



Palmer Amaranth Update

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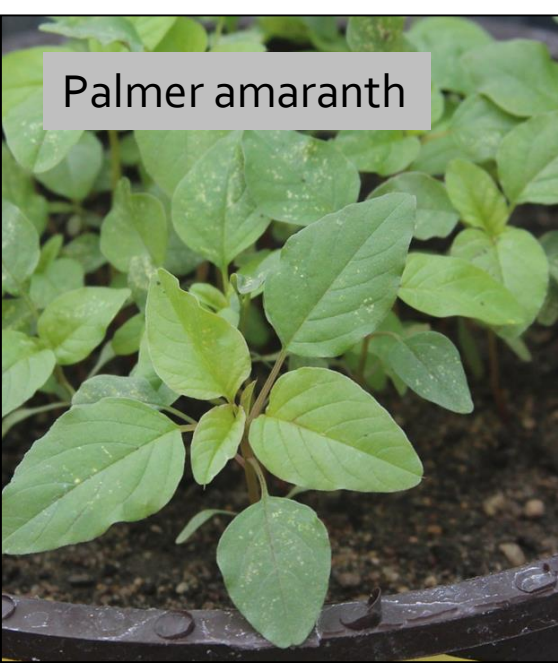
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Palmer Amaranth Background

- Native to the southwestern US and NW Mexico
- Summer annual broadleaf
- Dioecious – male and female flowers on separate plants
- Reproduces by seed – estimates from 100,000 to 500,000 seeds per plant
- Developed resistance to several important herbicide SOA
- Movement by man: on farm equipment, in alternative feed for livestock, in seed
- Movement by nature: water, migrating waterfowl

A photograph of a young Palmer amaranth seedling with several green, ovate leaves growing from a central point. The plant is set against a dark, moist soil background.

Palmer amaranth



Palmer amaranth, credit T Legleiter, Purdue Univ.



Redroot pigweed, credit, Bruce Ackley, The Ohio State Univ., Bugwood.org



Palmer amaranth, credit A. Hager, Univ of Illinois



Waterhemp, credit, M. Horak, Kansas State Univ.

