

Weed Management Update

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Outline

- Herbicide resistance screening
- New herbicides for coming season
- Two SuperWham applications Program
- Weed control in Roxy Rice

Herbicide Resistance

- Provide diagnosis for cross/multiple resistance in rice fields and map the resistance for the rice production area in California

Herbicide Resistant Weeds in California Rice Fields

Common name	Trade name	MOA
Bensulfuron	Londax®	ALS inhibitor
Bispyribac-sodium	Regiment®	ALS inhibitor
Halosulfuron	Sandea®	ALS inhibitor
Imazosulfuron	League	AL inhibitor
Orthosulfamuron	Strada	ALS inhibitor
Penoxsulam	Granite®	ALS inhibitor
Benzobicyclon	Butte	HPPD inhibitor
Carfentrazone	Shark H2O®	PROTOX inhibitor
Clomazone	Cerano®, Bombard®	Carotenoid biosynthesis inhibitor
Cyhalofop-butyl	Clincher®	ACCase inhibitor
Pendimethalin	Prowl H2O®	Tubulin inhibitor
Propanil	Stam®, SuperWham®	Photosystem II inhibitor
Thiobencarb	Abolish®, Bolero®	VLCFA (Very long chain fatty acids)
Triclopyr	Grandstand®	Synthetic auxin

HERBICIDE RESISTANCE TESTING FORM **RFBR-13-04**

Name of weed: *Ricefield bulrush*

Date of collection:

Submitter Information:

Name: [REDACTED]
Email: [REDACTED]
Phone #: [REDACTED]

Grower Information:

Name: [REDACTED]
Address: [REDACTED]
Phone #: [REDACTED]

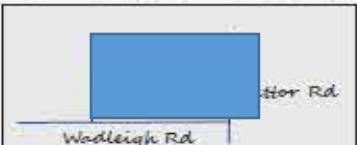
Herbicides used	Year	Resistance		Test result X=Resistant (This is for our reference, keep it brief)
		Known	Suspected	
Aquastop EC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Balinol Dispers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Captan MEG	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chlorox CA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crabgrass GA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Crabgrass GR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Crabgrass SC	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Milestone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lasso MVP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lontrel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regime CA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RimEdge 40 DF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roughneck EC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spikes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stop H2O	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stinger EDF CA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stinger CA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SuperWham CA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Field/Site Information:

GPS Coordinates:
Township: [REDACTED] Range: [REDACTED]
Nearest Road: [REDACTED]
Size of the field: 120 acres
Percentage of field that is suspected to be resistant: 5%
When was the resistance suspected in this field: 2013



Please draw a brief map of field with location of sampling.



How many plants were sampled: 30 acres

Water Management

- | | |
|--------------------------------|---|
| Source(s) of water: | Irrigation management: |
| <input type="checkbox"/> Pump | <input type="checkbox"/> Continuous flood |
| <input type="checkbox"/> Canal | <input type="checkbox"/> Plowzone |
| <input type="checkbox"/> Deck | <input type="checkbox"/> Layered method |

Was water compromised or lost during time of the report? Yes No

Bring the sample and form to your local UCCE Farm Advisor or drop off samples at the address below preferably by the end of September.
Rice Experiment Station, 1445 Butte City Hwy (rte 1) PO Box 1061, Butte, CA 95717

Species	Bolero	Butte	Cerano	Clincher	Regiment CA	Granite SC	Propanil	Shark EW	Grandstand CA
Barnyardgrass (18)	2	0	0	9	15	-	16	-	-
Early Watergrass (7)	1	1	1	2	6	-	3	-	-
Late Watergrass (1)	1	0	0	1	1	-	1	-	-
Smallflower Umbrella Sedge (1)	0	0	-	-	0	0	0	0	0
Bearded Sprangletop (7)	1	0	0	2	-	-	-	-	-
Redstem (2)	-	-	-	-	0	0	0	0	0

HERBICIDES TESTED**RESISTANCE STATUS****PHOTOGRAPH OF YOUR SAMPLE**

VLCFA Inhibitor

Bolero®

thiobencarb

Your sample is NOT resistant.

