Vegetable Crop Weed Control Spinach, Lettuce, Carrots and Onions

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

Vegetable Weed Control Strategies

- Chemical
  - Few new chemical for use on vegetables coming on the market
  - Current materials are old and subject to regulatory issues
  - Emphasis has been on finding new uses for older materials
- Cultural & Mechanical
  - Growing in importance due to fewer chemical options

Year of Registration of Key Vegetable Herbicides

Trade Name	Chemical	Representative Crop	Year Registered
Lorox	Linuron	Carrots	1966
Dual Magnum	S-metolachlor	Potato, Peppers	1976
Kerb	Pronamide	Lettuce	1972
Dacthal	DCPA	Broccoli, Onions	1958
Devrinol	Napropamide	Broccoli, Tomatoes	1972
Caparol	Prometryn	Celery	1964

Fennimore, 2008

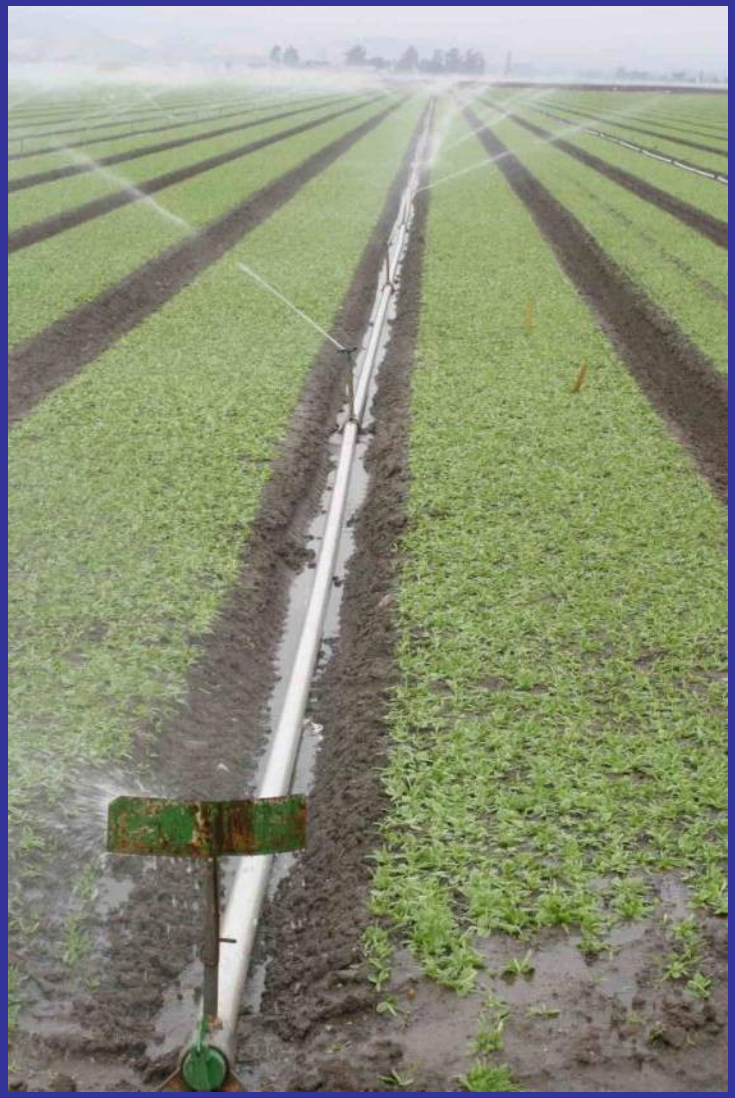
Why few new herbicides?

Why few new herbicides?

Maybe resistant weeds will change the situation

Spinach Weed Control Trials

- RoNeet on spinach is no longer being manufactured
- The only preemergence herbicide registered on this crop in California until 2008 when Dual Magnum was finally registered



