

# ***Managing the Top 10 Most Wanted Weeds in Almonds***

Central Valley Almond Day  
June 20, 2018

Kurt Hembree

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*cefresno.ucanr.edu*

# Problematic weed species

1. **Hairy fleabane** (*Conyza canadensis*)
2. **Horseweed** (*Conyza bonariensis*)
3. **Junglerice** (*Echinochloa colona*)
4. **Sprangletop** (*Leptochloa* sp.)
5. **Yellow nutsedge** (*Cyperus esculentus*)
6. **Field bindweed** (*Convolvulus arvensis*)
7. **Knotweed** (*Polygonum aviculare*)
8. **Evening-primrose** (*Oenothera laciniata*)
9. **Russian thistle** (*Salsola iberica*)
10. **Prostrate spurge** (*Euphorbia maculata*)

Hairy fleabane



Horseweed



Junglerice



Sprangletop



Yellow nutsedge



Field bindweed



Knotweed



Evening-primrose



Russian thistle

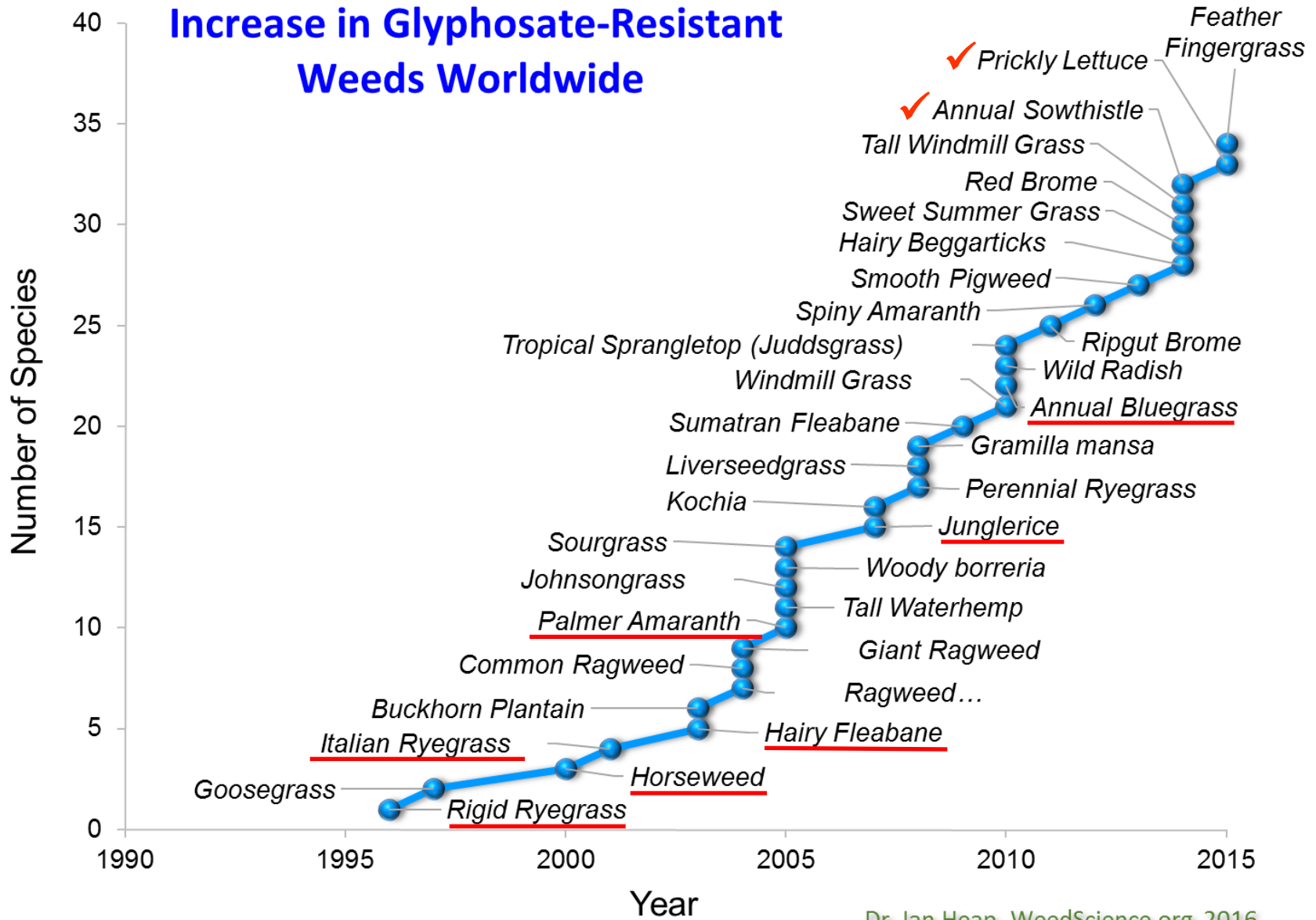


Statewide IPM Program  
2007 Regents, University of California

Prostrate spurge

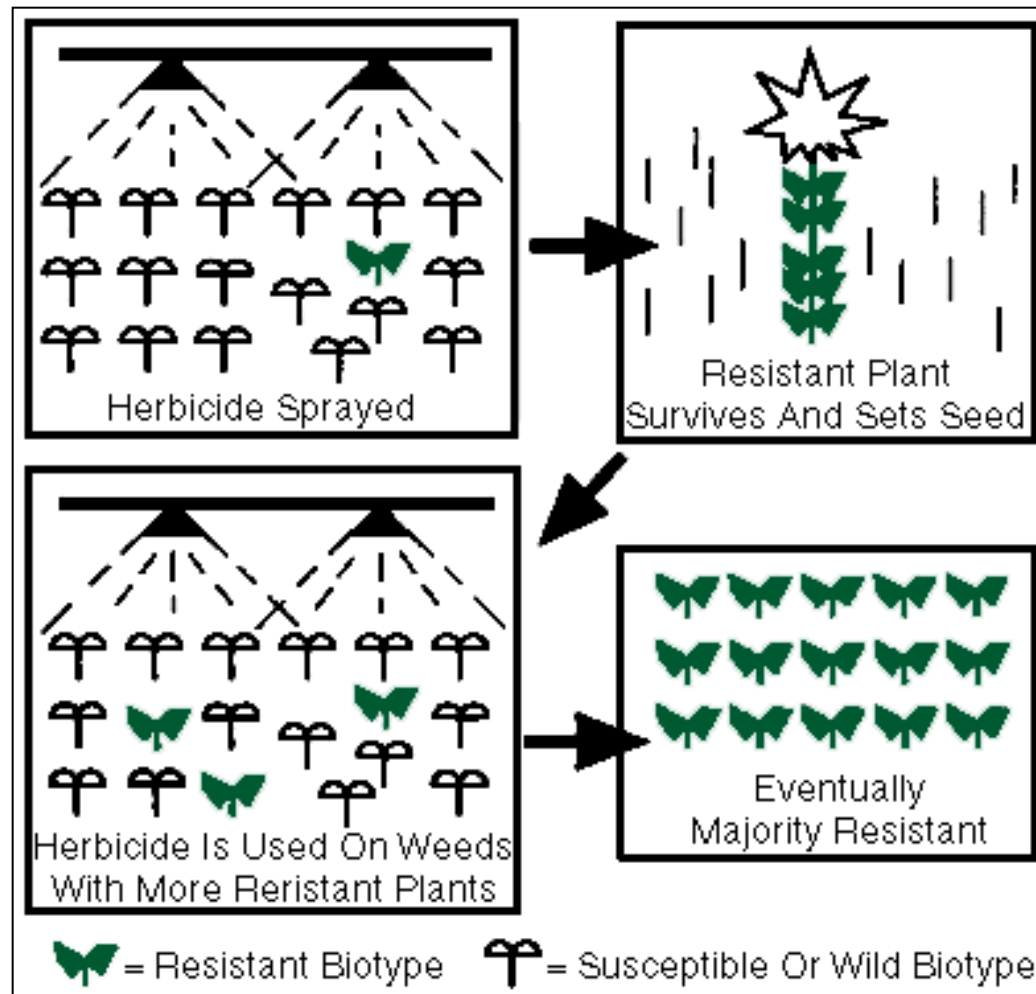


# Increase in Glyphosate-Resistant Weeds Worldwide



Dr. Ian Heap, WeedScience.org 2016

# Resistance is a selection process



# Herbicide-resistance management

Control tactic	Potential impact
Herbicide: rotation of MOAs	Excellent
Herbicide: tank-mixing MOAs	Excellent
Herbicide: timing of applications	Excellent
Herbicide: coverage and uniformity	Good to Excellent
Herbicide: rate	Good
Mechanical: primary and secondary	Fair to Good
Cultural: irrigation type	Fair to Good
Cultural: cover crops, mulching	Poor to Fair

\*Don't let any herbicide sprays go out with less than 2 MOAs in the tank.