NO

All tested samples are susceptible.

HPPD Inhibitor + ALS Inhibitor

Butte®

benzo[b]cyclo[2.2.1]hept-5-en-2-one + halo-sulfuron-methyl

Your sample is NOT resistant.

NO

96% of tested samples are susceptible.

Pigment synthesis Inhibitor

Cerano® 5MEG

clomazone

Your sample is NOT resistant.

NO

97% of tested samples are susceptible.

ACCase Inhibitor

Clincher® CA

cyhalofop-butyl

Your sample is MAY BE becoming resistant.

YES

23% survival rate on tested samples.

PS II Inhibitor

SuperWham®

propanil

Your sample is resistant.

YES

96% survival rate on tested samples.

ALS Inhibitor

Regiment® CA

bipyridac-sodium

Your sample is resistant.

YES

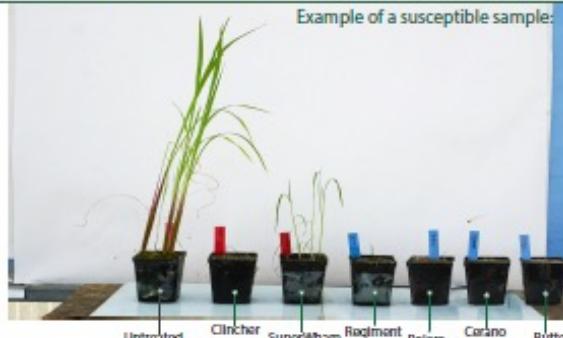
99% survival rate on tested samples.

Granular applied herbicides

BYG-20-02

**Foliar applied herbicides**

BYG-20-02

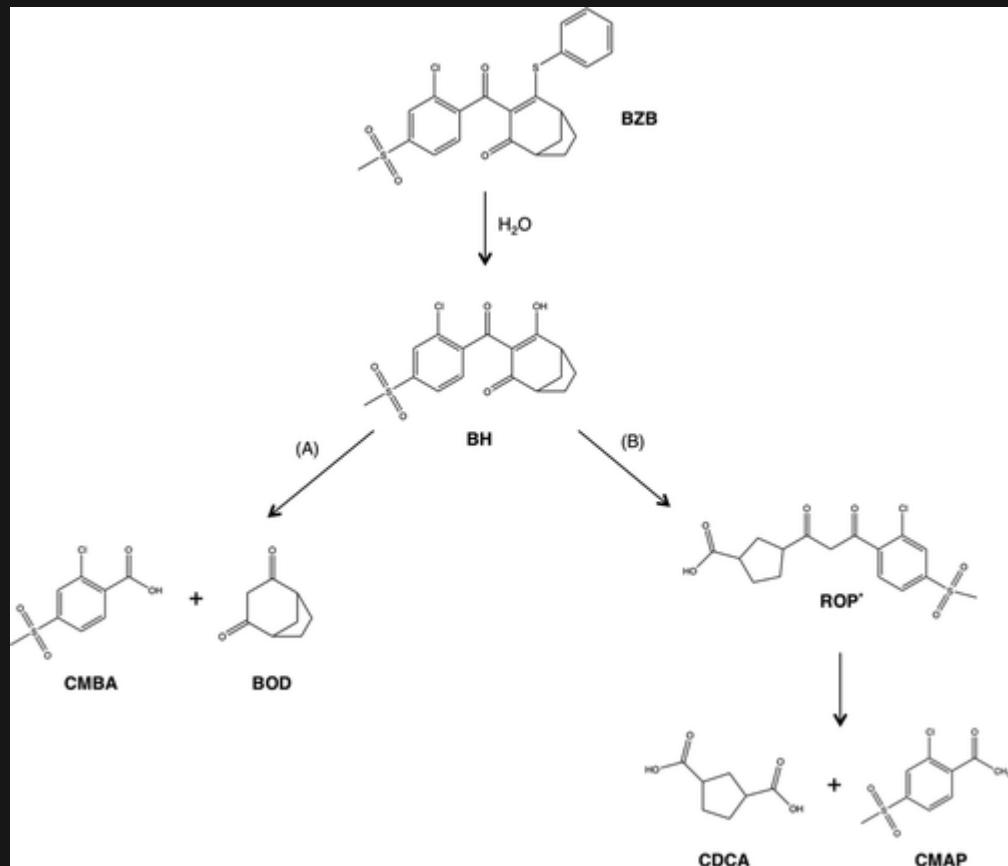
**Example of a susceptible sample:****General Principles of Herbicide Resistance Management**

