2000-01 PIVORUN FINAL REPORT

The effects of an exotic species on local biodiversity and environmental stability

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The high abundance of Chinese Privet in certain areas of Anderson, Pickens, and Oconee County, South Carolina, led us to examine influence of this species on the plant diversity of native landscapes and on the density of trees in the shrub layer. The relationship among Chinese privet, plant diversity and small mammal abundance was also studied because the relationship of the small mammal community to plant diversity may be indirectly related to privet's effect on plant diversity. Comparison of tree densities in privet and no privet sites provides insight into the role of privet in affecting future community structure. Privet fruit production in relation to the size (dbh) of the plant was also compared because documenting the relationship between the size of the privet plant and fruit abundance may be helpful in planning early management strategies. The specific objectives were to (1) compare the plant diversity of herbaceous, shrub and canopy layers in privet plots relative to control plots; (2) compare the shrub layer plant density (excluding privet) between control and privet sites; (3) investigate the relationship between small mammal abundance with plant diversity in the herbaceous, shrub, and canopy layer and with the importance value of privet; and (4) compare fruiting production to size (dbh) of a privet plant.

This study was specifically done in and around Clemson, South Carolina. Three sites were selected with a monospecific stand of privet and an adjacent control plot (no privet infestation) on the same stream or lowland area. Site one (Seneca) privet plot and the control plot were located in the Seneca Creek area of the South Clemson Forest in Oconee County. Site two (Pendleton) was located in the Mill Division area in the South Clemson Forest in Anderson County. Site 3 (Botanical Gardens) was located in the south end of the Botanical Gardens of Clemson University in Pickens County. All three sites were located within 15 miles of Clemson, South Carolina. All sites were riparian or bottomland habitats, characterized by such dominant canopy species as tulip poplar (Liriodendron tulipifera), sweet gum (Liquidumbar stryacifulia), white oak (Quercus alba), black cherry (Prunus serotina), mockernut hickory (Carya tomentosa), and river birch (Betula nigra).

Plant diversity sampling was done in July and August of 2001. Vegetation characterization of all sites was done by measuring the density and diversity of the canopy, shrub, and herbaceous layer. Small mammals were trapped from September 12, 2000 through April 3, 2001 over ~ 6 months. Privet fruit abundance was also estimated in each sampling quadrant.

Privet plots were less diverse in the herbaceous and the shrub layer relative to control plots, but type of plot did not affect diversity in the canopy layer. Privet plots also had a lower density of trees in the shrub layer. Poisson

regression showed that small mammal abundance was inversely related to plant diversity in the shrub layers. However, there was no significant relationship between small mammal abundance and plant diversity in the canopy and herbaceous layer. The size of the plant (dbh) had no effect on the amount of seeds the plant produced. It appears that privet reduces biodiversity and density of plants in the areas it invades which may have future ramifications on community structure. Privet may possibly benefit small mammals by providing protection, a food source, and an area for foraging. Privet plants with a small dbh may still produce copious amounts of seeds. Therefore, early detection and removal of young privet plants before they reach maturity may be necessary for effective management.

Throughout this study, several students participated in the research including two outstanding SC Governor's school students through the Summer Programs for Research Interns and several Clemson University undergraduate students and graduate students. One of the Governor's school students traveled to the National Science Fair in California to present her project associated with this research. A manuscript is also currently in preparation to submit to the local journal *Southeastern Naturalist* using the results from this research.