

Weed Control updates in Cranberry

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NCSFR
Cranberry Institute
Oregon Cranberry Growers
Seawind farms
Ocean Spray



Topics

- Satellite HydroCap
- Herbicide Screening

Multistate Evaluation of Cranberry Tolerance and Weed Control with Pendimethalin Herbicide

Dr. Thierry E. Besançon – Rutgers University

Dr. Katherine Ghantous – UMass Cranberry Research Station

Dr. Marcelo Moretti – Oregon State University

Dr. Jed Colquhoun – University of Wisconsin Madison

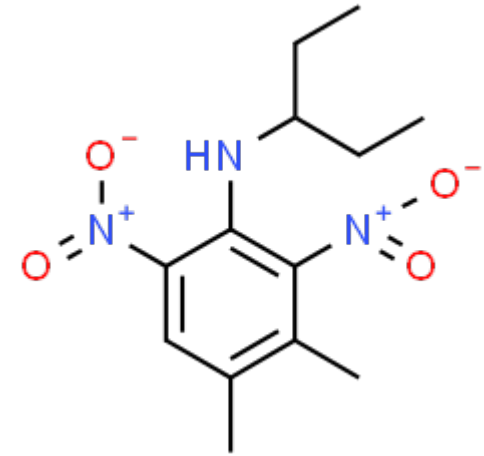
Cyrus Smith – Ocean Spray Cranberries, Inc.



Oregon State
University

What is pendimethalin?

- WSSA Group 3 herbicide - Microtubule Inhibitors
- Soil-applied for pre-emergence control of annual grasses and some broadleaf weeds
- Absorbed by both roots and shoots of emerging seedlings but not readily translocated
- Labeled for use on soybean, corn, grains, and some vegetables (cucurbits, solanaceous, cole crops...)
- Cranberry included on Satellite Hydrocap (UPL) label - same EPA crop subgroup (13-07G) as the representative commodity (strawberry)



GROUP 3 HERBICIDE

SATELLITE[®]
HydroCap  HERBICIDE

For Use in Selected Crops

ACTIVE INGREDIENT:	
Pendimethalin, N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine	38.7%
OTHER INGREDIENTS:	61.3%
TOTAL:	100.0%

(1 gallon contains 3.8 lbs. of microencapsulated pendimethalin in an aqueous carrier.)

STRAWBERRIES AND OTHER LOW-GROWING BERRIES
Bearberry, Bilberry, Blueberry (lowbush), Cloudberry, Cranberry,
Lingonberry, Muntries, Partridgeberry, Strawberry

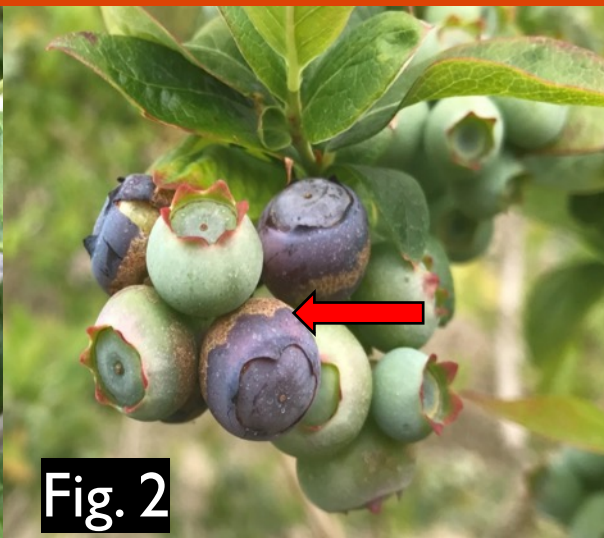
Application Methods: Apply by ground, air, or chemigation.

Use Methods, Timings and Use Rates

Stunting, reduced growth, or reduction in daughter plants may occur with this use.

Widespread blueberry injury in New Jersey in 2017

- Leaf stunting with shortened internodes
- Leaf marginal chlorosis and necrosis (Fig. 1)
- Equatorial russeting (Fig. 2)
- Absence of calyx development (Fig. 3)
- Russeting caused mature fruits to split (Fig. 4)