- Apply integrated weed management practices. Use multiple herbicide sites-of-action with overlapping weed spectrums in rotation, sequences, or mixtures.
- Use the full recommended herbicide rate and proper application timing for the hardest to control weed species present in the field.
- Scout fields after herbicide application to ensure control has been achieved. Avoid allowing weeds to reproduce by seed or to proliferate vegetatively.
- Monitor site and clean equipment between sites.
- When resistance to an herbicide develops there may be resistance to all herbicides with the similar mode of action.

Cliffhanger and Butte®-based
programs: constant refinement to
maximize weed control

What is Cliffhanger

- It is benzobicyclon alone in a liquid form.
- Hydrolysis of benzobicyclon rapidly forms the active compound, benzobicyclon hydrolysate.
- Sorption data indicate BH does not bind tightly, or irreversibly, with this soil.
- Flooding resulted in decreased BH loss.
- Temperature increased dissipation.



Cliffhanger

- *Cliffhanger SC is not currently registered for use in California*
- Label was federally approved by the USEPA on November 1, 2021.
- Cliffhanger label was submitted to CDPR last December 2021 with an anticipated approval in December 2022 – February 2023.
- 2023 anticipated for Cliffhanger launch in CA.

Cliffhanger

- Cliffhanger can be applied from DOS – 82 days before harvest.
- Foundation herbicide or applied later as a part of a season long weed management program. Focus on sedges and sprangletop control.
- Enhanced dispersion and increased speed of activity provides more flexibility to fit more grower practices.
 - No changes in recommendation. Sedges: pre-emergent to 5 leaf stage; Sprangletop: pre-emergent to 2.5 leaf stage
- Better fit for crop rotations
- Labelled use rates: 8.4 – 10.3 oz/A
- 1% MSO recommended
- Applications will be made into the water.
- Water management recommendations similar to those with BUTTE.
- 12 hour REI
- 82 day PHI

HERBICIDE PROGRAM	RATE/ACRE	TIMING	CROP INJURY (%)			
			20 DAT			
			BLEACHING	CHLOROSIS	STUNTING	STAND REDUCTION
Butte	9 lb	0.5-1 LSR	0	0	5	7
Cliffhanger + MSO	10.3 floz + 1% v/v	0.5-1 LSR	0	0	5	5
Zembu	14.9 lb	DOS	0	0	15	42
Cliffhanger + MSO	10.3 floz + 1% v/v	3.5-4 LSR	0	0	3	5
Cerano	10 lb	DOS	0	0	5	5
Cliffhanger + MSO	10.3 floz + 1% v/v	3.5-4 LSR	0	0	0	0
Cliffhanger + Granite SC + MSO	10.3 floz 2.5 floz + 1% v/v	3.5-4 LSR	0	0	0	0
Cliffhanger + MSO	10.3 floz + 1% v/v	0.5-1 LSR	0	0	5	5
Regiment CA + Grandstand CA + Dyne-Amic	0.8 oz 0.5 pt + 5 floz	Mid-Tiller	0	0	5	5
Cliffhanger + MSO	10.3 floz + 1% v/v	0.5-1 LSR	0	0	3	3
RebelEX CA + MSO	20 floz + 1.25 %v/v	Mid-Tiller	0	0	5	5
Cliffhanger + MSO	10.3 floz + 1% v/v	0.5-1 LSR	0	0	0	0
Regiment CA + Dyne-Amic	0.8 oz + 5 floz	Mid-Tiller	0	0	0	0
SuperWham! + COC	4 qt + 2.5 % v/v	Full-Tiller	0	0	0	0
Cliffhanger + MSO	10.3 floz + 1% v/v	0.5-1 LSR	0	0	20	5
SuperWham! + Grandstand CA + COC	4 qt 0.5 pt + 2.5 % v/v	Full-Tiller	0	0	0	0

