Weed Control Options for Leaf Lettuce

- Richard Smith, Vegetable Crop and Weed Science Farm Advisor, Monterey County

Importance of Kerb to Leaf Lettuce Industry

- It was first registered for use on lettuce in 1972
- Kerb is the most used herbicide on lettuce
  - 158,400 acres of leaf lettuce
  - 51% of acres treated with Kerb

Weeding Costs for Romaine Lettuce

Six row 80-inch beds*

Operation	Costs/A
Herbicide (Prefar)	43
Cultivation 2x	8
Thinning	137
Handweeding	68**

*2009 Sample Costs to Produce Romaine Hearts

What Are the Alternatives?

Leaf Lettuce
Weed Control Strategies

Chemical	Percent of Acreage
Prefar	17
Balan	4
Metam	2

WEED	Balan	Prefar	Kerb
CHICKWEED	C	P	C
GOOSEFOOT	C	P	C
GROUNDSEL	N	N	N
HENBIT	N	N	C
LAMBSQUARTERS	C	C	C
LONDON ROCKET	N	N	C
MALVA	N	N	P
MUSTARD	N	N	C
NETTLE	N	P	C
BLACK NIGHTSHADE	N	N	C
HAIRY NIGHTSHADE	N	N	C
PIGWEED	C	C	C
PINEAPPLE WEED	N	N	N
PURSLANE	C	C	C
SHEPHERD'S PURSE	N	N	C
SOWTHISTLE	N	N	N
SWINE CRESS	N	N	N
WILD RADISH	N	N	P
ANNUAL BLUEGRASS	C	C	C
LOVEGRASS	C	C	C
SPRANGLETOP	P	C	C

Kerb
More effective on mustards, nettle and nightshades

WEED	Balan	Prefar
CHICKWEED	C	P
GOOSEFOOT	C	P
GROUNDSEL	N	N
HENBIT	N	N
LAMBSQUARTERS	C	C
LONDON ROCKET	N	N
MALVA	N	N
MUSTARD	N	N
NETTLE	N	P
BLACK NIGHTSHADE	N	N
HAIRY NIGHTSHADE	N	N
PIGWEED	C	C
PINEAPPLE WEED	N	N
PURSLANE	C	C
SHEPHERD'S PURSE	N	N
SOWTHISTLE	N	N
SWINE CRESS	N	N
WILD RADISH	N	N
ANNUAL BLUEGRASS	C	C
LOVEGRASS	C	C
SPRANGLETOP	P	C

Key Weeds Uncontrolled by Prefar or Balan

Shepherd's Purse

Hairy and Black Nightshade

Leaf Lettuce
Weed Control Strategies

- Fumigation
  - Metam sodium
  - Rotation with Strawberries

Blading Vapam on 80 inch beds

Transplanting Leaf Lettuce

May be useful in early planting slots

- **Use of Transplants**
  - Transplants give a jump on the weeds
  - It has been easier to find herbicides for transplanted lettuce
- **Prowl H2O &**
- **Dual Magnum**
  - Both are in the registration process for use on transplanted lettuce

Photo: Eric Brennan

Vegetable Weed Control Strategies

Back to the Basics

- **Cultural & Mechanical**
  - **Preirrigation**
  - **Rotations**
  - **Sanitation**
  - **Cultivation strategies**

Preirrigation of listed beds can reduce weed emergence by up to 50%

No preirrigation

Preirrigation

Shem Tov and Fennimore

- Aggressive weed control programs that include not allowing weeds to set seed reduced weed populations to low levels
- These approaches will be very helpful in the absence of our most effective herbicide

Purslane in bags carried to edge of field

Closer cultivation with precision guidance can reduce weed pressure close to the seedline and reduce subsequent weeding costs

Focus on Shepherd's Purse and Do Not Allow it to Set Seed

Setting seed in winter broccoli

Plants up against Lettuce following weeding

Other Options:
Tillet® Cultivator

Summary

- This is a very difficult situation with no easy solutions
- Using a combination of approaches and paying attention to the basics will be helpful
- The main issue is to keep weeds contained to keep hand weeding costs at a manageable level

Pepper Weed Control Studies

- Peppers have a wide spectrum of materials for use pre and post plant
- The biggest issue with this crop is that it is a long-season crop that can be expensive to weed later in the growth cycle