**Weed Resistance and Integrated Pest Management**

Pindar GT contains two modes of action in one product. The modes of action of Pindar GT are the inhibition of the acetolactate synthase (ALS) enzyme (Group B) and inhibition of protoporphyrinogen oxidase (PPO) (Group E). Weed populations may develop biotypes that are resistant to different herbicides with the same mode of action. If herbicides with the same mode of action are used repeatedly in the same field, resistant biotypes may eventually dominate the weed population and may not be controlled by these products. Other resistance mechanisms, such as enhanced metabolism, may also exist and may cause reduced weed control.

**GROUP 1 HERBICIDE**

**VALENT®**

**SELECTMAX®**  
HERBICIDE  
WITH INSIDE TECHNOLOGY™

Active Ingredient By Wt.  
 \*Clethodim..... 12.6%  
 Other Ingredients..... 87.4%  
 Total..... 100.0%  
 Contains Petroleum Distillates  
 \*(E)-2-[1-[[[(3-chloro-2-propenyl)oxy]imino]propyl]5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one

Contains 0.97 lbs clethodim per gal  
 EPA Reg. No. 59639-132 EPA Est. 5905-GA-01

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**  
SEE BELOW FOR ADDITIONAL PRECAUTIONARY STATEMENTS.

**FIRST AID (continued)**  
**If inhaled:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.  
**HOT LINE NUMBER**  
 Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-892-0099 for emergency medical treatment information.  
**NOTE TO PHYSICIAN**  
 Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid, which can cause pneumonitis. If ingested, probable mucosal damage may contraindicate the use of gastric lavage.

**PERSONAL PROTECTIVE EQUIPMENT (PPE):**  
 Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category G on an EPA chemical resistance category selection chart.  
 Applicators and other handlers must wear: long-

**GROUP 29 HERBICIDE**

**Alion™ Herbicide**

For Preemergent Weed Control in Citrus Fruit, Stone Fruit, Pome Fruit, Tree Nuts and Pistachios

ACTIVE INGREDIENT: Indaziflam*	19.05%
OTHER INGREDIENTS:	80.95%
<b>TOTAL:</b>	<b>100.00%</b>

Contains 1.67 pounds of indaziflam per gallon.  
 \*(CAS No. 730979-19-8)

EPA Reg. No.: 264-1106 EPA Est. No.

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**

For MEDICAL and TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334-7577  
 For PRODUCT USE Information Call 1-800-334-9745

**FIRST AID**

<b>if on skin:</b>	<ul style="list-style-type: none"> <li>Take off contaminated clothing.</li> <li>Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>Call a poison control center or doctor for treatment advice.</li> </ul>
<b>if inhaled:</b>	<ul style="list-style-type: none"> <li>Move person to fresh air.</li> <li>If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.</li> <li>Call a poison control center or doctor for further treatment advice.</li> </ul>
<b>if swallowed:</b>	<ul style="list-style-type: none"> <li>Call a poison control center or doctor immediately for treatment advice.</li> <li>Have person sip a glass of water if able to swallow.</li> <li>Do not induce vomiting unless told to do so by a poison control center or doctor.</li> <li>Do not give anything to an unconscious person.</li> </ul>

For MEDICAL Emergencies Call 24 Hours A Day 1-800-334-7577  
 Have the product container or label with you when calling a poison control center or doctor or going for treatment.

Note to physician: No specific antidote is available. Treat symptomatically.

**PRECAUTIONARY STATEMENTS**  
**HAZARDS TO HUMANS AND DOMESTIC ANIMALS**  
**CAUTION**  
 Harmful if swallowed, absorbed through the skin or inhaled. Avoid contact with skin, eyes, or clothing. Avoid breathing mist.

agement (IPM) chemical practices applications of this gement strategies of resistant weed chemical weed control, ple modes of action, practices outlined populations are at the y the label and of action in sequential mode of action nless alternated or . nd resistance

