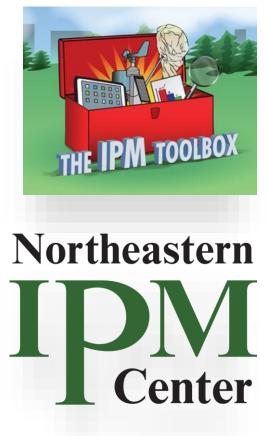
GROW: Bringing Research and Tools for Integrated Weed Management to Farmers

Emily Unglesbee, Michael Flessner, John Wallace



April 8, 2025



United States National Institute Department of of Food and Agriculture Agriculture





Funding Acknowledgment

Northeastern IDN Center



United States National Institute Department of of Food and Agriculture Agriculture This presentation was funded by the Northeastern IPM Center through Grant #2022-70006-38004, Accession Number: 1017389 from the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management, Regional Coordination Program.

Webinar Details

Webinar will end at 12:30pm



available within a week



We Welcome Your Questions

Please submit a question <u>at any time</u> using the Q&A feature to your right at any time If you'd like to ask a question anonymously, please indicate that at the beginning of your query.

> Northeastern IPM Center

Webinar Presenter



- Emily Unglesbee
- Director of Outreach & Extension,
- GROW/Virginia Tech



Webinar Presenter



- Michael Flessner
- Extension Weed Specialist, Virginia Tech



Webinar Presenter

- John Wallace
- Extension Weed Specialist, Pennsylvania State University





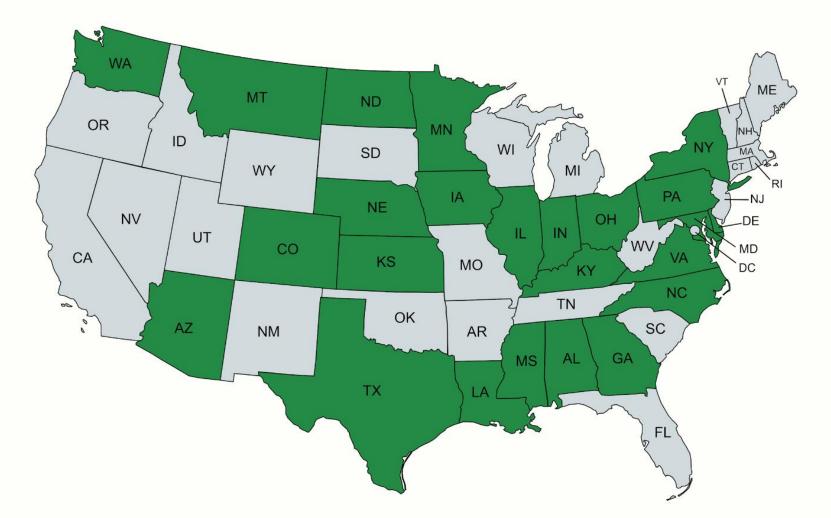
Some Questions for You

Northeastern IPN Center



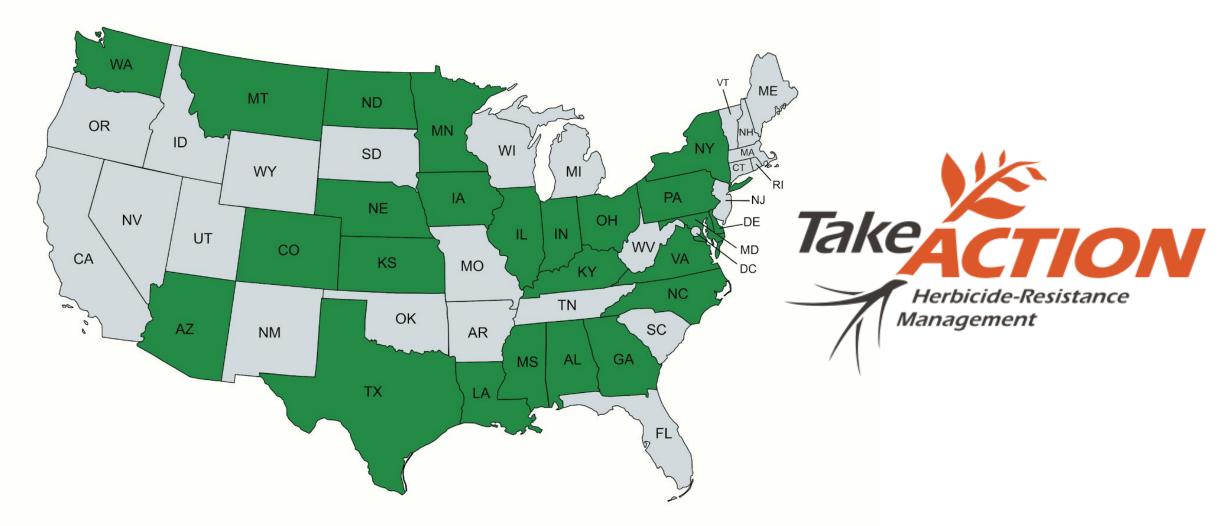
Getting Rid of Weeds (Through Integrated Weed Management)