Evaluated Control of Late Season Weeds

Malva infestation prior to harvest

- **Can be expensive to control**
- **Can reduce quality of peppers**

Treatment	Application	Material/A	Malva	Total weeds
Untreated	---	---	5.0	39.0
Dual Magnum	Directed	1.5 pints	4.3	24.0
Prowl H2O	Directed	2.0 pints	5.0	11.0
Dual Magnum + Prowl H2O	Directed	1.5 pints 2.0 pints	5.3	12.0
Outlook 6.0	Directed	14.0 oz	4.3	29.7

Treatment	Application	Material/A	Malva	Total weeds
Untreated	---	---	5.0	39.0
Dual Magnum + Prowl H2O	Directed	1.5 pints 2.0 pints	5.3	12.0
Chateau	Directed	3.0 oz	1.0	9.0
Chateau	Directed	6.0 oz	0.0	2.7
Chateau	Shielded	3.0 oz	1.7	6.0
Chateau	Shielded	6.0 oz	0.7	8.7
Chateau +DC 1–6184	Directed	3.0 oz	0.0	7.7
Chateau 51WG +DC 1–6184	Directed	6.0 oz	0.7	3.3
Broadstar 0.25G	Broadcast	37.6 lbs	0.7	3.7

Treatment	Application	Material/A	Total Weed Time
Untreated	---	---	24
Dual Magnum + Prowl H2O	Directed	1.5 pints 2.0 pints	10
Chateau	Directed	3.0 oz	8
Chateau	Directed	6.0 oz	6
Chateau	Shielded	3.0 oz	9
Chateau	Shielded	6.0 oz	6
Chateau +DC 1–6184	Directed	3.0 oz	7
Chateau 51WG +DC 1–6184	Directed	6.0 oz	6
Broadstar 0.25G	Broadcast	37.6 lbs	7

Chateau Used Layby

Untreated

Chateau @ 3 & 6 oz

Untreated

Broadstar 37 lbs/A

2010 Evaluations

- Broadstar is registered for ornamentals and its price structure will probably make it too expensive for use in vegetable crops
- However, on the Chateau label there is a provision for impregnating fertilizer with Chateau for use on mint, we would like to try that idea on peppers
- We are exploring the idea of obtaining a research authorization to be able to treat 100 acres of peppers with Chateau on fertilizer

Spinach Weed Control Trials

- RoNeet is being manufactured again
- Dual Magnum was registered in California in 2008, however it has limitations:
  - 12 month plant back restriction to lettuce
  - 50 day preharvest interval

