ML 2016 Project Abstract
For the Period Ending June 30, 2023

PROJECT TITLE: Cover it Up! 2
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https://mitppc.umn.edu/research/research-projects/cover-it-using-plants-control-buckthorn
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION:
ML 2016, Ch 186, Sec. 2, Subd 6a,

APPROPRIATION AMOUNT: $560,000
AMOUNT SPENT: $560,000
AMOUNT REMAINING: $0

Sound bite of Project Outcomes and Results
Many of Minnesota's forests are degraded by buckthorn invasion. Management is challenging because buckthorn typically returns quickly after removal. We found seeding wild rye grasses (in areas with >10% canopy openness) or densely planting shrubs and trees following initial herbicide application reduced buckthorn re-establishment concurrent with increased native cover.

Overall Project Outcome and Results
Buckthorn is an invasive shrub that outcompetes native plants and degrades Minnesota forests. Removal of buckthorn is a common management activity but often only provides short-lived benefits since buckthorn rapidly re-establishes. This project examined the efficacy of slower-establishing seed mixtures of herbaceous and woody species and evaluated how native plant seeding functions in the context of other forest management activities.
We found that densely planting native shrubs, particularly the elderberries *Sambucus racemosa* and *Sambucus canadensis* led to greatly reduced light availability and frequent exclusion of buckthorn seedlings (most plots contained no buckthorn after 4 years). Plantings of Abies balsamea and Acer saccharum had similar results (Schuster et al. 2022). Herbaceous seeding (primarily of native Elymus grasses) was less effective at reducing buckthorn abundance over 4 years compared to shrub planting (Schuster et al. 2022).

We overturned long-held conventional wisdom on the longevity of buckthorn seedbanks. Although it is commonly thought that buckthorn seeds persist for up to six years in the soil, we found that buckthorn seedbanks last 1-2 years. Critically, this indicates that the majority of buckthorn that are likely to arise during management are already present on site and vulnerable to management within the first two years. We compared the fuel loads and fire behavior between areas that were seeded and those that were not seeded in two sites. We found that seeding increased fire spread by 85% and increased metrics of fire severity by more than three-fold, helping fire to be more effective against buckthorn.

Our on-going citizen science network evaluated how native seeding works throughout Minnesota. Over 100 participants established over 600 plots. We also created a website (coveritup.umn.edu) that details the findings of this and related MITPPC-funded projects and serves as a platform for the citizen science network.

Project Results Use and Dissemination
This team published four peer-reviewed papers and a white paper that summarized major findings. One other paper has been submitted and two more are in preparation. Presentations were given at 11 major conferences

intended for professional and general audiences. The project also attracted significant media coverage: KARE 11, Fox 9, Pioneer Press, BBC, and WJON among others. These engagements demonstrate the strong desire for effective alternatives to improve buckthorn management.

Academic journal articles:
Published in 2020 Fosamine ammonium impacts on the targeted invasive shrub Rhamnus cathartica and non-target herbs. Journal: by Invasive Plant Science and Management. Authors: Schuster, Bockenstedt, Wragg, Reich.

Published in 2021: Phenological niche overlap between invasive buckthorn (Rhamnus cathartica) and native woody species. Journal: Forest Ecology and Management. Authors: Schuster, Wragg, Reich

Published in 2022: Using plants to control buckthorn (Rhamnus cathartica): Improved biotic resistance of forests through revegetation. Journal: Ecological Engineering. Authors: Schuster, Wragg, Roth, Bockendstedt, Frelich, Reich.

Published in 2022: Managing Invasive Buckthorn. University of Minnesota White Paper. Authors: Bernhardt, Koop, Larkin, Lee, Morey, Schuster, Venette, Wolf, Wragg, MITPPC Staff.

Published in 2023: No evidence of a long-lived seedbank in common buckthorn, Rhamnus cathartica L., within Minnesota deciduous forests. Journal: Biological Invasions. Authors: Schuster, Wragg, Roth, Reich.

In Review: Understory revegetation enhances efficacy of prescribed burning after common buckthorn (Rhamnus cathartica) management. Journal: Forest Ecology and Management. Authors: Schuster, Wragg, Roth, Reich

In preparation: Effects of native herb seeding and foliar herbicide on plant cover and buckthorn regeneration. Authors: Schuster, Kaul, Wragg, Reich

In preparation: Revegetating following invasive buckthorn removal increases native plant cover and diversity and long-term resistance to re-invasion. Authors: Schuster, Wragg, Reich

Oral presentations:
2019 Gathering Partners
2019 Duluth Cooperative Invasive Species Management Area
2019 Duluth Invaders R2ED Team
2020 Ecological Society of America
2020 Upper Midwest Invasive Species Conference
2020 Upper Midwest Invasive Species Conference
2020 Minnesota Noxious Weed Advisory Board
2021 CitSciVirtual Conference
2021 Minnesota Department of Natural Resources
2022 Legislative Citizen Commission on Minnesota Resources
2022 Upper Midwest Invasive Species Conference

Other media:
KARE 11
- *https://www.kare11.com/article/life/home-garden/grow-with-kare/grow-with-kare-be-a-citizen-scientist-and-fight-buckthorn-university-minnesota-native-plants-woods/89-33f5cd4e-a5af-4d26-8e7e-c1655f482f84?fbclid=IwAR2QtI8ch-dsNAa2HDkdbPH3Kx_wXqOMwYS9Q5FeSp3ddOrhpANohBD9Ccc*

Pioneer Press
- *https://www.twincities.com/2019/12/02/u-of-m-center-battles-hungry-invasives/*

BBC

- *https://www.bbc.com/news/science-environment-52507819?fbclid=IwAR1G2USRjsi7vkju_2rqFBpW9HVuQYZrfqdlfld95CjcqYYEjgHby1lV93s*

Star Tribune

- *https://www.startribune.com/in-retirement-minneapolis-man-takes-on-stubborn-foe-buckthorn/600046920/*

FOX 9

- *https://www.fox9.com/video/1129883*

WJON

- *https://wjon.com/u-of-m-research-project-reveals-new-information-on-buckthorn/*

StCroix360

- *https://www.stcroix360.com/2023/06/researchers-say-seeds-from-invasive-buckthorn-dont-live-as-long-as-previously-thought/*

MITPPC

- *https://mitppc.umn.edu/news/uprooting-decades-buckthorn-management-practices-no-long-lived-seedbank*
- *https://mitppc.umn.edu/news/cover-it-buckthorn-control-native-plants*

UMN

- *https://twin-cities.umn.edu/news-events/talking-invasive-buckthorn-management-u-m-0*
- *https://twin-cities.umn.edu/news-events/u-m-researchers-uproot-decades-buckthorn-management-practices*

To Know The Land

- *https://www.toknowtheland.com/podcast/ep181*

Friends of the Mississippi River

- *https://fmr.org/updates/conservation/fmrs-ecologists-investigate-how-suppress-buckthorn*

Cover It Up Newsletter: quarterly newsletter distributed to approximately 900 people since 2020.

Cover It Up Website: website documenting the Cover It Up project, its findings, and providing a portal for citizen science activities.