Where the GROW Team Is



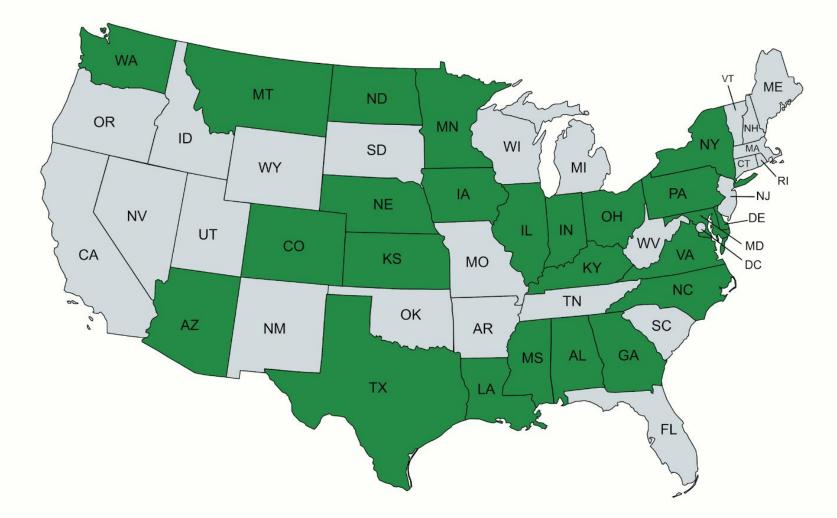
Where the GROW Team Is





Where the GROW Team Is







Partners and Funders









Agricultural Research Service



Bayer CropScience









GROW Research & Projects



Outreach & Extension

Website & Social Media Conference Travel & Site Visits Farmer Forums & Surveys Regional Leads & Advisory Board

Cover Crops

Planting Green

Herbicide Interactions

Long-Term Agricultural

Termination Timing

Research (LTAR)

Getting Rid Of Weeds Through Integrated Weed Management

Harvest Weed Seed Control

Harvest Weed Seed Retention Seed Impact Mills: On-Farm Chaff Lining: On-Farm

Precision IWM & Sustainable Ag

Digital Decision Support Tools Crop, Weed & Cover Crop Mapping National Ag Image Repository Cyberinfrastructure Communities of Practice



Harvest Weed Seed Control



Seed Impact Mills









Weed seed rain

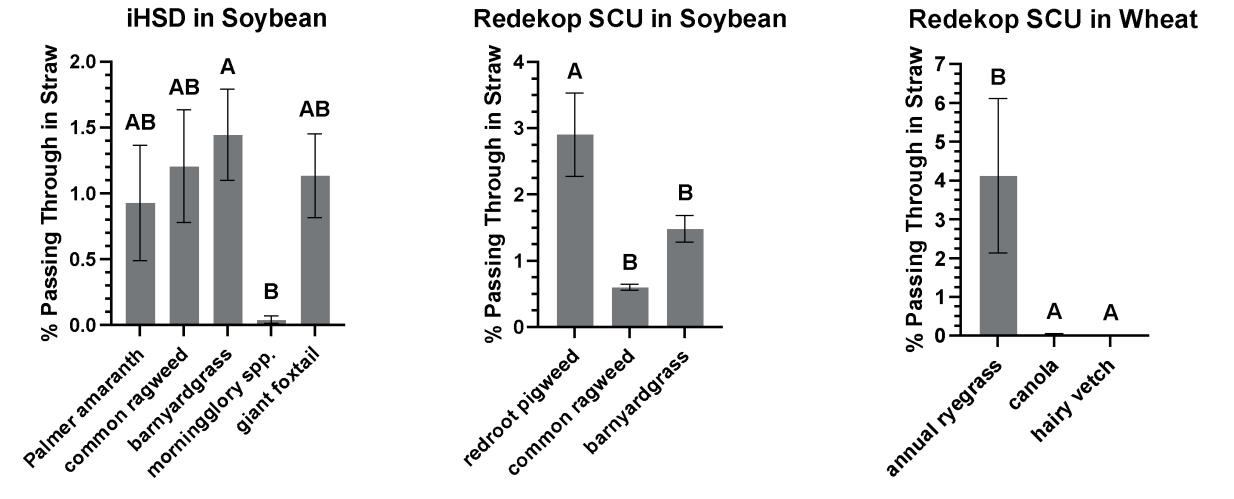
Seed shatter timing of dominant weeds in soybean 9 grass species 13 broadleaf weeds Drivers of seed shatter