2009 Weed Control Evaluations

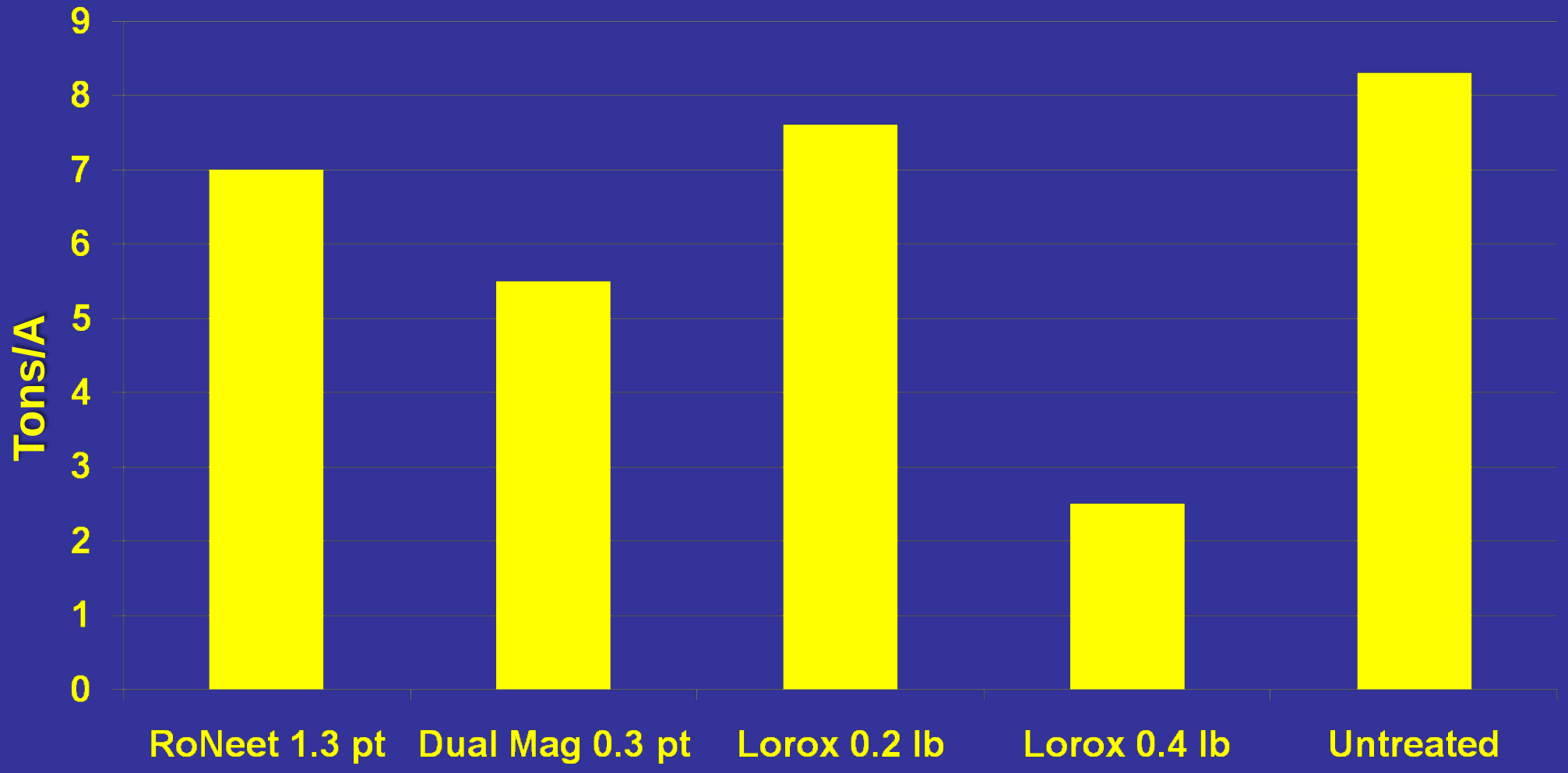
- We conducted 5 trials in 2009 focusing on light soil types evaluating the safety and efficacy of Lorox and Dual Magnum

2009 Spinach Evaluations

Treatment	Material/A	Lbs a.i./A
RoNeet 6E	1.25 pt	0.93
Dual Magnum 7.63	0.3 pt	0.29
Lorox 50	0.2 lb	0.1
Lorox 50	0.4 lb	0.2
Lorox 50	0.8 lb	0.4
Untreated	----	----

