Does the type of disturbance matter for the restoration of fire-suppressed Garry Oak savanna?

Andrew S. MacDougall and Roy Turkington

Department of Botany, University of British Columbia, Vancouver, BC
< amacdoug@interchange.ubc,ca >, Phone: 604-822-2700

Temperate savannas (combined grassland and sparse woodland) are endangered throughout North America due to a combination of factors including fire suppression. The re-introduction of fire, therefore, is viewed as an important tool for restoring the former functioning of savannas, and the endangered species found within. However, the ecological necessity of fire is often assumed but rarely tested. Fire is thought to promote savanna obligates by killing non-obligate species that dominate in its absence, reducing litter, and modifying the flows and pool sizes of resources. These impacts, however, can be replicated to varying degrees by disturbances such as mowing that are less dangerous to apply and less limited by seasonal conditions. Using a four-year field experiment, we tested the relative impact of fire versus mowing and raking in heavily invaded and fire-suppressed Garry Oak savanna. We manipulated the timing of the application (July vs. October) and varied site factors (savanna of deep and shallow soil). We examined their effect on the exotic grasses that have proliferated in the absence of fire, on above- and below-ground resources, and on the growth and recruitment of native forbs. We found no significant difference between fire and mowing on exotic grass control, plant recruitment, or on the promotion of previously established native flora – both were equally effective. The treatments significantly increased ground level light and bare soil, promoting recruitment. However, both also significantly increased available soil nitrogen due to the repeated deposition of ash (fire) or shattered plant material (mowing). More important than the type of treatment was the timing of application. Summer application (compared to fall) significantly increased grass mortality due to the effects of intense solar exposure on the grasses damaged by the treatments. Site factors were also relevant. The impact of both disturbances on the control of exotic species was much less effective on shallower soil areas. These areas contained a large pool of exotic annual and perennial species that were formerly rare but proliferated following disturbance. The effects of fire or mowing, therefore, are likely to vary depending on site conditions and on the pool of species found in the seed bank.