Seed Fate





Weed Seed Kill







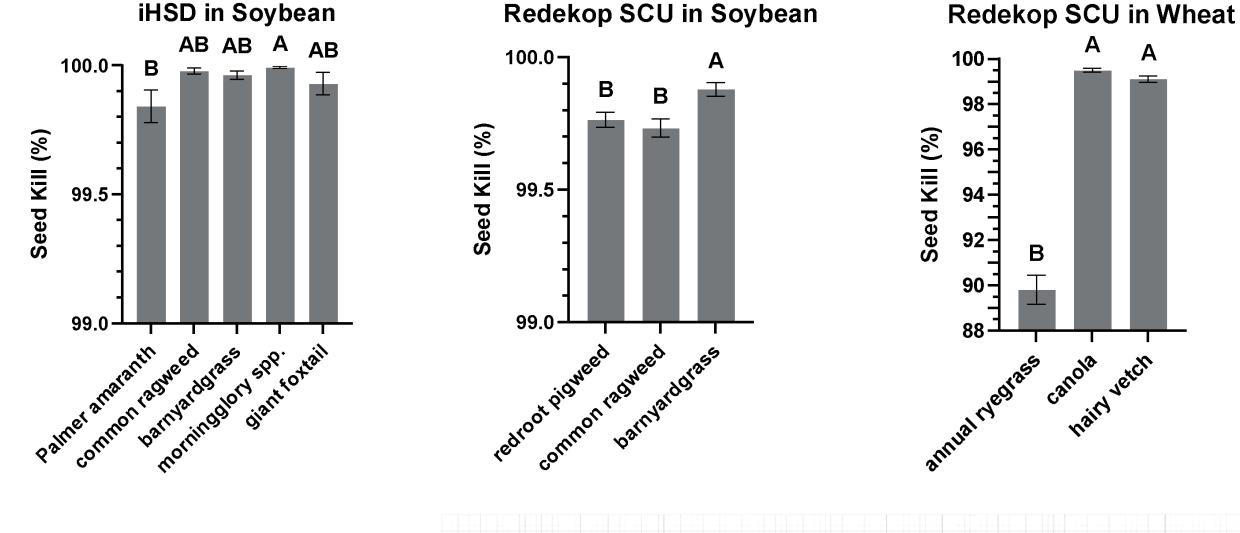
Weed Seed Kill – Test Stands



Species	Redekop SCU	iHSD
	Seed Kill (%)	Seed Kill (%)
Palmer amaranth	99.57 ± 0.10 ABC	99.93 ± 0.02 a
Common ragweed	99.72 ± 0.03 ABC	99.83 ± 0.02 ab
Barnyardgrass	99.31 ± 0.07 C	99.78 ± 0.01 ab
Morningglory spp.	99.77 ± 0.06 AB	99.66 ± 0.04 abc
Giant foxtail	98.61 ± 0.17 D	98.29 ± 0.25 d
Giant ragweed	99.79 ± 0.16 AB	100.0 ± 0 a
Waterhemp	99.78 ± 0.09 AB	99.78 ± 0.04 ab
Johnsongrass	99.93 ± 0.03 A	99.84 ± 0.03 ab
Velvetleaf	99.54 ± 0.08 ABC	99.53 ± 0.06 bc
Redroot pigweed	99.43 ± 0.04 BC	99.30 ± 0.08 c

Weed Seed Kill – with Combine





Current HWSC Research: On-Farm



Seed Impact Mills













WHACK Experiment

<u>W</u>eedseed <u>H</u>arvest <u>A</u>nd <u>C</u>ondense or <u>K</u>ill

Corn/Soybean Rotation





Four treatments: +/- cover crops +/- HWSC

Amaranthus spp.

and other driver weeds

Rotations with Wheat or Rice

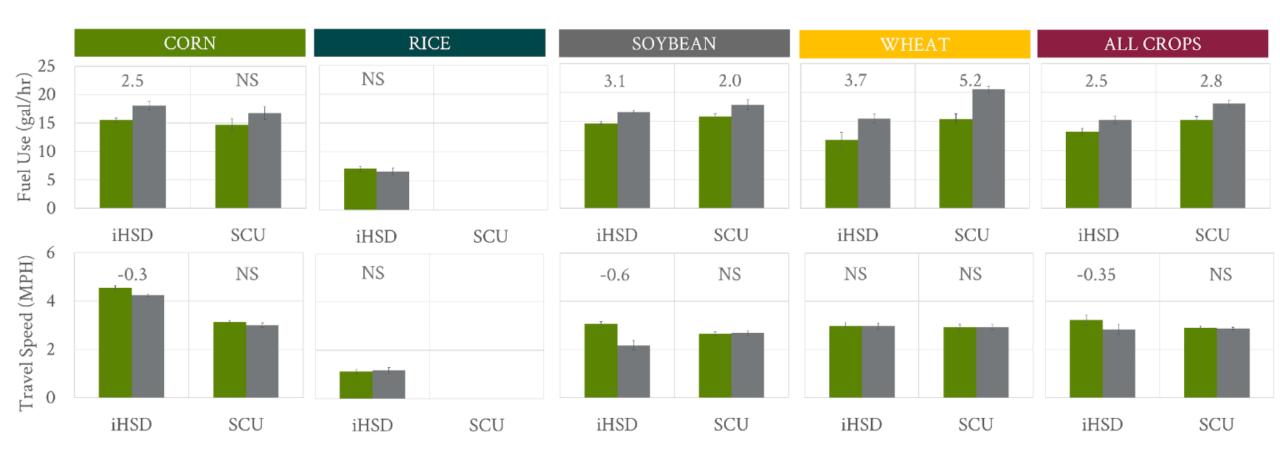


Two treatments: +/- HWSC

Italian ryegrass and other driver weeds

Combine Performance





Mill ON (HWSC)

Mill OFF (Conv.)

NO SEEDS. NO WEEDS

iHSD N = 42 Redekop SCU N = 54



Questions?





Advancing the utility of cover crops for Integrated Weed Management

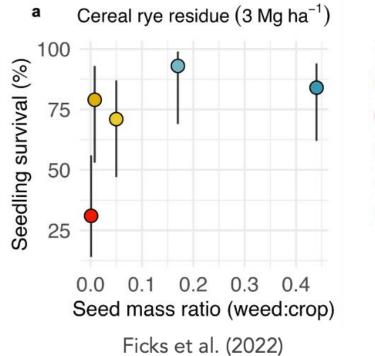
Planting green

Emerging agronomic practice of delaying CC termination until at or after cash crop planting.





Planting green. Gains in cover crop biomass increases weed suppression potential but is species specific.



