Weed Control in Strawberry with Herbicides

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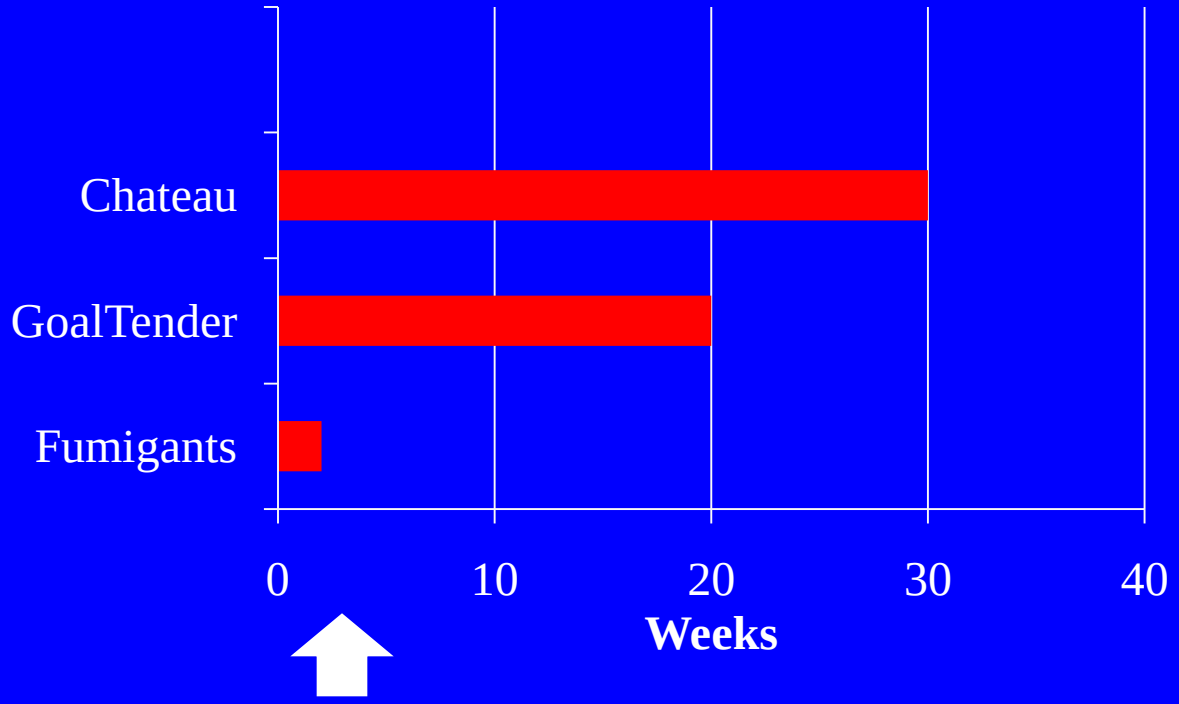
Herbicides

- Herbicides allow you to control weeds when and where needed better than any fumigant.
- Herbicides allow you the freedom to use clear tarps.

What we are trying to reduce – hand weeding

The Role of Herbicides

- **The soil residual activity of herbicides compliments fumigants and allows you to control weeds that fumigants miss.**



Herbicides vs. Fumigants

- Fumigants do not control weeds in-season, therefore if you only use fumigants you must kill all weed seed and propagules at fumigation.
- Herbicides provide backup to a less than perfect weed kill at fumigation.

