Developing a Weed Control Strategy in Transplanted Bell Peppers with Preemergence Herbicides *for California*

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Weed Control Challenges
field grown peppers without plastic mulch

- Peppers compete poorly with weeds for the first 40 to 60 days following transplanting.
- Peppers may be subject to weed pressure by both winter and summer annual weeds.

2007

Issues with weed control in California field grown peppers

- Several perennial weeds are problematic.
- Registered preemergent herbicides have gaps in spectrum of weeds controlled.
- Very few post-emergent herbicides registered.

2007

As a result of these challenges weed management is a significant cost of production.

Growers can easily spend $400/Acre

On herbicide application, mechanical cultivation,

and hand hoeing.

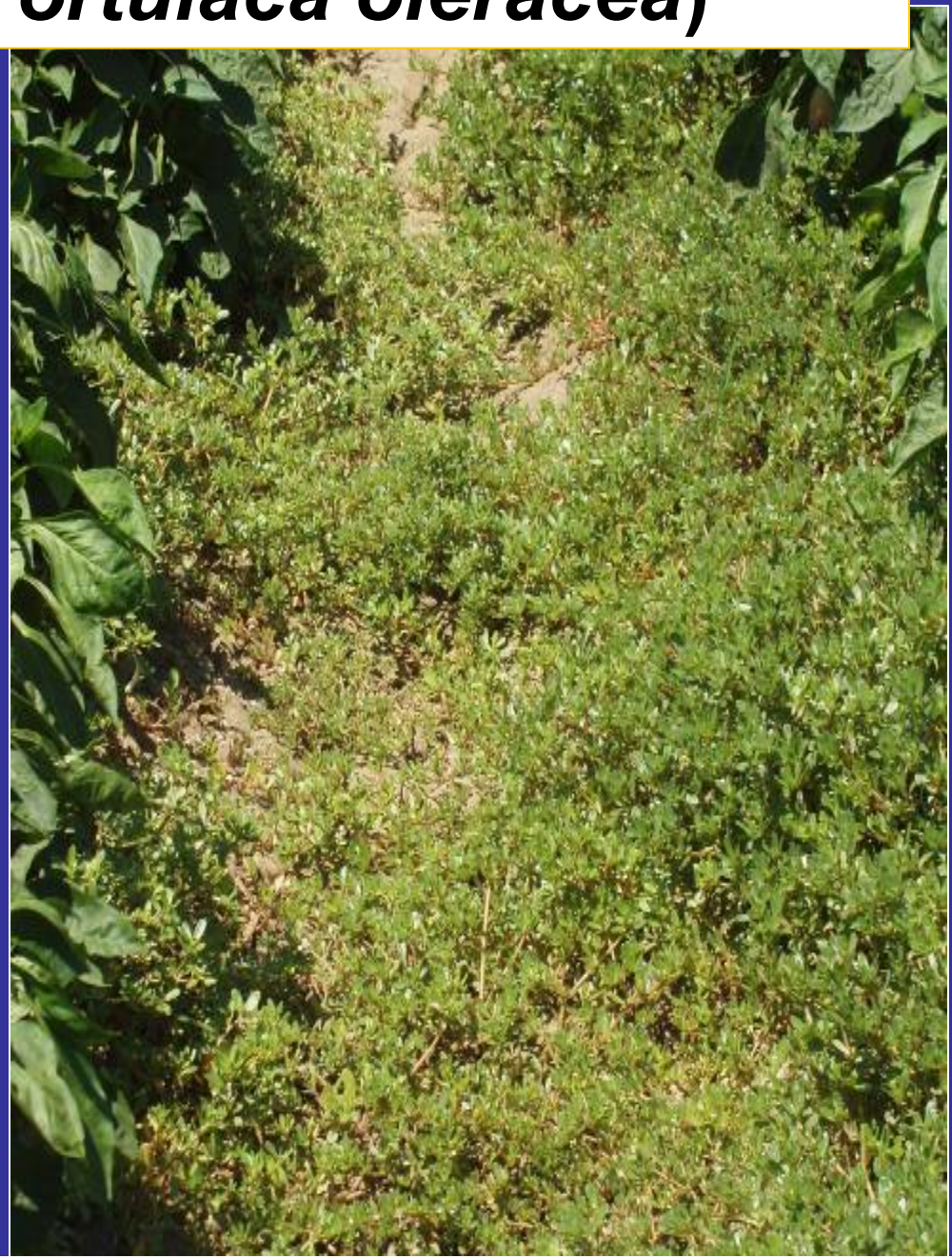
Difficult to control weeds in California

Hairy Nightshade
(Solanum sarrachoides)

Black Nightshade
(*Solanum nigrum*)

Also cutleaf nightshade and groundcherry.

Common purslane (*Portulaca oleracea*)



Pigweeds (Amaranthus sp.)