Spinach Weed Control Trials

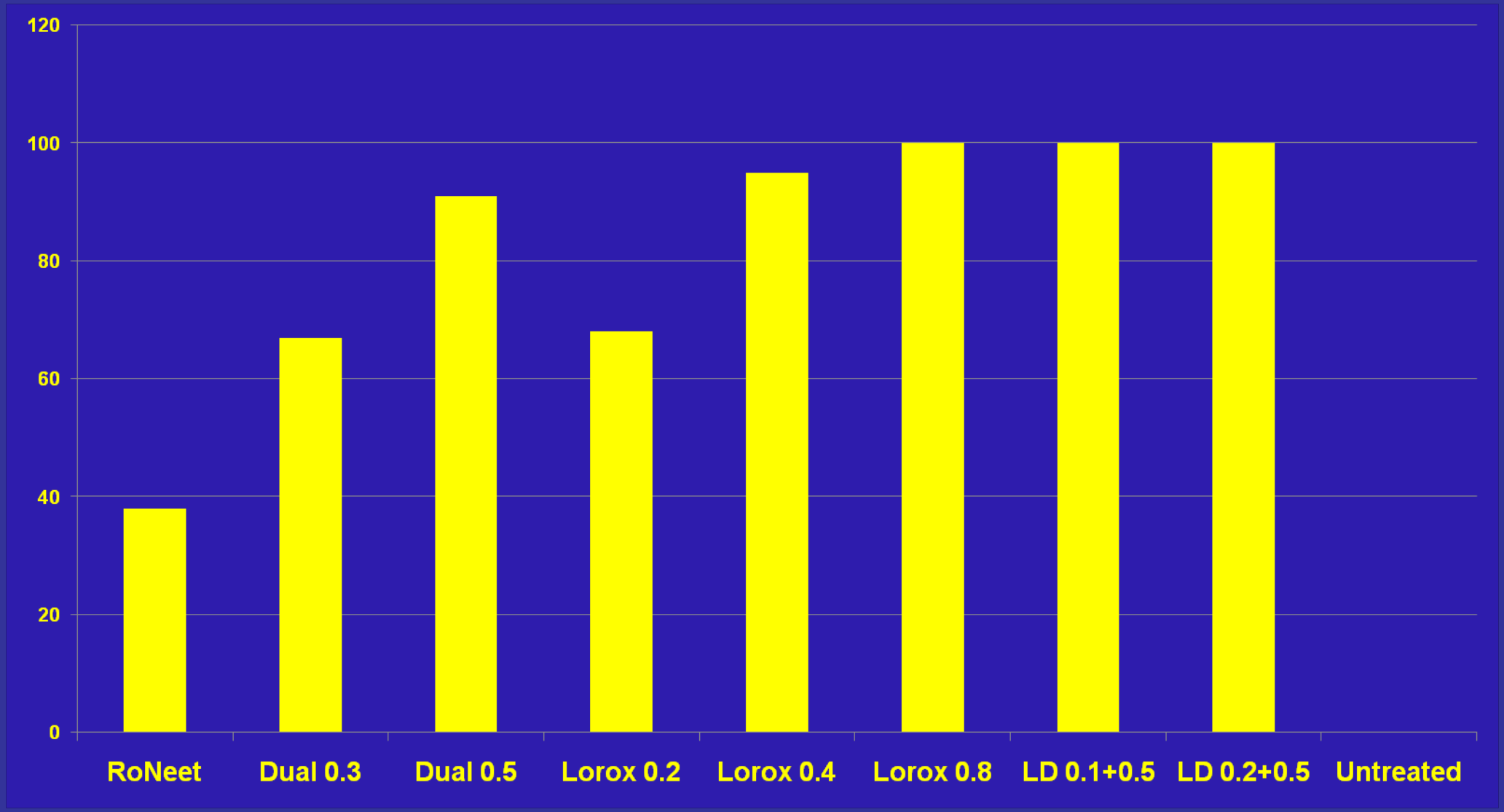
- Dual has 12 month plant back restriction to lettuce and a 50 day preharvest interval issues that limits it usefulness
- These issues with the Dual Mangum label are actively being worked on and will be resolved, however it will take time