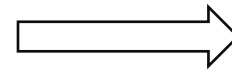


Determining the origin of blueberry injury

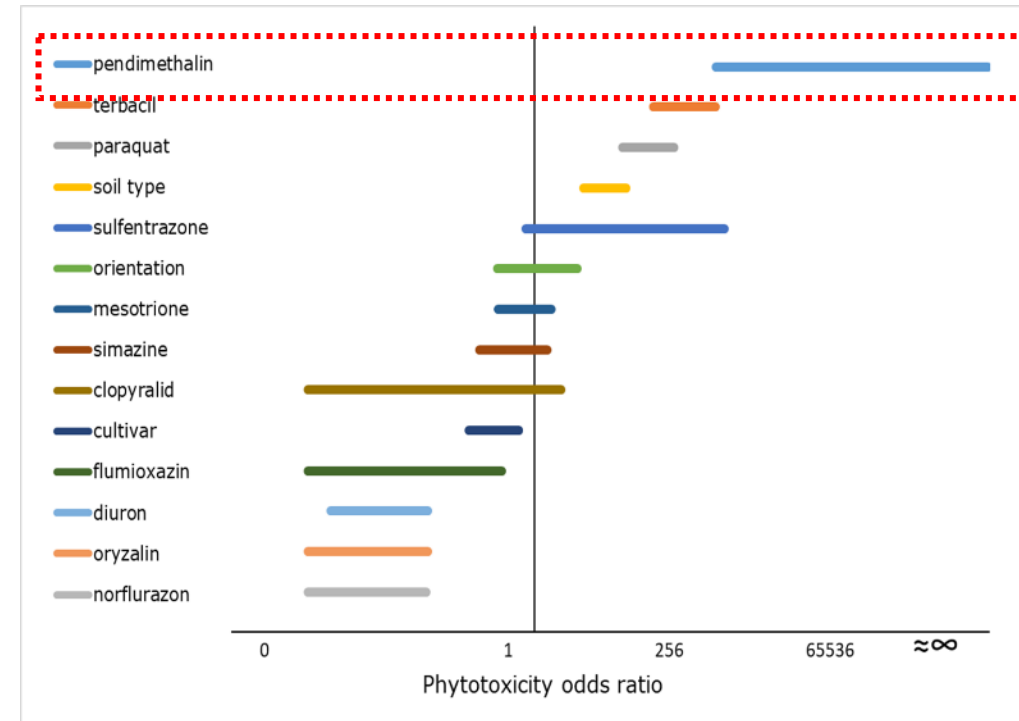
- 237 blueberry fields investigated in spring 2017

	Pendimethalin applied PRE	
	YES	NO
Damage	41%	0%
No damage	7%	52%

- Logistic regression analysis linked injury with use of pendimethalin PRE



- Late spring application (post budbreak)
- Soil texture (sandy soil, low organic matter)
- Shallow blueberry root system
- Use of high pendimethalin rate (12 pt/A)



Visual observation of pendimethalin injury to blueberry roots

- Excavation of 13-yr old blueberry bushes from the same field
- 50% of the plants received pendimethalin PRE at 1.6 kg ha⁻¹

- Light brown roots
- High density of hairy roots

no pendimethalin



VS

Pendimethalin 1.6 kg ha⁻¹



- Dark brown roots
- Missing many hairy roots

Evaluation of cranberry tolerance to pendimethalin

No previous evaluation documenting safety of pendimethalin use in cranberry

Objectives:

Evaluate cranberry tolerance to pendimethalin:

- Various rates (1X, 2X, 4X) labeled for use on cranberry
- Different application timings based on cranberry phenology
- Boom-applied (280 L ha⁻¹) or simulated chemigation (3,700 L ha⁻¹)

Experimental design:

- 2022 field trials conducted on cranberry in NJ, MA, WI and OR
- Two-factors factorial arranged in a randomized complete block design with 3 or 4 repetitions.
- ANOVA using PROC GLIMMIX in SAS 9.4 and means separated using Fisher's protected LSD ($\alpha = 0.05$)

Early spring pendimethalin application to cranberry vine

Massachusetts – Dr. Katherine Ghantous (UMass)

New Jersey – Dr. Thierry Besançon (Rutgers)

Wisconsin – Dr. Jed Colquhoun (UW Madison)

Treatments:

- Pendimethalin at 320 g ha⁻¹ or 640 g ha⁻¹
- Application timing: tight bud or bud swell
- Nontreated control included

Applications:

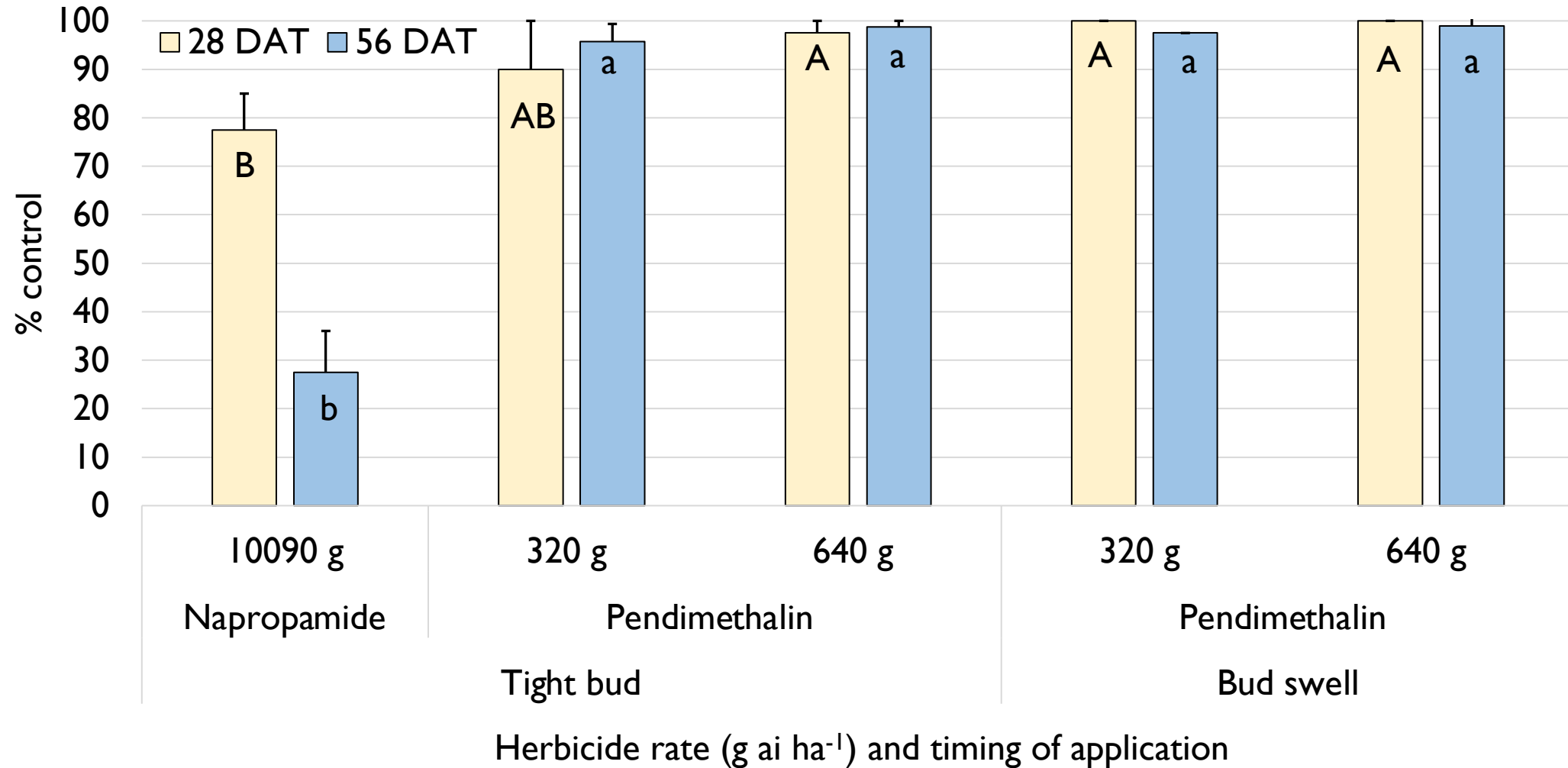
- ⇒ boom-applied in New Jersey and Wisconsin (280 L ha⁻¹)
- ⇒ simulated chemigation in Massachusetts (3,700 L ha⁻¹)

Evaluations:

- cranberry vine injury and stunting at 14, 28, and 56 DAT
- measurement of cranberry upright development 56 DAT
- cranberry yield by the end of the growing season



Large crabgrass (*Digitaria sanguinalis*) control following early season pendimethalin application – Budd's Farm, NJ





Cranberry upright development 56 DAT

UMass cranberry research station data

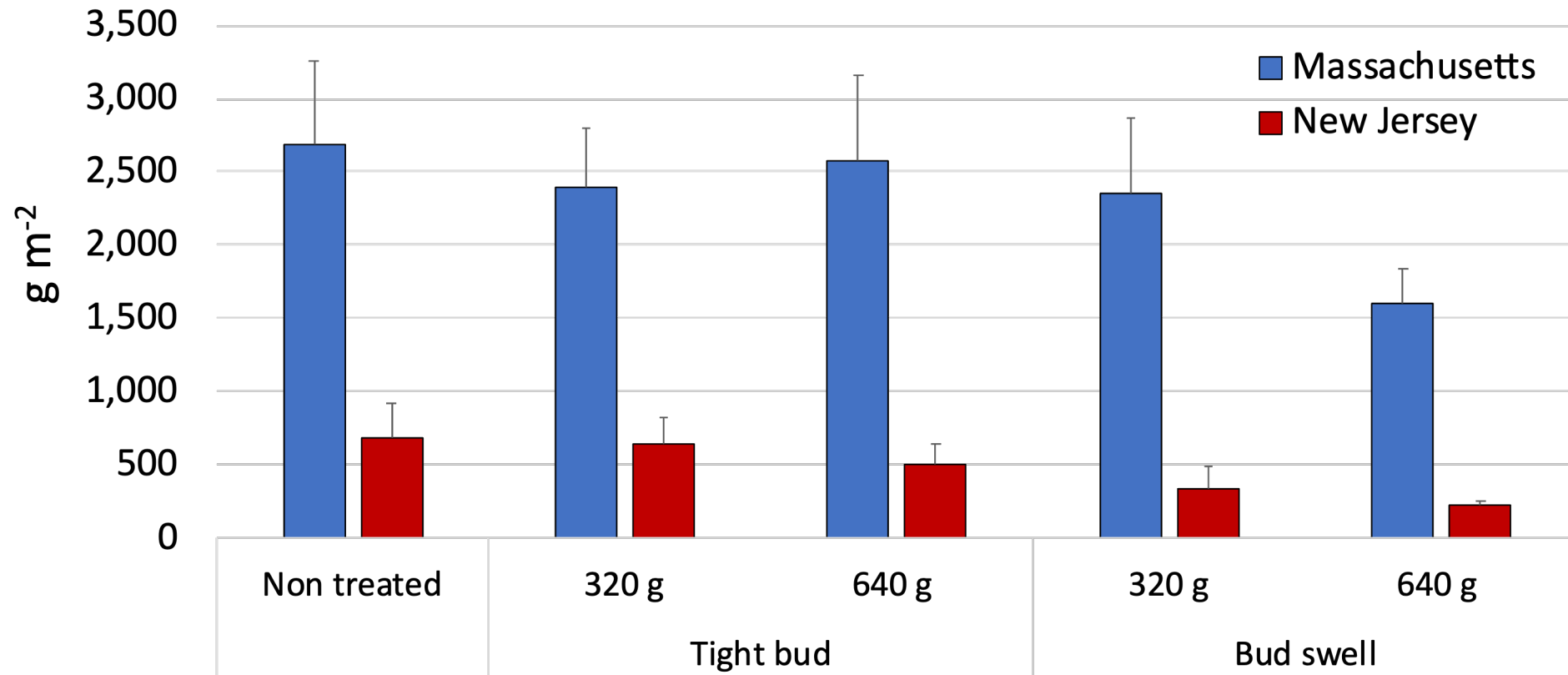
Cranberry stage	Pendimethalin rate (g ha ⁻¹)	Terminal bud necrosis (%)	Terminal shoot length (cm)
Non treated		8	4.7 a
Tight bud	320	10	4.0 abc
	640	13	4.3 ab
Bud swell	320	13	3.2 c
	640	13	3.7 bc