**Table 3. Herbicide use information in almonds in CA**

Herbicide active ingredient	Herbicide mode-of-action	Herbicide product example	Herbicide activity	Herbicide product/acre <sup>1</sup>	Tree age <sup>2</sup>	PHI days <sup>3</sup>
clethodim	group 1	Select Max	foliar	9 - 16 fl oz	non-bearing	365
fluazifop-p-butyl	group 1	Fusilade DX	foliar	16 - 24 fl oz	non-bearing	365
sethoxydim	group 1	Poast	foliar	1 - 2.5 pt	after planting	15
flazasulfuron	group 2	Mission	soil and foliar	2.14 - 2.85 oz	≥36 months	130
penoxsulam + oxyflourfen	group 2 + 14	Pindar GT	soil and foliar	1.5 - 3 pt	≥15 months	60
rimsulfuron	group 2	Matrix FNV	soil and foliar	2 - 4 oz	≥12 months	14
oryzalin	group 3	Surflan A.S.	soil	2 - 6 qt	after planting	0
pendimethalin	group 3	Prowl H <sub>2</sub> O	soil	2 - 6.3 qt	anytime	60
trifluralin	group 3	Treflan 4L	soil	1 - 4 pt	anytime	0
2,4-DB amine	group 4	Orchard Master	foliar	2 - 3 pt	after planting	60
simazine	group 5	Princep 4L	soil	1 - 2 qt	≥36 months	0
EPTC	group 8	Eptam 7-E	soil	2.5 - 3.5 pt	after planting	16
glyphosate	group 9	Roundup, etc.	foliar	11 - 105 fl oz	anytime	3
glufosinate	group 10	Rely 280, Lifeline	foliar	48 - 82 fl oz	after planting	14
norflurazon	group 12	Solicam DF	soil	1.25 - 5 lb	≥18 months	60
carfentrazone	group 14	Shark EW	foliar	1 - 2 fl oz	after planting	3
flumioxazin	group 14	Chateau SW	soil and foliar	6 - 12 oz	≥12 months	60
oxyfluorfen	group 14	GoalTender	soil and foliar	0.25 - 3 pt	after planting	15 - 30
pyrafluferrin-ethyl	group 14	Venue	foliar	2 - 4 fl oz	after planting	0
saflufenacel	group 14	Treevix	foliar	1 oz	≥9 months	7
napropamide	group 15	Devrinol 2-XT	soil	2 gal	after planting	0
isoxaben	group 21	Trellis SC	soil	16 - 31 fl oz	after planting	60
paraquat	group 22	Gromoxone SL	foliar	1.25 - 4 pt	after planting	pre-shake
mesotrione	group 27	Broadworks	soil and foliar	6 fl oz	≥12 months	30
indaziflam	group 29	Alion	soil	5 - 6.5 fl oz	≥12 months	14

# Almonds – postemergent herbicides

	Poast, SelectMax, Fusilade (1)	Roundup, etc. (9)	Rely 280, Lifeline (10)	Shark (14)	Goal, etc. (14)	Treevix (14)	Venue (14)	Gramoxone (22)
Hairy fleabane	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Horseweed	Red	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Junglerice	Green	Yellow	Yellow	Red	Red	Red	Red	Yellow
Sprangletop	Green	Yellow	Yellow	Red	Red	Red	Red	Yellow
Yellow nutsedge	Red	Yellow	Red	Red	Red	Red	Red	Yellow
Field biindweed	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Knotweed	Red	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
Evening-primrose	Red	Green	Green	Yellow	Yellow	Green	Green	Green
Russian thistle	Red	Yellow	Green	Yellow	Yellow	Green	Green	Green
Prostrate spurge	Red	Green	Green	Yellow	Yellow	Green	Green	Green



