A perennial problem: Revisiting control methods for Canada thistle

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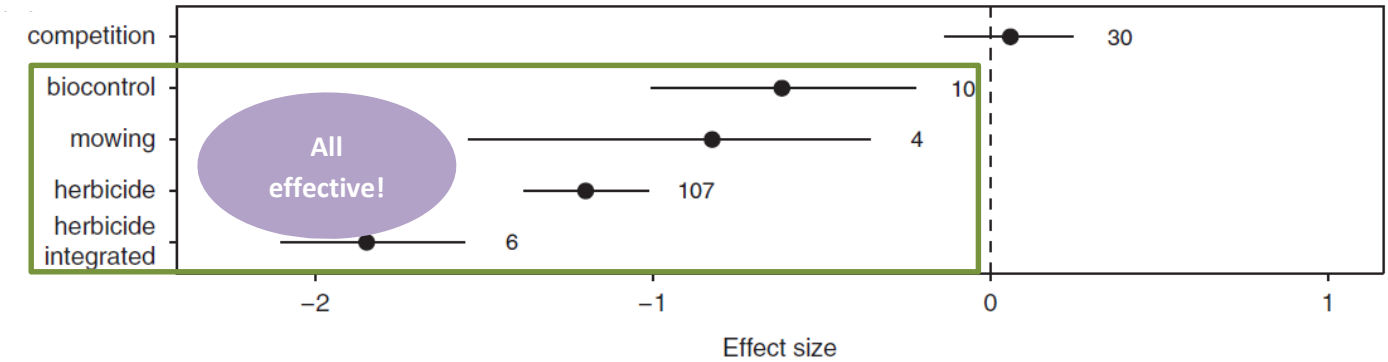
Introduction: Canada thistle (*Cirsium arvense)* is the most frequently listed noxious weed in the U.S. and Canada and has been on Montana's noxious weed list since 1895. There has been a lot of research conducted about controlling Canada thistle, but it remains a management challenge. In order to identify best management strategies and direct future research, we conducted a meta-analysis which can be thought of as "research about research."

Methods: We conducted a literature search and identified 1,819 articles about Canada thistle, but only 45 articles qualified for inclusion in our analysis on management in perennial systems (rangelands, natural areas, etc.). We gathered results from those 45 previously-published studies and pooled them together for collective analysis. For each management strategy, we calculated an effect size, which is the abundance of Canada thistle in treated plots compared to the abundance of Canada thistle in non-treated plots. An effect size less than zero indicated a decrease in Canada thistle while an effect size greater than zero indicated an increase in Canada thistle. For example, an effect size of -0.7 is equivalent to a 50% reduction in Canada thistle relative to non-treated plots.

Results: Biocontrol (insects or pathogens), mowing, herbicide, and herbicide integrated with one or more management techniques were all effective (i.e. effect size <0; see graph below). Competition (seeding desirable species to compete with Canada thistle) had no effect on Canada thistle. While herbicide was the most frequently studied management technique, we found integrating different strategies with herbicide was *more effective* than applying herbicide alone. Examples of strategies integrated with herbicides included burning, competition, mowing, and soil disturbance. Additionally, mowing alone was as effective as herbicide. Non-chemical techniques and integrated weed management were under-studied and warrant future research and experimentation for Canada thistle control. We also found fewer studies evaluated the long-term efficacy of Canada thistle management so more long-term studies are encouraged.



Average effect size and 95% confidence intervals for Canada thistle abundance measured ≥1 year after treatment as a function of management techniques. The number next to the confidence interval is the number of data points that was used to calculate the average (multiple data points per study were possible). Management techniques were different from one another if their confidence intervals did not overlap.

To learn more about our study, including results from annual cropping systems, see Davis et al. 2018.

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Test Your Knowledge of A perennial problem: Revisiting control methods for Canada thistle

BHIEDRCEI
_ _ _ _ _ _ _ _ _
most studied management technique

AOLHNEMNICC
_ _ _ _ _ _ _ _ _ _ _
type of research we may want to consider in the fight against Canada thistle (hint, look at abstract!)

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an effective approach for enhanced long-term control of Canada thistle

AIMSSETNLYAA
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statistical method used to review previously published literature

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scientific name of Canada thistle

SEFFCETZEI
_ _ _ _ _ _ _ _ _ _ _
measurement used to quantify the effect of a management technique (hint, look at x-axis of graph)

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name of journal this research was published in recently

Solutions are posted to the MSU Extension Invasive Rangeland Weed website:
http://www.msuinvasiveplants.org/extension/monthly_weed_post.html

MONTANA STATE UNIVERSITY EXTENSION

Montana noxious weed Education Campaign