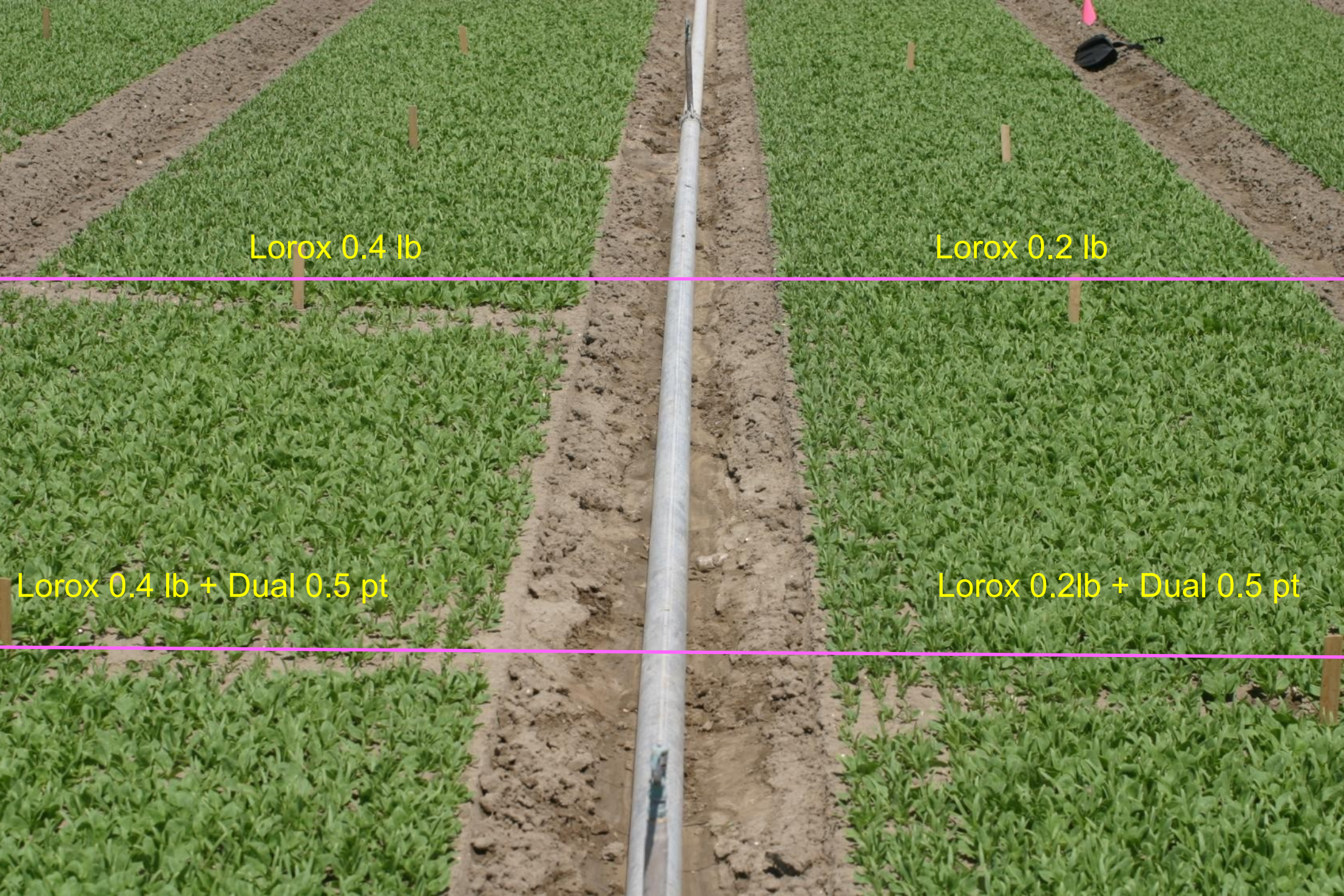
2008 Weed Control Evaluations

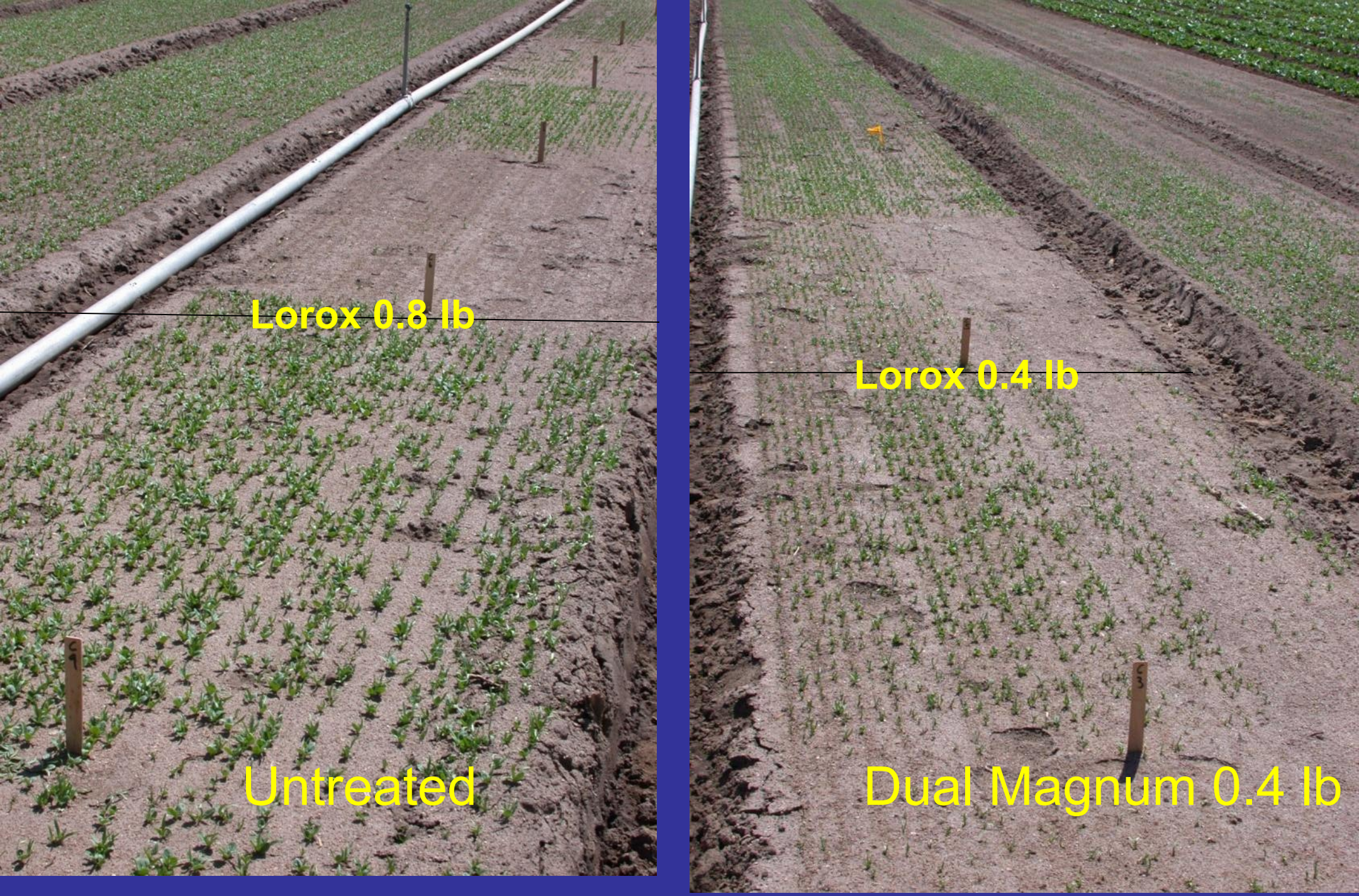
- Finding New Herbicides for Spinach is Very Difficult
- We conducted 5 trials in 2008 on various soil types and various parts of the valley (San Ardo to Castroville) evaluating the safety and efficacy of Lorox and Dual Magnum