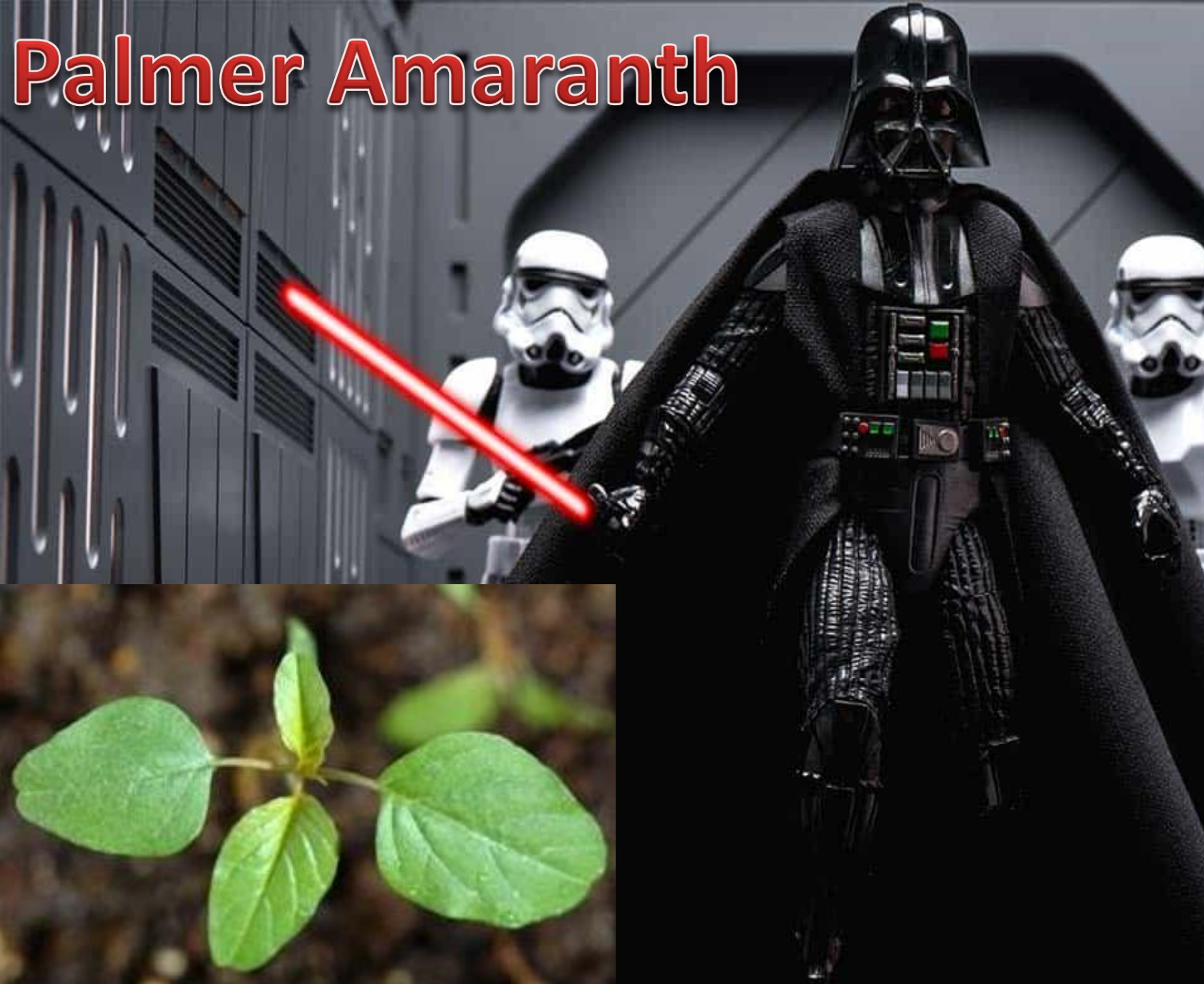


Redroot Pigweed

Waterhemp



Palmer Amaranth





Petiole length





K. George Beck and James Sebastian,
Colorado State University, Bugwood.org



Redroot pigweed, credit, Ken Chamberlain,
The Ohio State Univ., Bugwood.org

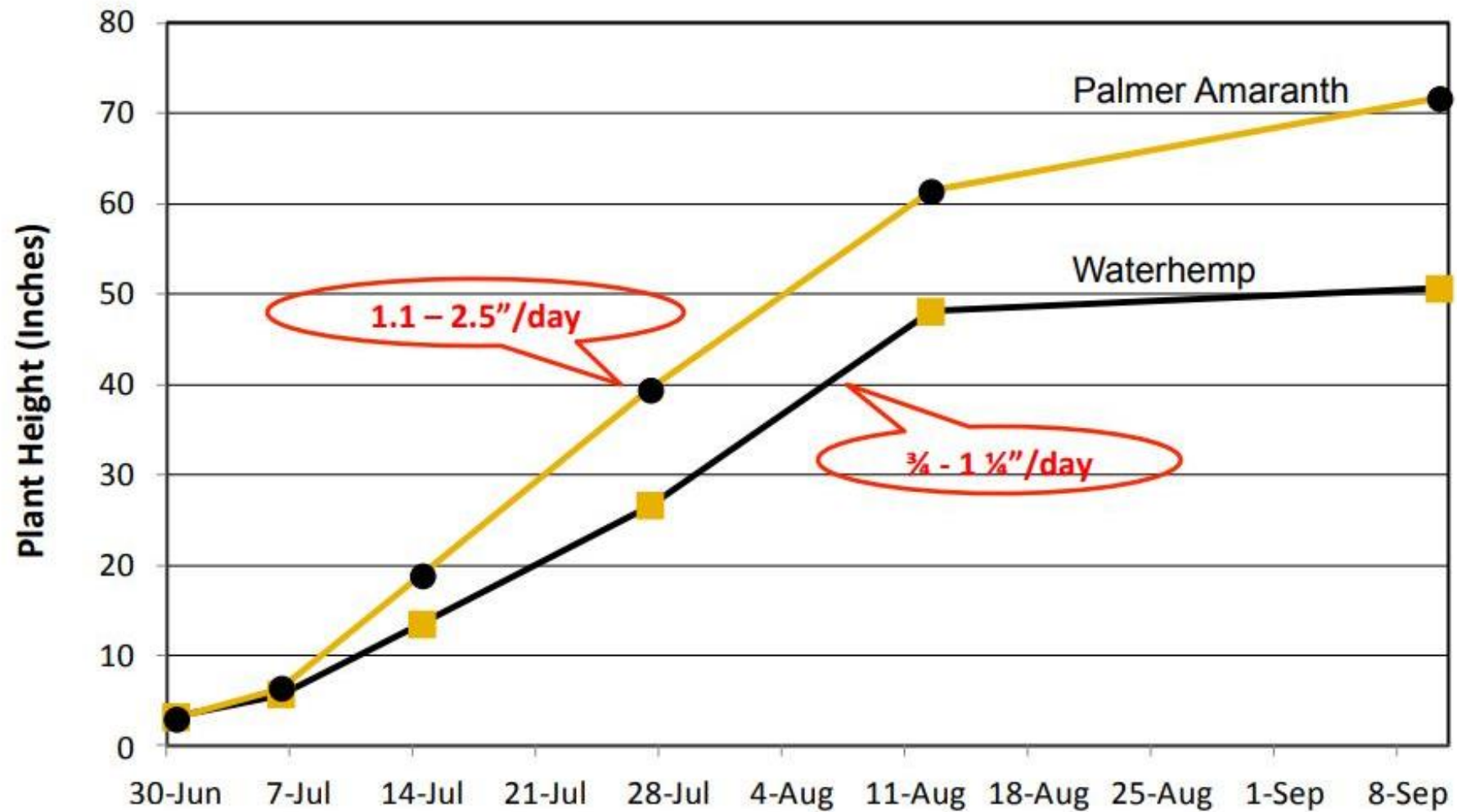


Palmer amaranth, credit, Bruce Ackley, The
Ohio State Univ., Bugwood.org



Palmer amaranth, credit, Univ. of Minnesota

Palmer Amaranth and Waterhemp Growth Through the Growing Season (Mokane, Missouri 2009)



Palmer amaranth (left) and waterhemp (right) 35 days after planting



MN Regulation

Minnesota Noxious Weed and Seed Law

- In 2014, The commissioner approved the emergency recommendation of the Minnesota Noxious Weed Advisory Committee to list Palmer amaranth as a **Prohibited Noxious Weed** on the Eradicate List
- 2016 – November - Listed Palmer Amaranth listed as a Prohibited Weed Seed (zero tolerance) for seed sold in Minnesota, *STAT AUTH 21.85 subd 11- HIST:9 SR 693, 1510.0271* – Signed November, 2016