Redroot pigweed

Tumble pigweed

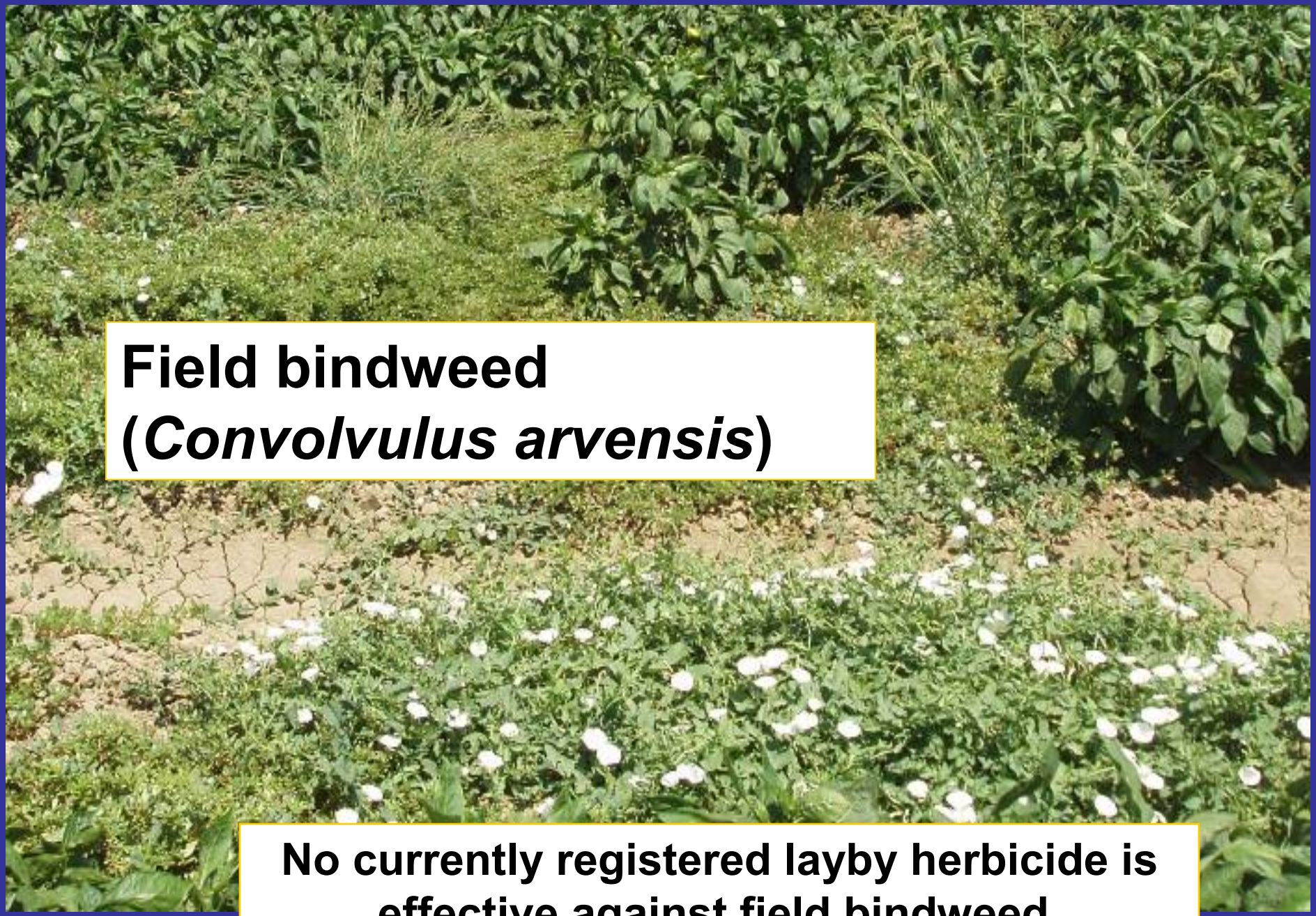
Also Prostrate pigweed

Puncturevine (*Tribulus terrestris*)

Difficult to control perennial weeds in CA

Yellow nutsedge (*Cyperus esculentus*)

Purple nutsedge (*Cyperus purpurea*)



Field bindweed (*Convolvulus arvensis*)

No currently registered layby herbicide is effective against field bindweed.

Little Mallow (*Malva parviflora*)

No currently registered layby herbicide is effective against malva.

Weed Control Materials Registered for Transplanted Peppers in California

- Preplant
  - Paraquat
  - Roundup
  - Metam Sodium
  - Shark (carfentrazone)
  - Scythe (pelargonic acid)
- Preplant - Preemergence
  - Treflan & Prowl H_2O
  - Dual Magnum (24c)
  - Goal[1,2]
- Post Transplant
  - Devrinol
- Layby
  - Dacthal
  - Prowl H_2O
  - Dual Magnum (24c)*
- Postemergence
  - Poast
  - Select Max (clethodim)
  - Sandea

1- Preformed beds up to 30 days prior to transplanting, must work beds
2- Applied to shaped beds and tarped (approved in 2004)

Field Research Objectives

To develop a "weed control strategy" for peppers with preemergence herbicides applied

- At PLANTING

and/or

- At LAYBY

that provide weed control throughout the growing season.