Weeds difficult to control with fumigants

Annual bluegrass (Poa annua) plant. J. M. DiTomaso

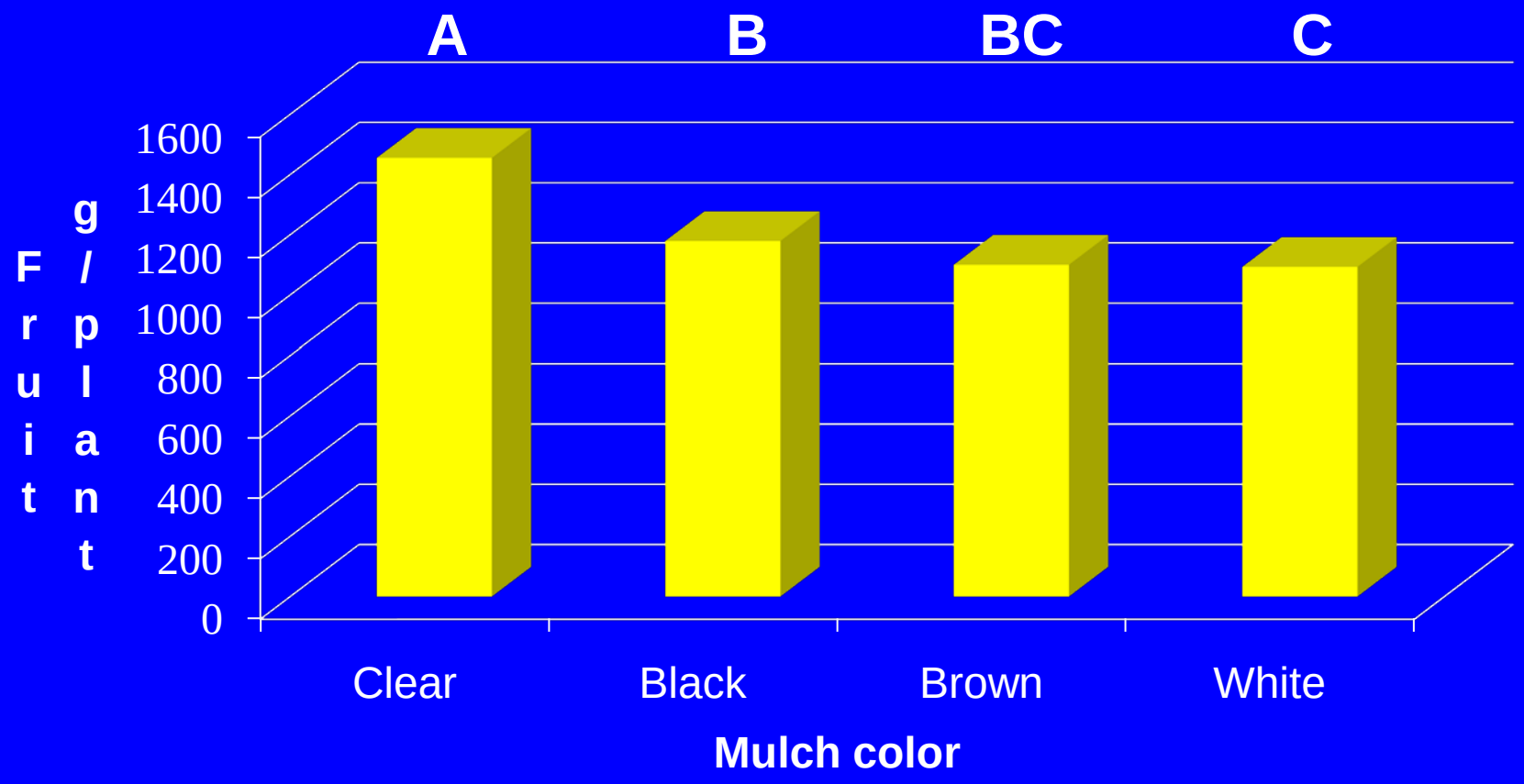
C206-01

Yellow nutsedge - perennial

Fallow beds – time for application

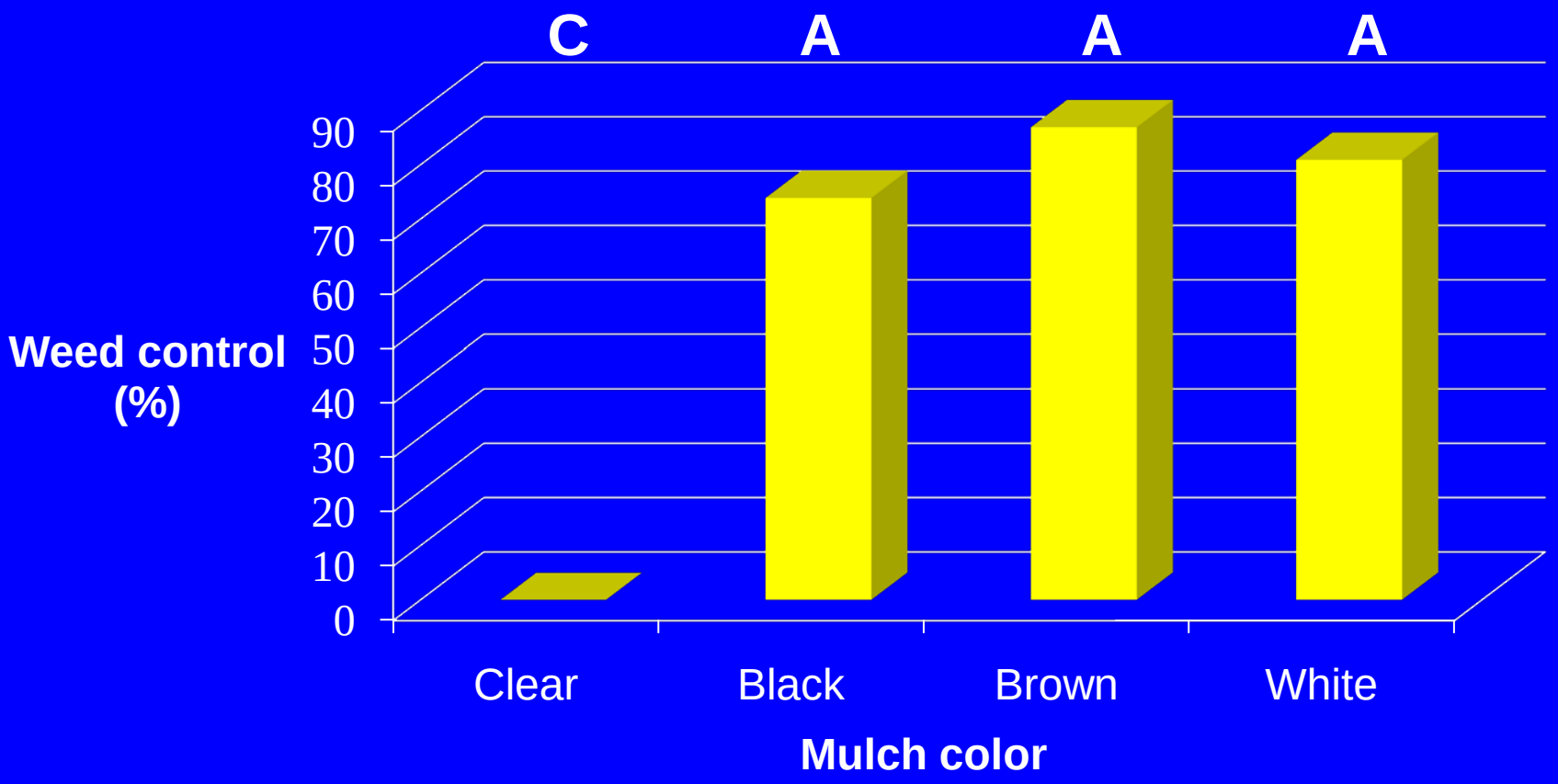
Clear plastic – weed control must be good

Effect of mulch color on fruit yield – Irvine 1988



Voth and Bringhurst 1990, average of 6 varieties

Effect of mulch color on weed control – Watsonville 2001



Johnson and Fennimore 2005

Weed control dilemma

- Black plastic controls weeds better than clear but reduces fruit yields.
- Clear film promotes earlier and higher fruit yields.
- What can you do?

Weed spectrum

Weed	Chateau	Goal	Metam Na	Prowl
Bluegrass	C	P	C	C
Chickweed	C	N	C	C
Clover	C	P	N	N
Filaree	C	C	C	N
Fleabane	C	P	C	N
Malva	C	C	N	P
Yellow nutsg	N	N	P	N
Shepherd's	C	C	C	P
Sowthistle	C	C	C	N

Herbicide selectivity

- Selectivity: the herbicide controls the weed but is safe to the crop.
- Selectivity must be carefully verified in an extremely valuable crop like strawberry.

Trial locations

- Spence USDA Farm, Salinas, CA. Ran 10/24/07 to 9/30/08.
- Spence USDA Farm, Salinas, CA. Ran 10/24/09 to 10/30/10.