Current Status in Minnesota

• STATEWIDE SUMMARY

- 18 landowners in Six Counties With Confirmed Palmer plants since 2016

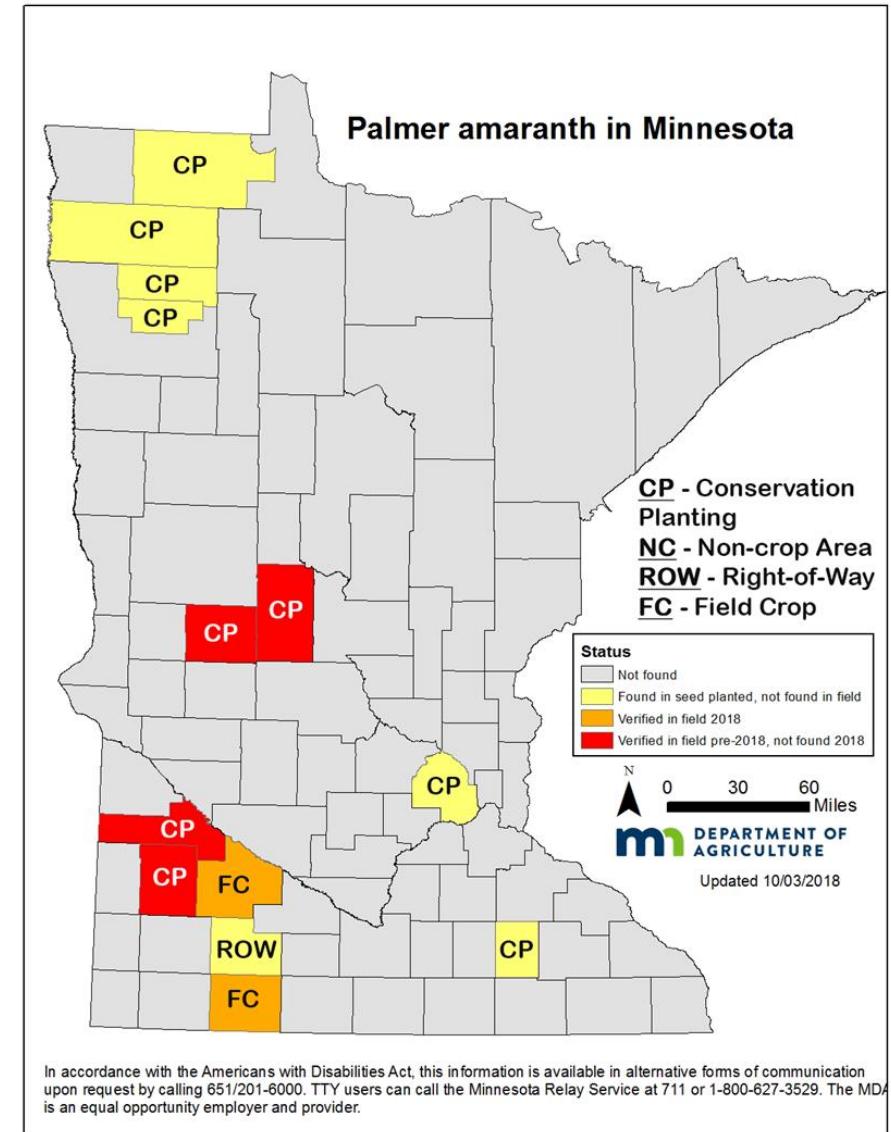
- 42 CRP plantings in 4 Counties (2016 – 2017)
 - NO PALMER discovered in Lyon, Yellow Medicine, Todd or Douglas counties in Fall 2018 on these plantings
- 2 Soybean fields - 1 Jackson & 1 Redwood County – Fall 2018
 - Plants hand-pulled and destroyed; no seed produced
 - No other Palmer plants found within a 5-mile radius MDA field survey

* 2017 – Summer – seed lot tested positive for Palmer

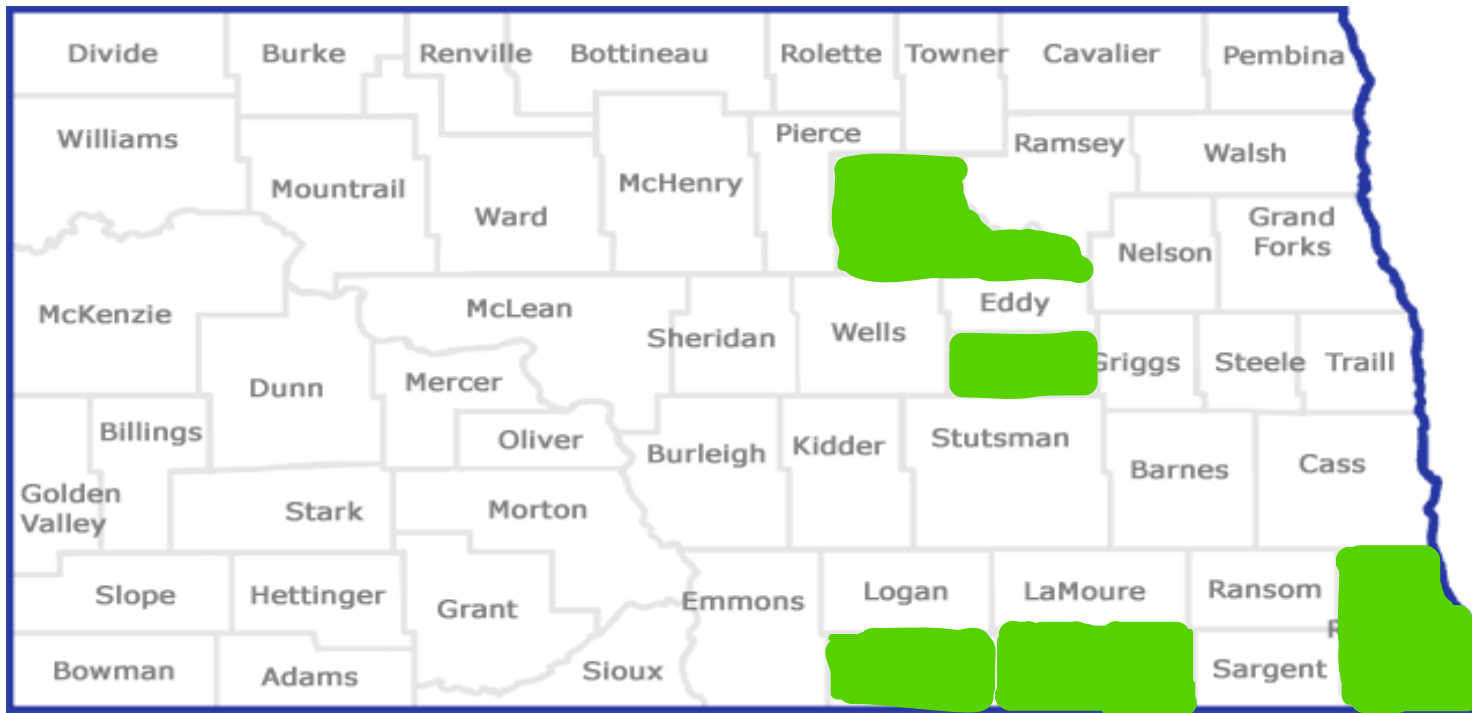
- Sold to MNDOT for seeding a ROW in SW MN
- **MDA Found No Palmer On This Site In 2017 or 2018**