2004 - 2008
CA Weed Control Trials in Peppers

- **Field Trials**
  - **Central Coast** (Santa Clara and Monterey Counties)
  - **San Joaquin Valley** (Fresno County)
- **Materials evaluated included:**
  - **Dual Magnum** (S-metolachlor)
  - **Chateau** (flumioxazin)
  - **Goal Tender** (oxyfluorfen)
  - **Outlook** (dimethenamid)
  - **Prowl H_2O**
  - **Devrinol** (napropamide) **or** **Dacthal** (DCPA) **– *Standards***

Goal Tender (DowAgro Sciences)

- Goal Tender applied to shaped beds 30 days prior to transplanting.
- Goal Tender less tendency to lift off the soil and damage young pepper plants.

Goal 2XL
2 lb/gal

Goal Tender
4 lb/gal
Registered

Concerns with Goal Treated Beds without Incorporation

Dual Magnum (Syngenta)

- When we started the current label was very restrictive and we are working with Syngenta to improve the wording and the allowed usage (i.e. restricted to bell types and at-planting applications).
- It is registered for a 60 day PHI and, if we could work out details on the wording of the label, it would be an important tool as a layby application.

Dual Magnum (Syngenta)

- Now available is an INDEMNIFIED 24c label for Dual Magnum in peppers, onions, celery, and spinach.
- Growers can only obtain this label by going to the Syngenta sponsored website and registering as a user. **http://farmassist.com**
- This agreement affords Syngenta protection from unreasonable liability.

Outlook (BASF)

- Currenty this product is not registered for use in peppers. We are working with BASF to determine application method (over the top versus directed spray), timing, and application rate.
- We have noticed excellent weed control, but crop phytotoxicity may be a problem.

Chateau, Broadstar (flumioxazin) (Valent)

- This product provided excellent weed control. BUT Crop PHYTOTOXICITY is a PROBLEM.
- We worked with Valent Corp. to determine application method (spray versus granule), timing, and application rate for a couple of years.
- We stopped testing it but then resumed last year in conjunction with water repellent adjuvants to increase selectivity.

Bell Pepper Herbicide Studies

Methods	Fresno	Monterey
Preplant Goal Tender:	March 15	April 15
Transplant Peppers:	April 15	May 15
Variety:	Jupiter or Indra	Baron
Plot size:	2(40”) x 70’	40” bed x 25’
Water volume:	30 gal/A	74 gal/A
Layby herbicides:	May 30 – mid June	June 16
Irrigation:	Sprinkler to furrow	Sprinkler to drip
Soil type:	Panoche clay loam	Pacheco silt loam
Harvest:	Aug 1-15	Aug 19

Transplant Application	Lbs a.i./A	Layby Application	Lbs a.i./A
Dual Magnum 7.62	1.43	Dual Magnum 7.62	1.43
Dual Magnum 7.62	1.43	Outlook 6.0	0.60
Dual Magnum 7.62	1.43	Dacthal 75W	7.00
Goal Tender 4F[1]	0.50	Dual Magnum 7.62	1.43
Goal Tender 4F[1]	0.50	Outlook 6.0	0.60
Goal Tender 4F[1]	0.50	Dacthal 75W	7.00
Outlook 6.0	0.60	Dual Magnum 7.62	1.43
Outlook 6.0	0.60	Outlook 6.0	0.60
Outlook 6.0	0.60	Dacthal 75W	7.00
Chateau - Broadstar 0.125 lb ai/A per 250 lbs	0.094	Dual Magnum 7.62	1.43
Chateau - Broadstar	0.094	Outlook 6.0	0.60
Chateau - Broadstar	0.094	Dacthal 75W	7.00
Devrinol (standard)	1.50	Dacthal 75W	7.00
Untreated	---	---	---