Florpyrauxifen-benzyl (Loyant)

- Rate: 1.00-1.33 pint/A. You can have two applications (total 2.66 pint/A)
- Adjuvant: Methylated seed oil, others
- Ground application: Apply in 10 gpa or more when apply by ground
- Water management: Residual water remaining in the field does not adversely affect weed control so long as weeds are at least 70% exposed
- Timing: Loyant can be applied from 2 leaf stage with no exposed roots up to 60 days before harvest
- Tank mixes: Can be tank mixt with Clincher, Regiment, Granite, propanil and Grandstand. No varietal response
- Do not apply near beans, soybean, sunflower, tomato, cucurbit crops, other vegetable crops, cotton, carrots, grapes, fruit trees, nut trees, corn, grain sorghum, wheat, flowers, ornamental shrubs or trees, or other desirable broadleaf plants or trees, as injury may occur
- **Recommendation: It must be used as part of a program that utilizes multiple residual herbicides in front of a timely application of Loyant**

Loyant Weed control

- Control
 - Barnyardgrass
 - Rice flatsedge
 - Ducksalad
 - Redstem
 - Monochoria
 - California arrowhead
 - Waterhyssop species
 - Cattail
- Suppressed
 - Early water grass
 - Late watergrass
- Control- biotype and stage of growth dependent
 - Smallflower umbrellasedge
 - Field bulrush

Treat.	Treatment		Rate	Alt	Alt	Appl.	Appl.
No	Description	Rate	Unit	Rate	Unit	Method	Timing
1	Cerano	672	g ai/ha	12	lb/A	POST	DOS
	Loyant	40	g ai/ha	1.33	pt/A	POST	1 leaf
	MSO			0.5	pt/A	POST	1 leaf
2	Cerano	672	g ai/ha	12	lb/A	POST	DOS
	Loyant	40	g ai/ha	1.33	pt/A	POST	4" SMF
	MSO			0.5	pt/A	POST	4" SMF
3	Cerano	672	g ai/ha	12	lb/A	POST	DOS
	Loyant	40	g ai/ha	1.33	pt/A	POST	6" SMF
	MSO			0.5	pt/A	POST	6" SMF
4	Cerano	672	g ai/ha	12	lb/A	POST	DOS
	Loyant	40	g ai/ha	1.33	pt/A	POST	8" SMF
	MSO			0.5	pt/A	POST	8" SMF
5	Cerano	672	g ai/ha	12	lb/A	POST	DOS
	Loyant	40	g ai/ha	1.33	pt/A	POST	10" SMF
	MSO			0.5	pt/A	POST	10" SMF
UTC	clomazone	672	g ai/ha	12	lb/A	POST	DOS

Weed control with different Loyant applied at different timings at 21 DAT

Treatments	SMF	DKS	RDS
1	85a	100a	100a
2	75a	100a	100a
3	80a	100a	100a
4	80a	100a	100a
5	75a	100a	100a
UTC	0b	0b	0b

Treat.	Treatment		Rate	Alt	Alt	Appl.	Appl.
1	clomazone	672	g ai/ha	12	lb/a	PRE	DOS
	cyhalofop-butyl	313	g ai/ha	20	fl oz/a	POST	4 LF RICE
	penoxsulam	44	g ai/ha				
	Loyant	39	g ai/ha	1.33			50-60 DAP
	MSO			0.5	pt/a	POST	
2	clomazone	672	g ai/ha	12	lb/a	PRE	DOS
	cyhalofop-butyl	313	g ai/ha	20	fl oz/a	POST	4 LF RICE
	penoxsulam	44	g ai/ha				
	Loyant	78	g ai/ha	2.66			50-60 DAP
	MSO			0.5	pt/a	POST	
4	clomazone	672	g ai/ha	12	lb/a	PRE	DOS
	cyhalofop-butyl	313	g ai/ha	20	fl oz/a	POST	4 LF RICE
	penoxsulam	44	g ai/ha				
	Loyant	39	g ai/ha	1.33			60 D PHI
	MSO			0.5	pt/a	POST	
5	clomazone	672	g ai/ha	12	lb/a	PRE	DOS
	cyhalofop-butyl	313	g ai/ha	20	fl oz/a	POST	4 LF RICE
	penoxsulam	44	g ai/ha				
	Loyant	78	g ai/ha	2.66			60 D PHI
	MSO			0.5	pt/a	POST	