** 2018 – Spring - seed lot tested positive for Palmer

- Sold to 8 Landowners, planted at 14 locations in 4 counties potentially impacting 1,400 acres
- **MDA Found No Palmer On These Acres In 2018**



Palmer amaranth was confirmed in five North Dakota Counties in August and September



County	Possible source
McIntosh	Migratory birds
Dickey	Purchase of used combine out-of-state
Foster	Custom combining
Benson	Railroad car cleanout
Richland	Alternative sources for cattle feed

Palmer amaranth in sugarbeet

- Palmer amaranth identified in five counties growing sugarbeet
 - Douglas
 - Redwood
 - Richland
 - Todd
 - Yellow Medicine
- Experience with controlling PA in sugarbeet from Michigan
- We need PA control recommendations before it is identified in sugarbeet fields in MN and ND

Palmer Amaranth control in greenhouse, 2017

Herbicide treatment	Height (inch)	Control 5 DAT	Control 24 DAT
		------(%)-----	
Betamix+ethofumesate+UpBeet (3 pt + 12 fl oz + 1 oz)	2	99 a	99 a
Betamix+ethofumesate+UpBeet (3 pt + 12 fl oz + 1 oz)	4	56 b	57 b
Betamix+ethofumesate+UpBeet (3 pt + 12 fl oz + 1 oz)	8	34 c	24 c

Herbicide treatment	Height (inch)	Control 20 DAT	Control 28 DAT
		------(%)-----	
Betamix+ethofumesate+UpBeet (3 pt + 12 fl oz + 1 oz)	2	70 a	23
Betamix+ethofumesate+UpBeet (3 pt + 12 fl oz + 1 oz)	4	43 b	17
Betamix+ethofumesate+UpBeet (3 pt + 12 fl oz + 1 oz)	8	38 b	13



Palmer amaranth control in sugarbeet

Peters.2018.1.3.pigweed control in sugarbeet

- Field experiments were conducted near Lincoln, NE and Scottsbluff, NE in 2018 to evaluate ethofumesate PRE fb chloroacetamide herbicides POST for palmer amaranth control
 - Palmer amaranth is indigenous
 - There are similarities between Lincoln, NE soils and MN/ND soils
- Sugarbeet tolerance experiment were conducted near Amenia, ND
 - Sugarbeet tolerate herbicide treatments for PA control
- Waterhemp efficacy experiment was conducted near Lake Lillian and Moorhead, MN
 - How effective are PA control recommendations for waterhemp control