Relative Weed Control on Spinach

One Trial



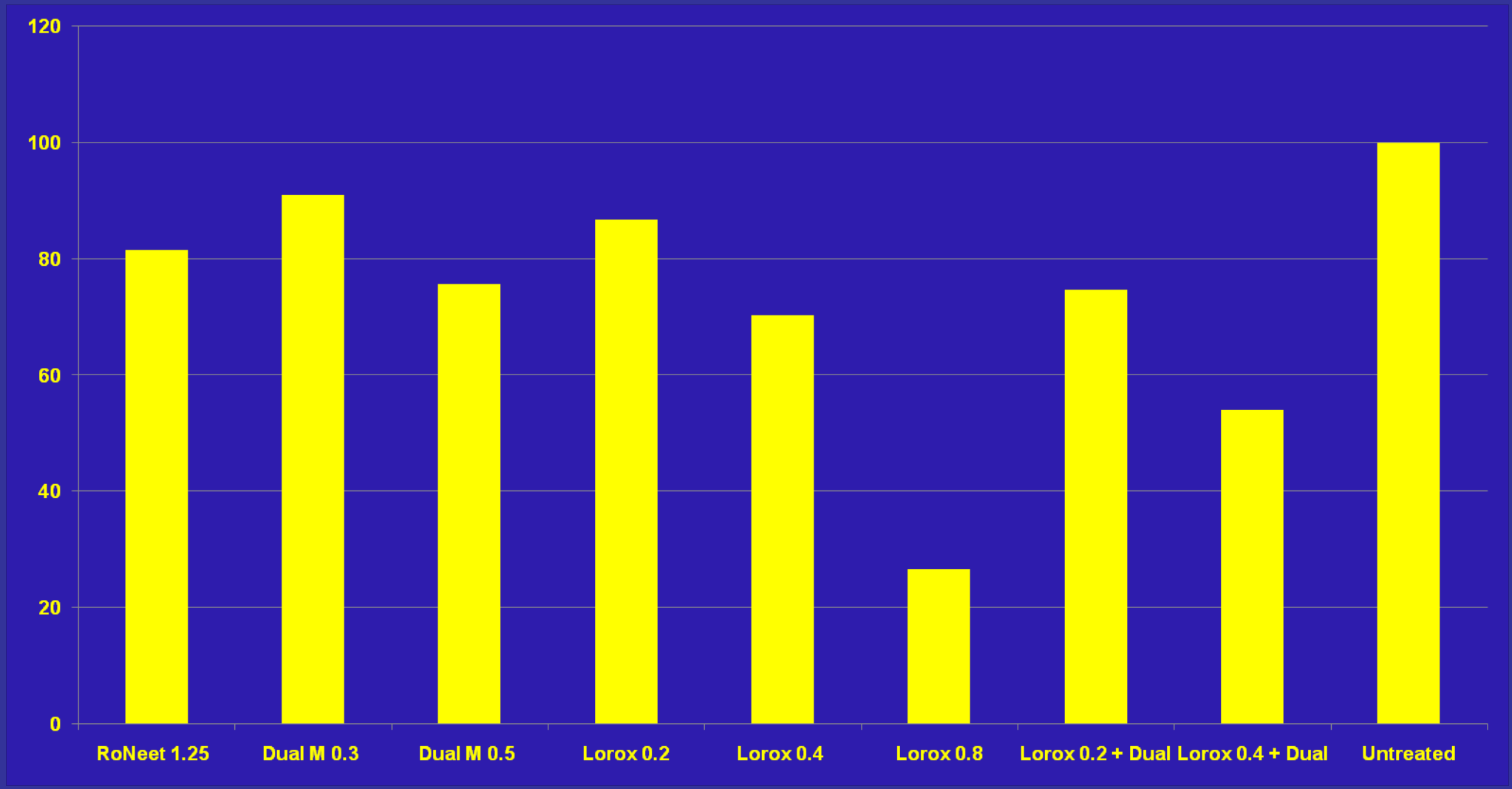

Lorox 0.4 lb
Lorox 0.2 lb
Lorox 0.4 lb + Dual 0.5 pt
Lorox 0.2lb + Dual 0.5 pt


Lorox 0.8 lb
Lorox 0.4 lb
Untreated
Dual Magnum 0.4 lb

Safety of Lorox at the 0.4 lb/A Rate

Soil Type	Safety
Sorrento silt loam	Safe
Arnold loamy sand diablo clay*	Safe
Cropley silty clay	Moderate safety
Greenfield fine sandy loam	Marginal
Chualar loam	Not Safe

Relative Yield of Spinach
Mean of 5 Trials



Spinach Weed Control Summary

- Based on these studies, the safety of Lorox looks similar to Dual Magnum
- 0.4 lbs of Lorox looks just as injurious as 0.5 pt of Dual Magnum and weed control between them appears to be similar

Spinach Weed Control Summary

- On light soils, Lorox is injurious to yield at the 0.4 lb/A rate
- The rate must be carefully selected according to soil type
- At the 0.2 lb/A rate, weed control drops off, but safety increases
- Similar trends were seen for Dual Magnum at the 0.3 and 0.5 pint/A rates

Lettuce Weed Control Trials

- There are no new herbicides in development for use on direct seeded lettuce
- Prowl H2O is in the registration process for use on transplanted lettuce

- This year we evaluated delayed applications of Prowl H2O on direct seeded lettuce
- This concept has been successfully used with this material on onions
- In short however, it was not safe on the lettuce and no further work will be conducted

Yield Evaluation of Prowl H2O Evaluation

Treatment	Mean Head Wt	Tons/A
Kerb 3.3SC 2.4 pints	2.35	33.8
Kerb 3.3SC 4.8 pints	2.45	35.2
Prefar 4E 6.0 quarts	2.47	35.5
Prowl H2O* 1.1 pints	2.01	28.8
Kerb 3.3SC 2.4 pint Prowl H2O* 1.1 pints	2.02	29.2
Untreated	2.45	35.2

* Applied 4 days after 1st irrigation

Lettuce Herbicide Problem Solving

- I received more calls on herbicide issues with Kerb and Prefar this year.
- As a result, I put out a trial on a site with Chualar loam soil looking at a range of rates of these two materials to evaluate at what point do we start to see symptoms on this type of soil