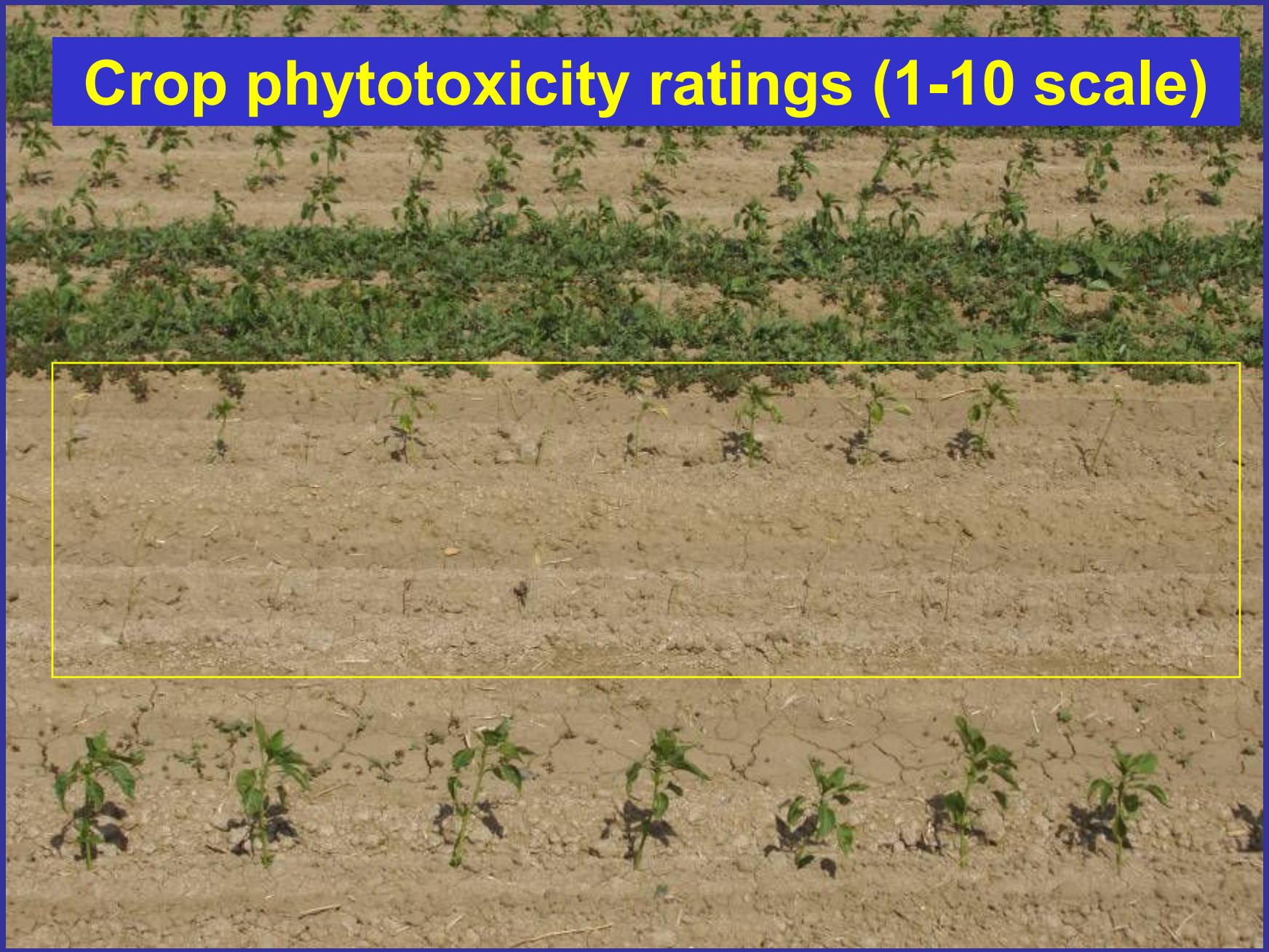
Plot size: Two 40-inch beds x 70’ row
4 replications

