

ESTABLISHMENT AND SPREAD OF *MICROSTEGIUM VIMINEUM* (JAPANESE STILTGRASS) IN CLOSED-CANOPY FORESTS

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ABSTRACT

Establishment and spread of *Microstegium vimineum*, an invasive exotic grass, in closed-canopy U.S. eastern forests were evaluated across a local (roadside to forest interior) and regional (across two geographic provinces) environmental gradient. Seed dispersal distances from roadside populations into forest interiors based on seed rain and soil seed bank data were determined. Biotic, abiotic, and disturbance variables were measured in plots with and without *M. vimineum* and were compared using a generalized linear model and logistic regression. Colonization and extinction of *M. vimineum* patches were followed over 3 years, and spread rate was estimated using a reaction-diffusion model.

Direct seed dispersal from the roadside populations occurred primarily adjacent to the maternal plants, indicating that the disjunct *M. vimineum* patches

within the forest interiors occurred via secondary seed dispersal over longer distances. The decreasing stem height and reduced reproductive capacity of the forest interior *M. vimineum* compared to roadside populations were confirmed over the local environmental gradient.

Patches of *M. vimineum* in the forest interiors across the regional gradient were best defined by high native plant richness and diversity. Greater canopy opening, more moss, and shallower litter depths were positively and significantly associated with *M. vimineum* presence but only during the driest year.

Colonization rates of the forest interiors were significantly higher for the more mesic sites than the more xeric sites. The same trend was noted for the spread rate. These results support the possibility of accelerating spread rates weighted by a reduction in *M. vimineum* fitness in shaded environments.