Environment and Natural Resources Trust Fund (ENRTF)
M.L. 2018 ENRTF Work Plan (Main Document)

Today's Date: February 23, 2018

Date of Next Status Update Report: 11/30/18

Date of Work Plan Approval:

Project Completion Date: 06/30/2020

Does this submission include an amendment request? No

PROJECT TITLE: Palmer amaranth detection and eradication continuation

Project Manager: Monika Chandler

Organization: Minnesota Department of Agriculture

College/Department/Division: Plant Protection Division

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Web Address:
http://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/palmeramaranth.aspx

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Location: Statewide

Total Project Budget: $ 431,200

Amount Spent: $ 0

Balance: $ 431,200

Legal Citation: M.L. 2018, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

I. PROJECT STATEMENT:

Palmer amaranth is an invasive plant that threatens row crop production and prairies. Growing quickly at 2-3 inches per day and reaching heights of 10 feet tall, it outcompetes other plants. Palmer amaranth is an annual that produces prolific seed – up to a million per plant. It developed resistance to multiple classes of herbicides making it challenging to control. Palmer amaranth can cause yield losses up to 91% in corn (Weed Sci. 49:202-208) and 78% in soybeans (Weed Sci. 51:37-43). It has invaded established prairies in Illinois.

Palmer amaranth was first found in Minnesota in fall 2016 and declared an agricultural emergency. Palmer amaranth seed was a contaminant of a conservation seed mix that was planted at 30 locations. Infrastructure developed with our *Elimination of Target Invasive Plant Species* LCCMR project and Minnesota Department of Agriculture (MDA) emergency funds enabled us to respond quickly. In 2016, Palmer amaranth was documented in Lyon and Yellow Medicine Counties. Fourteen landowners were involved and there were 33 plantings where contaminated seed mix was sown. Palmer plants, including seedheads, were incinerated to reduce establishment and spread. This proved to be very effective. In 2017, only a handful of Palmer amaranth plants were found at three plantings identified in 2016. There were additional Palmer amaranth finds in 2017. An additional two landowners are now involved and together they have 10 plantings. Continued rapid and effective management could prevent statewide establishment and spread. We will:

- **Intensively monitor sites with Palmer amaranth.** Vegetation at Palmer sites will be monitored closely to identify Palmer plants before seed is produced. Palmer germinates throughout the growing season so monitoring the entire season is needed. Palmer amaranth seedbanks are not long-lived so aggressive management now could eradicate Palmer from these sites.
- **Continue control efforts at sites with Palmer amaranth.** Control methods may include flame weeding with torches, prescribed fire, spot treatment, increased plant competition by seeding more native grasses and, if necessary, broadcast herbicide application (ENRTF dollars will not be used for broadcast application).
- **Conduct ground and aerial surveys.** Additional conservation planting will be surveyed for Palmer amaranth presence or absence. Aerial survey will increase efficiency of ground survey by advance scouting for Palmer or similar looking plants. It will also reduce the amount of field entries and exits thereby reducing the risk of inadvertent spread of Palmer.

We received funding from the emerging issues account to begin this work in 2017. This project continues this work.

II. OVERALL PROJECT STATUS UPDATES:

First Update November 30, 2018

Second Update May 31, 2019

Third Update November 30, 2019

Final Update May 31 2020

III. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Develop and utilize aerial survey methods (U of M)
Description: Remote sensing will be utilized with the goal of developing methods to identify probable Palmer amaranth by aerial survey. This will increase the efficiency of ground survey by identifying areas with possible

Palmer amaranth plants. We request to use project funds for out of state travel to areas where Palmer is more common such as Iowa for method testing.

Aerial survey will be done by imaging fields with a camera/sensor attached to a UAV. Initial survey will be done at plantings selected for ground survey so they are ground truthed. We will also image plantings in another state such as Iowa where Palmer amaranth is present so that we can test our methods and develop a library of aerial images of Palmer amaranth. Imaging fields during the growing season will enable us to work with these images over the winter.

ENRTF BUDGET: $ 159,700

Outcome	Completion Date
1. Test remote sensing methods	03/31/20
2. Identify areas with Palmer or similar looking plants for targeted ground survey	06/30/20

First Update November 30, 2018

Second Update May 31, 2019

Third Update November 30, 2019

Final Update May 31, 2020

ACTIVITY 2: Monitor, ground survey and control (MDA and CCM)
Description: We will regularly monitor existing infestations to look for Palmer and determine control steps needed. We will survey additional conservation plantings on the ground. Prescribed fire and flame weeding are methods that will control Palmer amaranth while benefitting native species in conservation plantings. Additionally, these methods will not lead to herbicide resistance development.