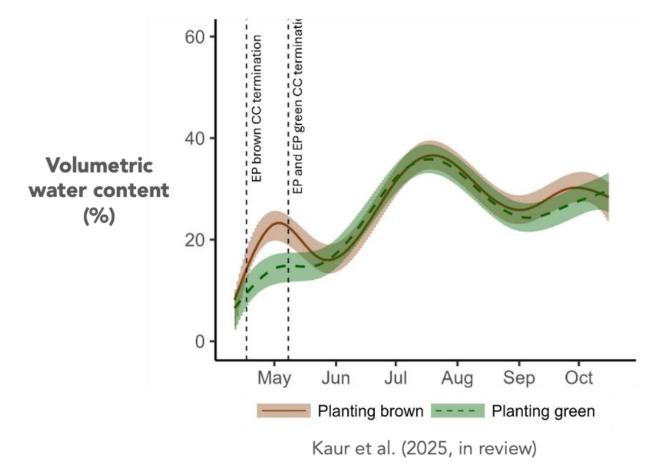
	palmer amaranth
-	painter amaranan
0	common ragweed
0	velvetleaf
0	morningglory
\circ	burcucumber





NO SEEDS. NO WEEDS

Planting green. Delayed termination can reduce early-season soil moisture

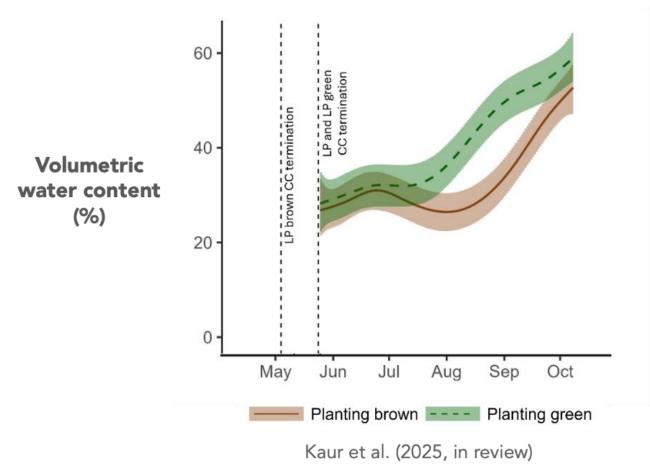






NO SEEDS. NO WEEDS

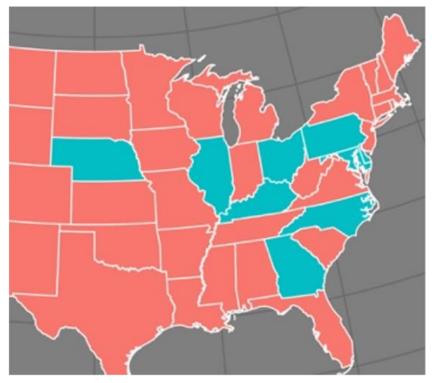
Planting green. Delayed termination can conserve soil moisture during reproductive phase



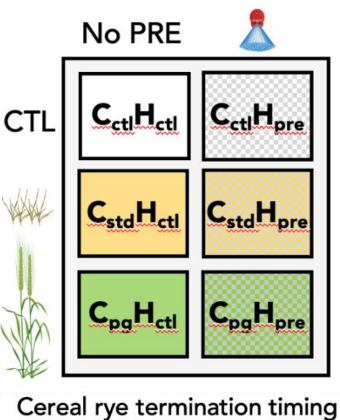




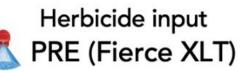
GROW-Legacy Project (2023-2025)



GROW Legacy Experiments 54 site-years (9 locations x 2 crop sequences x 3 years)



14 DPP 📃 1 DAP





Weed populations at key decision points





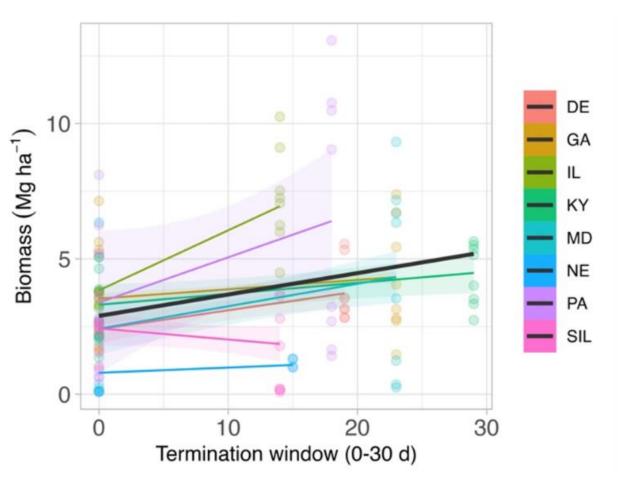
Management questions addressed



Average biomass gains when delaying termination across regions?

When do biomass gains provide significant gain in weed suppression?

How do weed species responses differ in relationship to biomass?

