


Cover it up! Using plants to control buckthorn
Early lessons for Minnesota

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Buckthorn fundamentally changes forests



- Forms dense stands
- Decreases native diversity
 - Forest structure
 - Animal forage and habitat
 - Nutrient cycling
- Feedback loops with earthworms

Buckthorn removal is insufficient

- Up to \$2,000 per acre
- Incomplete removal or lack of follow-up means **buckthorn returns quickly and vigorously**
- Little benefit of removal within a few years



Challenges of Removal



There are some ways to control buckthorn but they are very expensive and/or cannot be used in all places



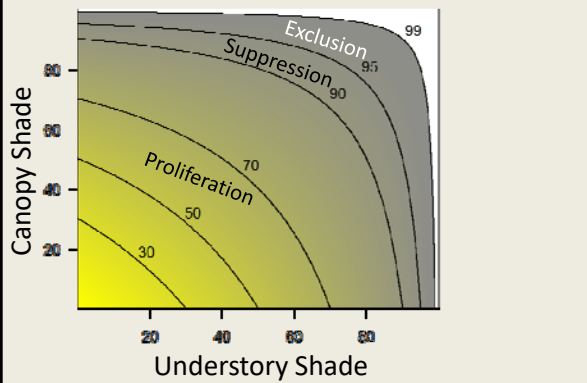
Repeated burning



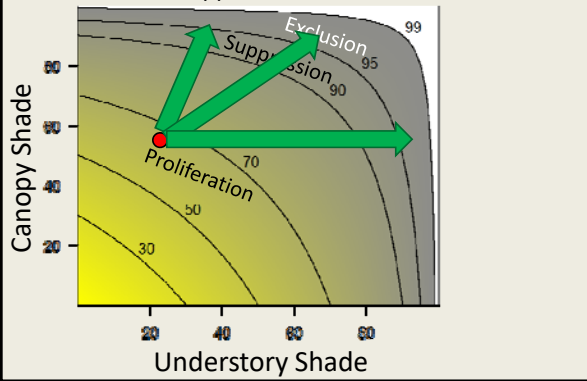
Repeat removal



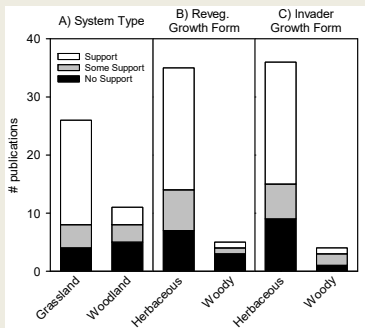
Buckthorn is shade-tolerant, but still needs some light



How can we re-vegetate forests to move them into Suppression or Exclusion zones?



Re-vegetation is common in grasslands, but not in forests



Schuster et al. 2018

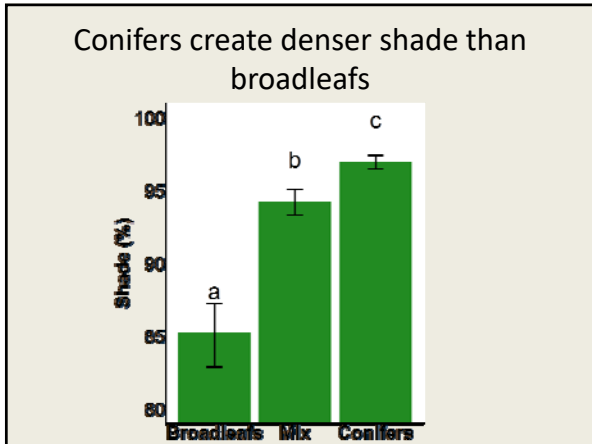
Identifying an effective re-vegetation method to control buckthorn means...

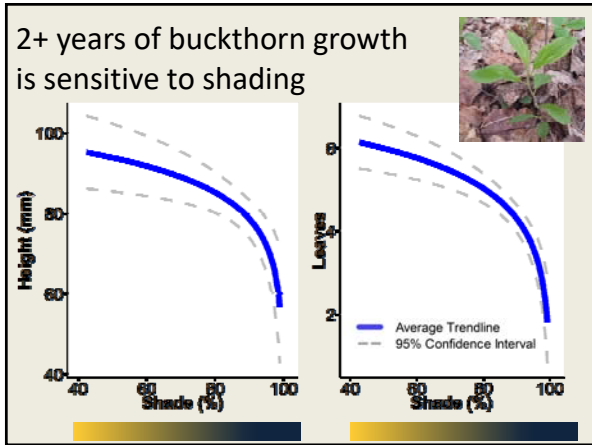
- Cost and labor savings for managers and funders
 - Reduced herbicide applications
 - Increased forest health and diversity
- Increased value of forests for wildlife and people

