

2011-2012 MAIN PROPOSAL

PROJECT TITLE: Development of biological control for common tansy

I. PROJECT STATEMENT

Common tansy, *Tanacetum vulgare*, is an invasive weed of grasslands, forest and field margins, riparian areas, and rights-of-way. Tansy infestations are associated with loss of plant diversity, toxicity to humans and livestock, wildlife habitat degradation, and hindering reforestation and restoration efforts. Land managers are beginning to recognize tansy's invasive and destructive potential. Beltrami, Cass, Itasca, and Koochiching counties added tansy to their prohibited noxious weed list and it will be evaluated for addition to the state list. Cooperative weed management areas frequently list tansy as a target weed. Tansy is the largest weed issue for the Superior National Forest. Survey results demonstrate that tansy is widespread in northeast Minnesota and appears to be moving into western and southern Minnesota. We expect this weed to continue to spread.

The goal is to develop biological control that can restore balance in systems invaded by tansy. Current tansy control methods are inadequate. Herbicide control is costly and may not be an option for environmentally sensitive areas such as wetlands. Other control methods such as mowing are not effective. Biological control could be a cost-effective, long-term management tool for tansy. Biological control reunites the target pest with the insects or diseases that control the pest in its native range. Tansy is a good target for biological control because there are few closely related species in North America and it is attacked by numerous insects in its native range. Thus, finding an insect biocontrol candidate that is host-specific, negatively impacting only tansy is probable. Our objectives are to advance tansy biological control development and evaluate tansy infestations.

A joint United States and Canadian effort to develop biological control was initiated in 2006. CABI Europe-Switzerland conducts the research. Funding coordination and information dissemination for United States partners is directed by Monika Chandler with the Minnesota Department of Agriculture (MDA). Six insect biological control candidates have been identified and host-specificity testing begun. Additional study of the biology and host-specificity of these insect candidates is needed.

In anticipation of tansy biocontrol, it is important to quantify tansy infestations at future tansy bioagent release sites. The information will provide pre-release baseline data on infestation size and density that will be used post-release to measure bioagent efficacy. In addition, the information will improve our understanding of tansy movement and spread.

If tansy is allowed to proliferate unchecked, it will be far more expensive and difficult to manage than if we develop and implement control methods now. Biological control is a promising tool to meet this need and restore balance to tansy invaded habitats. Developing biological control and preparing for future tansy bioagent releases is an excellent approach to tansy management.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Collect and test biocontrol candidates **Budget:** \$150,000

Conduct field surveys to identify and collect insect biocontrol candidates in tansy's native range in Europe. Surveying and collecting must be done overseas. Host-specificity testing determines whether each insect candidate is safe to release in North America. Testing would focus on the

two most promising candidates, a root-feeding beetle and a stem-mining weevil. This research will be conducted by CABI Europe-Switzerland.

Outcome	Completion Date
1. Bioagent candidate insect species are collected.	06/30/2014
2. Host-specificity testing with at least 15 test plant species for 2 bioagent candidate species is completed.	05/31/2014
3. Written report of testing results provided.	06/30/2014

Activity 2: Field study of tansy infestations in Minnesota Budget: \$43,600

Future bioagent release sites will be assessed and baseline data collected on infestation size and density. Change over time between the baseline and the infestation after bioagent release will be used to evaluate bioagent efficacy. Tansy stem density and percent cover will be measured in field research plots. This work will be conducted in Minnesota by a student worker supervised by the Biological Control Coordinator at MDA.

Outcome	Completion Date
1. Sites are selected and delimited. Research plots are set up.	08/31/2011
2. Data are collected and entered into a database.	08/15/2013
3. Final analysis and interpretation of datasets are completed.	08/31/2013

III. PROJECT STRATEGY

A. Project Team/Partners

Tansy biocontrol development is a multi-country, multi-agency, public and private enterprise. **Receive funding:** CABI will conduct and receive funds for overseas research. MDA will conduct and receive funds for the field study of tansy infestations in Minnesota.

Not receive funding: Additional partners listed are providing in-kind services including intellectual input, research sites, technical support, plant materials, and tansy infestation and distribution data: MN-DNR: Luke Skinner; U of MN: Appropriate professors and professionals; MN-DOT: Tina Markeson; UPM Blandin Paper Mill: Cheryl Adams; CABI: André Gassmann - overseas tansy biocontrol research. There are 26 other members from various universities and federal and state agencies. Funding would be received by MDA for the tansy infestation density study and CABI for the bioagent candidate field surveys and collection and host-specificity testing projects. See section III-C for other funding partners.

B. Timeline Requirements

This project will run for three years beginning on July 1, 2011 and ending on June 30, 2014.

