



Mustard Cover Crops for Vegetable Crops

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Michigan Vegetable Council



OUTLINE

- 1. Oomen Brothers Farm (Ralph Oomen)
 - A. Overview
 - **B.** Cover Cropping
- 2. Mustard Cover crop research (Dan Brainard)
 - A. Impacts on carrot quality and yield
 - B. Impacts on weeds and nitrogen
- 3. Managing Mustards for Biofumigation (Ben Werling & Video)
- 4. Q & A

OOMEN BROTHERS FARM

1.

OOMEN BROTHERS FARM OVERVIEW

- 1600 Acres; Oceana and Mason County
- Major Crops
 - Asparagus (fresh market)
 - Carrots
 - Zucchini
 - Other vegetables: Broccoli; Winter squash; Snap beans
 - Field crops: Wheat, Corn, Soybeans
- Markets: Mostly Processing
 - Michigan Freeze Pack
 - Gerber Foods
 - Arbre Farms



COVER CROPS ON OOMEN FARMS RYE IN ASPARAGUS



COVER CROPS ON OOMEN FARMS RYE IN ASPARAGUS







Rye may delay spear emergence and reduce risk of freeze damage

COVER CROPS ON OOMEN FARMS RYE IN ASPARAGUS





Rye protects spears from sand abrasion and wind damage

HIGH-BOY FOR COVER CROP SEEDING





COVER CROPS ON OOMEN BROTHERS FARM CARROT WINDBREAKS





- Carrots emerge in strips
- Cover crop killed with graminicide









OTHER COVER CROPS WE ARE TRYING



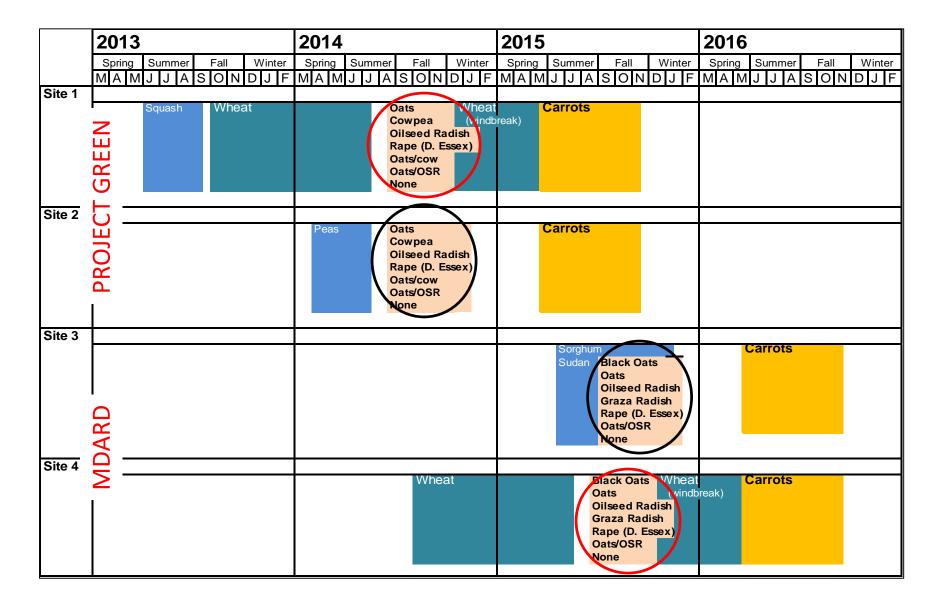
COVER CROPPING RESEARCH

2.