Herbicide variety trial 2007-08

- Objective to identify which varieties are most and least sensitive to Chateau and GoalTender herbicides
- Chateau applied at 2, 3 & 6 oz/A
- GoalTender 0.25 & 0.5 pt/A
- Varieties – Albion, Camarosa, Festival, Ventana, Palomar, Plant Sciences, San Juan, Lanai

Herbicide variety trial 2009-10

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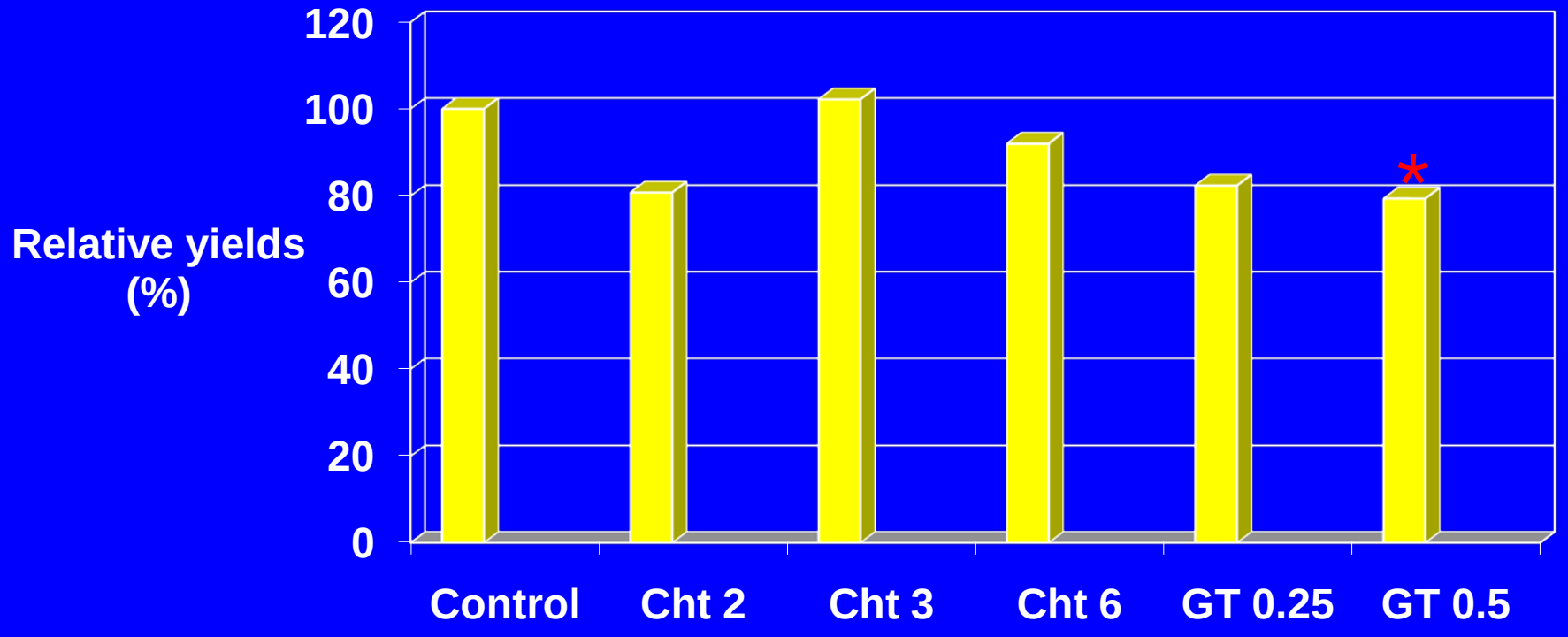
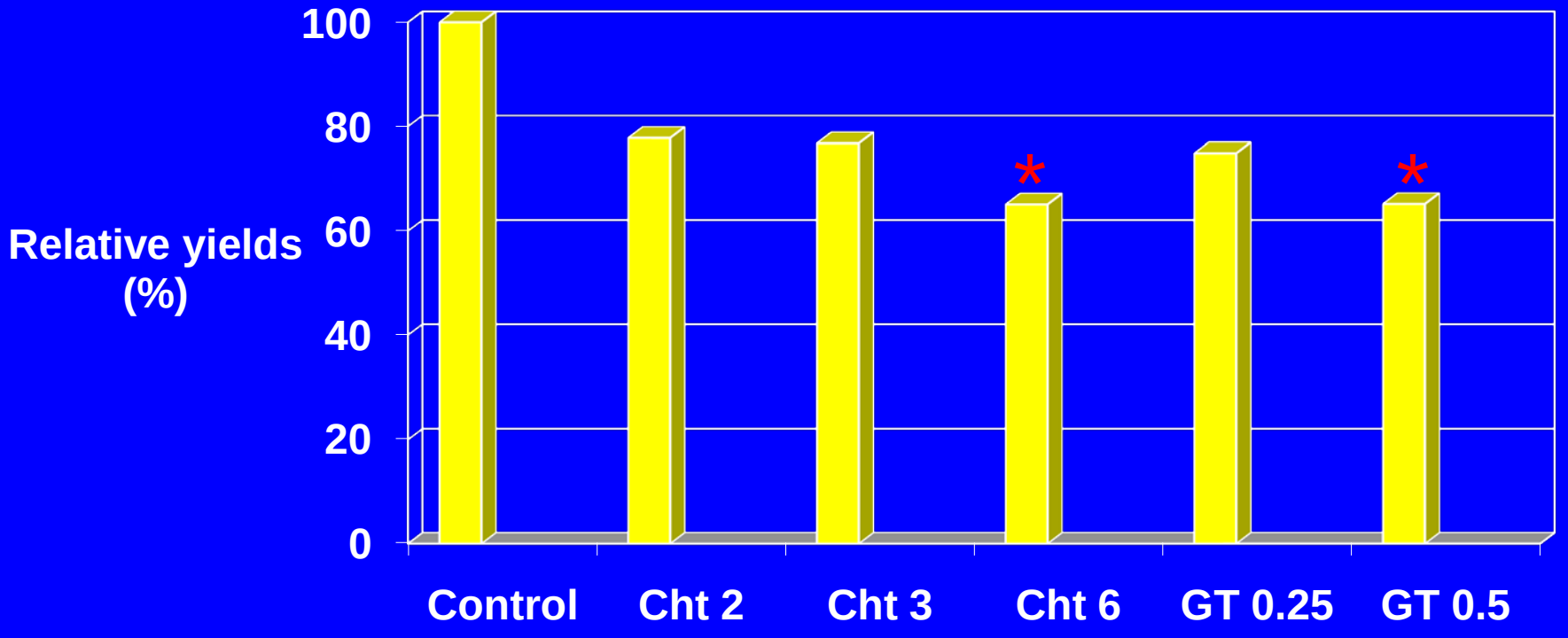
- Chateau applied at 2, 3 & 6 oz/A
- GoalTender 0.25 & 0.5 pt/A
- Varieties – Albion, Camarosa, Palomar, San Andreas, Ventana, 4634 PSI, 5298 PSI, San Juan, Del Rey