C. Long-Term Strategy and Future Funding Needs

Developing biological control for tansy management is a joint US and Canadian long-term project. Receiving LCCMR funding for this project would cover a portion of the cost for the next three years and would allow us to leverage other potential funding sources. From 2006 until present, project funding sources have included UPM Blandin Paper Mill, the MDA, and the Montana Noxious Weed and Trust Fund in the United States for a total of 125,000 USD.

Canadian funders included Advancing Canadian Agriculture and Agri-Food, Saskatchewan Agriculture Development Fund, Enbridge, Inc., EnCana Corp., British Columbia Ministry of Forests and Range, and the Alberta Sustainable Resource Development for a total of 220,000 CAD. This project is a three phase project. Phase one involves the identification of and host-specificity testing for insect candidates. Phase two evaluates the efficacy of promising bioagent candidates. The final phase is large-scale implementation of tansy biological control. We are in the first phase of the project. Additional public and private funding will be sought to continue this project. LCCMR funding would be utilized to leverage full project funding.

2011-2012 Development of biological control for common tansy budget

IV. TOTAL TRUST FUND REQUEST BUDGET 3 years

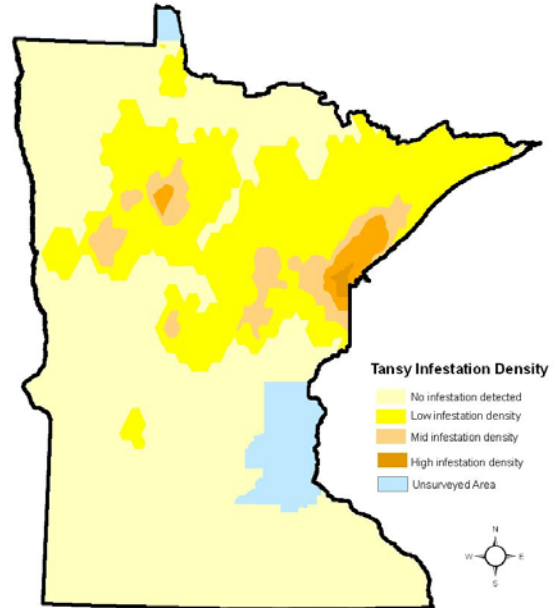
<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: Total	\$29,300
1—3 year FTE summer student worker mean wages \$15.50/hr plus fringe benefits @ 12.65% at MDA for 14 weeks/yr	\$29,334
Contract: CABI-Europe Switzerland for tansy biocontrol research. Funding amount requested is approximately 45% of total project cost for the next 3 years including: <ul style="list-style-type: none"> • Partial salary for a lead research scientist and student worker (\$95,000.00) • CABI personnel travel to N. Europe and Russia (\$5,000.00) • Project supplies/equipment (\$6,500.00) • Other costs related to insect identification, collection, and shipment (\$6,500.00) • CABI indirect costs @ 33% (\$37,000.00) 	\$150,000
Equipment/Tools/Supplies:	\$1,000
Equipment/Tools include a handheld GPS unit	\$500
Supplies include field data collection supplies such as sample bags and plot markers	\$500
Travel: Travel is to/from statewide research sites in MN.	\$13,300
1—3 mo. vehicle rental (\$700/mo includes milage) per year for 3 years and fuel	\$8,280
Meals and lodging	\$5,000
Additional Budget Items:	
TOTAL ENVIRONMENT & NATURAL RESOURCES TRUST FUND \$ REQUEST	\$193,600

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period: Committed funding from Saskatchewan Agriculture Development Fund; Canadian Agricultural Adaptation Program; Encana Corp.; Enbridge, Inc.; Canadian Pacific Rail; Suncor Energy, Inc.; TransCanada Corp.; and Marksmen, Inc.	\$145,000	Secured
USDA Forest Service (2011)	\$ 15,000	Pending
Other State \$ Being Applied to Project During Project Period:	\$ -	
In-kind Services During Project Period: Field equipment, computing/software, GIS and data management for tansy infestation study in Minnesota (\$15,000 from MDA) and overall project coordination (\$15,000 for US project coordinator's, Monika Chandler, salary at MDA) and (\$25,000 for Canadian project coordinator's, Alec McClay, salary at McClay Ecoscience, Inc.)	\$ 55,000	Secured
Remaining \$ from Current ENRTF Appropriation (if applicable):	\$ -	
Funding History: From 2006 until present, project funding sources have included UPM Blandin Paper Mill, the MDA, and the Montana Noxious Weed and Trust Fund in the United States for a total of 125,000 USD. Canadian funders included Advancing Canadian Agriculture and Agri-Food, Saskatchewan Agriculture Development Fund, Enbridge, Inc., EnCana Corp., British Columbia Ministry of Forests and Range, and the Alberta Sustainable Resource Development for a total of 220,000 CAD.	\$345,000	Spent
2010: Committed funding from Saskatchewan Agriculture Development Fund; Canadian Agricultural Adaptation Program; Encana Corp.; Enbridge, Inc.; Canadian Pacific Rail; Suncor Energy, Inc.; TransCanada Corp.; Marksmen, Inc.; and Pennington County, South Dakota	\$ 95,000	Secured for 2010
2010: USDA Forest Service (2010)	\$ 15,000	Pending

