The Defoliation Rate of *Agelastica alni* Against Topographic Variables: Altitude and Soil Moisture

Introduction

The Alder Leaf Beetle (Agelastica alni), a species once thought to be extinct in Britain has since reclaimed pest status as one of the most prolific defoliators of Alnus spp. (Sonmez *et al*., 2017). This may provide a unique opportunity to assess the management of a species deemed disserving, and whether this could compromise the ecology of one historically proven fragile. Present standardizations employ pesticides intended to destroy a given population (Mahmoudi, 2022).

Methodology

- 12 Alder trees randomly selected on an altitudinal gradient
- Tree locations and altitudes mapped using Google Maps as shown in figure 1
- The crown of each tree was inspected with binoculars once a month
- Observations are assigned to a percentage-based classification from 1-5 (e.g. 1 = 0 – 20% defoliated)
- Soil Moisture percentage simultaneously collected with a commercial Soil Meter

(Figure 1: map of subject trees)

Statistical Analysis

The association between all variables was based on the average results for each subject, using a Pearson's Correlation test.

- There is a significant correlation between soil moisture and the defoliation rate (Pearsons correlation: $r = 0.628$, N = 12, p= 0.029).
- There is a significant correlation between altitude and the defoliation rate (Pearsons correlation: $r = 0.658$, N = 12, p= 0.020).

Aims/ Objective

The aim of this research was to investigate the potential for an ecological relationship between the defoliation rate of a Coleopteran pest and the topography of their host habitat. Particularly one that may be exploitable in efforts of indirect biological control.

The objective: to record the rate of defoliation and level of soil moisture each month, for 5 months, at each of 12 Alder trees at increasing altitudes.

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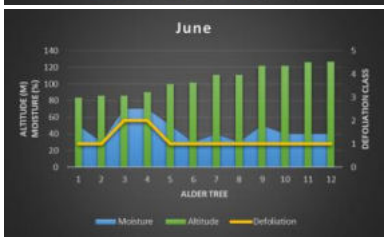
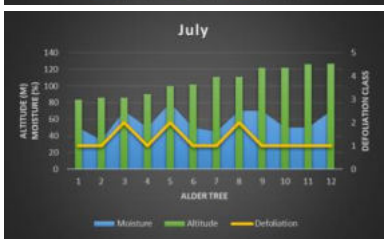
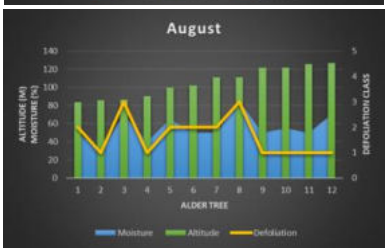
Discussion

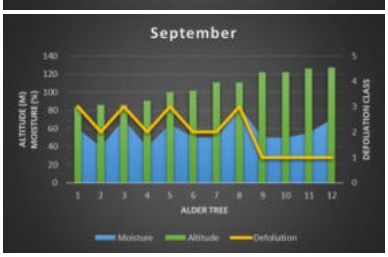
Some insects have changeable rates of defoliation when presented with environmental variance. The population dynamics of certain pine pests have proven susceptible to climate effects and forest parameters (Hentschel *et al*., 2018). Similar studies found that the intensity of insect herbivory against host trees was directly related to specific environmental variables: tree distribution and the quality of soil/leaf litter (Hajizadeh *et al*., 2016). The life cycle of A. alni raises the relevance of these specific variables as A. alni is known to occupy the soil and litter beneath a host tree for their winter and summer diapause (Lehmann *et al*., 2020).

Results









Conclusion

This study may demonstrate that a relationship likely exists between the defoliation rate of *A. alni* and the topography of their habitat. Perhaps also indicative of a commonality among Chrysomelids. Such ecological dependencies may be exploited with further research into a measure of indirect biological control that could negate the need for environmentally harmful chemical agents.