Weed control data of different rates of Loyant at 28 DAT

Treatments	WTG		SMF		RDS	
1	99	a	86	a	100	A
2	99	a	96	a	100	A
4	99	a	95	a	100	A
5	99	a	96	a	100	A

Treatments	Grain Blanking (%)	Seeds per Panicle (#)	1000 grain weight (g)
1	9 a	86 a	37.7 A
2	11 a	83 a	36.2 A
4	25 a	84 a	42.1 A
5	34 a	80 a	37.6 A
Untreated Control	14 a	82 a	42.4 A

Loyant, florpyrauxifen-benzyl



Herbicide Treatments

Treat.	Treatment		Rate	Alt	Alt	Appl.	Appl.
No	Description	Rate	Unit	Rate	Unit	Meth.	Timing
1	Loyant	39	g ai/ha	1.33			
	MSO			0.5	pt/a	POST	Full-Tiller
2	triclopyr	420	g ae/ha	1			
	MSO			0.5	pt/a	POST	Full-Tiller
3	Loyant	39	g ai/ha	1.33			
	triclopyr	420	g ae/ha	1		pt/a	POST Full-Tiller
	MSO			0.5			
4	Loyant	78	g ai/ha	2.66			
	MSO			0.5	pt/a	POST	Full-Tiller

Loyant cattails control at 7, 14, 21, 28, and 42 DAT

Treatments	7	14	21	28	42
1	0 a	6 a	35 A	75 A	96 A
2	0 a	0 b	0 B	0 B	1 B
3	0 a	17 a	45 A	78 A	85 A
4	0 a	30 a	75 A	96 A	100 A

Cattail Treatments at 42 DAT

Untreated Control



Grandstand at 1 pt/A



Loyant at 1.33 + Grandstand at 1 pt/A



Loyant at 1.33 pt/A



Loyant at 2.66 pt/A



Two SuperWham application

Weed Control with ROXY Rice Technology

Treatment	Product and Rate	Application timing
1	Untreated control (UTC)	Pre-seeding/ Bare ground
2	ALB 2023 (1.5 pt/A)	Pre-seeding/ Bare ground
3	ALB 2023 (1.75 pt/A)	Pre-seeding/ Bare ground
4	ALB 2023 (2.0 pt/A)	Pre-seeding/ Bare ground
5	ALB 2023 (2.25 pt/A)	Pre-seeding/ Bare ground
	ALB 2023 (2.0 pt/A)	Pre-seeding/ Bare ground
6	Alb 2024 (1.5 pt/A)	3-4 LSR/ 20-25 DAP
	MSO (0.5% v/v)	
	Butte (7.5 lbs/A)	DOS
7	Granite SC (2.5 fl oz/A)	5 LSR/ 30-35DAP
	Grandstand CA (0.5 pt/A)	
	NIS (0.25% v/v)	
	ALB 2023 (2.0 pt/A)	Pre-seeding/ Bare ground
8	Granite SC (2.5 fl oz/A)	5 LSR/ 30-35DAP
	MSO (0.5% v/v)	
	ALB 2023 (2.0 pt/A)	Pre-seeding/ Bare ground
9	Granite SC (2.5 fl oz/A)	5 LSR/ 30-35DAP
	Grandstand CA (0.5 pt/A)	
	NIS (0.25% v/v)	
	ALB 2023 (2.0 pt/A)	Pre-seeding/ Bare ground
10	Granite SC (2.5 fl oz/A)	5 LSR/ 30-35DAP
	Loyant (2.0 pt/A)	
	Clincher (11 fl oz/A)	
	MSO (0.5% v/v)	

DAP - Days after planting; DOS - Day of seeding

28 DAS