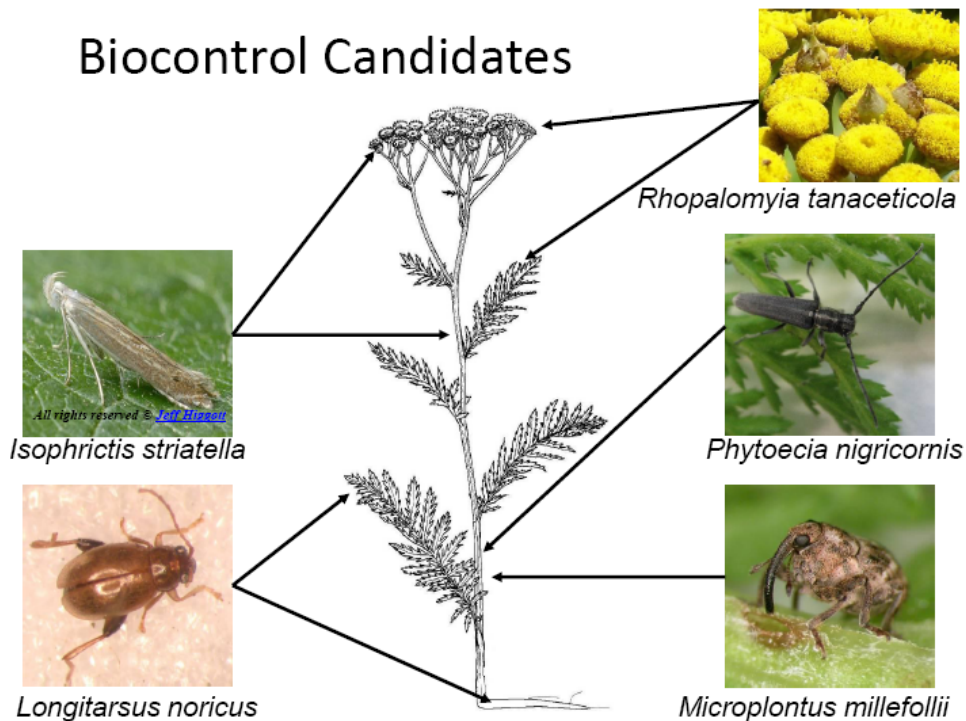


Tansy is the yellow flowered plant that overtook this grassland in Carlton Co., MN. A single plant can produce up to 50,000 seeds and live for 10 years. Tansy can also reproduce by underground stems to form large, dense clumps. Most herbivores including wildlife, livestock, and insects do not eat tansy. This combination of strong reproductive potential and lack of herbivore feeding give tansy a competitive advantage over native and other desirable vegetation. Biocontrol would reunite tansy with the insect herbivores that keep it in balance in its native range.



Estimated common tansy distribution and infestation density in Minnesota based upon a roadside survey. The invasion front appears to be advancing south and westward.

Biocontrol Candidates



Tansy bioagent candidates and the plant parts they impact. Additionally, there is a seed gall midge, *Ozirhincus tanaceti* that is not pictured here. Photos are by A. Gassmann.

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Qualifications

Project Manager

Monika Chandler, M.S., Biological Control Program Coordinator, Minnesota Department of Agriculture

Monika has ten years of biological control experience and she has specifically coordinated the tansy biocontrol research project since it began in 2006. Her experience includes a LCMR project titled "Assessing the Establishment of *Apthona* spp. Released for Control of Leafy Spurge, *Euphorbia esula* L., in Minnesota" with Luke Skinner, David Ragsdale, and Dharma Sreenivasam. Her responsibilities as a biological control program coordinator are to:

- Coordinate with public and private land managers to implement leafy spurge and spotted knapweed biological control statewide
- Develop biological control projects geared toward pesticide reduction
 - Development of biological control for common tansy project coordinator for the United States
 - Study the efficacy of biological control for Canada thistle
 - Initiate biological control of gypsy moth in Minnesota
- Produce and present educational programming for training and outreach activities in order to keep researchers, agricultural professionals, and land managers apprised of biological control methods and advances
- Build and utilize a Geographic Information System (GIS) to track biological control releases and target infestation changes over time

Organization Description

This project will be managed within Minnesota Department of Agriculture's Plant Protection Division.