Dispersal, reproduction and physiological ecology of two invasive non-indigenous fern species, *Lygodium microphyllum* and *Lygodium japonicum*

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One of the greatest threats to the integrity of native ecosystems is their invasion by non-indigenous species. Nowhere else in the continental United States is this threat more conspicuous than in Florida. *Lygodium microphyllum* and *L. japonicum* are two recent invaders that are currently spreading through Florida's native ecosystems. Once established in a community, these two species appear to displace native species and alter local fire ecology. *L. microphyllum*, in particular, can completely dominate a native habitat with time, causing the collapse of the natural community. We are studying both their reproductive strategies and their relative growth rate at different light levels. The results indicate that both species are capable of intragametophytic selfing, which supports the hypothesis that the reproductive strategy partially explains the continuing spread of both species. Since spores are dispersed readily by wind, the ability of a single spore to form a sporophyte will aid in the ability of both species of *Lygodium* to rapidly infest new habitat. In addition, *L. microphyllum* is capable of intergametophytic crossing. The results of the study suggest that outcrossing is promoted via the production of an antheridiogen pheromone. These pheromones are produced by mature female gametophytes and promote maleness in neighboring gametophytes. Early results also show that both *Lygodium* species have a growth advantage in low light irradiances compared to native species, the causes for this apparent advantage in low light are still being determined. With these studies, we expect to increase our understanding of the ecology and physiology of these highly invasive species. This, in turn, may assist land managers in developing strategies to prevent and control their rapid spread.

Predicting the potential distribution of a plant invader: integrating field studies and climate matching approaches

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Accurate prediction of the potential distribution of invasive species is important to their control. Field studies and a computer model (CLIMEX) were used to predict the potential distribution of the invasive Chinese tallow tree, *Sapium sebiferum*. Seedlings of *S. sebiferum* were planted in 4 microhabitats in a factorial design of open and closed canopy and upland and lowland microhabitats at 7 sites along a coastal (1,300 km) transect and an inland (400 km) transect in the southeastern U.S. These transects extend beyond the current geographic range of *S. sebiferum*. A reduced competition treatment was applied to half of the seedlings in each microhabitat at each site. Seedling survival and growth rates were measured 1-2 years after planting. In predicting the potential U.S. distribution of this invasive tree, model parameters for CLIMEX were based on greenhouse studies of seedling tolerances to key environmental conditions and on climate matching of the known global distribution of *S. sebiferum* with U.S. climatic records. Average seedling survival ranged from 20 to 100% and was 100% in at least one microhabitat at all sites. Average seedling basal diameter ranged from 3.3 to 7.5 mm with the largest seedlings occurring in open microhabitats and in sites beyond the present southeastern distribution of *S. sebiferum*. Reduced competition increases survival and growth rates particularly in upland microhabitats. Computer predictions match field results and suggest that *S. sebiferum* has yet to occupy its entire new range in the U.S.

(This year's competition is currently under way, however, if you are interested in conducting studies related to invasive exotic plant management in Florida, we strongly encourage you to submit a proposal for the next competition in spring 2002. For more information please contact John Volin at jvolin@fau.edu.)