Can Eptam Increase the Activity of POST Herbicides?

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Inspiration

- Colorado Dry Bean meeting
- Interaction between Preemergence Ethofumesate and Postemergence Glyphosate (Kniss and Odero 2013)
- Ethofumesate followed by glyphosate increased efficacy compared to glyphosate alone
  - Increased retention, absorption
- Similar results from other lipid synthesis inhibitor herbicides???

Introduction

- ND produces the most dry edible beans and sunflower in the United States
- Eptam registered in dry edible bean, sunflower, safflower, sugarbeet, potato, and forage legumes (alfalfa or trefoil)
- In ND, Eptam alone provides poor to fair weed control
- All crops have limited POST herbicide options
  - Increase efficacy of available POST herbicides

Adjuvant Effects

- The influence of EPTC on external foliage wax deposition (Gentner 1966)
- Wax production reduced 50%
- Water contact angle reduced from 148˚ to 94˚
- Surface area contact increased 277%

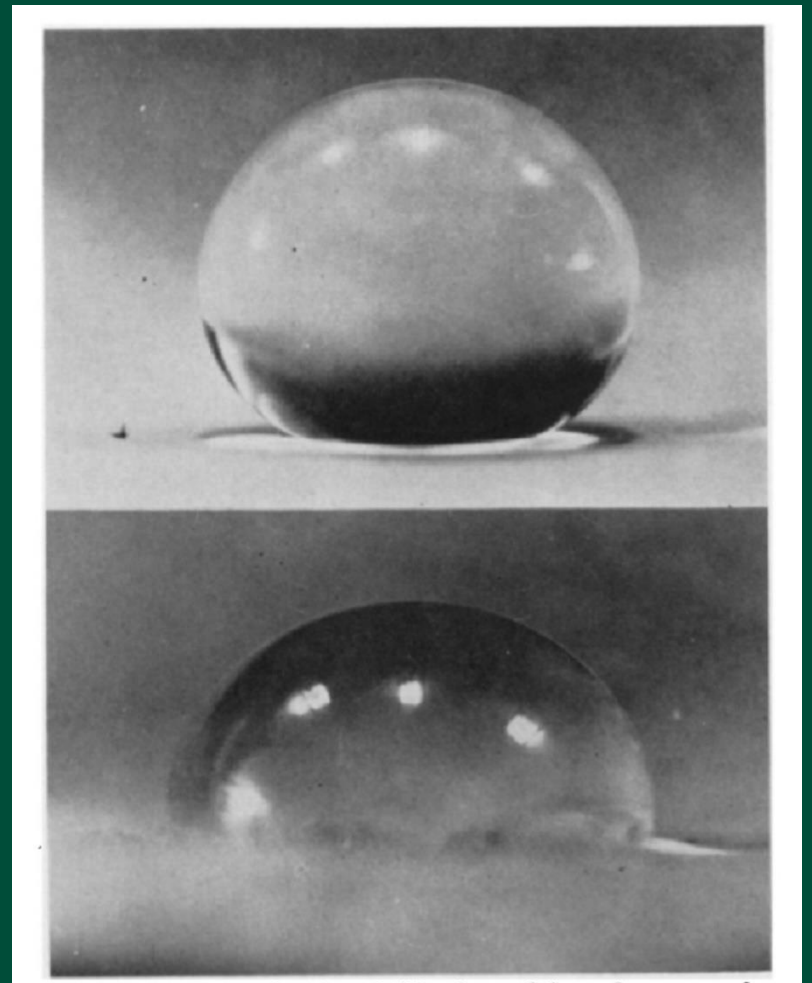

Figure 4. Water droplets 1/78 of a ml in volume on the surface of an untreated (upper) and EPTC-affected (lower) cabbage leaf. Stroboscopic lights were used to minimize the influence of evaporation on droplet size during the photographic procedure.