Treatment List

Treatment	APP A PRE Etho Rate	APP B 2 TL Etho Rate	APP C 6 TL Etho Rate	APP B 2 TL Warrant Rate	APP C 6 TL Warrant Rate	Total Etho Applied
1*	3 pts	4 fl oz	4 fl oz	—	—	3.5 pts
2	3 pts	4 fl oz	4 fl oz	3 pts	—	3.5 pts
3	3 pts	3 pts	4 fl oz	—	—	6.25 pts
4	3 pts	2 pts	4 fl oz	1.5 pts	—	5.25 pts
5	3 pts	4 fl oz	4 fl oz	—	3 pts	3.5 pts
6	3 pts	4 fl oz	3 pts	—	—	6.25 pts
7	3 pts	4 fl oz	2 pts	—	1.5 pts	5.25 pts
8	3 pts	4 fl oz	4 fl oz	3 pts	3 pts	3.5 pts
9	3 pts	3 pts	4 fl oz	—	3 pts	6.25 pts
10	3 pts	2 pts	2 pts	—	—	7 pts
11	3 pts	2 pts	2 pts	1.5 pts	1.5 pts	7 pts
12	Weed Free Check					
13	Weedy Check					

^ADefinitions and Abbreviations: APP: Application timing (A, B, and C); PRE, Pre-crop emergent; TL: True leaf; Etho: Ethofumesate,

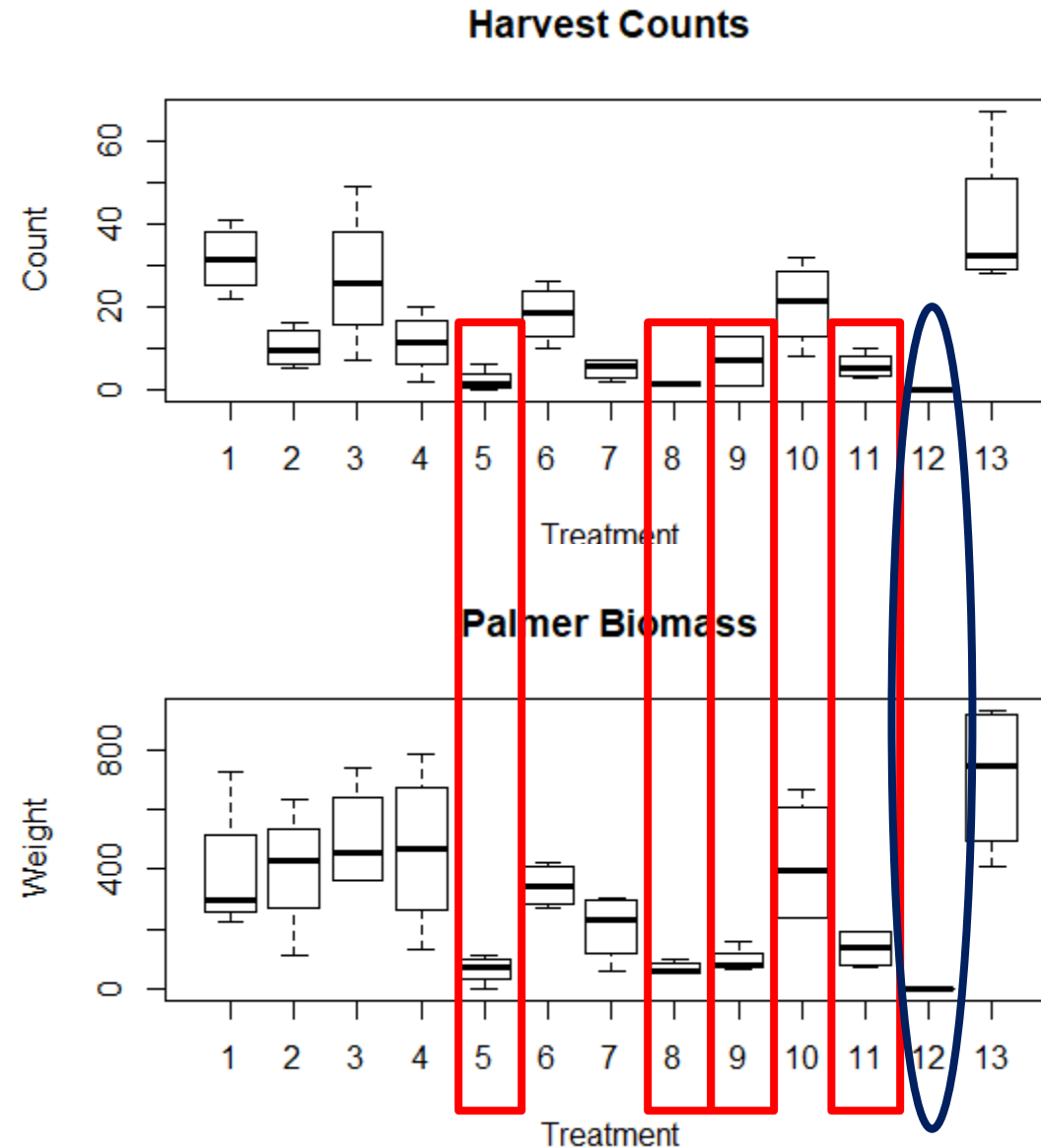
*Treatments 1-11 will received a 28 fl oz application of PowerMax included as a tank mix at each application timing.