2007

2007

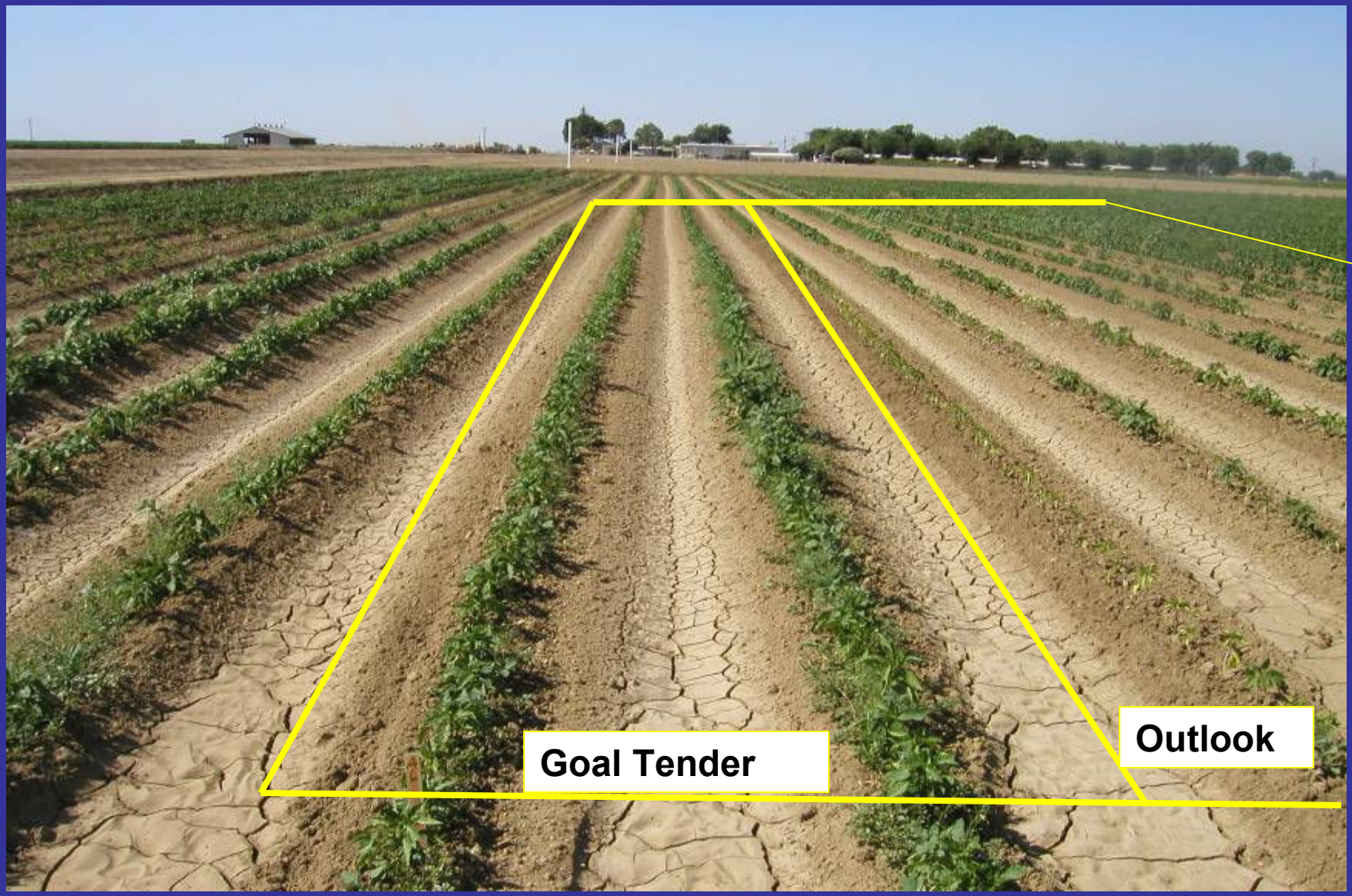
Weed control ratings (1-10 scale)