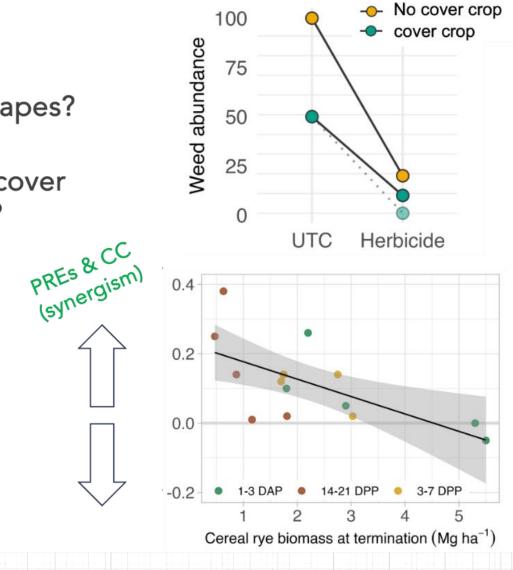


Management questions addressed

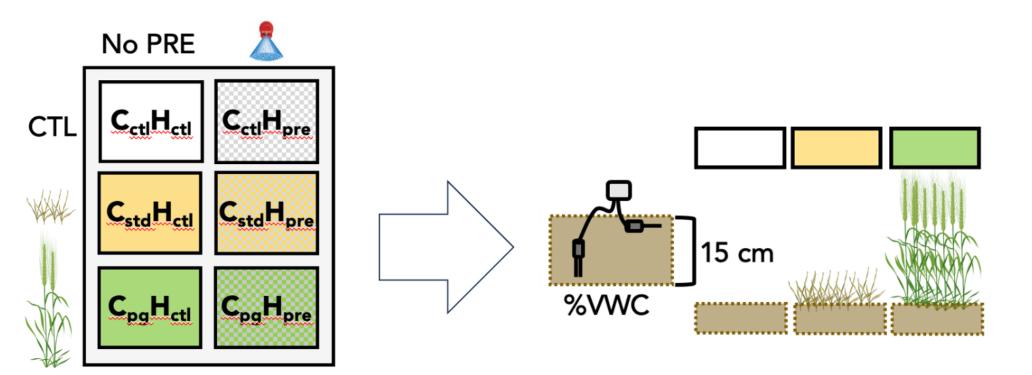
G

Does planting green permit reduced herbicide inputs while limiting weed escapes?

Are there conditions in which PREs and cover crops produce synergistic weed control?



Adaptive soil-water management?



Cereal rye termination timing



Herbicide input PRE (Fierce XLT)

Management questions addressed

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-20 -20 -20 -20 -20

-40

-50

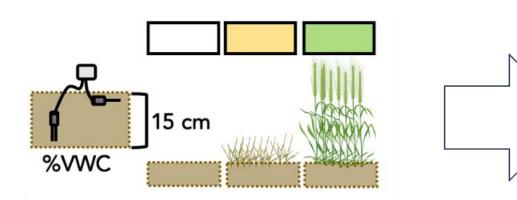
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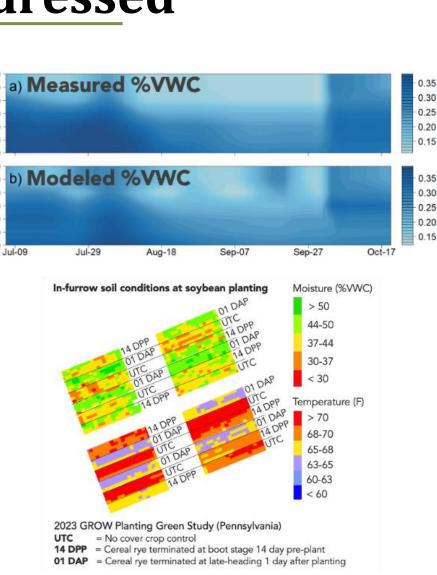
-60

-20



Can we use process-based models to predict effects of termination timing on water use & availability?

Is early season soil moisture dynamics a predictor of weed emergence patterns?







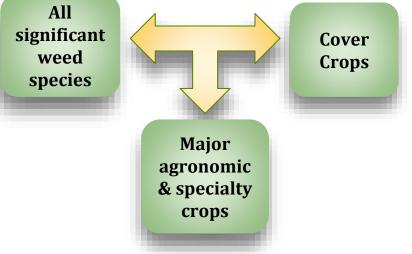
Precision Ag & Tech Development

National Agricultural Image Repository

Addresses a national need for highresolution, annotated imagery of agricultural plants

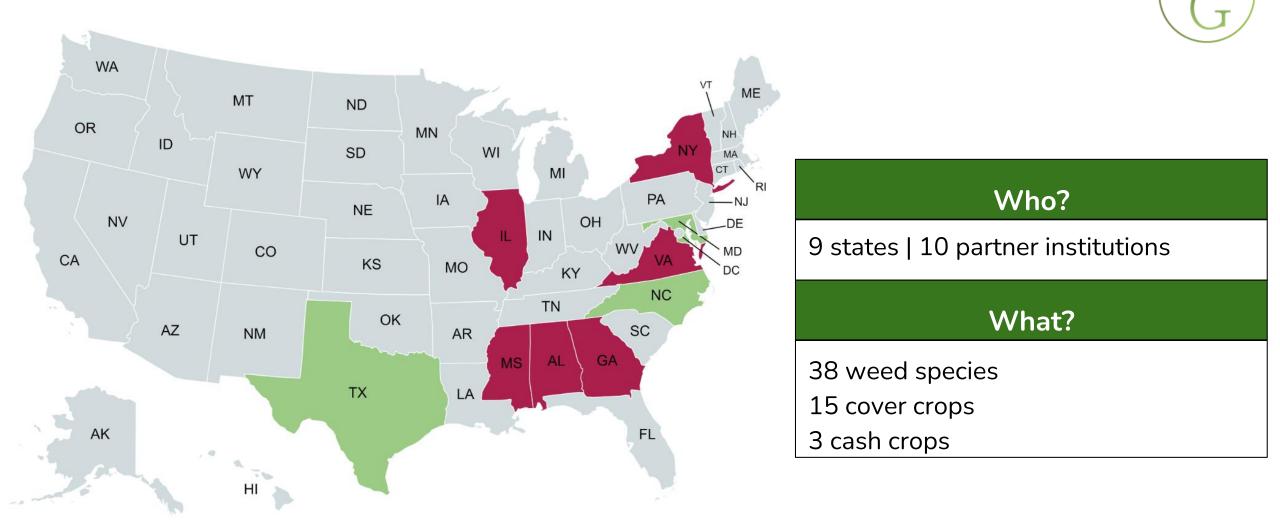
Data collection follows protocols for automated annotation and segmentation and covers field and semi-field protocols