Untreated


Kerb 4.0 lb a.i./A


Prefar 9.0 lbs/A

Kerb vs Prefar Symptoms

Kerb had deformity, yellowing; stunting

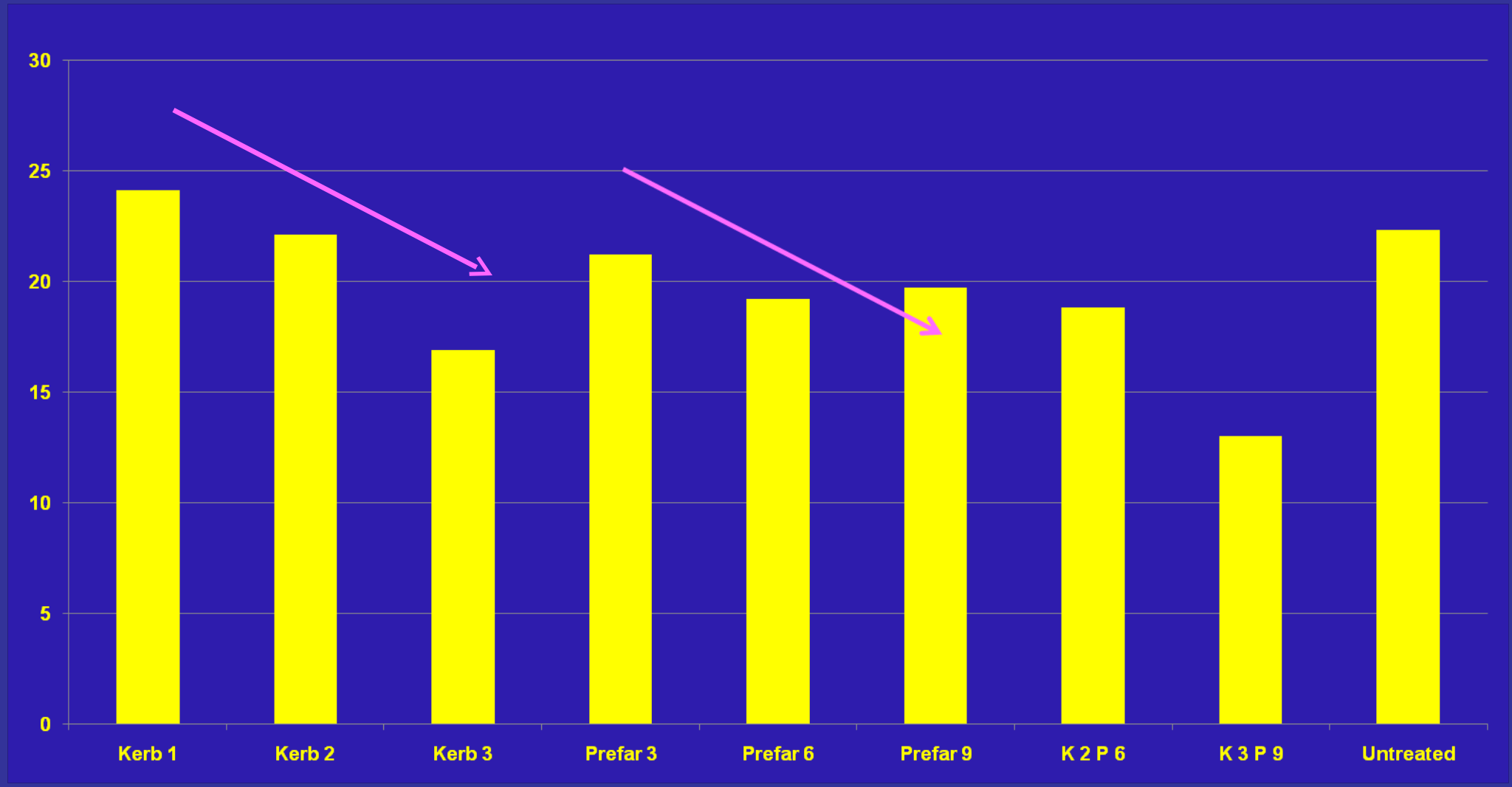
Prefar 1st true leaf shiny; stunting


Untreated


Kerb


Prefar

Impact of Kerb and Prefar Rate on Yield of Romaine



Carrots Weed Control Trials

- Carrots have an effective herbicide that provides excellent weed control
- Syngenta is planning to register Caparol on this crop which will provide yet another effective material
- The carrot (including cilantro!) registration packet was submitted to EPA this year……

