REMOVAL OF LICHENS, LIANAS, AND EPIPHYTES BY BARK SHEDDING IN *BURSERA SIMARUBA*

P. PARKER C. SHELBY, ANITA L. MANNAN, E. HANK TALIAFERRO

Abstract. Bark shedding in *Bursera simaruba* may be an adaptation for limiting colonization by epiphytes. We tested this hypothesis by comparing densities of lichens, lianas, and epiphytes on *B. simaruba* with densities on similarly sized non-shedding trees of other species at Palo Verde National Park, Costa Rica. Percent cover of lichens, total number of lianas, and average basal area of lianas were significantly greater on comparison trees than on *B. simaruba*. Epiphytes were rare on all species. Bark shedding may reduce lichens and lianas on *B. simaruba* and thereby increase photosynthetic rates of bark tissue.

Key Words: bark shedding, Bursera simaruba, *epiphytes, lianas, lichens*

INTRODUCTION

The Jiñocuave tree, *Bursera simaruba*, ranges throughout the southern United States and tropical America. This species typically thrives in warm dry climates and is among a relatively small number of tropical trees that has photosynthetic bark (Janzen 1983). The green bark characteristically turns a clear reddish color as it ages and flakes off to expose new photosynthetic material beneath. We hypothesized that bark shedding reduces the percent cover of lichens as well as the number and size of lianas and epiphytes growing on the tree. The removal of vines, lianas, and epiphytes may serve as a mechanism that keeps the photosynthetic bark exposed to sunlight and allows the continued production of glucose during the dry season after the tree has shed its leaves to reduce desiccation. Additionally, bark shedding may lower mortality rates of *B. simaruba* because trees carrying fewer lianas have decreased weight loads and greater stabilities (Putz 1984).

METHODS

On 11-12 January, 1996 at Palo Verde, Costa Rica, we sampled ten *Bursera simaruba* within mature forest on the Sendero Pizote, and ten additional *B. simaruba* alongside the park road. For each *B. simaruba*, we selected the nearest tree with similar DBH (+ 5 cm) and without peeling or flaking bark for comparison. We measured the diameter at breast height and examined each tree for lichens, lianas, and epiphytes. We estimated percent lichen cover for the bottom 5 m of each tree (as determined by a clinometer) using a petri dish marked with one hundred dots. The total number of dots that intersected lichens were compared to the total number of dots that intersected the tree. Lichens were distinguished by their distinct boundaries and different color and texture relative to the tree bark. We counted all lichen patches > 0.5 cm2. We counted the number of epiphytes and lianas growing on the tree and calculated liana basal areas.

RESULTS

We found no lichens on *B. simaruba* trees, while comparison trees averaged 2.3% lichen cover (Table 1). Two *B. simaruba* had lianas compared to fourteen comparison trees, and the average basal area of lianas was higher on comparison trees than on Bursera (Table 1). Epiphytes were rare (0 on *B. simaruba*, 1 on comparison trees), so there was no significant difference in epiphyte loads between *B. simaruba* and comparison trees.

Table 1: Lichen, liana, and epiphyte growth on *Bursera simaruba* and paired comparison trees

	mean ± SE		
	Bursera simaruba (n = 20)	Comparison trees (n=20)	P
Lichen Cover (%)	0.00 ± 0.00	2.30 ± 0.62	0.001
Liana basal area	0.06 ± 0.04	4.13 ± 1.58	0.019
Epiphytes/ tree	0.00 ± 0.00	0.05 ± 0.05	0.330

DISCUSSION

B. simaruba had significantly fewer lichens and lianas growing on its trunk and branches than similarly sized non-shedding trees. In fact, no lichens and only three lianas were observed on all of the *B. simaruba* trees we sampled. This supports the hypothesis that bark shedding in *B. simaruba* reduces the growth of foreign plant material along the trunk and branches, and maximizes the bark area able to photosynthesize.

In Palo Verde, the reduced lichen cover on *B. simaruba* trees may have limited ecological benefits because they covered only ≈ 2% of the surface area of nearby non-shedding tree species. However, the reduced numbers of lianas on *B. simaruba* relative to its neighbors would allow significantly more light to penetrate to the photosynthetic bark.

Bark shedding in *B. simaruba* may have evolved as a mechanism to inhibit growths, or may simply be a result of the photosynthetic material in the bark expiring, in which case reducing growths is merely a beneficial side effect. This will be a difficult issue to resolve. Additionaly, although bark shedding appears the most likely explanation for reduced loads of lichens and lianas on *B. simaruba*, we cannot preclude the possibility that *B. simaruba* bark produces allelopathic chemicals. This seems a less likely mechanism, partly because it unlikely that one or a few chemicals would inhibit both lichens and lianas.

LITERATURE CITED

Stevens, G. 1983. *Bursera simaruba*. Pages 201-202 *in* Janzen, D.H. Costa Rican Natural History. The University of Chicago Press, Chicago, Illinois, USA.

Putz, F. E. 1984. The natural history of lianas on Barro Colorado Island, Panama, Ecology.