Ultimate goal of developing a database of:





Ag Image Repository

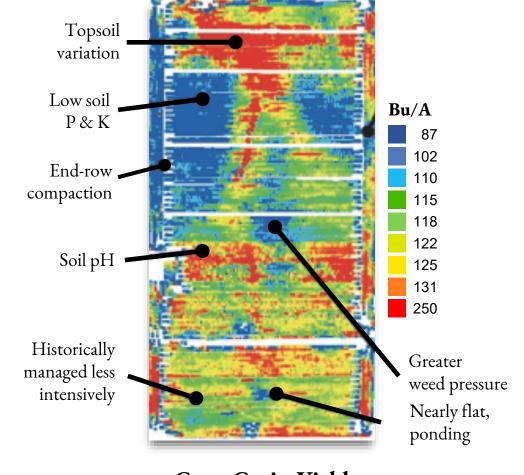


Ag Image Repository participating states 2023

AgIR Field
AgIR Semi-Field and Field

Cover crop performance varies between and among fields





High spatial variability (drainage issues) Corn Grain Yield USDA-ARS, Centralia, MO

Weeds3D: Low-Cost Platforms for Weed Mapping & Biomass Estimation

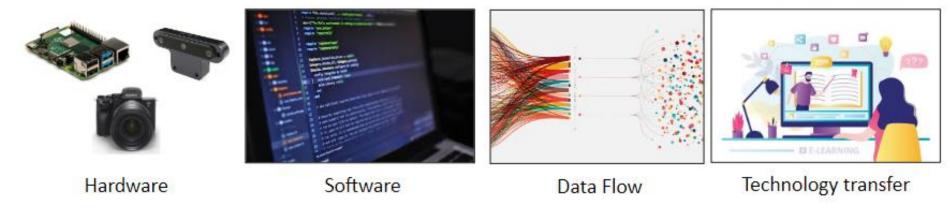
- GoPro structure-from-motion approach
- OAK-D stereocamera approach





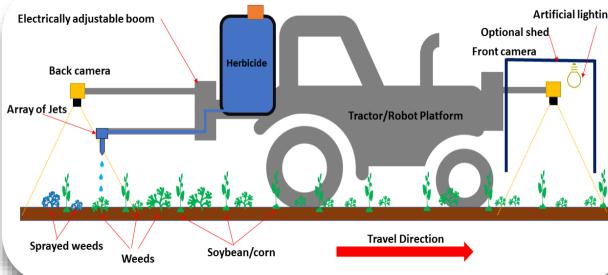


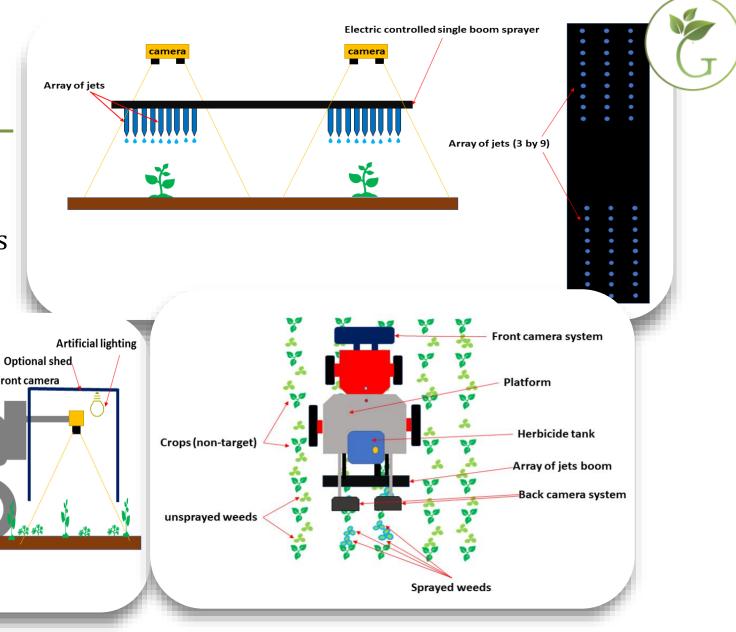




Precision Weed Management

Integrating real-time mapping and identification with precision chemical, physical, or thermal management tools







Questions?





GROW Outreach Platforms

BOUT \star integrated weed management \star media kit news portal $| extsf{Q} |$ SEAF

GROY

Getting Rid Of Weeds Through Integrated Weed Management

We are a scientist-led network coordinating research to help farmers across the U.S. fight herbicide-resistance with a greater diversity of weed control strategies to complement chemical use.

GROW aims to provide information on tools such as cover crops, increased crop competition, harvest weed seed control, and more.