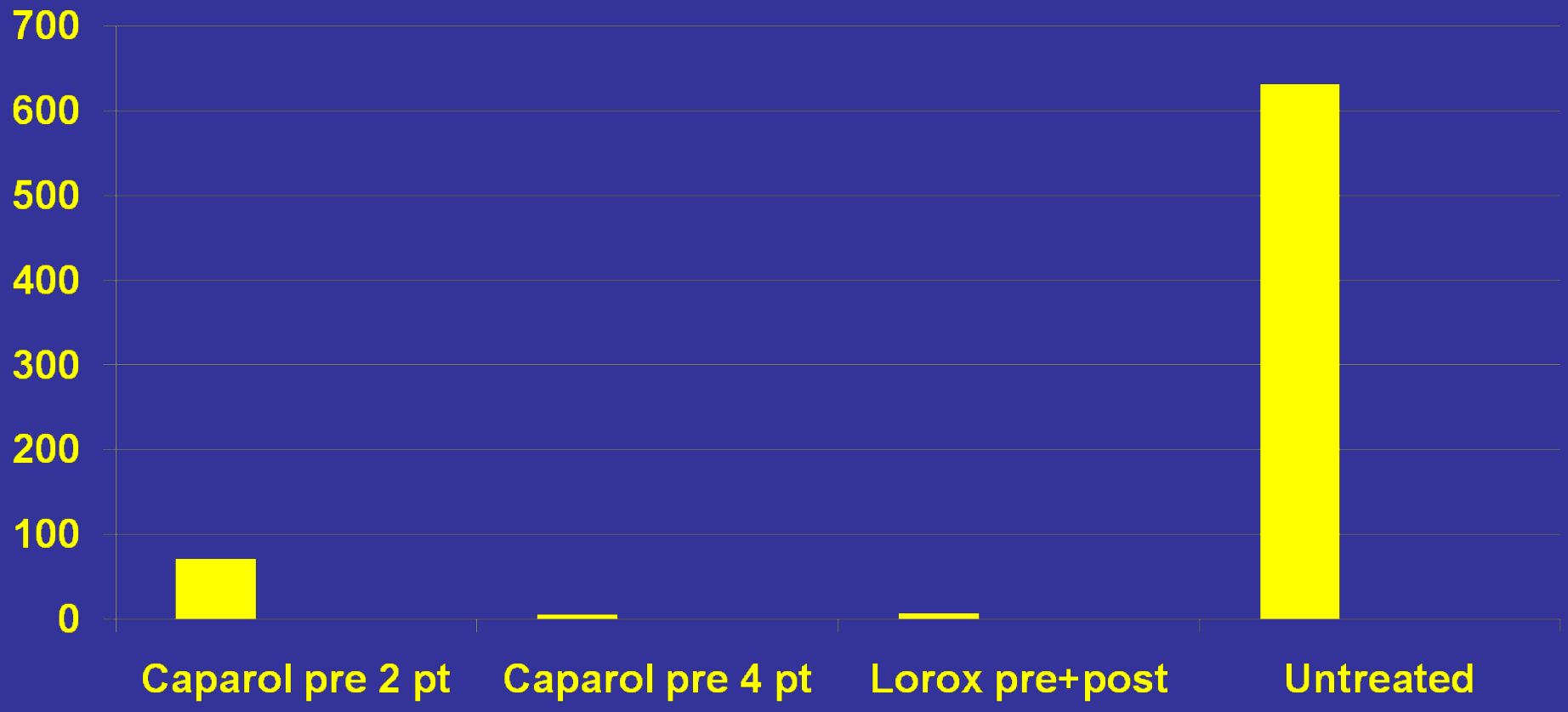
- In preparation for the eventual registration of Caparol on carrots we conducted a trial to look at application rates and timing

Treatment	Timing	Rate/A
Caparol	Preemergence	2 pints
Caparol	Preemergence	4 pints
Caparol FB Caparol	Preemergence Post emergence	2 pints 4 pints
Caparol FB Caparol	Preemergence Post emergence	4 pints 4 pints
Caparol	Post emergence	2 pints
Caparol	Post emergence	4 pints
Lorox FB Lorox	Preemergence Post emergence	1.5 pound 1.5 pound
Nortron Caparol	Preemergence Post emergence	48 ounces 2 pints
Untreated	----	----

Treatment	Timing	Rate/A	Percent Weed Control
Caparol	Preemergence	2 pints	54
Caparol	Preemergence	4 pints	100
Caparol FB Caparol	Preemergence Post emergence	2 pints 4 pints	97
Caparol FB Caparol	Preemergence Post emergence	4 pints 4 pints	100
Caparol	Post emergence	2 pints	90
Caparol	Post emergence	4 pints	95
Lorox FB Lorox	Preemergence Post emergence	1.5 pound 1.5 pound	98
Nortron Caparol	Preemergence Post emergence	48 ounces 2 pints	100
Untreated	----	----	0

Treatment	Timing	Rate/A	Percent Weed Control
Caparol	Preemergence	2 pints	54
Caparol	Preemergence	4 pints	100
Caparol FB Caparol	Preemergence Post emergence	2 pints 4 pints	97
Caparol FB Caparol	Preemergence Post emergence	4 pints 4 pints	100
Caparol	Post emergence	2 pints	90
Caparol	Post emergence	4 pints	95
Lorox FB Lorox	Preemergence Post emergence	1.5 pound 1.5 pound	98
Nortron Caparol	Preemergence Post emergence	48 ounces 2 pints	100
Untreated	----	----	0

Hours/Acre to Weed Carrots



Onion Weed Control Trials

- **Several significant registrations in 2007:**
  - **Prowl H2O at loop stage**
  - **Goal Tender at 1st true leaf stage**
  - **Outlook at 2nd true leaf stage**
  - **Nortron for pre and post emergence use**

Onion Weed Control Trials

- We had not worked with Nortron and made that the focus of our 2008 screening trial

Treatment	Rate/A	Timing
Untreated	----	----
Dacthal + Goal Tender	1.3 gal + 6.0 oz	Pre + post
Goal Tender	0.5 ounce	Preemergence
Goal Tender	1.0 ounce	Preemergence
Goal Tender	2.0 ounce	Preemergence
Nortron	16 ounces	Preemergence
Nortron	24 ounces	Preemergence
Nortron	32 ounces	Preemergence
Nortron + Nortron	16 oz + 16 oz	Pre + post
Nortron + Nortron	32 oz + 16 oz	Pre + post
Nortron + Goal Tender	16 oz + 6.0 oz	Pre + post
Nortron + Goal Tender	32 oz + 6.0 oz	Pre + post