Monitor
Monitoring existing infestations will involve visiting each site a minimum of three times per growing season to walk the fields and look for Palmer amaranth. If it is difficult to tell whether a pigweed is Palmer amaranth, samples from the suspect plant will be sent to the University of Illinois Plant Clinic for a species determination with a genetic test. MDA general or emergency funds will be used for this testing. If Palmer amaranth is found, control measures will be implemented. Monitoring data will be entered into ISMTrack, an EDDMapS product.

Ground Survey
To ground survey additional conversation plantings we will work with agency partners to identify and prioritize plantings for survey. Plantings will be selected throughout the state, but there will be an emphasis on the southern border region due to concerns about Palmer amaranth introduction from Iowa. We will develop a survey protocol based on walking a pattern in the planting. Presence/absence survey data will be entered into EDDMapS. If Palmer amaranth is found, data will be displayed at a county level due to landowners' sensitivity about Palmer amaranth.

Control
If Palmer amaranth is found, the project team will determine the best course of action. Extension weed scientists will be consulted when appropriate. Indications to date are that incinerating plants in fall 2016 with propane torches was effective at reducing seed. We will continue torching plants as needed. Additionally, prescribed fire will be used at all known Palmer sites in spring 2018 to reduce Palmer and improve the native plant competition. Data from management activities will be entered into ISMTrack.

ENRTF BUDGET: $ 271,500

Outcome	Completion Date
1. Infestations will be monitored during the growing season a minimum of three times per year. Palmer plants will be controlled prior to seed development. Currently there are 30 locations to monitor in Lyon and Yellow Medicine Counties.	06/30/20
2. At least 25 additional conservation plantings statewide are surveyed each year for the presence/absence of Palmer amaranth. Selection of sites to survey will be based on geographic distribution and newer plantings will be prioritized.	06/30/20
3. Investigate potential infestation reports from the public and agency partners.	06/30/20
4. Utilize prescribed fire and flame weeding to control Palmer amaranth.	06/30/20

First Update November 30, 2018

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IV. DISSEMINATION:

Description: We will communicate about our activities and findings with the public, Cooperative Weed Management Areas, land managers, and weed scientists. Communication with the public will be via news media (print, television, and radio) and social media such as Facebook and Twitter. We will provide updates to the University of Minnesota Extension blog Minnesota Crop News for communication with the agricultural community. We will also provide updates to MDA's multi-agency/organization Noxious Weed Advisory Committee that meets a minimum of two times per year.

First Update November 30, 2018

Second Update May 31, 2019

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Final Update May 31, 2020

V. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview: See attached spreadsheet

Explanation of Capital Expenditures Greater Than $5,000: N/A

Explanation of Use of Classified Staff: N/A

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:

Enter Total Estimated Personnel Hours: 4,160	Divide by 2,080 = TOTAL FTE: 2.00

Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

Enter Total Estimated Personnel Hours: 6,080 CCM: 4,000 U of M: 2,080	Divide by 2,080 = TOTAL FTE: 2.92

B. Other Funds:

SOURCE OF AND USE OF OTHER FUNDS	Amount Proposed	Amount Spent	Status and Timeframe
Other Non-State $ To Be Applied To Project During Project Period:			
	$	$	
Other State $ To Be Applied To Project During Project Period:			
MDA Emergency Funds M.L. 2016, Chp. 17, Sec. 17.041, Subd. 1	$ 50,000	$	Approximate; pending
In-kind Services To Be Applied To Project During Project Period: MDA: Overhead, field equipment, computing/software, GIS and data management, and project management for 2 years ($24,000); U of M: UAV Lab equipment for 2 years ($20,000); and CCM: Approximately $2.50/hr difference between actual cost per member and billing rate = $11,670.	$ 55,670		Secured for length of project
Past and Current ENRTF Appropriation:			
2017 Palmer Amaranth Detection and Eradication	$ 173,000		Emerging Issues funding through 06/30/2018
2017 Elimination of Target Invasive Plants - Phase 2 project M.L. 2016, Chp. 186, Sec. 2, Subd. 06e1 and Subd. 06e2	$ 750,000	$ 326,600 as of Nov 2017 status report	With respect to Palmer, this funding enabled us begin hiring a Palmer amaranth specialist before EI funds were available and to train people to identify and report Palmer.
Other Funding History:			
MDA Emergency Funds M.L. 2016, Chp. 17, Sec. 17.041, Subd. 1	$	$ 66,204	Spent