Crop phytotoxicity ratings (1-10 scale)



2007

Goal Tender Worked! Fresno – June 1, 2005



Fresno - July 13, 2005

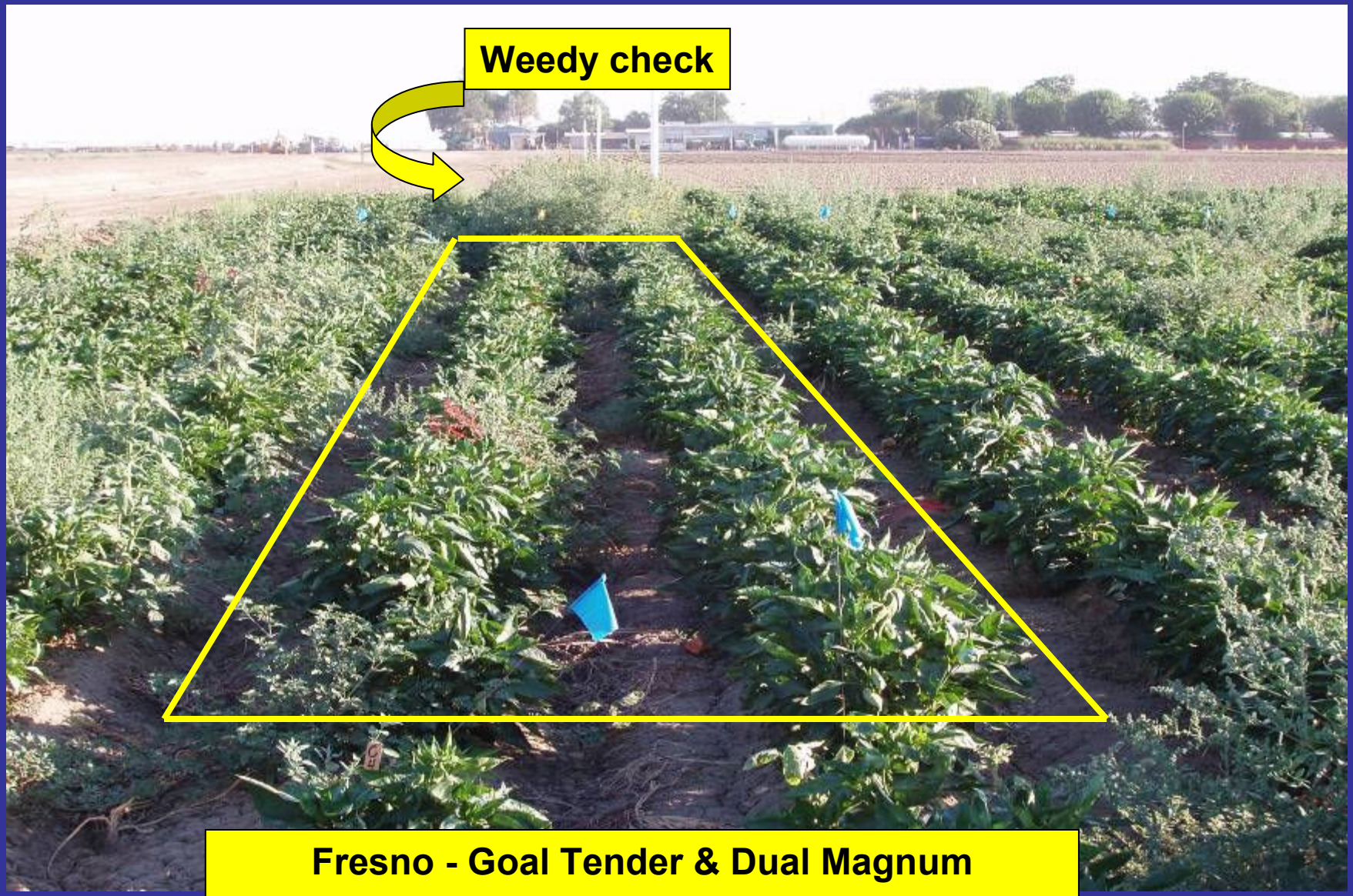
Dual Magnum

Goal Tender

Outlook

Outlook
Dual
Magnum

Fresno: Outlook stunting persisted to harvest – August 23, 2005



Fresno - Goal Tender & Dual Magnum

August 23, 2005

Treatments	a.i./ Acre	24 DAT	67 DAT
Dual Magnum 7.62 *Fb Dual Magnum*	1.43 *1.43*	9.8	9.6
Dual Magnum *Fb Outlook*	1.43 *0.60*	10.0	8.5
Dual Magnum *Fb Dacthal*	1.43 *7.00*	10.0	9.7
Goal Tender 4F[1] *Fb Dual Magnum*	0.50 *1.43*	1.3	8.7
Goal Tender[1] *Fb Outlook*	0.50 *0.60*	1.5	9.3
Goal Tender[1] *Fb Dacthal*	0.50 *7.00*	1.0	8.8
Outlook 6.0 *Fb Dual Magnum*	0.60 *1.43*	10.0	8.3
Outlook *Fb Outlook*	0.60 *0.60*	10.0	8.5
Outlook *Fb Dacthal*	0.60 *7.00*	9.7	7.0
Flumioxazin impregnated on fertilizer *Fb Dual Magnum*	0.094 *1.43*	7.7	9.0
Flumioxazin *Fb Outlook*	0.094 *0.60*	9.7	8.8
Flumioxazin *Fb Dacthal*	0.094 *7.00*	8.2	8.8
Untreated - *weeded*	-- --	0.7	6.7
Untreated - *weedy*	-- --	1.0	0.7

Weed Control Ratings

Yield of Peppers Lbs/plot

Treatments	a.i./A	Marketable	Total Fruit
Dual Magnum 7.62 *Fb Dual Magnum*	1.43 *1.43*	77.6	112.2
Dual Magnum *Fb Outlook*	1.43 *0.60*	71.3	103.5
Dual Magnum *Fb Dacthal*	1.43 *7.00*	61.0	89.5
Goal Tender 4F[1] *Fb Dual Magnum*	0.50 *1.43*	62.6	97.6
Goal Tender[1] *Fb Outlook*	0.50 *0.60*	91.6	116.0
Goal Tender[1] *Fb Dacthal*	0.50 *7.00*	66.0	89.1
Outlook 6.0 *Fb Dual Magnum*	0.60 *1.43*	47.2	65.5
Outlook *Fb Outlook*	0.60 *0.60*	41.8	66.2
Outlook *Fb Dacthal*	0.60 *7.00*	21.0	31.9
Flumioxazin impregnated on fertilizer *Fb Dual Magnum*	0.094 *1.43*	57.5	84.4
Flumioxazin *Fb Outlook*	0.094 *0.60*	79.4	112.3
Flumioxazin *Fb Dacthal*	0.094 *7.00*	65.3	89.0
Untreated – *weeded*	-- --	78.4	107.5
Untreated – *weedy*	-- --	20.9	31.5