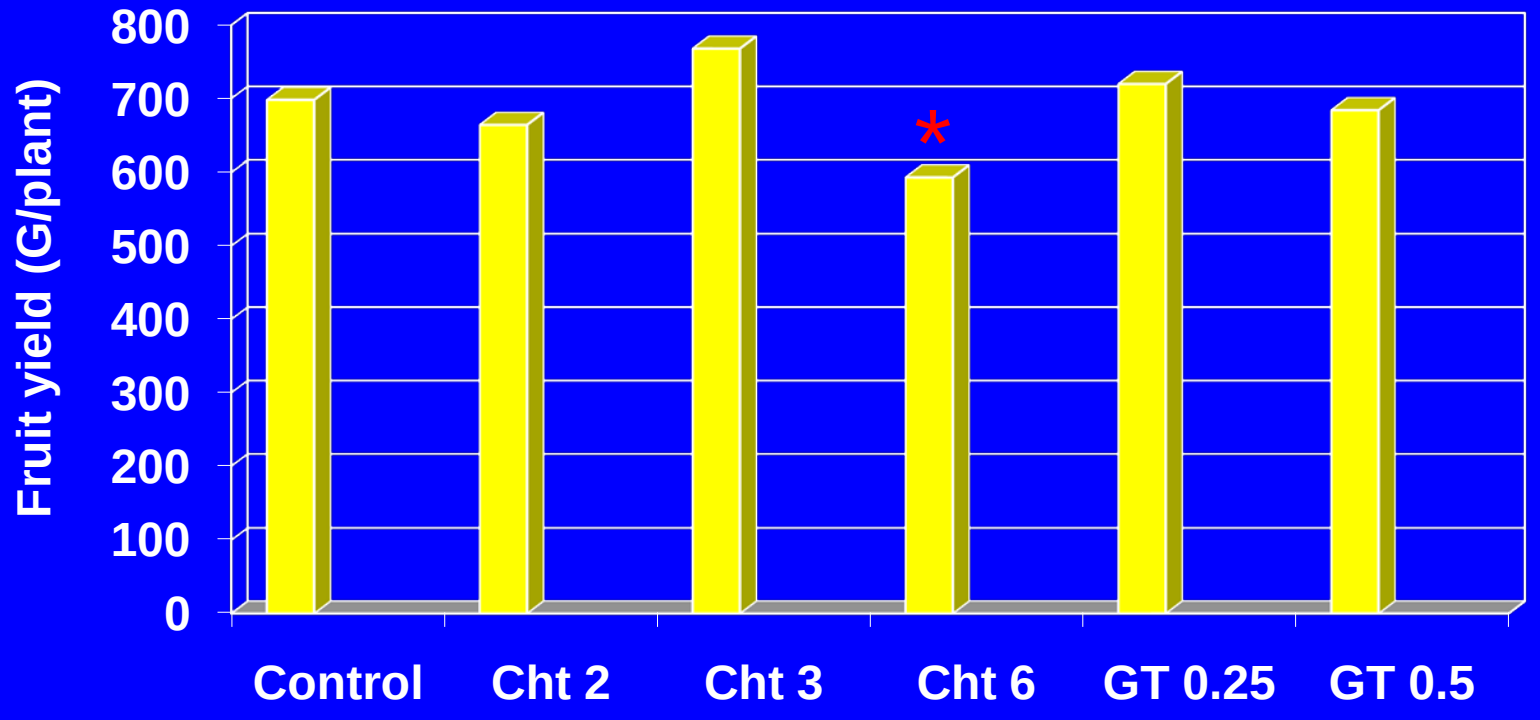
Palomar Yields 2008



Lanai Relative Yields 2008



San Andreas yields 2010



GoalTender fallow bed Label

Specimen Label

Dow AgroSciences

GoalTender™

Herbicide

™Trademark of Dow AgroSciences LLC

Use Directions For: artichokes (globe), broccoli/ cabbage/cauliflower, cacao, citrus (nonbearing), coffee, conifer (seedbeds, transplants, container stock) and selected deciduous trees, cotton, cottonwood, eucalyptus, fallow bed (cotton/soybeans), garbanzo beans, garlic, guava (Hawaii only), horseradish, jojoba, mint, onions, onions grown for seed, papaya (Hawaii only), taro, treefruit/nut/vine

Active Ingredient	
oxyfluorfen: 2-chloro-1-(3-ethoxy-4-nitrophenoxy)4-(trifluoromethyl)	41%
Inert Ingredients	59%
Total	100%

TRANSPLANTED CROPS	GoalTender Use Rate up to 0.5 pint/A	GoalTender Use Rate up to 1.0 pint/A
BROCCOLI	0 DAYS	30 DAYS
CABBAGE	0 DAYS	30 DAYS
CAULIFLOWER	0 DAYS	30 DAYS
CELERY	30 DAYS	30 DAYS
CONIFER	0 DAYS	0 DAYS
GARLIC	0 DAYS	30 DAYS
GRAPE/KIWI	0 DAYS	0 DAYS
ONION	0 DAYS	30 DAYS
PEPPER	30 DAYS	30 DAYS
STRAWBERRIES	30 DAYS	30 DAYS
TOMATO	30 DAYS	30 DAYS
TREEFRUIT/NUT/CITRUS	0 DAYS	0 DAYS

IMPORTANT:
The fallow beds should be worked thoroughly to a depth of at least 2.5 inches prior to planting; weed control should not be expected following breaking of the soil surface. **Failure to achieve thorough and complete incorporation, or to follow the recommended treatment-planting interval, may result in stand reduction and/or vigor reduction of the planted crop.**

Reentry interval 24 hours

GoalTender Calif. 2(ee)

GoalTender™ herbicide
EPA Reg. No. 62719-447
Special 2(ee) Recommendation†

Fallow-Bed Use Prior to Transplanting Strawberries or Peppers Grown in Plastic Culture

(For distribution and use only in the state California)

Directions for Use

GoalTender™ herbicide may be applied broadcast or banded as a fallow bed application to pre-formed beds prior to planting of strawberries or peppers grown in plastic culture.