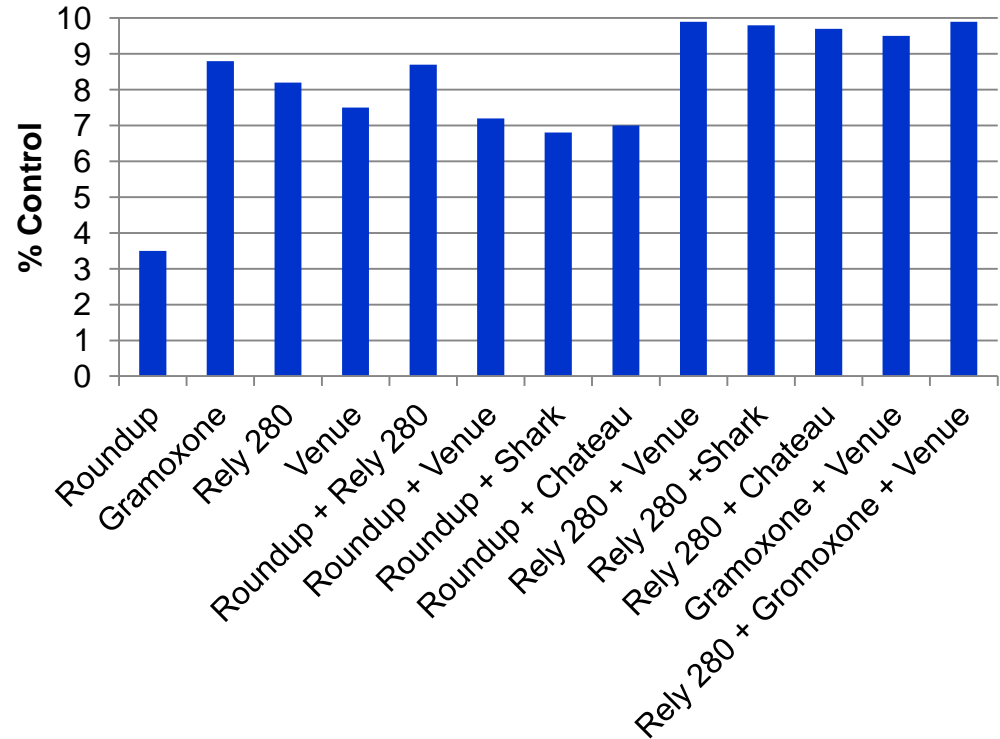
Timing and coverage critical

# Almonds – postemergent tank-mixes

	Roundup + Rely 280	Rely 280 + Shark + MSO	Roundup + Treevix + Gramoxone + MSO	Rnundup + Rely 280 + Treevix + MSO	Treevix + Venue + Gramoxone + MSO	SelectMax + Roundup + Rely 280 + NIS
Hairy fleabane						
Horseweed						
Junglerice						2X
Sprangletop						2X
Yellow nutsedge						
Field biindweed						
Knotweed						
Evening-primrose						
Russian thistle						
Prostrate spurge						



### Hairy fleabane control 30 DAT



# Sprangletop – Tulare County

Treatments	Rate/A	27-May	*	8-Jun	16-Jun	22-Jun
		7 DAT	14 DAT	20 DAT	7 DAT	14 DAT
Glyphosate	44 floz	60	75	90	70	93
Glyphosate	88 floz	80	93	96	83	99
Glyphosate	132 floz	85	93	90	68	97
Glyphosate	176 floz	87	92	95	87	99
Glufosinate	5 pts	87	97	98	93	100
Clethodim + COC	1 pt + 1% v/v	72	78	93	63	93
Glyphosate + Glufosinate	44 floz + 5 pts	92	98	100	97	100
Glyphosate + Clethodim + COC	44 floz + 1 pt + 1% v/v	75	83	92	73	98
Glufosinate + Clethodim + COC	5 pts + 1 pt + 1% v/v	87	92	99	96	97
Glyphosate + Glufosinate + Clethodim + COC	44 floz + 5 pts + 1 pt + 1% v/v	95	97	98	93	100
UTC		0	0	0	0	0