Treatment	Rate/A	Timing	% Weed Control
Untreated	----	----	0
Dacthal + Goal Tender	1.3 gal + 6.0 oz	Pre + post	99
Goal Tender	0.5 ounce	Preemergence	76
Goal Tender	1.0 ounce	Preemergence	85
Goal Tender	2.0 ounce	Preemergence	95
Nortron	16 ounces	Preemergence	53
Nortron	24 ounces	Preemergence	51
Nortron	32 ounces	Preemergence	55
Nortron + Nortron	16 oz + 16 oz	Pre + post	44
Nortron + Nortron	32 oz + 16 oz	Pre + post	67
Nortron + Goal Tender	16 oz + 6.0 oz	Pre + post	98
Nortron + Goal Tender	32 oz + 6.0 oz	Pre + post	99

Treatment	Rate/A	Timing	% Weed Control
Untreated	----	----	0
Dacthal + Goal Tender	1.3 gal + 6.0 oz	Pre + post	99
Goal Tender	0.5 ounce	Preemergence	76
Goal Tender	1.0 ounce	Preemergence	85
Goal Tender	2.0 ounce	Preemergence	95
Nortron	16 ounces	Preemergence	53
Nortron	24 ounces	Preemergence	51
Nortron	32 ounces	Preemergence	55
Nortron + Nortron	16 oz + 16 oz	Pre + post	44
Nortron + Nortron	32 oz + 16 oz	Pre + post	67
Nortron + Goal Tender	16 oz + 6.0 oz	Pre + post	98
Nortron + Goal Tender	32 oz + 6.0 oz	Pre + post	99

Treatment	Rate/A	Timing	% Weed Control
Untreated	----	----	**0**
Dacthal + Goal Tender	1.3 gal + 6.0 oz	Pre + post	**99**
Goal Tender	0.5 ounce	Preemergence	**76**
Goal Tender	1.0 ounce	Preemergence	**85**
Goal Tender	2.0 ounce	Preemergence	**95**
Nortron	16 ounces	Preemergence	**53**
Nortron	24 ounces	Preemergence	**51**
Nortron	32 ounces	Preemergence	**55**
Nortron + Nortron	16 oz + 16 oz	Pre + post	**44**
Nortron + Nortron	32 oz + 16 oz	Pre + post	**67**
Nortron + Goal Tender	16 oz + 6.0 oz	Pre + post	**98**
Nortron + Goal Tender	32 oz + 6.0 oz	Pre + post	**99**

Treatment	Rate/A	Timing	% Weed Control
Untreated	----	----	**0**
Dacthal + Goal Tender	1.3 gal + 6.0 oz	Pre + post	**99**
Goal Tender	0.5 ounce	Preemergence	**76**
Goal Tender	1.0 ounce	Preemergence	**85**
Goal Tender	2.0 ounce	Preemergence	**95**
Nortron	16 ounces	Preemergence	**53**
Nortron	24 ounces	Preemergence	**51**
Nortron	32 ounces	Preemergence	**55**
Nortron + Nortron	16 oz + 16 oz	Pre + post	**44**
Nortron + Nortron	32 oz + 16 oz	Pre + post	**67**
Nortron + Goal Tender	16 oz + 6.0 oz	Pre + post	**98**
Nortron + Goal Tender	32 oz + 6.0 oz	Pre + post	**99**