It is recommended that soil moisture be used to activate GoalTender using one of the following practices soon after application.

- Irrigate the beds with ½ inch of sprinkler irrigation and then put plastic down anytime during the 30-day treatment-to-planting interval.

  (or)
- If there is adequate existing soil moisture, apply plastic to the beds as soon as possible after application and allow the moisture which condenses and accumulates beneath the plastic to thoroughly wet the treated soil.

Mechanical incorporation of the fallow-bed treatment prior to laying plastic is not required. Not disturbing the soil may allow for extended weed control. Not incorporating increases the potential for crop injury, especially under wet conditions. Therefore, the treatment should be incorporated if the risk of crop injury is not acceptable. Follow the minimum treatment-to-planting intervals outlined below (also found on the main product label).

Supplemental Label

VALENT

LABELING ACCEPTABLE
STATE OF CALIFORNIA
DEPARTMENT OF PESTICIDE REGULATION
PESTICIDE REGISTRATION
Date 1-30-07 Reviewer S. Sutherland
Reg. No. 59639-99-AA

CHATEAU HERBICIDE SW

EPA Reg. No. 59639-99
(EXCEPT NEW YORK)

RECEIVED
SEP 8 2006
BY PEST/REGISTRATION
ID # 219702

CHATEAU HERBICIDE SW USE ON: STRAWBERRY

Shielded and Hooded Application in Strawberry Row Middles
Broadcast Postemergence Application to Dormant Strawberries

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH PRECAUTIONARY STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

GENERAL INFORMATION

Chateau SW, at 3 oz. per acre, can be applied to the soil a minimum of 30 days prior to transplanting strawberries provided the strawberries will be transplanted through a plastic mulch.

Chateau SW at 3 oz. per acre, can be applied to dormant strawberries for the preemergence control of the weeds listed in Table 1, Broadleaf Weeds Controlled by Residual Activity of *Chateau* SW.

Chateau SW, at 3 oz. per acre, can be applied with a shielded or hooded sprayer for the preemergence control of the weeds listed in Table 1, Broadleaf Weeds Controlled by Residual Activity of *Chateau* SW, in strawberry row middles.