# Postemergent Herbicide Combinations For Select Summer Weeds in Tree Nut Crops in California

Kurt Hembree, UC Cooperative Extension, Fresno County

Herbicide active ingredients <sup>1</sup> (rates per broadcast acre)	Barnyardgrass	Hairy fleabane (GR <sup>2</sup> )	Horseweed (GR <sup>2</sup> )	Junglerice (GR <sup>2</sup> )	Knotweed, prostrate	Lambsquarters, common	Morningglory, annual	Mullein, turkey	Palmer amaranth (GR <sup>2</sup> )	Puncturevine	Purslane, common	Russian thistle	Sprangletop
GLY (32 fl oz) + GLU (56 fl oz)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + GLU (56 fl oz) + CAR (2 fl oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + GLU (56 fl oz) + PYR (4 fl oz) + COC (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + GLU (56 fl oz) + SAF (1 oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + GLU (56 fl oz) + OXY (16 fl oz) + NIS (0.25% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + GLU (56 fl oz) + FLU (4 oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + GLU (56 fl oz) + PAR (32 fl oz) + NIS (0.25% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLU (56 fl oz) + CAR (2 fl oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLU (56 fl oz) + PYR (4 fl oz) + COC (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLU (56 fl oz) + SAF (1 oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLU (56 fl oz) + OXY (32 fl oz) + NIS (0.25% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLU (56 fl oz) + FLU (4 oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLU (56 fl oz) + PAR (32 fl oz) + NIS (0.25% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + SAF (1 oz) + PYR (2 fl oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + SAF (1 oz) + FLU (4 oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GLY (32 fl oz) + PYR (4 fl oz) + OXY (32 fl oz) + NIS (0.25% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
PAR (48 fl oz) + SAF (1 oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
PAR (48 fl oz) + PYR (4 oz) + OXY (32 fl oz) + NIS (0.25% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
PAR (48 fl oz) + SAF (1 oz) + PYR (2 fl oz) + MSO (1% v/v)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

■ = <50% control   
 ■ = 50-75% control   
 ■ = 76-95% control   
 ■ = >95% control

<sup>1</sup>GLY (glyphosate 5 lb a.i./gal); GLU (glufosinate 2.34 lb a.i./gal); CAR (carfentrazone 1.9 lb a.i./gal); PYR (pyraflufen 0.17 lb a.i./gal); SAF (saflufenacil 70% WG); OXY (oxyfluorfen 2 lb a.i./gal); FLU (flumioxazin 50% WG); PAR (paraquat 2 lb a.i./gal); MSO (methylated seed oil); COC (crop oil concentrate); NIS (non-ionic surfactant)

<sup>2</sup>GR = glyphosate-resistant biotype

*There may be several trade names available for each of the active ingredients listed. Refer to your local chemical dealer or manufacturer for specific herbicide products available. Numerous factors influence the performance of herbicides, so refer to the manufacturer's label for specific treatment recommendations. Ratings in this chart are based on visual observations made of weeds treated at or beyond label timing recommendations at a spray volume of at least 30 gpa.*

*Kurt Hembree, UC Cooperative Extension, Fresno County. July 2017. <http://cefresno.ucanr.edu>*





# For optimum control with postemergent herbicides...

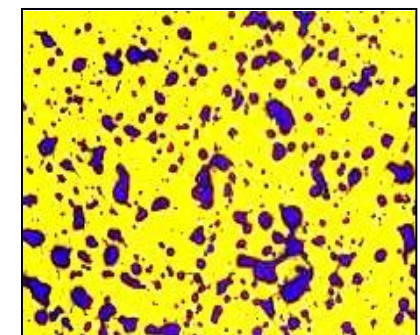
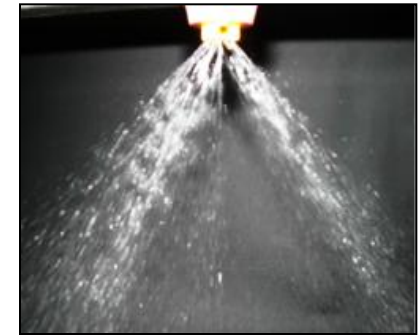
Hairy fleabane (GR)	Treat when <8 leaves, with a 2 or 3-way mix, and good spray coverage.
Horseweed (GR)	Treat when <8 leaves, with a 2 or 3-way mix, and good spray coverage.
Junglerice (GR)	Treat with Glu+Par before flower heads emerge or with a grass herbicide before they become drought-stressed.
Sprangletop	For NB: treat with Cleth+Gly+Glu twice at a 3-week interval before seed set.
Yellow nutsedge	Treat with Gly with <4 leaves every 21-28 days; or tank-mix Gly+Rim and apply twice at a 2-week interval.

# For optimum control with postemergent herbicides...

Field bindweed	Treat with Gly when runners are 12-16" long and at 10% flower in fall.
Knotweed	Treat <21 days after emergence with appropriate tank-mix materials.
Evening-primrose	Treat with Gly+Glu <21 days after emergence.
Russian thistle	Treat <softball size plants with Saf or similar contact material.
Prostrate spurge	Treat <14 days after emergence (seed set is about 21 days after emergence).