Yield of Spinach Trial No. 2

Soil type = Chualar Loam



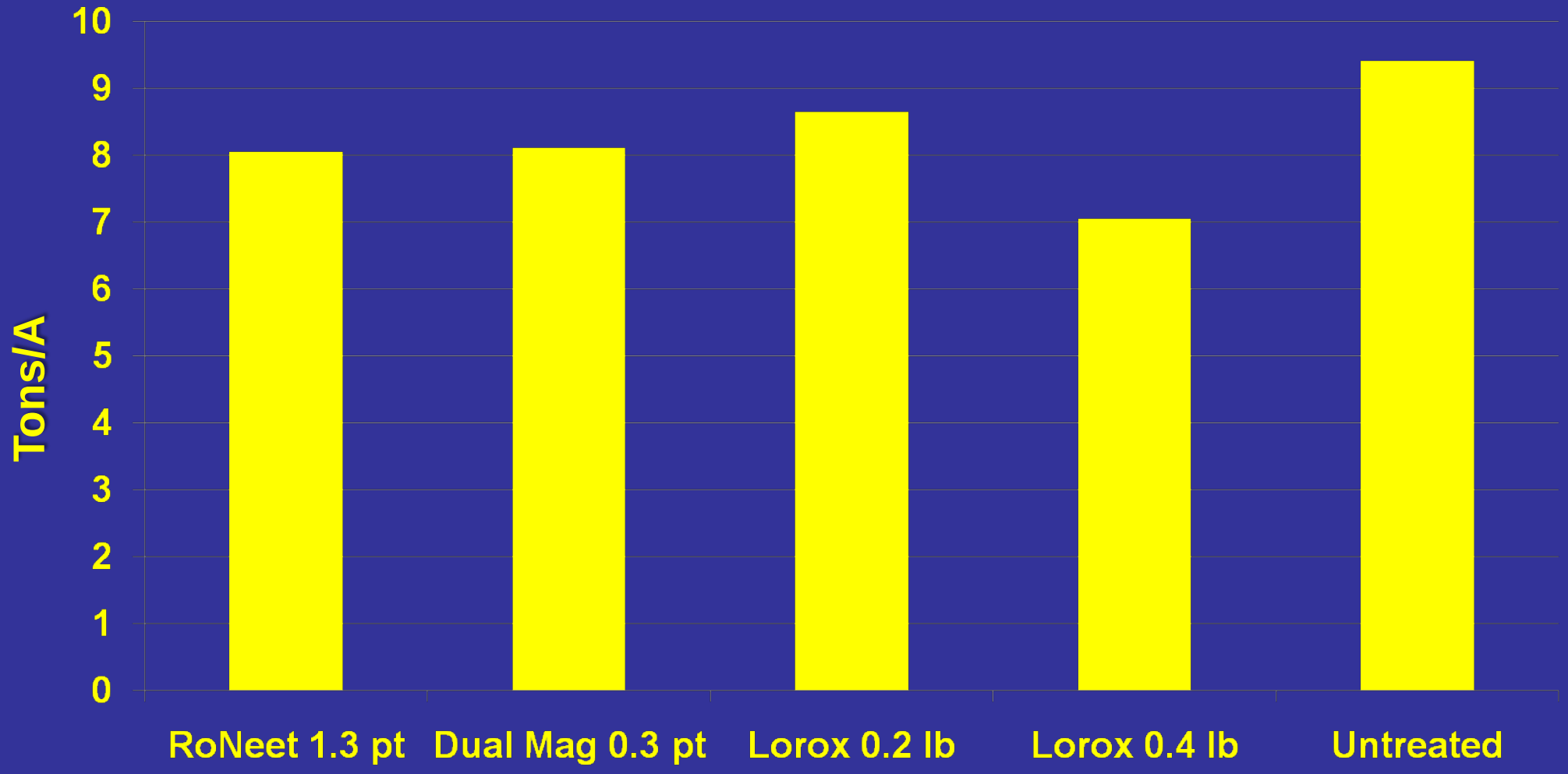
Soil Characteristics of Five Spinach Trials

Soil Type	OM	Sand	Silt	Clay
Arnold Loamy Sand	1.2	62	18	20
Greenfield FSL*	0.8	47	28	25
Chualar Loam	0.8	68	16	16
Metz FSL	0.9	55	29	16
Chualar loam	0.9	73	18	9