Study #1 Objectives

- Objective: Test of concept
- PRE applied Nortron (0.5 & 1 pt) and Eptam (3.5 & 4.5 pt)
- POST applied Basagran (2 pt), Permit (0.67 oz), and Flexstar (0.75 pt)
- Weeds: Lambsquarters, Common Ragweed
- Mayville, ND

Study #1 Results

No	Treatment	Rate	14 DAT		28 DAT	
			Lambsquarters	Common Ragweed	Lambsquarters	Common Ragweed
		pt/A	%		%	
1	Nortron + Sonalan (PPI)	0.5 + 2	**35**	**35**	**28**	**28**
2	Nortron + Sonalan (PPI)	1 + 2	**35**	**35**	**30**	**30**
3	Eptam + Sonalan (PPI)	3.5 + 2	**52**	**52**	**43**	**43**
4	Eptam + Sonalan (PPI)	4.5 + 2	**37**	**37**	**40**	**40**
5	Sonalan (PPI) **fb** Basagran + MSO (POST)	2 **fb** 2	**73**	**73**	**50**	**50**
6	Nortron + Sonalan (PPI) **fb** Basagran + MSO (POST)	0.5 + 2 **fb** 2	**80**	**80**	**63**	**63**
7	Nortron + Sonalan (PPI) **fb** Basagran + MSO (POST)	1 +2 **fb** 2	**68**	**68**	**60**	**60**
8	Eptam + Sonalan (PPI) **fb** Basagran + MSO (POST)	3.5 + 2 **fb** 2	**95**	**95**	**80**	**90**

No	Treatment	Rate	14 DAT		28 DAT	
			Lambsquarters	Common Ragweed	Lambsquarters	Common Ragweed
		pt/A	%		%	
10	Sonalan (PPI) **fb** Permit + MSO (POST)	2 **fb** 0.67 oz	**90**	**90**	**62**	**78**
11	Nortron + Sonalan (PPI) **fb** Permit + MSO	0.5 + 2 **fb** 0.67 oz	**91**	**91**	**79**	**83**
12	Nortron + Sonalan (PPI) **fb** Permit + MSO	1 + 2 **fb** 0.67 oz	**95**	**95**	**95**	**88**
13	Eptam + Sonalan (PPI) **fb** Permit + MSO (POST)	3.5 + 2 **fb** 0.67 oz	**93**	**93**	**97**	**95**
14	Eptam + Sonalan (PPI) **fb** Permit + MSO (POST)	4.5 + 2 **fb** 0.67 oz	**99**	**99**	**96**	**97**
15	Sonalan (PPI) **fb** Flexstar + MSO (POST)	2 **fb** 0.75	**92**	**92**	**60**	**80**
16	Nortron + Sonalan (PPI) **fb** Flexstar + MSO (POST)	0.5 + 2 **fb** 0.75	**96**	**96**	**50**	**85**
19	Nortron + Sonalan (PPI) **fb** Flexstar + MSO (POST)	1 + 2 **fb** 0.75	**99**	**99**	**72**	**92**
18	Eptam + Sonalan (PPI) **fb** Flexstar + MSO (POST)	3.5 + 2 **fb** 0.75	**99**	**99**	**93**	**98**

Study #1 Summary

- Nortron and Eptam alone provided poor control of lambsquarters and common ragweed
- POST applied herbicide efficacy was improved following PPI herbicides
- Eptam increased weed control more compared to Nortron
- Improved efficacy was more apparent at 28 DAT

Study #2 Objectives

- Can reduced rates of Eptam be used to achieve acceptable (>80%) control?
- PRE applied Eptam (1, 2, 3 pt)
- POST applied Basagran (2 pt), Permit (0.67 oz), and Flexstar (0.75 pt)
- Weeds: redroot pigweed, lambsquarters, common ragweed
- Mayville, ND

Study #2

No	Treatment	Rate	14 DAT			28 DAT		
			Redroot Pigweed	Lambsquarters	Common Ragweed	Redroot Pigweed	Lambsquarters	Common Ragweed
		pt/A		%			%	
1	Eptam	3.5	**45**	**55**	**25**	**43**	**53**	**25**
2	Basagran + MSO	2	**30**	**25**	**0**	**30**	**25**	**0**
3	Eptam **fb** Basagran + MSO	1 **fb** 2	**45**	**47**	**28**	**45**	**48**	**28**
4	Eptam **fb** Basagran + MSO	2 **fb** 2	**73**	**90**	**75**	**73**	**90**	**73**
5	Eptam **fb** Basagran + MSO	3 **fb** 2	**82**	**99**	**93**	**82**	**99**	**93**

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Study #2

No	Treatment	Rate	14 DAT			28 DAT		
			Redroot Pigweed	Lambsquarters	Common Ragweed	Redroot Pigweed	Lambsquarters	Common Ragweed
		pt/A	%			%		
6	Permit + MSO	0.67 oz	**37**	**43**	**45**	**42**	**50**	**58**
7	Eptam **fb** Permit + MSO	1 **fb** 0.67 oz	**55**	**45**	**58**	**69**	**73**	**63**
8	Eptam **fb** Permit + MSO	2 **fb** 0.67 oz	**83**	**95**	**88**	**83**	**95**	**92**
9	Eptam **fb** Permit + MSO	3 **fb** 0.67 oz	**95**	**95**	**96**	**95**	**92**	**96**