Cover Crops Before Carrots

- Objectives: Evaluate the effects of cover crops on
 - 1. Nematodes
 - 2. Weeds
 - 3. Nitrogen
 - 4. Carrot Quality and Yield
- Funding:
 - MCC; MVC; Project GREEEN (2014 Covers → 2015 Carrots)
 - MCC; USDA-MDARD (2015 Covers → 2016 Carrots)
- <u>Collaborators</u>: Brainard, Baas, Melakeberhan, Werling, Hayden, Noyes, Grabau, Oomen Brothers Farm, Oomen Farms, Shafer Farms, Karnemaat Farms

On-farm trials



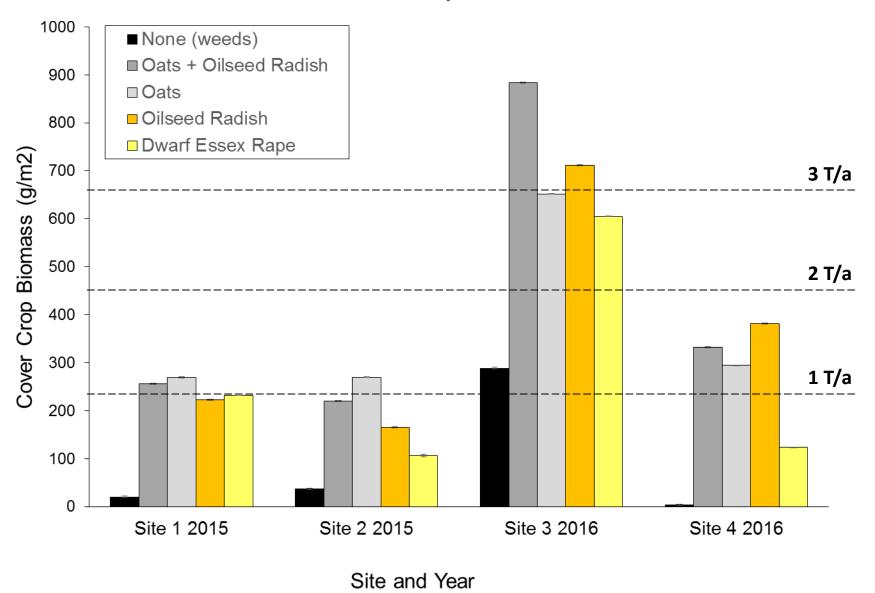








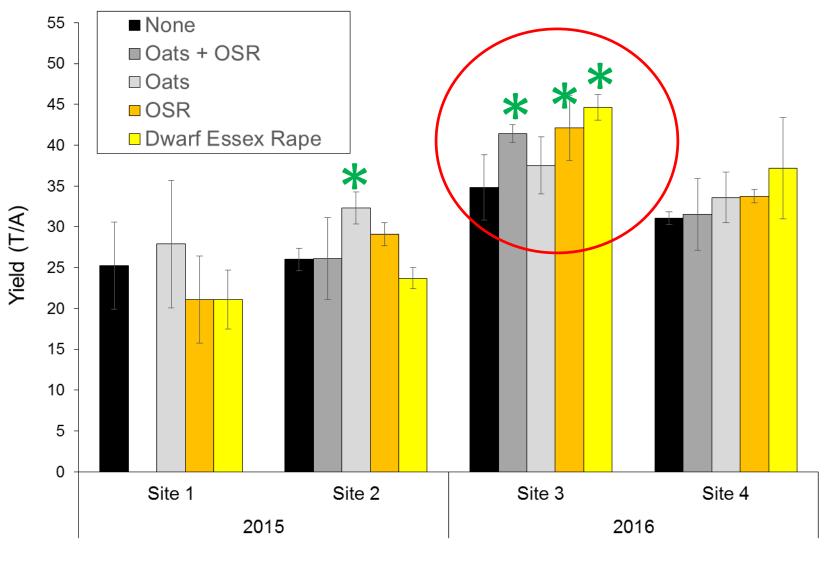
Cover Crop Biomass





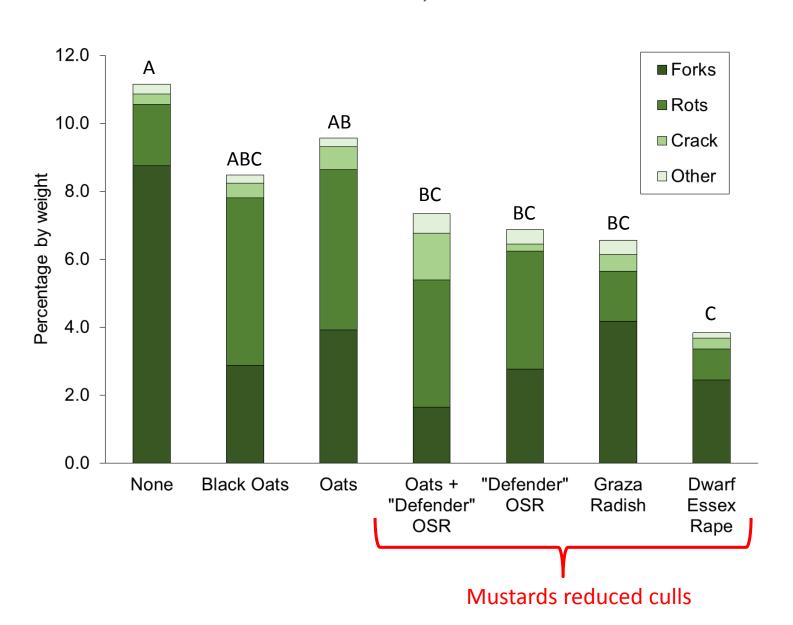


Carrot Marketable Yield



Site and Year

Carrot Cull Percentage Site 3, 2016

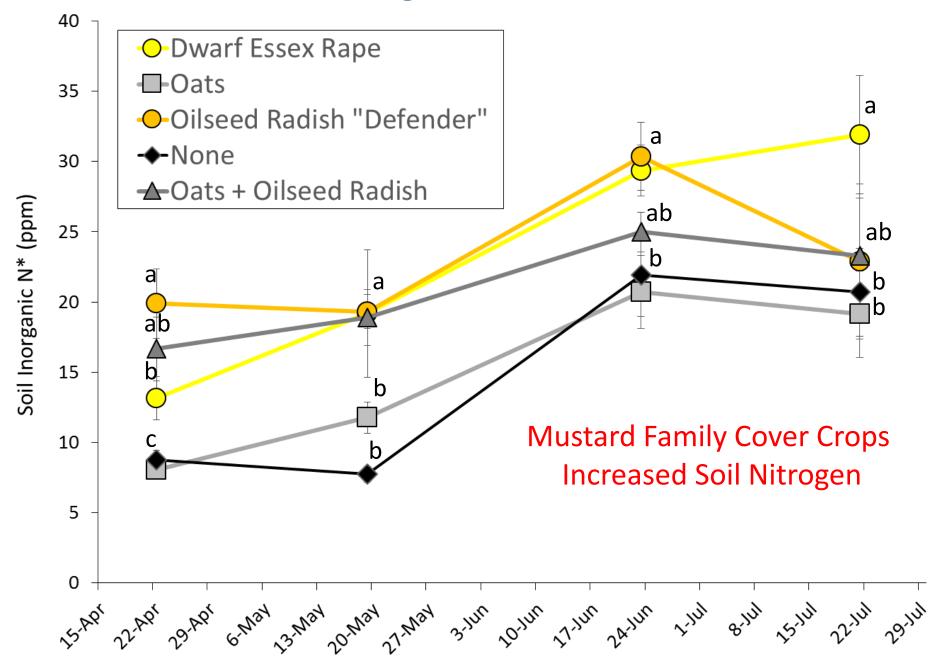


Nematode Effects?