Videos, Photos, Charts, Digital Tools & Text

60+20+LibNews20+(4)	reed orary 0+ eds)
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GROW Website



- <u>www.growiwm.org</u>
- Subscribers:
 - Farmers
 - Crop Advisors
 - Media Outlets
 - Ag Scientists
 - Government organizations
- Weed Management Toolbox
- Weed Identification Pages
- IWM Definitions, Resources & Tools
- Herbicide Resistance Pages
- News Page updated weekly with IWM research & news
- Newsletter: The Weekly Update from GROW



NO SEEDS. NO WEEDS

GROW



GROW IWM @growiwm7083 145 videos



GROW.IWM @GetRidOfWeeds



Weekly/daily posts on news, events & travel & social media campaigns

GROW Social Media Platforms

Linked in

GROW (Getting Rid of Weeds) Weekly posts on news/research



@grow.iwm Weekly photos on news & events & social media campaigns GROW IWM Weekly posts on news & events & social media campaigns

Educational webpages





Farmer-Led Education



G

GROW Farmer Case Studies

Short videos showcasing farmers using innovative weed management tactics

GROW Farmer Forums

Educational webinars featuring a farmer panel of growers with experience with different IWM tactics



Both charts detail the effect of common crop & weed management tactics on individual weed species:

Crop Rotation

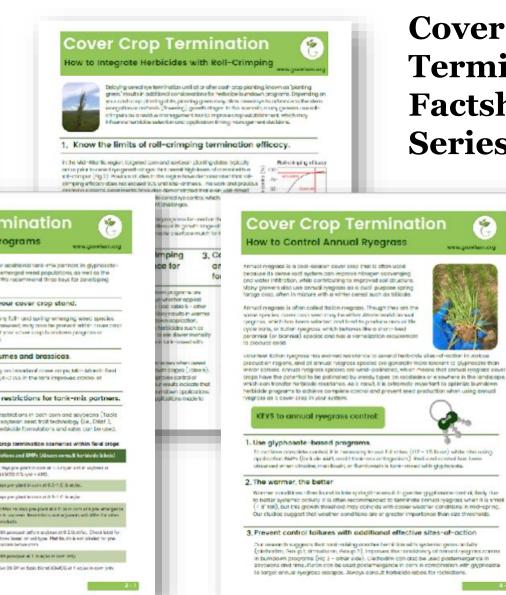
- •Cover Crop Use
- Tillage and Cultivation
- Planting Date & Methods
- Fertility Practices
- Harvest Weed Seed Control
- •Chemical Use











Cover Crop Termination Factsheet **Series**

10

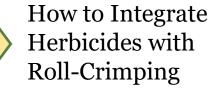
www.upowiwm.org



Herbicide **Application BMPs**



How to Select Herbicide Programs





How to Control **Annual Ryegrass**



Coming Soon: Check My Herbicide Plan



Field Location						
State	Select State 🗸	EFFECTIVE MODE OF ACTION				
County	Select County 🗸	Burndown				
		TOTAL EFFECTIVE MODE OF ACTION		1	2	1
ack Continue		Herbicide	Group #	Palmer amaranth	Common waterhemp	Horseweed / Mares
Continue		2,4-D (2,4-D)	4	×	~	~
		Roundup (glyphosate)	9	×°	~	×°
		Postemergence				
		TOTAL EFFECTIVE MODE OF ACTION		0	1	0
		Herbicide	Group #	Palmer amaranth	Common waterhemp	Horseweed / Mares

New Take Action Website Home





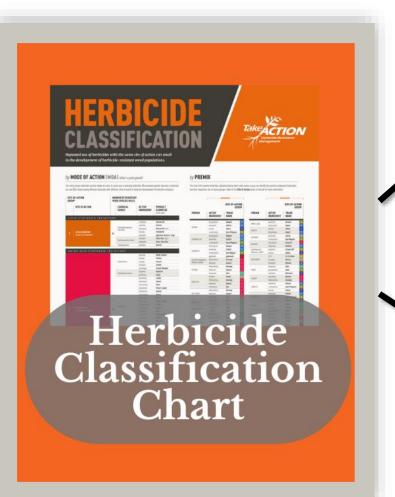
GROW is now managing and maintaining outreach & comms for the soy checkoff's longstanding herbicide-resistance management program, Take Action.

ONLY weed-specific Take Action content (no insect or diseasespecific info) has moved to a new home on the GROW website.





Take Action Herbicide Classification Chart



Each Site of Action/Herbicide Group, with all active ingredients within each listed

Each available herbicide premix, broken down by active ingredient & Site-of-Action Group Number