* Yield reduction was observed on soil types highlighted in red

Yield of Spinach 2008-09 Average

Nine trials



Lorox on Spinach Weed Control Summary

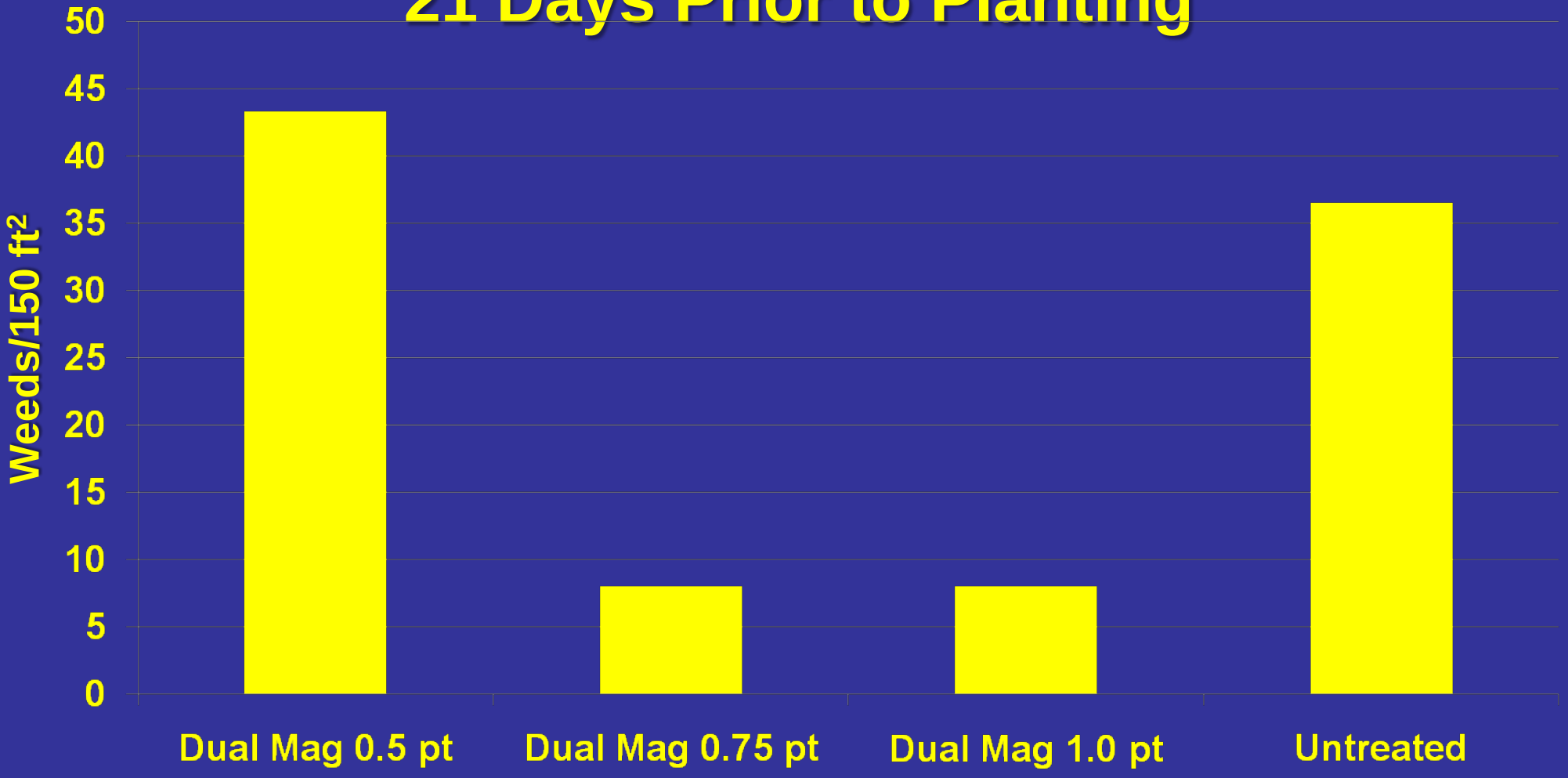
- Spinach is sensitive to Lorox at rates at and above 0.4 lbs of material/A
- On key soil types in the valley it looks to be safe, but on the coarse sandy soils of the eastside and low organic matter soils, it is too injurious

Dual Magnum on Spinach

In order to try to accommodate the 50 day PHI for spinach in the summer we conducted a trial in which Dual Magnum was applied 21 days prior to planting and watered into the soil (beds were lightly worked at planting)

Weed Counts

Dual Magnum Applied
21 Days Prior to Planting



Dual Magnum on Spinach Summary

- It is unclear when the preharvest interval for Dual Magnum will be reduced (20 days)
- In the mean time, applying the Dual Magnum prior to planting can work around the current 50 day PHI

Weed Research Reports Online

Google Cooperative Extension Monterey

Vegetable Crops & Weed Science

Conduct an applied research and educational program in vegetable crop production and weed science for crops grown in Monterey, Santa Cruz and San Benito Counties. Production issues include soil fertility, abiotic problem diagnosis, cover crop management and new crop development. Weed identification services are provided, as well as research on weed control.

Viticulture

Has cross-county
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Onions - Dry Bulb

- 2009 Dry Bulb Onions Weed Control Studies
- 2008 Dry Bulb Onion Weed Control Studies
- 2007 Dry Bulb Onion Weed Control Studies
- 2006 Dry Bulb Onion Weed Control Studies
- 2005 Dry Bulb Onion Weed Control Studies
- 2004 Dry Bulb Onion Weed Control Studies

Peppers

- 2009 Pepper Weed Control
- 2008 Pepper Weed Control
- 2007 Dual Post Emergence Use on Peppers Evaluation
- 2007 Pepper Weed Control
- 2006 Pepper Weed Control
- 2005 Pepper Weed Control Trials

Thank you for your attention