	Bacterivores			Fungivores			
Cover Crop	Oct. 2014†	Apr. 2015	Jul. 2015	Oct. 2015	Oct. 2014	Apr. 2015	Jul. 2015
Control	98 ± 25	29 ± 2	45 ± 10 c	43 ± 9	22 ± 7	3 ± 2	15 ± 6
Oats	95 ± 12	60 ± 5	102 ± 14 ab	72 ± 18	25 ± 11	7 ± 2	27 ± 6
Oats+'Defender'	92 ± 10	48 ± 14	71 ± 2 <u>abc</u>	89 ± 40	22 ± 5	7 ± 2	18 ± 1
'Defender' Radish	97 ± 11	51 ± 13	118 ± 21 a	55 ± 15	9 ± 2	10 ± 3	16 ± 1
Dwarf Essex Rape	94 ± 10	64 ± 24	56 ± 20 bc	62 ± 24	19 ± 7	6 ± 2	11 ± 1
	Herbivores				Omnivores and Predators		
Control	12 ± 3 b	3 ± 0	8 ± 4 b	22 ± 8	14 ± 4	3 ± 1	5 ± 2
Oats	18 ± 4 b	6 ± 2	22 ± 7 b	37 ± 10	11 ± 2	2 ± 1	3 ± 1
Oats+'Defender'	26 ± 8 b	2 ± 1	30 ± 5 b	51 ± 17	15 ± 7	4 ± 1	7 ± 3
'Defender' Radish	45 ± 10 a	5 ± 1	59 ± 15 a	36 ± 9	14 ± 1	2 ± 0	2 ± 1
Dwarf Essex Rape	29 ± 5 ab	7 ± 3	15 ± 2 b	35 ± 7	8 ± 4	1 ± 0	3 ± 1
	Root-lesion nematode						
Control	12 ± 3 b	2 ± 0	7 ± 4 b	20 ± 7			
Oats	17 ± 3 b	5 ± 1	21 ± 6 b	35 ± 10			
Oats+'Defender'	25 ± 9 ab	2 ± 1	28 ± 5 b	50 ± 17			
'Defender' Radish	43 ± 10 a	4 ± 1	57 ± 15 a	34 ± 9			
Dwarf Essex Rape	26 ± 5 ab	6 ± 3	15 ± 2 b	24 ± 6	_		

Grabau, Z.J., Maung, Z.T.Z., Noyes, D.C., Baas, D.G., Werling, B.P., Brainard, D.C. and Melakeberhan, H., J. of Nematology 48: 325.

Soil Nitrogen, Site 3, 2016



Effects on Weeds, Site 3, 2016



Summary of Mustard Effects Oomen Brothers

1. Carrots

Improved yields Reduced culls (forks)

2. Nitrogen

Improved N retention

3. Weeds

Suppressive; especially of winter annuals

Ongoing Questions

Nematodes &

Diseases

Inconsistent & Complicated

How can we improve consistency of biofumigation?

MANAGING MUSTARDS FOR BIOFUMIGATION

3.

Getting the Most Out of Your Mustard Cover Crop



What are your goals for your cover crop?

Cover	Erosion fighter	Building soil organic matter	Seed cost
Mustard	Very good	Very good	\$37/acre (8#)
Rye	Excellent	Excellent	\$16/acre (2 bu)
Oats	Very good	Good	\$7.50 (2 bu)

From managing cover crops profitably, 3rd ed.

So why the interest in mustards?

Biofumigation: Mustards produce glucosinolates, which break down into chemicals with pesticidal activity

Biofumigation video available at:

https://www.youtube.com/watch?v=jePUyzjXl

mw&feature=youtu.be







Grower Cooperators

Ralph Oomen

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Josh Dykstra

Corey Noyes

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Weeds, Site 3, 2016

_	Weeds				
Cover Crop	Winter annual (% cover)	Powell amaranth (#/m²)	Common lambsquarters (#/m²)		
		#/m2			
None	55 ab	53 ab	123 ab		
Black Oats	28 cd	12 bcd	38 c		
Oats	33 cd	3 cd	38 c		
Oats + "Defender" OSR	3 e	2 cd	17 c		
"Defender" OSR	0 e	3 cd	12 c		
Graza Radish	5 e	17 bcd	27 c		
Dwarf Essex Rape	15 de	23 bc	14 c		

Mustard Family Cover Crops Reduced weeds