Treatment List

- Ethofumesate at 3 pt/A PRE fb glyphosate plus ethofumesate (2 to 4 leaf stage) fb glyphosate plus ethofumesate (6 to 8 leaf stage)
- POST application
 - 2 to 4 leaf stage
 - 4 to 6 leaf stage
 - 2 to 4 / 4 to 6 leaf stage
- Herbicide treatments
 - Warrant, 3 pt/A
 - Ethofumesate, 2 pt/A
 - Warrant + ethofumesate, 1.5 + 2 pt/A

Palmer amaranth number and weight m⁻², Scottsbluff NE in 2018

Num	Treatment
1	Etho/PM/PM, PRE/2/6 TL
2	+ Warrant, 2TL
3	+ Etho, 2TL
4	+ Warr+etho, 2TL
5	+ Warrant, 6TL
6	+ Etho, 6TL
7	+ Warr+Etho, 6TL
8	+ Warr/Warr, 2/6 TL
9	+ Etho/Warr, 2/6 TL
10	+ Etho, 2 TL
11	+ Warr+Etho/Warr+ Etho
12	Weed Free Check
13	Weedy Check



Warrant was effective at reducing density and biomass

Trt #	Treatment	Rate (pt or fl oz/A)	Sugarbeet growth stage (Num leaves)
5	Etho / PM + Etho / Warrant + PM + Etho	3p / 28 + 4 / 3p + 28 + 4 /	PRE / 2-4 / 6-8
8	Etho / Warrant + PM + Etho / Warrant + PM + Etho	3p / 3p + 28 + 4 / 3p + 28 + 4	PRE / 2-4 / 6-8
9	Etho / Etho + PM / Warrant + PM + Etho	3p / 3p + 28 / 3p + 28 + 4	PRE / 2-4 / 6-8
11	Etho / Etho + Warrant + PM / Etho + Warrant + PM	3p / 2p + 1.5p + 28 / 2p + 1.5p + 28	PRE / 2-4 / 6-8

- Ethofumesate applied preemergence
- Warrant applied at the 2 to 4 or 6 to 8 leaf stage
- Etho at 3 pint at the 2 to 4 leaf stage fb Warrant at the 6 to 8 leaf stage
- Ethofumesate + Warrant fb Ethofumesate + Warrant

July 2, 2018



Etho / PM + Etho / Warrant + PM + Etho

July 2, 2018



Untreated Control

June 7, 2018



June 7, 2018



August 14, 2018



Etho / PM + Etho / Warrant + PM + Etho

August 14, 2018



Untreated Control

July 30, 2018



July 30, 2018



Waterhemp control and sugarbeet tolerance, Moorhead and Lake Lillian MN and Amenia ND, 2018

Trt	Treatment	Rate (pt or fl oz/A)	Sugarbeet stage (Num leaves)	AMATA Mrhd Jun 27	AMATA L Lilli Jul 22	Visible Gro Red Amenia	Recov sugar Amenia
				%	%	%	lb/A
1	Etho/PM + Etho/ PM + Etho	3p / 28 + 4 / 28 + 4	PRE / 2-4 / 6-8	88 a	89 a	2 a	11,015
5	Etho / PM + Etho / Warrant + PM + Etho	3p / 28 + 4 / 3p + 28 + 4 /	PRE / 2-4 / 6-8	96 a	98 a	7 a	11,037
8	Etho / Warrant + PM + Etho / Warrant + PM + Etho	3p / 3p + 28 + 4 / 3p + 28 + 4	PRE / 2-4 / 6-8	100 a	100 a	26 b	10,845
9	Etho / Etho + PM / Warrant + PM + Etho	3p / 3p + 28 / 3p + 28 + 4	PRE / 2-4 / 6-8	93 a	95 a	30 bc	11,851
11	Etho / Etho + Warrant + PM / Etho + Warrant + PM	3p / 2p + 1.5p + 28 / 2p + 1.5p + 28	PRE / 2-4 / 6-8	94 a	100 a	35 c	10,497