н	OTOSYNTHESIS INH	вно	(S			
			Amide	propanil	SuperWham	
				atrazine	AAtrex, others	
			Trincing	ametryn	Evik Pramitol	
			Triazine	prometon prometryn	Caparol	
5 (t	PHOTOSYSTEM II INHIBITORS			simazine	Princep	
	(D1 Serine 264 binders and	28	Triazinone	hexazinone	Velpar	
	non-histidine 215 binders)			metribuzin	Metribuzin, others	
			Uracil	terbacil	Sinbar	
				diuron Direx, Karm fluometuron Cotoran		
			Urea	linuron	Cotoran Lorox, Linex	
				tebuthiuron	Spike	
	PHOTOSYSTEM II INHIBITORS		Benzothiadiazinone	bentazon	Basagran, others	
	(D1 Histidine 215 binders)	1	Nitrile	bromoxynil	Maestro, Moxy, o	
			Phenyl pyridazine	pyridate	Tough	
0	TROGEN METABOLIS GLUTAMINE SYNTHETASE INHIBITOR	3	Phosphinic acid	glufosinate	Liberty, Rely, othe	
			——сомі	PONENT	TION	
	PREMIX		COMI	SITE-OF-AC		
	PREMIX		IVE	SITE-OF-AC GF TRADE		
	PREMIX	ING	IVE	SITE-OF-AC GF TRADE		
		bicyc	TIVE REDIENT	SITE-OF-AC GF TRADE NAME	ROUP	
	PREMIX	bicyc	IVE REDIENT lopyrone trione	SITE-OF-AC GF TRADE NAME	ROUP 27	
		bicyc meso atrazi	IVE REDIENT lopyrone trione	SITE-OF-AC GF TRADE NAME Optogen Callisto	27 27 5	
		bicyc meso atrazi s-me	IVE REDIENT lopyrone trione ine	SITE-OF-AC GF TRADE NAME Optogen Callisto AAtrex	27 27 5	
		bicyc meso atrazi s-me bicyc	IVE REDIENT lopyrone trione ine tolachlor	SITE-OF-AC GF TRADE NAME Optogen Callisto AAtrex Dual II Magnum Optogen Callisto	27 27 27 5 15 27 27 27	
	ACURON	bicyc meso atrazi s-me bicyc meso	IVE REDIENT lopyrone trione ne tolachlor lopyrone	SITE-OF-AC GF TRADE NAME Optogen Callisto AAtrex Dual II Magnum Optogen	27 27 5 15 27 27 27 27 27	
	ACURON	bicyc meso atrazi s-me bicyc s-me bicyc	IVE REDIENT lopyrone trione tolachlor lopyrone tolachlor lopyrone	SITE-OF-AC GF TRADE NAME Optogen Callisto AAtrex Dual II Magnum Optogen Callisto Dual II Magnum Optogen	27 27 27 5 15 27 27 27 27 27 27	
	ACURON	bicyc meso atrazi s-me bicyc meso s-me bicyc	IVE REDIENT	SITE-OF-AC GF TRADE NAME Optogen Callisto AAtrex Dual II Magnum Optogen Callisto Dual II Magnum Optogen Callisto	27 27 5 15 27 27 27 27 27 27 27 27	
	ACURON ACURON FLEXI	bicyc meso atrazi s-me bicyc meso s-me bicyc	IVE REDIENT lopyrone trione tolachlor lopyrone tolachlor lopyrone	SITE-OF-AC GF TRADE NAME Optogen Callisto AAtrex Dual II Magnum Optogen Callisto Dual II Magnum Optogen	27 27 27 5 15 27 27 27 27 27 27	



Free Print Orders



Take Action Herb of Action Look-up

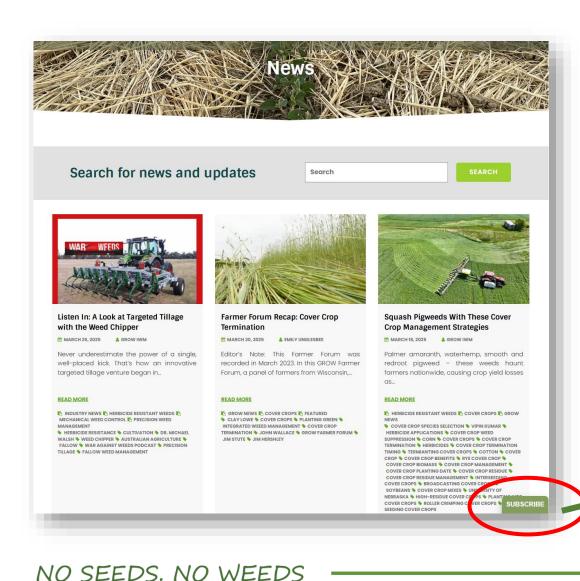
ction Herbicide Site on Look-up Tool	Site of Action: Photosystem II Inhibitors (Serine 264 binders) (Group 5) Photosynthesis Inhibitors Trade Name	+
	Active Ingredients	+
	⊘ atrazine	
Take		
HERBICIDE-RESISTANCE MANAGEMENT	Site of Action: Very Long-Chain Fatty Acid Synthesis Inhibitors (Group 15) Seedling Shoot Grouph Inhibitors	
	Trade Name	+
	Active Ingredients	+
Herbicide Lookup Tool	⊘ s-metolachlor	
OR ACTIVE INGREDIENT		
	Site of Action: HPPD Inhibitors (Group 27)	
	Trade Name	+
	Active Ingredients	+
	bicyclopyrone	

NO SEEDS. NO WEEDS

ACURON

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- One to two news stories per week.
- The Weekly Update from GROW goes out every Wednesday morning

		Other	SIGN UP
SIG	NUP		Government organization
her		Farm Advisor	Media
	organization	🗆 Student	🗆 Farmer
entist		I am a:	
m Advisor	Media		
a: Ident	■ Farmer	Email Address *	
il Address *		Last name	
		First name	
name		your inbox.	strategies that really work, light to
name			Take Action community to receive strategies that really work, right to
	ction community to receive gies that really work, right to		



Questions?



Some Questions for you

Northeastern IPN Center



Upcoming Webinars

https://www.northeastipm.org/ipm-in-action/the-ipm-toolbox/

Pesticide Label Changes Brought On by the Endangered Species Act April 29, 2025 – 11:00 a.m. (eastern) Presenters: Niranjana Krishna, Kurt Vollmer, Bill Chism, Mark VanGessel



United States National Institute Department of Food and Agriculture Agriculture



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"Find a Colleague" site http://neipmc.org/go/colleagues



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Recording of IPM Toolbox Webinar Series



Past recordings and today's Webinar will be available to view **on demand** in a few business days.



http://www.neipmc.org/go/ipmtoolbox

You can watch as often as you like.



United States National Institute Department of of Food and Agriculture Agriculture