- Nb of floral bud per upright not affected by pendimethalin application.
- Nb of axillary shoots per upright not affected by pendimethalin application.

Cranberry commercial yield following early season pendimethalin application - 2022

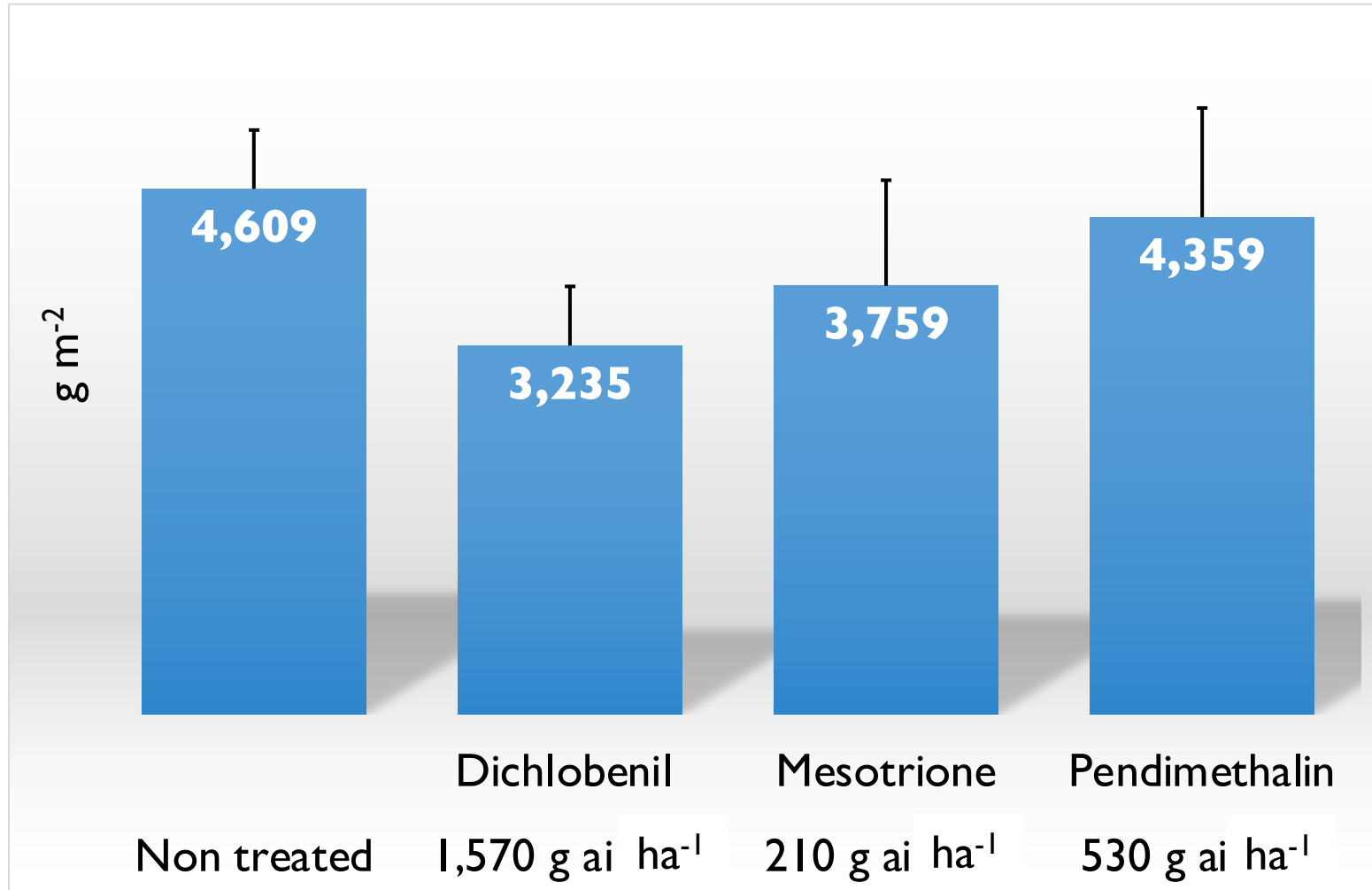
New Jersey: boom application at 280 L ha⁻¹ – 3 years old bed