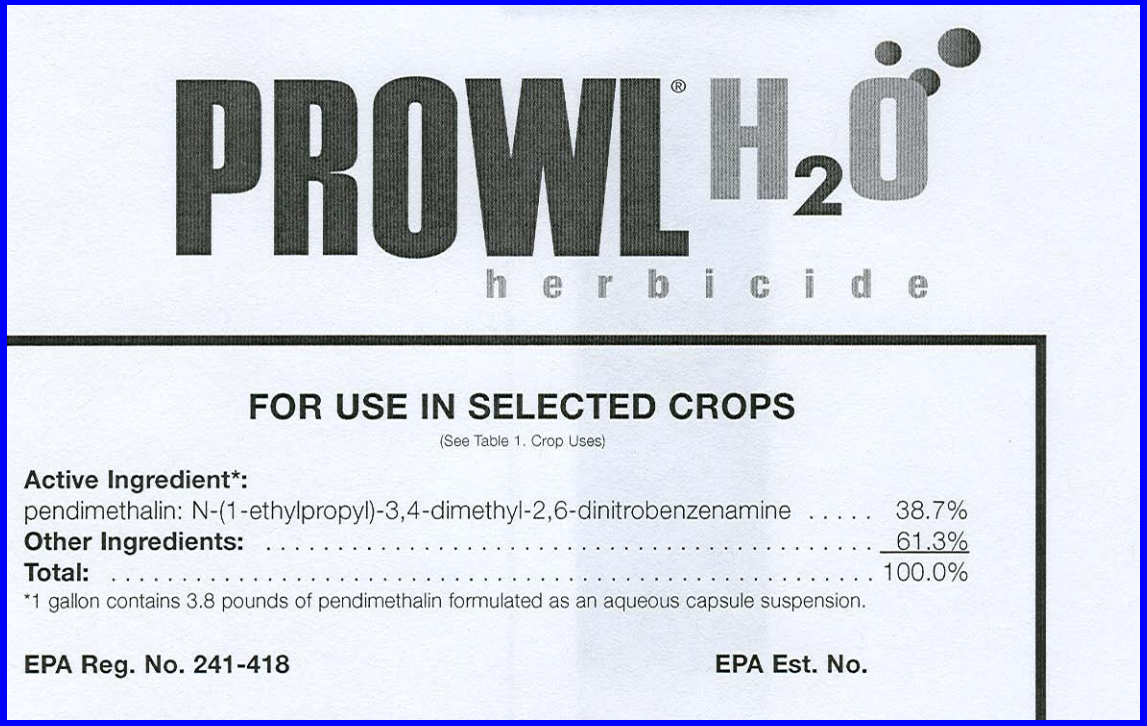
Application Method	Minimum Time From Application to Harvest (PHI)	Use Rate Per Acre Per Application (oz)	Use Rate Per Acre Per Year (oz)	Special Use Instructions
Pre-transplant	Not applicable	3	3	Apply a minimum of 30 days prior to transplanting and prior to plastic mulch being laid. Apply as part of a tank mix to control emerged weeds.
Preemergence to dormant strawberries	Not applicable	3	3	Crop oil concentrate, at 1% v/v, or non-ionic surfactant, at 0.25% v/v, may be added to help control emerged broadleaf weeds.
Hooded or shielded sprayer application to row middles	Do not apply after fruit set	3	3	**Apply only to row middles – do not apply over strawberries.** Apply prior to weed emergence. Crop spotting may occur if an adjuvant is added. **Application after fruit set may result in spotting of fruit and should be avoided.** Do not allow spray drift to come in contact with fruit or foliage

Reentry interval 12 hours

Herbicide variety: summary

- Two years data: Albion, Camarosa, Ventana, PS 5298 and San Juan varieties did not suffer yield loss from either GoalTender or Chateau.
- One years data: Del Rey, Festival, PS 4634 did not suffer yield loss from either GoalTender or Chateau.
- San Andreas tolerated labeled rates of GoalTender and Chateau but be careful of overlap.
- Lanai appears to be sensitive to both herbicides.

Now registered on Strawberry



PROWL® H_2O

herbicide

FOR USE IN SELECTED CROPS

(See Table 1. Crop Uses)

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 pounds of pendimethalin formulated as an aqueous capsule suspension.

EPA Reg. No. 241-418 **EPA Est. No.**

Prowl H2O

- Can be applied pre-transplant
- Can be applied post-transplant but not if new leaves are present
- Can apply to row middles if applied at least 35 days before harvest
- Can apply no more than 3 pints/A per application and no more than 6 pints/A per season.

Prowl H2O: rates by soil texture

Use Rates

Soil Texture	Broadcast Rate (pts/A)
Coarse	1.5
Medium	2.0 to 2.5
Fine	2.5 to 3.0

Watsonville 2001-02

Treat.	Rate	Timing	Bluegrass	Malva	Fruit
		/Transpt.	No/40ft2		Trays/A
Prowl	2.1 pts	PRE	7.3 bc	1.8 bc	4840 a
Prowl	2.1 pts	POST	5.3 c	1.8 bc	3604 de
Control	0	NA	15.0 a	5.3 abc	4708 ab

Oxnard 2001-02

Treat.	Rate	Timing	Bluegrass	Malva	Fruit
		/Transpt.	No/40ft2		Trays/A
Prowl	2.1 pts	PRE	5.3 b	18.8 abc	2017
Devrinol	4 lbs	PRE	6.5 b	17.8 abc	1947
Control	0	NA	32.3 a	29.5 a	1986

Prowl H20 2.1 pints/A at Salinas

Prowl H2O

- A new tool for strawberry weed management
- Has a very flexible label
- Very effective on annual grasses
- Very safe to strawberry applied pre-transplant
- Reentry interval is 24 hours

Sandea impregnated mulch in strawberry - Bayfilm

Acknowledgements

- USDA ARS PW Area Wide MB Alternatives Program
- California Strawberry Commission

- Thanks to John Rachuy and Ben Weber