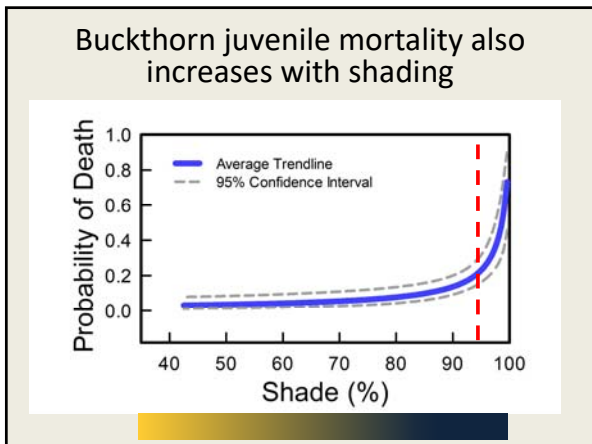
How do different light environments affect buckthorn?

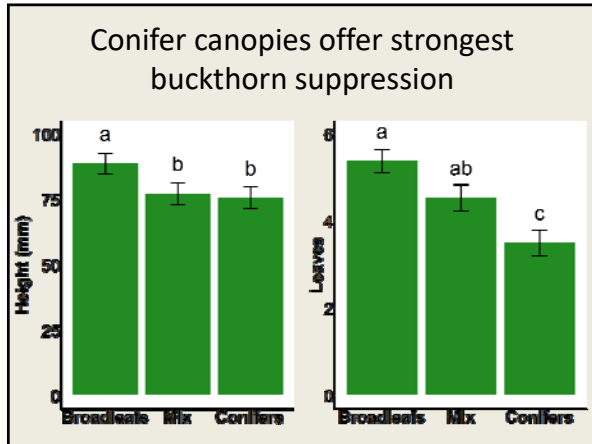
Experiment in Cloquet, MN











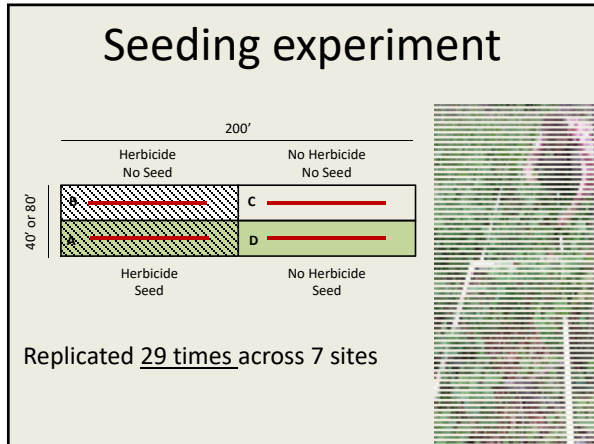
Lesson for Minnesota

Species are not equal in their ability to create shade

Managers may need to plant something different than what is already present on-site

How can these principles be applied via re-vegetation?

How do dense seeding and planting of native species affect buckthorn re-establishment?



