

THE ROLE OF TREE-FALL GAPS IN THE INVASION OF EXOTIC PLANTS IN FORESTS: THE CASE OF WINEBERRY, *RUBUS PHOENICOLASIUS*, IN MARYLAND

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Abstract

In forests, plant invasions frequently begin in tree-fall gaps and other disturbed sites. Some forest invasives appear restricted to new gaps; others reach wide distributions within stands. Predicting the potential distribution of new invasives would be valuable for management. We propose that a forest invasive will be limited to newly disturbed sites if 1) establishment is limited to new disturbances, and 2) established individuals do not survive canopy closure. An invasive species that can either establish or persist under closed canopy has the potential to occupy the entire forest stand.

We evaluated the role of forest gaps in the invasion of *Rubus phoenicolasius* Maxim (Rosaceae), a native of Asia that is invasive in disturbed sites and successional forests in eastern USA. We censused 15 x 15 m plots centered in gaps created in a 2002 storm vs. random points in adjacent young and old deciduous stands at Smithsonian Environmental Research Center (38°53'N, 76°33'W), Maryland.

In the old stand, established *R. phoenicolasius* ramets were present in 10 of 20 gaps, but only 2 of 19 random plots. In large gaps ramet density was 34X greater, and primocane length double, compared to that in small gaps. Tip-rooting (vegetative reproduction) was limited to large gaps. In the young stand ramets were in all four gaps and four of five random plots. Fruits were present in three large gaps, but no small gap or random plots, in the old stand; in the young stand fruits were found in all gaps, but in only one random plot. In the mature stand seedlings were present in 10 gaps, but none of the random plots; seedling density was 4X in gaps associated with uprooted (vs. snapped) trees. In the young stand seedlings were present in three gaps and two random plots.

Thus, tree-fall gaps are required for seedling establishment, vegetative reproduction, and fruiting in mature forest. We are investigating whether established ramets persist with canopy closure in the forest and under different shade treatments in a garden experiment.