Study #2

No	Treatment	Rate	14 DAT			28 DAT		
			Redroot Pigweed	Lambsquarters	Common Ragweed	Redroot Pigweed	Lambsquarters	Common Ragweed
		pt/A		%			%	
10	Flexstar + MSO	0.75	**72**	**52**	**55**	**72**	**52**	**55**
11	Eptam **fb** Flexstar + MSO	1 **fb** 0.75	**90**	**93**	**82**	**90**	**93**	**82**
12	Eptam **fb** Flexstar + MSO	2 **fb** 0.75	**95**	**96**	**95**	**95**	**96**	**95**
13	Eptam **fb** Flexstar + MSO	3 **fb** 0.75	**99**	**96**	**97**	**99**	**96**	**97**
	LSD (0.05)		**6**	**8**	**6**	**5**	**4**	**6**

Study #2 Summary

- Eptam alone provided poor to moderate weed control – 40% across all weeds 28 DAT
- Increased Eptam rates increased POST herbicide efficacy
  - generally > 90% across all weeds
    - Eptam rate should be at least 2 pt/A to achieve acceptable level of weed control

Eptam at 3.5 pt/A

Basagran +
MSO

Eptam fb
Basagran

Eptam at 3.5 pt/A

Permit +
MSO

Eptam fb
Permit

Eptam at 3.5 pt/A

Reflex +
MSO

Eptam fb
Reflex

NDS

Study #3 & 4 Objectives

- Potato and Weed Response to Postemergence-Applied Halosulfuron, Rimsulfuron, and EPTC (Boydston 2007)
  - Increased control when Eptam tankmixed with POST herbicides
- Evaluate effect of Eptam tank mixed with POST herbicide to improve efficacy
- Evaluate effect of Eptam applied as EPOST followed by POST herbicide to improve efficacy (7 DA)

Tank Mix Results

No	Treatment	Rate	14 DAT Common Ragweed	28 DAT Common Ragweed
		pt/A	%	%
1	Eptam	1	**0**	**0**
2	Eptam	2	**0**	**0**
3	Eptam	3	**0**	**0**
4	Basagran + MSO	2	**22**	**22**
5	Eptam + Basagran + MSO	1 + 2	**32**	**32**
6	Eptam + Basagran + MSO	2 + 2	**32**	**32**
7	Eptam + Basagran + MSO	3 + 2	**32**	**32**

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LSD = 2.5

Tank Mix Results

No	Treatment	Rate	14 DAT Common Ragweed	28 DAT Common Ragweed
		pt/A	%	%
8	Permit + MSO	0.67 oz	**20**	**50**
9	Eptam + Permit + MSO	1 + 0.67 oz	**25**	**60**
10	Eptam + Permit + MSO	2 + 0.67 oz	**25**	**63**
11	Eptam + Permit + MSO	3 + 0.67 oz	**35**	**65**
12	Flexstar + MSO	0.75	**72**	**72**
13	Eptam + Flexstar + MSO	1 + 0.75	**82**	**82**
14	Eptam + Flexstar + MSO	2 + 0.75	**82**	**82**
15	Eptam + Flexstar + MSO	3 + 0.75	**85**	**85**

LSD = 2.5

Sequential Results

No	Treatment	Rate	14 DAT Common Ragweed	28 DAT Common Ragweed
		pt/A	%	%
1	Eptam	1	**0**	**0**
2	Eptam	2	**0**	**0**
3	Eptam	3	**0**	**0**
4	Basagran + MSO	2	**45**	**45**
5	Eptam **fb** Basagran + MSO	1 + 2	**43**	**43**
6	Eptam **fb** Basagran + MSO	2 + 2	**58**	**58**
7	Eptam **fb** Basagran + MSO	3 + 2	**53**	**53**

LSD = 5

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Sequential Results

No	Treatment	Rate	14 DAT Common Ragweed	28 DAT Common Ragweed
		pt/A	%	%
8	Permit + MSO	0.67 oz	**32**	**52**
9	Eptam **fb** Permit + MSO	1 + 0.67 oz	**32**	**65**
10	Eptam **fb** Permit + MSO	2 + 0.67 oz	**30**	**68**
11	Eptam **fb** Permit + MSO	3 + 0.67 oz	**33**	**70**
12	Flexstar + MSO	0.75	**72**	**73**
13	Eptam **fb** Flexstar + MSO	1 + 0.75	**72**	**75**
14	Eptam **fb** Flexstar + MSO	2 + 0.75	**85**	**85**
15	Eptam **fb** Flexstar + MSO	3 + 0.75	**89**	**89**

