Ecology of the Invasion of *Ligustrum obtusifolium* in the Shaw Nature Reserve: an examination of habitat suitability

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Invasive species are a threat to diversity and forest regeneration in particular. The border privet, *Ligustrum obtusifolium,* is an invasive species from the Eastern United States and is detrimental to forest growth because it forms dense thickets that block light from seedlings, and it exhibits rapid shoot elongation in shaded conditions, making it an aggressive competitor for sunlight. In the Shaw Nature Reserve (Grey Summit, MO), this species has invaded large extensions of regenerating woodlands. In this reserve, efforts have been focused in controlling this pest through burning, cut and paint, and spraying. The goals of this study were to describe the suitable habitat for *L. obtusifolium,* determine if distance from the road influences that habitat, and to examine the relationship between the privet height and neighboring species richness and herbivory. The study sites were four woodland plots, two infested and two uninfested, of 30 X 30 meters. In each plot we set up four transects parallel to the road at 0 m (start of vegetation), 10 m, 20 m, and 30 m. We set up ten focal points on each transect every 3 meters. In the infested plots, the points were the focal plants. In each plot we measured light availability (photosynthetic photon flux density), air temperature and humidity, soil temperature and moisture, percent cover of the ground by foliage (in an 80 cm diameter circle), and species richness (plants taller than 10 cm). In the focal plants it was measured the height, percentage of herbivory, and the presence of fruits. Principal Components Analysis of the sites by distance to the road indicates that the privet Site 2 had higher air temperature values and lower richness, light availability, and percent cover levels than the privet Site 3. The uninfested Site 1, tend to have greater light availability, air humidity, species richness, and percent cover than the other study sites. The uninfested Site 4 had high levels of soil temperature and air temperature. The reason for the increased privet height in Site 2 is possibly because of the lack of sunlight due to the denser canopy since privets seem to have greater shoot elongation in low light condition. In addition, in Site 2 there was less species richness measured, which illustrates what kind of negative effect these invasive species can have on native populations. There was very little correlation with distance to road. Only the 0 m distances were similar in three of the four sites. The lack of correlations with distance to road was most likely due to the fact that the studied woodlands were very homogenous and open environments. Linear regressions between privet height with herbivory and species richness showed only a negative relationship between the height of the focal plants and proportion of herbivory in one site. This relationship is possibly due to the younger plants having less developed chemical defenses in their leaves. Based on these results and communications with James Trager about the history of the Shaw Reserve, it seems probable that there is a potential for privet invasion further into the reserve, and the reason it has not happened yet is because of the management (burning) efforts and because the uninvaded areas are further from the original planting site of the privets. The invasion of *Ligustrum obtusifolium* in the Shaw Nature Reserve is critical. This study shows that this species is changing the woodland environments by increasing shade in the understory which could be related to the decrease in species richness. Management practices to control privet and prevent its further establishment should continue. This study is the first to provide base-line information to understand the ecology of invasion of border privet in this reserve.