Invasive Plant Seedbank Development After Wildfire in Alaska’s Boreal Forest

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Questions
- Is a viable non-native seedbank developing in burned habitat?
- What is the proportion of non-native to native seeds in the seedbank?
- Does the presence and species composition of moss present influence the emergence of seedbank seedlings?

Introduction
Permafrost and cold winters have prevented invasive species spreading in Alaska in the past, but climate change and wildfires have increased vulnerability to bird vetch (Vicia cracca) and white sweetclover (Melilotus albus). White sweetclover and bird vetch compete with native vegetation for habitat and dramatically change soils as nitrogen fixers. Invasive seeds have the potential to build up in soils the same way native seeds do, forming a soil seedbank. Most non-native seeds decline in their viability within 25 years in soil (Conn and Werdin-Pfisterer, 2010). However, white sweetclover seeds can last for up to 80 years in the seed bank, and require scarification to germinate (Turkington et al. 1978). Non-native seedbanks can develop post-disturbance, such as after a wildfire, road development, or forest clearing, since seeds are more likely to arrive at the site and accumulate over time. Decreased burn intervals between wildfires and increased disturbance allows less time for ecosystem recovery, which creates opportunities for invasive plants to establish themselves. Research has shown a shift in seed banks from native species to more non-native over a 20 year period after forest clearing (Conn et al. 1984).

Field Methodology
1. Revisited 27 sites where invasives had been recorded spreading into burned land in 2007.
2. 15 Sites were able to be sampled, and we sampled the soils along 3 transects in each site.
3. Sampled top (0-3 cm from surface) and bottom (3-6 cm subsurface) layers of soil in each location.

Greenhouse Methodology
4. To allow new seedlings to emerge, the vascular cover was removed.
5. Estimated non-vascular plant cover by species in top layers
6. Placed in the greenhouse for potential seeds to germinate (average of 70.85°F and daily watering)
7. Identified, counted, and plucked seedlings that emerged over 8 week period

Discussion
What these early results suggest:
- Very small amount of persistent viable seed banks of invasives in the burns
- Native species are better represented (likely due to better dispersal mechanisms)

Future Directions:
- Remove moss and see what comes up
- Stee soil and check for remaining seed viability
- Potential scarification of any remaining white sweetclover seeds to gauge further invasive seed bank resilience

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References