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LSD = 5

Study #3 & 4 Summary

- Applying Eptam in tank mix or sequential provided similar increased control (approx 10%) of POST herbicides
- Few treatments achieved acceptable level of weed control

Comprehensive Review

- Eptam increases POST herbicide activity by reducing cuticle formation
- PRE Eptam rates of at least 2 pt/A applied PPI provided acceptable control
- POST applied EPTC does not achieve acceptable level of weed control

Problems

- Reintroduction of tillage/incorporation
- High cost of Eptam treatment
  - $10 to $30/A

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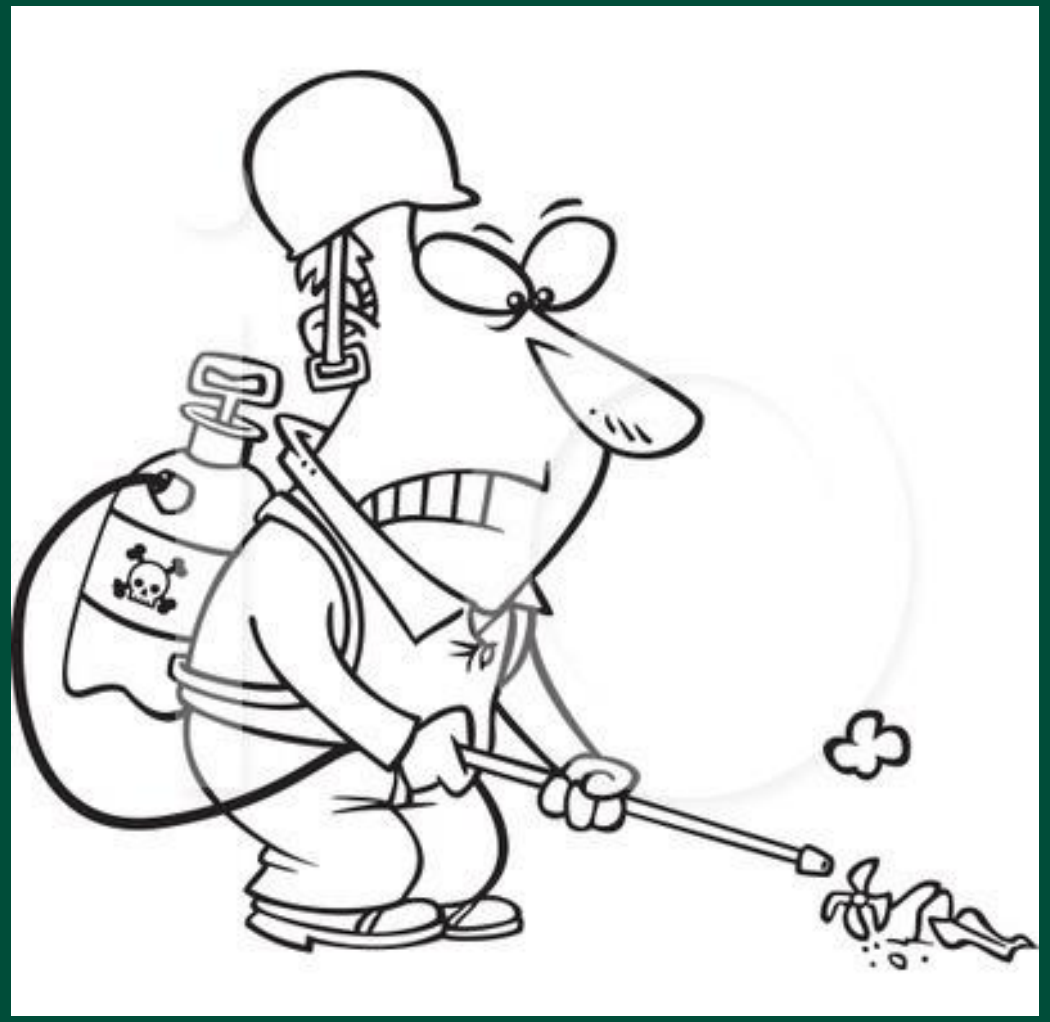
Questions?



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