VI. PROJECT PARTNERS:

A. Partners receiving ENRTF funding

Name	Title	Affiliation	Role
Monika Chandler	Biological Control and Invasive Plant Management Coordinator	MDA	She will lead infestation monitoring, ground survey and report follow up. She will also provide overall project coordination
Demoz Gebre Egziabher	Professor	U of M	He will lead the development and utilization of aerial survey methods

Dustin Looman	Assistant Manager	CCM	He will manage crews and lead Palmer amaranth control activities

B. Partners NOT receiving ENRTF funding

Name	Affiliation	Role
Federal & state agencies	NRCS, FSA, BWSR and DNR	Identify sites to survey
Private landowners		Help manage Palmer infestations

VII. LONG-TERM- IMPLEMENTATION AND FUNDING:

Palmer amaranth eradication would have enormous positive ecological and economic implications. If Palmer amaranth becomes widespread in cropping systems, additional herbicides would be used. This could be detrimental to pollinators and water quality. Crop production costs would increase by an estimated $20-30 per acre for soybean and $15-20 for corn production. If half of Minnesota's 7.4 million acres of soybeans and 8.7 million acres of corn were infested, production costs would increase by approximately 165 million dollars annually. This burden would be borne by farmers and consumers and does not take into account the threat of non-target treatment impacts to surrounding agricultural natural areas. Additionally, Palmer amaranth is becoming problematic in prairie in Illinois and is outcompeting native vegetation. The stakes are high. There is not much Palmer amaranth in Minnesota. Now is the time to control it and keep it out of conservation plantings.

VIII. REPORTING REQUIREMENTS:

- The project is for 2 years, will begin on 07/01/2018, and end on 06/30/2020.
- Periodic project status update reports will be submitted November 30 and May 31 of each year.
- A final report and associated products will be submitted between June 30 and August 15, 2020.

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

A. Budget Spreadsheet
B. Visual Component or Map

Aerial survey for Palmer amaranth detection

Palmer amaranth's long seedheads produce a lot of seed that enables spread.

Conservation Corps Minnesota burning Palmer amaranth in a conservation planting

Attachment A:
Environment and Natural Resources Trust Fund
M.L. 2018 Budget Spreadsheet

Project Title: Palmer Amaranth Detection and Eradication Continuation
Legal Citation:
Project Manager: Monika Chandler
Organization: Minnesota Department of Agriculture
College/Department/Division: Plant Protection Division
M.L. 2018 ENRTF Appropriation: $431,200
Project Length and Completion Date: 2 years, June 30, 2020
Date of Report: February 23, 3017

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	TOTAL BUDGET	TOTAL SPENT	TOTAL BALANCE
BUDGET ITEM			
Personnel (Wages and Benefits)	$156,300		$156,300
MDA Personnel: One 2 year 100% time Plant Health Specialist position estimated salary $56,000 per year plus fringe benefits @ 36% for Activity 2			
Professional/Technical/Service Contracts			
Contract with Conservation Corps Minnesota for Palmer amaranth survey and management in conservation areas. Management methods include spot herbicide application, flame weeding and prescribed burning. Training and equipment (tools and personal protective equipment such as fire retardant clothing, gloves, hardhats, etc.) for crews (control and survey) and field specialists (survey) is included.	$98,000		$98,000
Contract with University of Minnesota to develop and utilize aerial survey methods. Costs include a 50% time engineer $126,100 (salary $94,575 and fringe @ 25% $31,525), travel $15,800 (mileage $10,800 and meals and lodging $5,000), equipment $10,000 (airframe and sensors 2 @ $4,000 each and ground station $2,000) and other (repairs $2,000 and specialized pix4d software license $5,000)	$159,700	$0	$159,700
Equipment/Tools/Supplies			
MDA Supplies: Herbarium supplies, flagging materials, etc.	$1,000		$1,000
Travel expenses in Minnesota			
MDA Travel: Mileage @ 53.50¢ for 17,000 miles ($9,000), approximately 40 days of lodging ($4,000) and 94 days of meals/yr ($3,200) per year.	$16,200		$16,200
COLUMN TOTAL	**$159,700**	**$0**	**$159,700**