a sufficient combination with the chicken wire to keep both herbivores away from the deerweed plants.



Hypothesis

If deerweed is fenced off from the rabbit population with a fence of chicken wire, then the deerweed will grow to be far healthier and larger than their unprotected counterparts.

Data

Figure 1. Plant Volume Over Time for Unfenced Samples

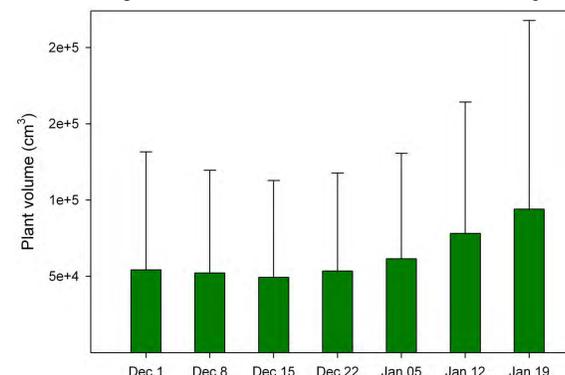
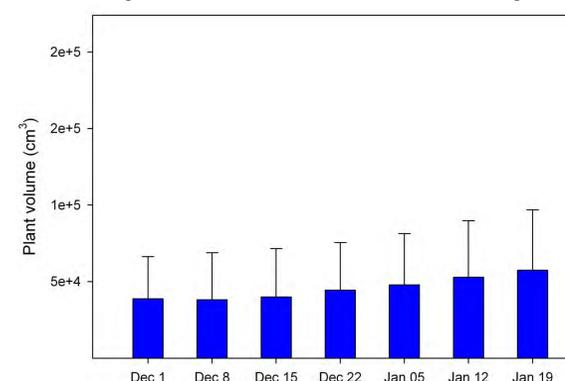


Figure 2. Plant Volume Over Time for Fenced Samples



Further Research

Future studies may investigate a joint chicken wire-wire netting method, protection of the other host plant, milk vetch, or with a different seasonal climate.