Massachusetts :chemigation at 3,700 L ha⁻¹ – Mature bed



Cranberry commercial yield following early season pendimethalin application

Wisconsin 2021 and 2022 data



- Application on dormant cranberry vine – 40 years-old bed
- 530 g ai ha⁻¹
- Boom application at 280 L ha⁻¹
- No significant yield difference between herbicide treatments
- Increased injury with Satellite (avg. 10%) compared to other treatments (**≤ 2% avg.**)

Pendimethalin application to non-dormant cranberry vine

New Jersey – Dr. Thierry Besançon (Rutgers)

Treatments:

- Pendimethalin at 320 or 640 g ha⁻¹ at cabbagehead or bud elongation
- Pendimethalin at 320 g ha⁻¹ at cabbage head followed by 320 g ha⁻¹ at rough neck stage
- Nontreated control

Applications:

⇒ boom-applied over cranberry canopy at 280 L ha⁻¹

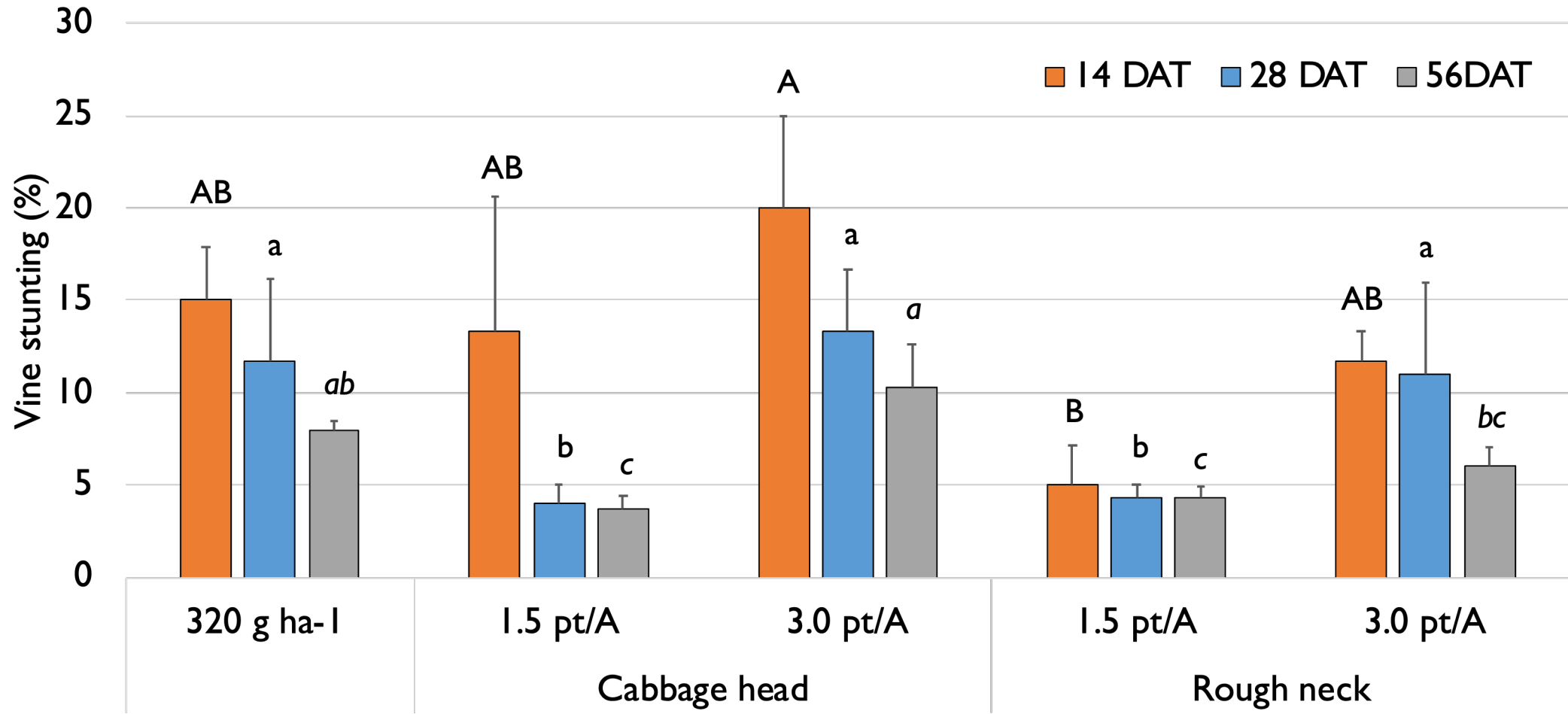
Evaluations:

- cranberry vine stunting at 14, 28, and 56 DAT
- measurement of cranberry upright development 8WAT
- cranberry yield by the end of the growing season



Cranberry vine stunting following pendimethalin application to non dormant vine - 2022

DAT: days after treatment



Pendimethalin rate and timing of application

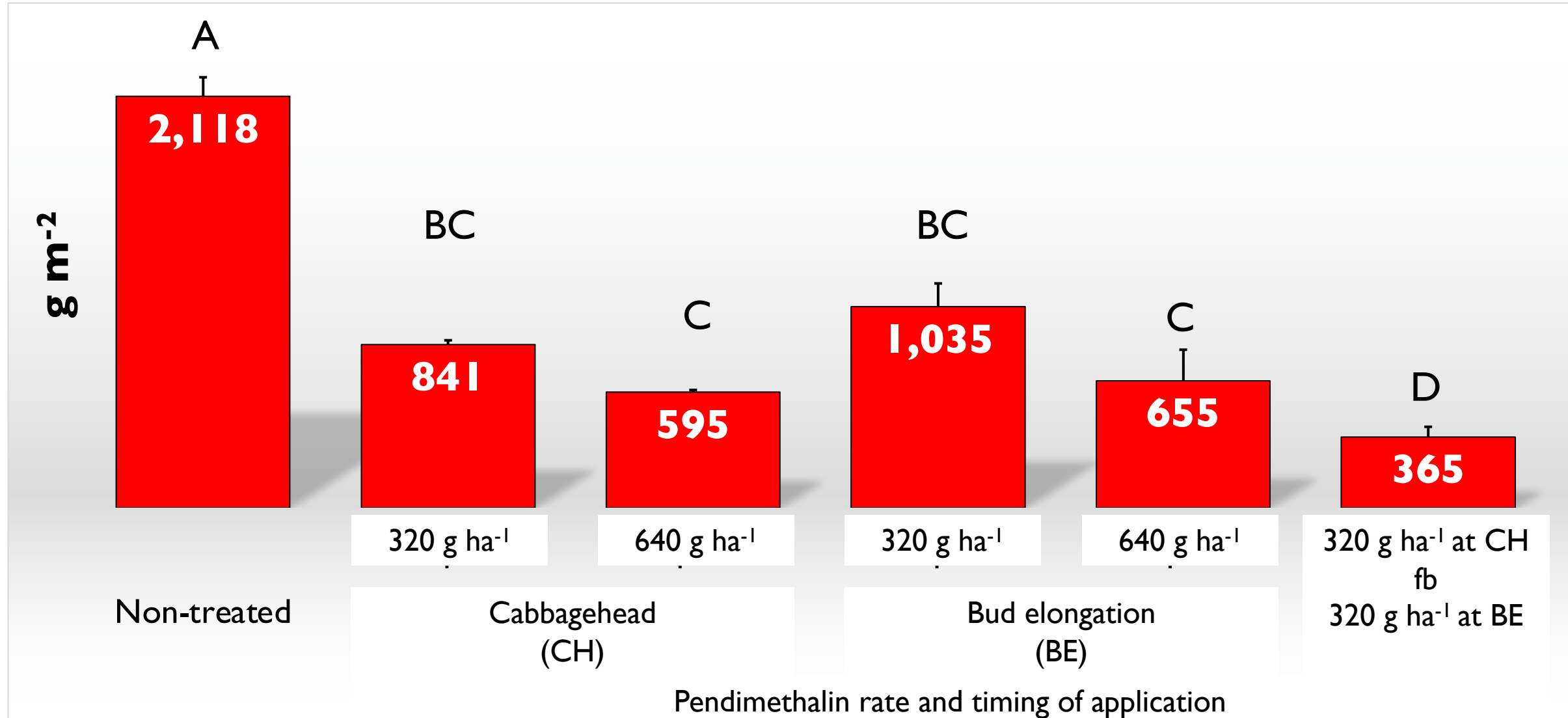


Cranberry upright development 56 DAT

Timing of application	Pendimethalin rate (g ai ha ⁻¹)	Terminal bud necrosis (%)	Terminal shoot length (cm)	Repro. structures (# upright ⁻¹)
Non treated		3 b	5.9 a	3.3 a
Cabbage head (CH)	320	7 b	5.4 ab	2.8 b
	640	9 b	5.4 ab	2.6 bc
Bud elongation (BE)	320	9 b	4.6 c	2.2 cd
	640	11 ab	5.1 bc	2.4 bc
320 CH + 320 BE		20 a	3.5 d	1.8 d

⇒ Pendimethalin split-applied or at rough neck significantly reduced growth and the density of reproductive structures on terminal cranberry shoot

Cranberry commercial yield following pendimethalin application to non dormant vine - 2022



Pendimethalin high rate and method of application

Oregon – Dr. Marcelo Moretti (OSU) and Cyrus Smith (Ocean Spray)

Three-factors factorial arrangement:

- Herbicide: pendimethalin at 640 or 1,280 g ha⁻¹ (+ non-treated control)
- Application timing: tight bud or cabbagehead stage
- Application volume: 280 (boom application) or 3,700 (simulated chemigation) L ha⁻¹

Evaluations:

- cranberry vine injury (including stunting) at 30, 70, and 100 DAT
- cranberry yield by the end of the growing season





Cranberry VINE INJURY

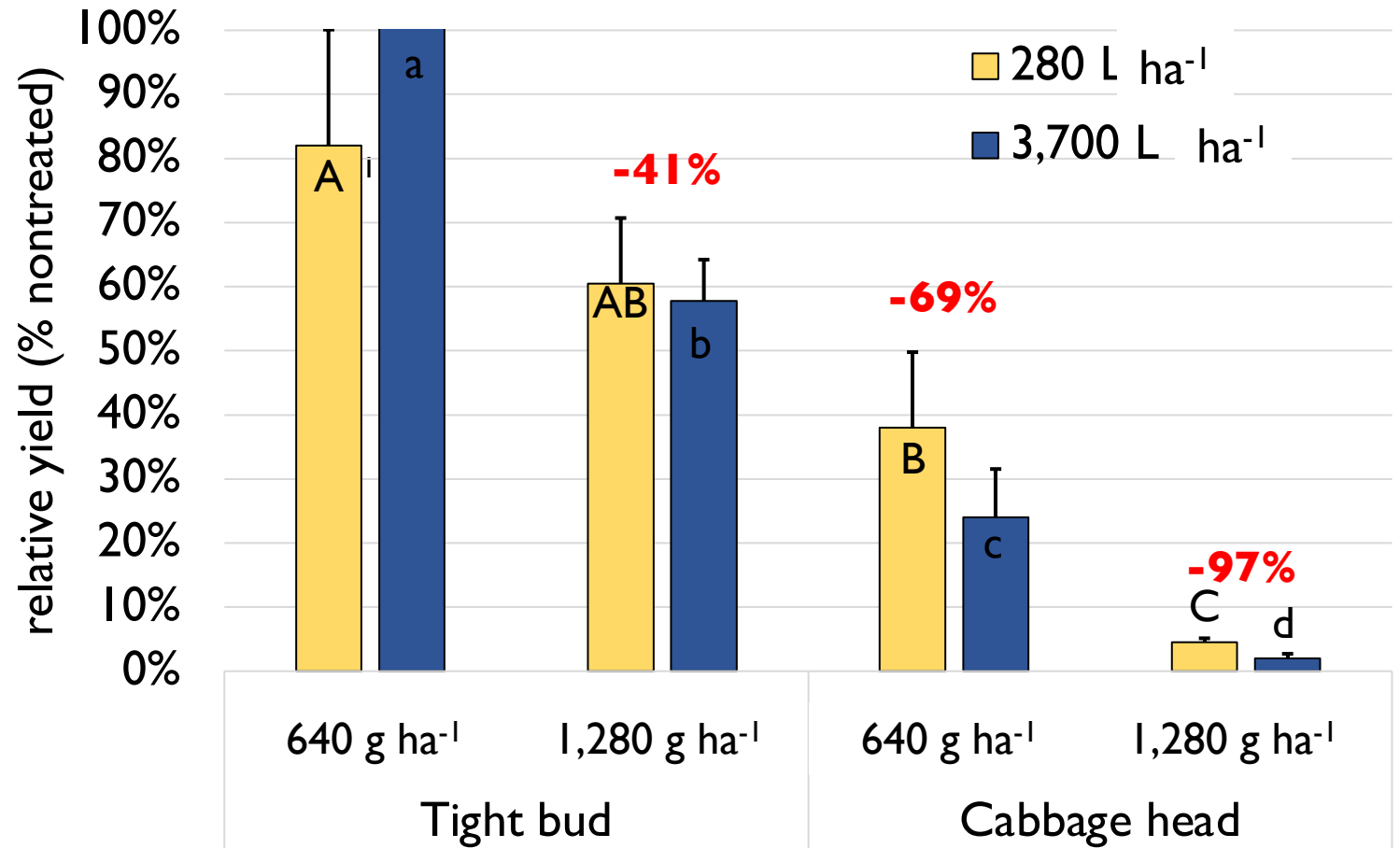
OSU data

APPLICATION TIMING	Injury 30 DAT (%)		Injury 70 DAT (%)		Injury 100 DAT (%)	
Tight bud	0	B	3	B	4	B
Cabbage head	22	A	30	A	14	A
APPLICATION VOLUME	Injury 30 DAT (%)		Injury 70 DAT (%)		Injury 100 DAT (%)	
280 L ha ⁻¹	8		20	A	13	A
3,700 L ha ⁻¹	4		8	B	4	B
HERBICIDE RATE	Injury 30 DAT (%)		Injury 70 DAT (%)		Injury 100 DAT (%)	
640 g ha ⁻¹	4		9	B	7	
1,280 g ha ⁻¹	9		20	A	10	