Peppers never recovered

2008 Fresno Pepper Trial

2008 Bell Pepper X Preemergence Herbicides

April 18 - At Planting application - applied post transplant, over the top

Pepper Variety - INDRA 10.5 inch spacing

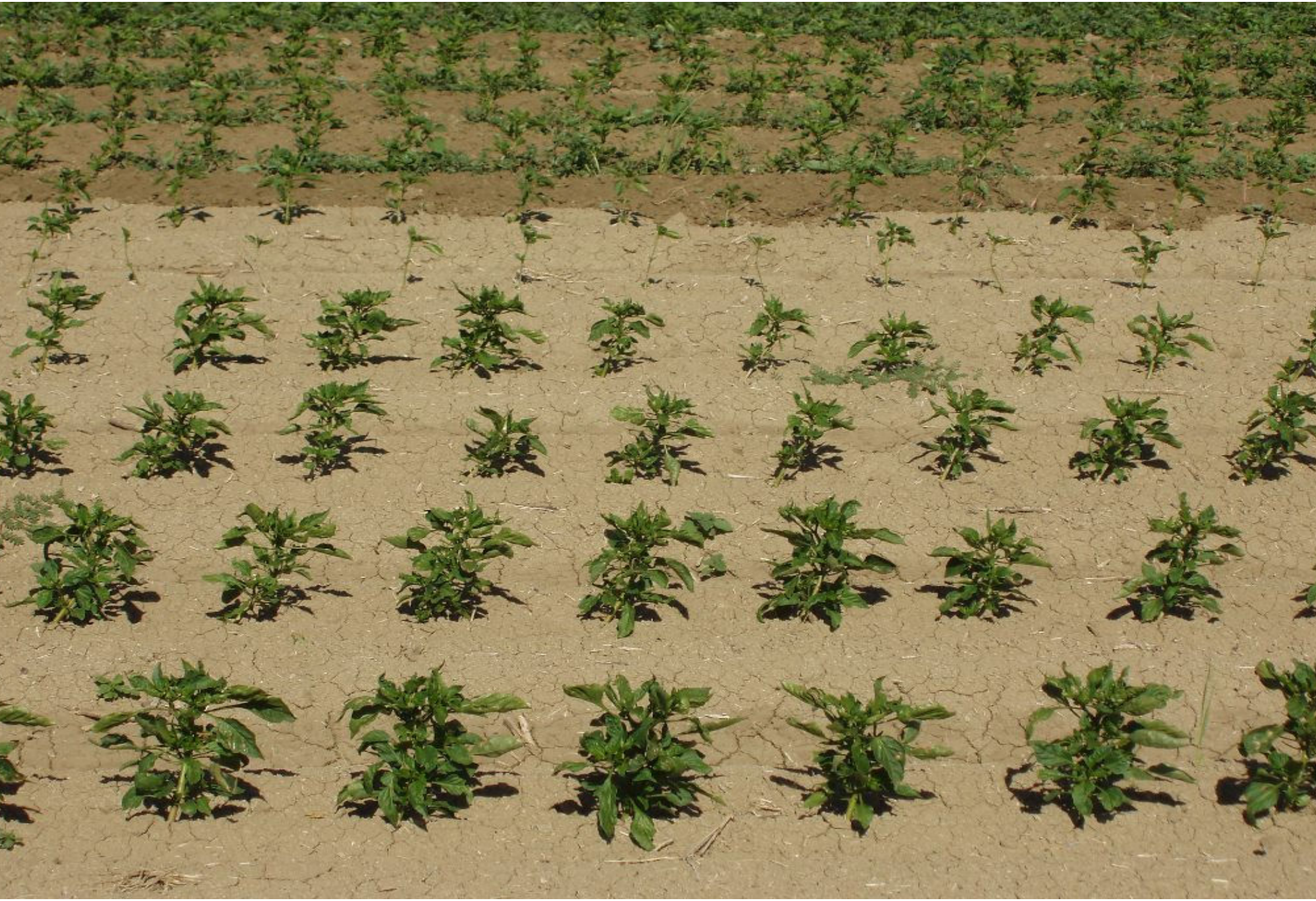
		lbs ai/A	rate/A	6 plots
1	untreated			
2	handweeded			
3	Dual Magnum	1.4	1.5 pt	43 ml
4	Outlook Lo	0.5	10.7 oz	19 ml
5	Outlook Hi	1.0	21.4 oz	38 ml
6	Prowl H_2O Lo	0.75	1.5 pt	45 ml
7	Prowl H_2O Hi	1.5	3.0 pt	90 ml
8	Dacthal	7.0	9.3 lb	254 gr
9	Dual Magnum	1.4	1.5 pt	43 ml
10	Dual Magnum	1.4	1.5 pt	43 ml
11	Dual Magnum	1.4	1.5 pt	43 ml
12	Dual Magnum	1.4	1.5 pt	43 ml
13	Dual Magnum	1.4	1.5 pt	43 ml
14	Dual Magnum	1.4	1.5 pt	43 ml
15	Outlook Lo	0.5	10.7 oz	19 ml
16	Outlook Hi	1.0	21.4 oz	38 ml
17	Outlook Lo	0.5	10.7 oz	19 ml
18	Outlook Lo & Prowl H2O Lo	0.5 & 0.75	10.7 oz & 1.5 pt	19 ml & 45 ml
19	Outlook Hi & Prowl H2O Lo	1.0 & 0.75	21.4 oz & 1.5 pt	38 ml & 45 ml
20	Outlook Lo & Prowl H2O Lo	0.5 & 0.75	10.7 oz & 1.5 pt	19 ml & 45 ml
21	Outlook Hi & Prowl H2O Lo	1.0 & 0.75	21.4 oz & 1.5 pt	38 ml & 45 ml
22	Outlook Lo	0.5	10.7 oz	19 ml
23	Outlook Hi	1.0	21.4 oz	38 ml
24	Outlook Lo	0.5	10.7 oz	19 ml
25	Outlook Hi	1.0	21.4 oz	38 ml

2008 Bell Pepper X Preemergence Herbicides

Layby application - Directed spray

		lbs ai/A	rate/A	6 plots
1	untreated			
2	handweeded			
3	--------			
4	--------			
5	--------			
6	--------			
7	--------			
8	--------			
9	Dual Magnum	1.4	1.5 pt	43 ml
10	Outlook Lo	0.5	10.7 oz	19 ml
11	Outlook Hi	1.0	21.4 oz	38 ml
12	Prowl H_2O Lo	0.75	1.5 pt	45 ml
13	Prowl H_2O Hi	1.5	3.0 pt	90 ml
14	Dacthal	7.0	9.3 lb	254 gr
15	Outlook Lo	0.5	10.7 oz	19 ml
16	Outlook Lo	0.5	10.7 oz	19 ml
17	Outlook Hi	1.0	21.4 oz	38 ml
18	--------			
19	--------			
20	Outlook Lo & Prowl H2O Lo	0.5 & 0.75	10.7 oz & 1.5 pt	19 ml & 45 ml
21	Outlook Hi & Prowl H2O Lo	1.0 & 0.75	21.4 oz & 1.5 pt	38 ml & 45 ml
22	Dual Magnum	1.4	1.5 pt	43 ml
23	Dual Magnum	1.4	1.5 pt	43 ml
24	Dacthal	7.0	9.3 lb	254 gr
25	Dacthal	7.0	9.3 lb	254 gr