- Treatments provided greater than 90% waterhemp control at Moorhead and Lake Lillian in 2018
- Growth reduction was observed with repeat applications of Warrant or Warrant + Ethofumesate
- No differences in root yield, sucrose content or recoverable sucrose per acre at Amenia, ND

Other pigweed control options

prevent weeds from making seed

- Electricity [WeedZapClip-NoSound.mp4](#)
 - ground needed to be damp to wet to optimize control
 - window of good operating conditions was very narrow
 - generator pulled down an average horsepower tractor
 - buildup of burned plant exudate on the bar reduced conductivity and weed death
- Bourquin Weed Puller [WeedPuller-Edited-NoSound.mp4](#)
 - Works best under good moisture conditions
 - Large diameter weeds sporadically spaced pull better than narrow diameter weeds at high density

Zero Tolerance Approach

Iowa farmer has established a network of neighbors and other volunteers to help pull Palmer amaranth plants, pile and burn them

Online Resources



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Noxious and Invasive Weed Program



Noxious Weed Law | Noxious Weed List | County Ag Inspectors | Advisory Committee

The Noxious and Invasive Weed Team works with local governments and landowners to protect the environment, public health, public roads, crops, livestock, or other property in Minnesota from the injurious impacts of noxious and invasive weeds. The Noxious Weed Advisory Committee represents a wide range of agencies and organizations. This committee advises the Commissioner of Agriculture about plant species regulation, weed management and implementation of Minnesota's Noxious Weed Law. Enforcement of the Noxious Weed Law is a shared responsibility with local governments.

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❖ Weed of the Month Series



Leafy spurge is one of the weeds featured in this series


www.mda.state.mn.us/weedcontrol

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Weed management

Extension > Agriculture > Crops > Weed management



Herbicides
Herbicide information, calculating herbicide rates and calibrating sprayers

Weed identification
Photos and descriptions of weeds and weed seedlings common in Minnesota crop production

Resistance management
Strategies for diversifying weed control to manage herbicide resistance

Research reports
Weed control research conducted by University of Minnesota scientists and found on the [Applied weed science research website](#).

Applied weed science research
University of Minnesota website

Herbicide management videos
Diversify weed control to fight herbicide resistance

Minnesota Crop News

- 10/12 [Aphid-resistant soybean varieties available for Minnesota](#)
- 11/30 [2016 University of Minnesota's field crop trial results available now](#)
- 11/30 [Nov. 17-20 16 South Central Hay Auction Summary](#)
- 11/08 [Farmers - Get Nitrogen Smart!](#)
- 11/21 [Corn grain trial results and criteria to advance hybrid selection](#)

[More Minnesota Crop News](#)

Upcoming events

Today **Wednesday, December 7**

Wednesday, December 7
CPM Short Course and MCPR Trade Show

Thursday, December 8
CPM Short Course and MCPR Trade Show
Rice County Soil Health

Monday, December 12
1:00pm Nitrogen Smart-Slayton
Conservation Tillage Conference

Tuesday, December 13
Conservation Tillage Conference

Events shown in time zone: Central Time

<http://z.umn.edu/palmerID>

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ICM News

Harvest Considerations to Reduce Weed Seed Movement

September 10, 2018



Harvest is just around the corner for many Iowa farmers and now is a good time to consider options to reduce movement of weed seed between fields with harvest equipment. While we may not think of it during harvest time, combines are extremely effective at transporting seed from field to field. A few precautions leading up to harvest and during harvest can help manage any escaped problem weeds.

Category: Weeds | Herbicide Resistance

Crop: Corn | Soybean

Tags: weed seed movement | weed management | harvest weed management

2018 Labor Day Palmer amaranth tour

September 3, 2018 8:52 AM

It's Labor Day weekend, that means it's time for me to see what's happening at the first three Palmer amaranth infestations in western Iowa. The infestations (Harrison, Fremont, and Page Counties) were first reported in 2013. Harrison County had two fields (approximately 50 acres) with extensive populations, whereas the other two involved scattered plants located primarily outside of production fields.

Category: Weeds

<https://crops.extension.iastate.edu/search/content/palmer%20amaranth>