Cranberry yield

OSU data



Conclusions

- Pendimethalin provides longer residual control of annual grasses than the napropamide standard (Devrinol).
- Pendimethalin applied at tight bud caused minimal injury and didn't reduce commercial yield.
- Optimum application rate for crop safety is 320 g ha⁻¹.
- Chemigation preferred to boom-application.
- Rates $\geq 320 \text{ g ha}^{-1}$ may cause severe injury and/or reduced cranberry yield.
- Narrow timing of application to ensure adequate crop safety
- 2023 NJ studies will focus on use of pendimethalin in newly plant nonproducing beds.
- **We do not yet recommend the use of pendimethalin for residual weed control in cranberry across producing regions in North America in 2023.**

Herbicide Screening in Cranberry

Dr. Marcelo Moretti & Cassie Bouska – Oregon State University

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Oregon State
University

Objective

Study cranberry tolerance to
Pyroxasulfone alone or in mixtures

Pyroxasulfone:

WSSA group 15 herbicide

Preemergence herbicide

Controls sedges, and annual grasses and broadleaves.

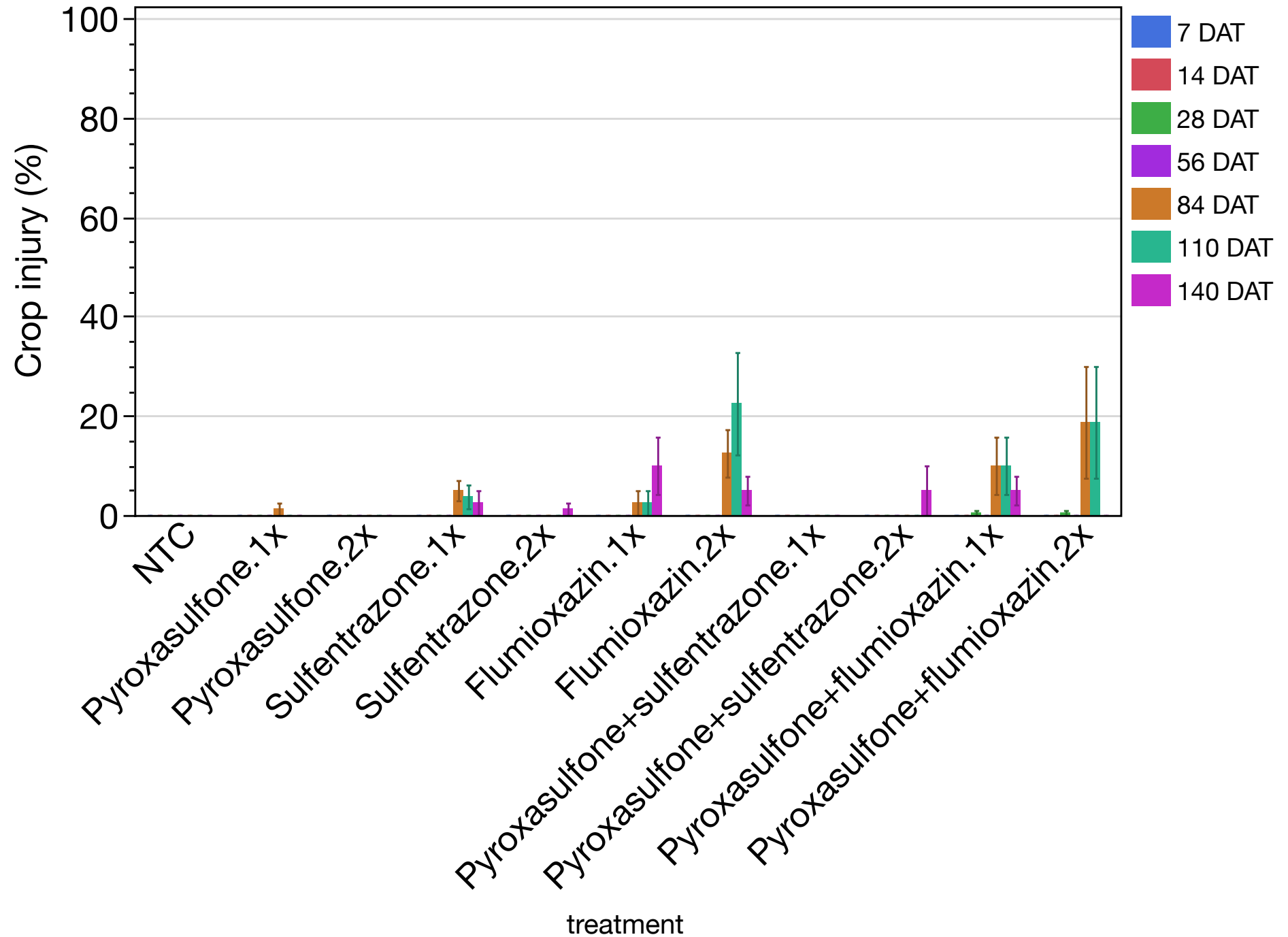
Methods

Stevens field

Chemigation at tight bud stage.



Objective



Thank you!

Oregon Cranberry Growers Association

Sea Wind Farms

Cassie Bouska & Lab members