Transplanted April 18, 2008
Photo on June 3

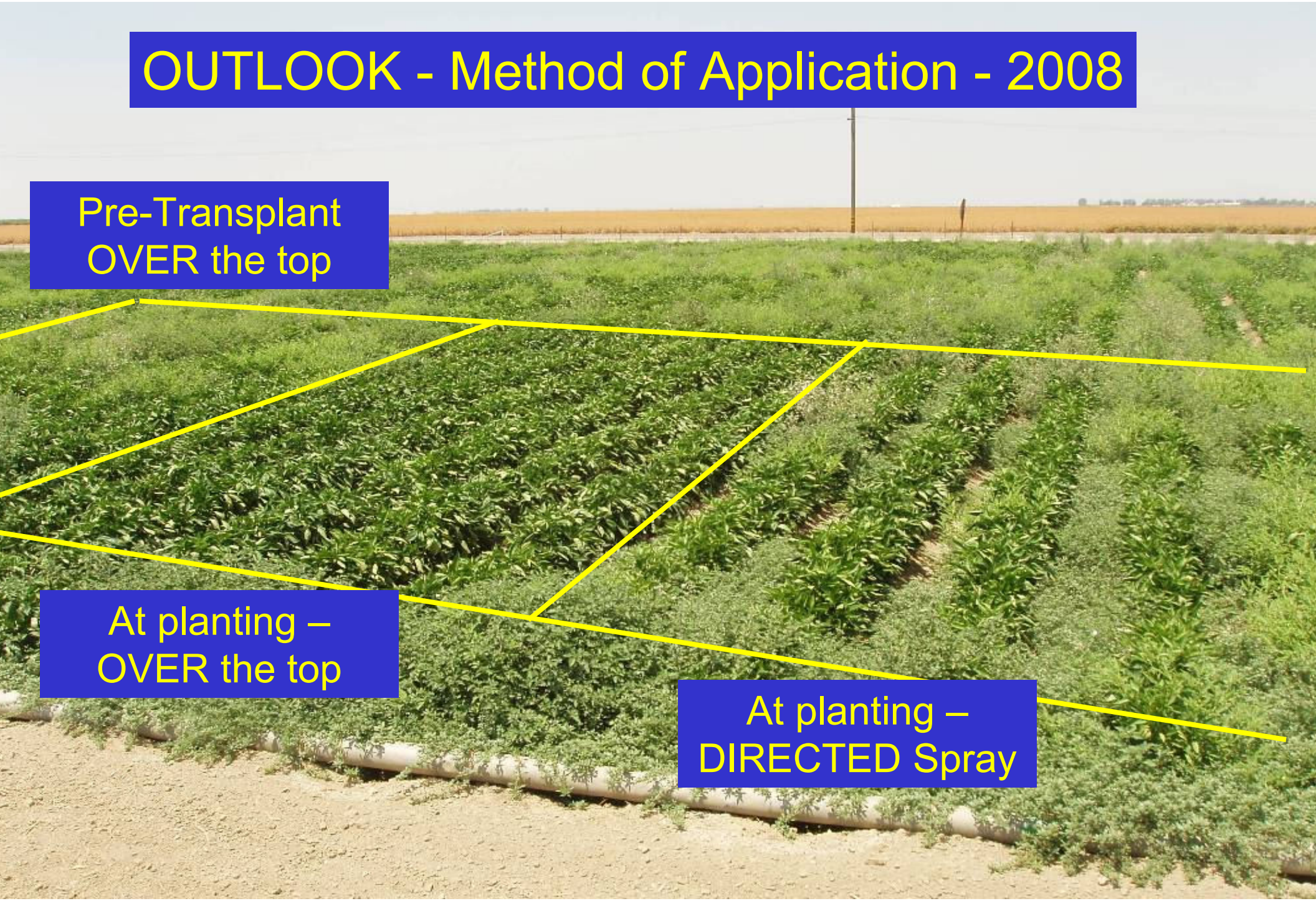


June 19, 2008

July 10, 2008

August 4, 2008

August 4, 2008


OUTLOOK - Method of Application - 2008
Pre-Transplant
OVER the top
At planting –
OVER the top
At planting –
DIRECTED Spray

A work in progress ...

Developing a Weed Control Strategy in Transplanted Bell Peppers with Preemergence Herbicides for California

... Thank you

Acknowledgements

California Pepper Improvement Foundation

California Pepper Commission

UC West Side Research & Extension Center

B and T Farms, Gilroy