Lesson for Minnesota

Seeding didn't increase shade in first year

Perennial species already showing greater cover this year

Re-vegetation by seeding is a **multi-year process**

Early May



Planting experiment

14 m

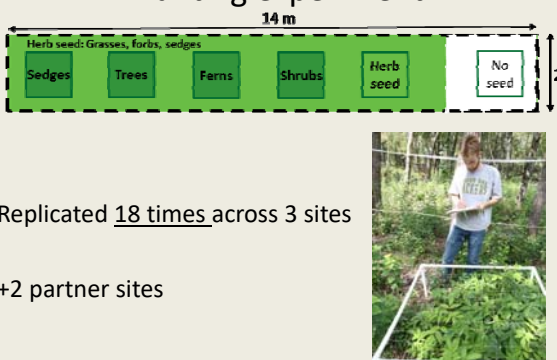
Herb seed: Grasses, forbs, sedges

Sedges Trees Ferns Shrubs Herb seed No seed

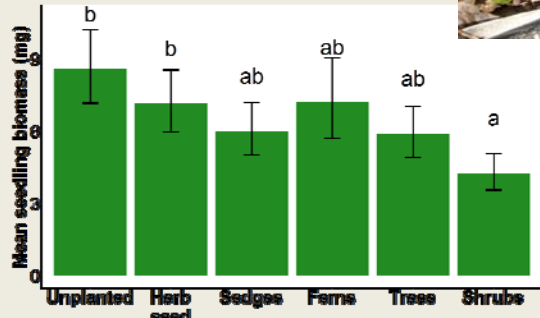

2 m

Replicated 18 times across 3 sites

+2 partner sites

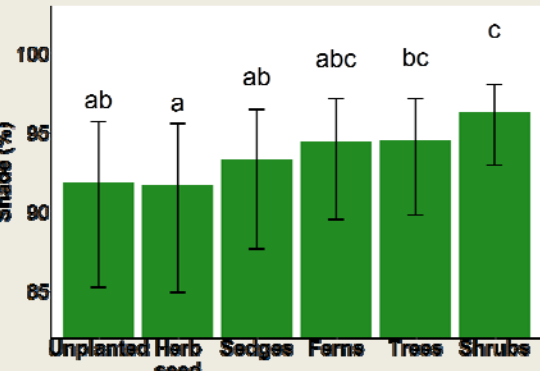


Planting shrubs, trees, or sedges creates smaller buckthorn...

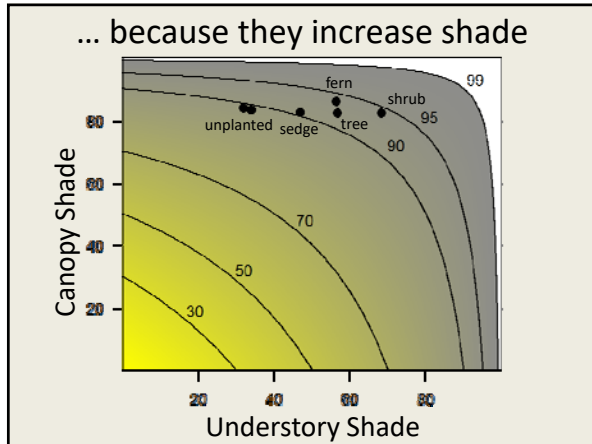


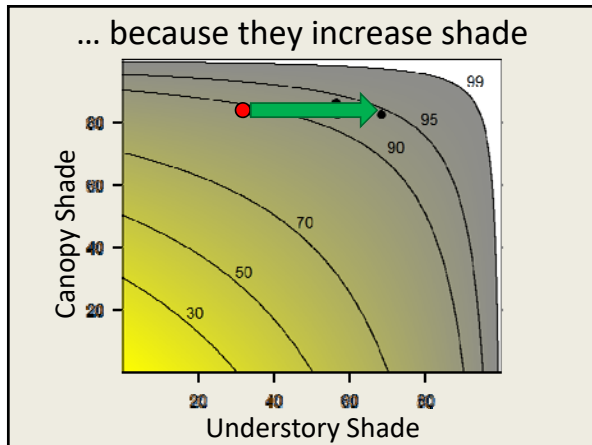
Treatment	Mean seedling biomass (mg)	Significance
Unplanted	~85	b
Herb seed	~75	b
Sedges	~65	ab
Ferns	~70	ab
Trees	~65	ab
Shrubs	~55	a

... because they increase shade



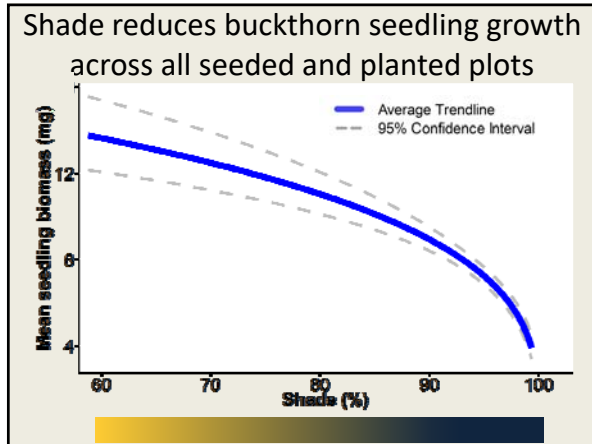
Treatment	Shade (%)	Significance
Unplanted	~92	ab
Herb seed	~92	a
Sedges	~93	ab
Ferns	~94	abc
Trees	~94	bc
Shrubs	~96	c





Lesson for Minnesota

Re-vegetating with **native species** can impede re-establishment of **buckthorn**



Lesson for Minnesota

Deep shade smothers buckthorn

This amount of shading **can** be created with re-vegetation (not just with big trees)

Goal is to reach this level of shading **quickly** after buckthorn removal
