THE DISTRIBUTION OF *OREOPANAX XALAPENSIS* WITH RESPECT TO FOREST EDGES

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Abstract: Oreopanax xalapensis is a tropical tree species of potential medical and economic importance. Anecdotal reports characterize *O. xalapensis* as an inhabitant of cloud forest edges. We tested whether that was true in the cloud forest of Monteverde, Costa Rica. In fact, average stem density increased with increasing distance from the forest edge to 50 m within the forest, but the patterns varied among small, medium, and large size classes. Results suggest that strips of forest may be inadequate to conserve populations of *O. xalapensis*, but defensible generalizations will require sampling that is more spatially and temporally extensive than was possible here.

Key Words: Oreopanax xalapensis, *shade tolerance, edge effects, distribution*

INTRODUCTION

Oreopanax xalapensis, a tropical tree within the Araliaceae, is potentially important both medicinally and economically. Extracts from the leaves of *O. xalapensis* showed notable antifungal activity and cytotoxic activity against four different cancer cell lines, but were not toxic to normal, nonproliferating cultures of adult rat hepatocytes (Setzer 2000). Understanding the ecological distribution of this tree could aid in its conservation by helping to identify forest habitats where it occurs.

Haber et al. (1996) reported that *O. xalapensis* is more commonly found in secondary cloud forest, edge, and light gaps than in mature cloud forest but presented no data. We investigated whether this was true in the cloud forest near the biological station in Monteverde, Costa Rica, by measuring size-specific densities across replicated transects from the forest edge to interior.

METHODS

We surveyed the distribution of *O. xalapensis* on 20 - 21 January 2006 near the Monteverde Biological Station, Costa Rica. We randomly located seven points along 350 m of forest edge. These served as the origin for sample belt transects (50 m long and 10 m wide) that extended into the forest perpendicular to the edge. We identified all *O. xalapensis* individuals taller than 1 meter and calculated the stem density for ten 5 m-long segments along each belt transect. We measured diameter at breast height (DBH) for each individual, and grouped individuals into three DBH size classes (small: 0-2 cm, medium: 2-10 cm, large: 10-37 cm). We investigated how stem density changed with distance from edge, DBH size class, and transect with a general linear model using JMP 5.0.1.

RESULTS

Trees of all size classes occurred throughout the transects from forest edges to the interior (Figure 1), but average stem

density increased with distance from edge ($F_{1,204}$ = 16.6, P < 0.0001). The relationship between stem density and distance depended on size class (size x distance interaction: $F_{2,204}$ = 4.05, P = 0.02), with a positive trend in the medium class (r^2 = 0.20, df = 68, P < 0.0001) and no relationship with distance in the large or small size classes for both regressions (P > 0.1, df = 68).

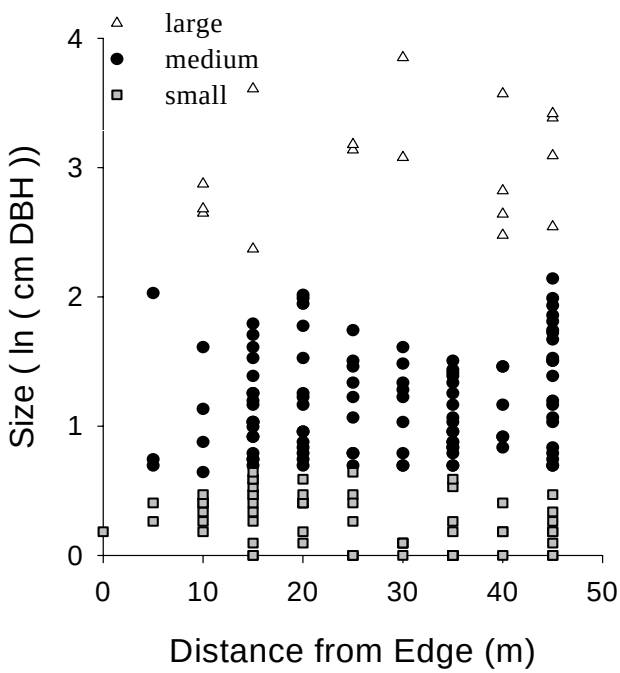

Fig. 1 Size (diameter) of *Oreopanax xalapensis* vs. distance from forest edge at Monteverde Biological Station, Costa Rica. Points are separated into 3 size classes (small: 0-2 cm; medium: 2-10 cm; large: 10-37 cm). Note increasing numbers of medium-size trees with increasing distance from edge.

DISCUSSION

We rejected the hypothesis that *O. xalapensis* density was highest at forest edges. In fact, we found that stem density increased with increasing distance from the forest edge. Because *O. xalapensis* was abundant in both small and medium size classes throughout the forest, we conclude that it must be a relatively shade tolerant species.

The interaction between stem density and distance from edge suggests some demographic tendencies in *O. xalapensis*. It may be that juveniles establish equally well from the forest edge to 50 m within the forest. In this case, higher survival rate in the interior versus the edge could generate the observed pattern of increasing stem density with distance from edge in the middle size class. The reversal to no affect of distance in the large size class could arise from higher survivorship of the medium size class closer to the edge. However, these interpretations assume a stable stage distribution. It is perhaps more likely that our data reflect historical variation in *O. xalapensis* establishment and/or survival. For example, forest re-growth into previously cleared land (i.e., edge shift) could have recently enhanced the probability that small saplings would survive to become medium-sized trees in what was the forest interior when we sampled the population. In this case, the distribution of *O. xalapensis* may differ at other edges due to different local environmental histories.

To our knowledge, this is the first quantification of the distribution and abundance of *O. xalapensis* with respect to forest edges. Given the general pattern of increased stem density with distance from forest edge, narrow strips of forest (< 100 m wide) could be inadequate to conserve sustainable populations of *O. xalapensis.*

LITERATURE CITED

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