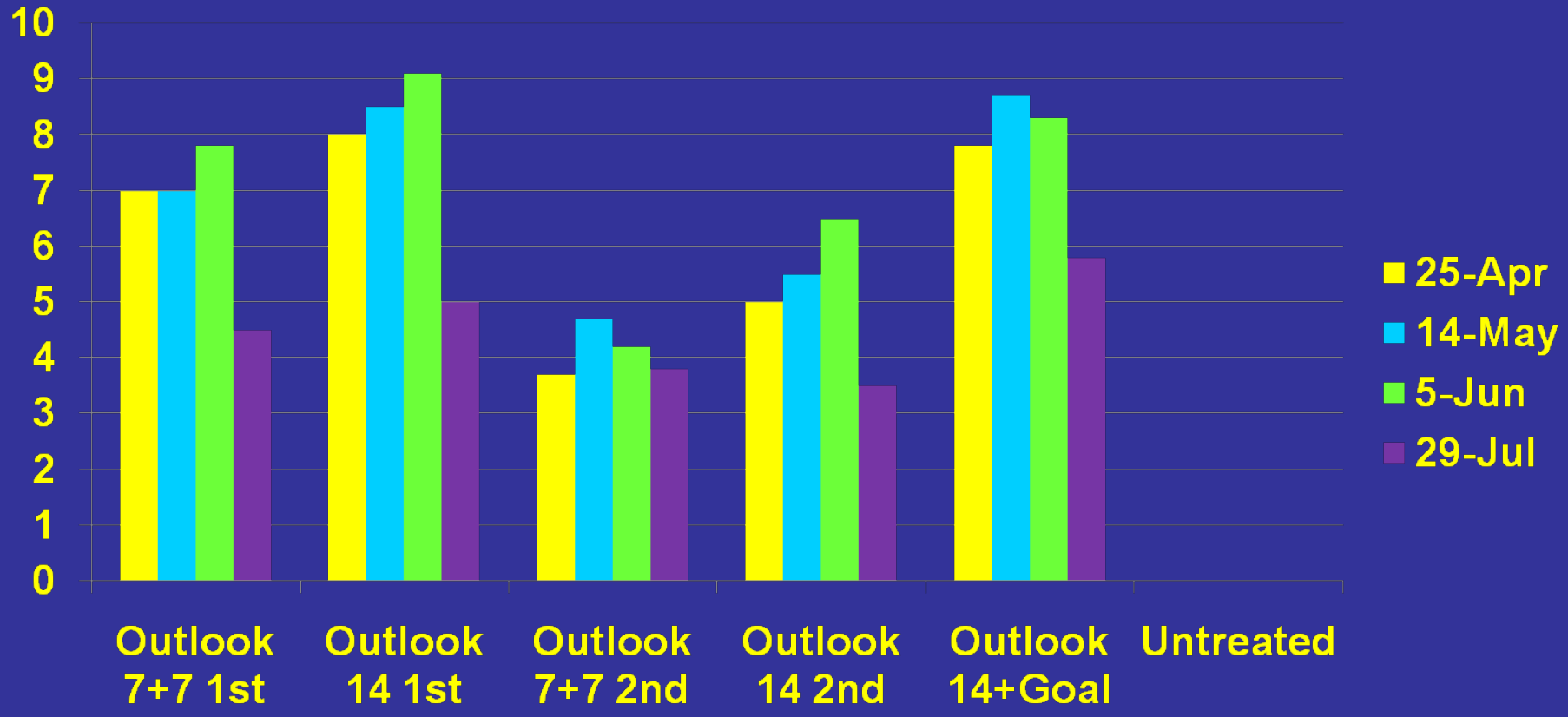
2008 Nutsedge Control Trial


Untreated
7-7-0-7+Outlook
Goal Tender
1st true leaf

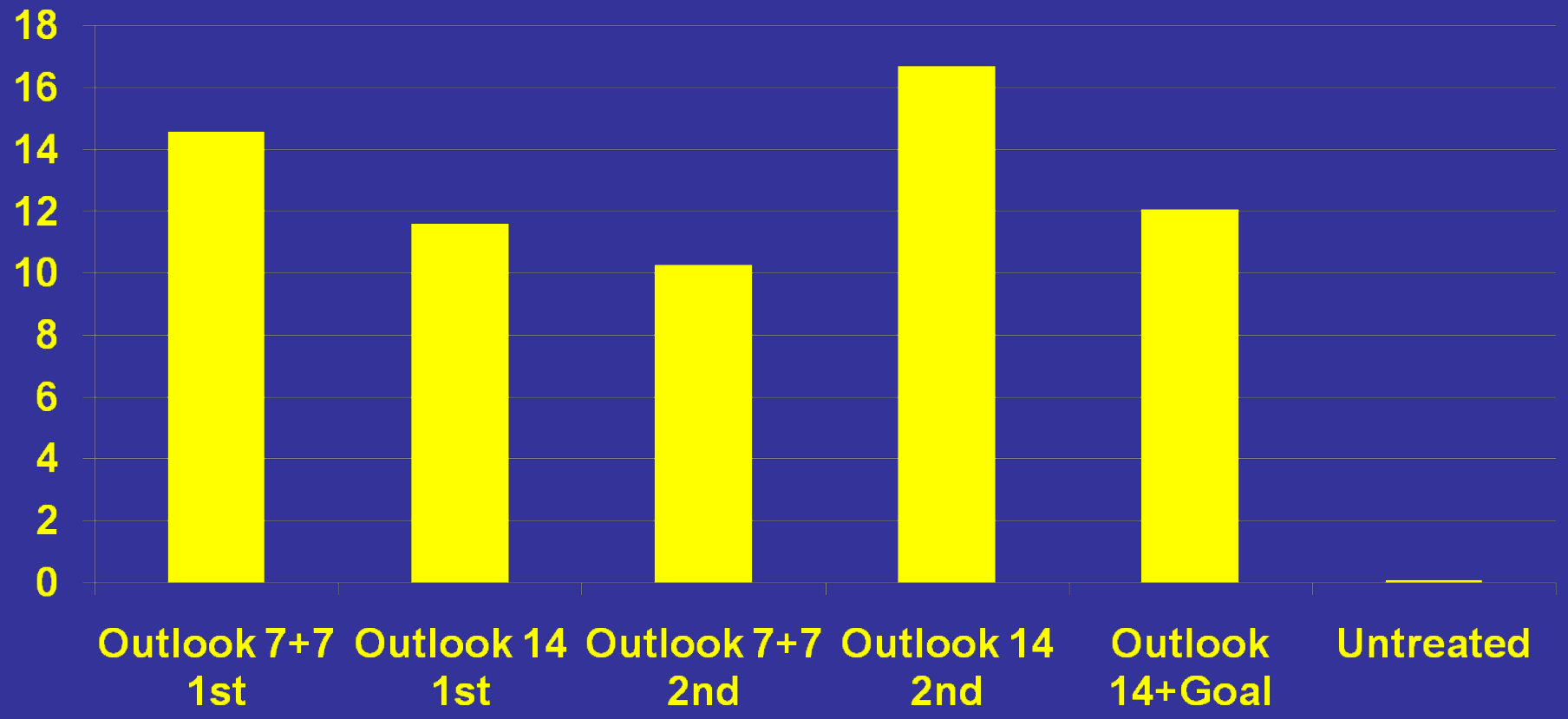

7-7-0-7 + Outlook 7+7
1st true leaf
7-7-0-7 + Outlook 7+7
2nd true leaf


Untreated
7-7-0-7 + Outlook 7+7
1st true leaf

Nutsedge Weed Control Rating Over Time



Yield of Onions
T/A



Acknowledgements

- Miriam Silva Ruiz, Research Assistant
- All the Growers and PCA's that cooperated with us on these trials from San Ardo to Castroville and San Juan Bautista