# Herbicide application considerations

- Target weeds
- Treatment timing
- Rate(s)
- MOA tank-mixing
- Sprayer operation
- Spray coverage
- Environmental conditions
- Spray drift
- Tree age and health
- Applicator skill



# Develop and use a weed spray check list

- Product MOAs considered based on weeds targeted
- Product rates needed for the conditions
- Adequate equipment and labor to meet treatment timing
- Functional and calibrated spray rig(s)
- Spray nozzle selection to manage coverage and drift
- Favorable environmental conditions
- Responsible and attentive applicator



# Almonds - Fresno County (220 DAT)

## Weed control 220 DAT

	Herbicide	Product/acre	Date	Hairy fleabane	Filaree	Brass buttons	Annual sowthistle	Spotted spurge	
1	Rely 280 + RUPM*	64 fl oz + 32 fl oz*	12/29/15	9.5 b	9.9	9.9 b	9.5 b	9.0 c	
	Rely 280 + RUPM*	64 fl oz + 32 fl oz*	4/1/16						
2	Broadworks + GoalTender	6 fl oz + 3 pt,	12/29/15	9.9 a	10.0	10.0 a	10.0 a	9.8 b	
	Broadworks + Prowl H <sub>2</sub> O	6 fl oz + 96 fl oz	4/1/16						
3	Broadworks + Matrix	6 fl oz + 4.0 oz	12/29/15	9.9 a	10.0	10.0 a	10.0 a	10.0 a	
	Chateau + Prowl H <sub>2</sub> O	12 oz + 96 fl oz	4/1/16						
4	Alion 200 SC + Matrix	3.5 fl oz + 4.0 oz	12/29/15	9.9 a	10.0	10.0 a	10.0 a	9.7 b	
	Broadworks + Prowl H <sub>2</sub> O	6 fl oz + 96 fl oz	4/1/16						
<i>Statistical notation</i>				<i>CV (%)</i>	<i>0.90</i>	<i>1.23</i>	<i>0.25</i>	<i>0.00</i>	<i>1.11</i>
				<i>LSD (p=0.05)</i>	<i>0.14</i>	<i>n.s.</i>	<i>0.05</i>	<i>0.05</i>	<i>0.17</i>

First application made on Dec 29, 2015 and second application made on April 1, 2016

\*AMS (dry ammonium sulfate)

Rely 280 64 fl oz/acre plus Roundup Powermax 32 fl oz/acre plus AMS at 8 lb/100 gal added to treatments 2-4

Weed control based on a 0 to 10 visual rating scale; where 0 = no control and 10 = 100% control

# Alkaliweed – Control?



Web site ⇒ [cefresno.ucanr.edu](http://cefresno.ucanr.edu)

The screenshot shows the website for the University of California Cooperative Extension Fresno County. The header includes the UC logo and the text "University of California Cooperative Extension Fresno County". Below the header is a navigation bar with "UCCE Fresno" and "Contact Us". A sidebar on the left lists various resources: Home, Powerpoint Presentations, Website Links, Weed Identification, Weed and Herbicide Topics, Weed Herbicide Charts, and Research Reports. The main content area is titled "Weed Management" and includes a sub-section "About my Program". This section contains text about the impact of weeds on crop production and land values, and a photograph of a field with tall weeds. A portrait of Kurt Hembree, Weed Management Farm Advisor, is shown on the left side of the main content area. At the bottom of the page, there are links for "EMAIL" and "PRINT".

University of California  
Cooperative Extension Fresno County

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Home  
Powerpoint Presentations  
Website Links  
Weed Identification  
Weed and Herbicide Topics  
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Research Reports


EMAIL | PRINT

## Weed Management

### About my Program

Crop and non-crop areas alike are impacted by weed growth to one degree or another. Weeds affect crop production in several ways; weeds delay or reduce stand establishment, affect crop growth and development, reduce food quality and yield, compete for resources like water and soil nutrients, reduce irrigation uniformity and efficiency, harbor rodents and other destructive pests, increase the risk of frost hazard in temperature sensitive crops, and increase the cost of production. In non-crop settings, weeds may be poisonous to people and livestock, interfere with water recreation and water transport, cause potential traffic hazards, pose a fire hazard, are unsightly, and reduce land values.

To effectively manage weeds, one must be able to correctly identify the weeds present, develop a broad understanding of weed growth and survival, become familiar with the tools (both chemical and non-chemical) available, and implement a strategy that is both economically and environmentally sound. This is sometimes referred to as "Integrated Weed Management".



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*Weed Management Farm Advisor*

agement

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