ANNUAL REPORT
COMPREHENSIVE RICE RESEARCH
(January 1, 2006 - December 31, 2006)

PROJECT TITLE: Weed Control in Rice

PROJECT LEADER: Albert Fischer, Associate Professor, Melvin D. Androus Professorship for Weed Science in Rice, Dept. of Plant Sciences Mail Stop 4 University of California, One Shields Avenue, Davis, CA 95616-8780 Phone:(530) 752-7386 Fax: (530) 752-4606 ajfischer@ucdavis.edu

PRINCIPAL UC INVESTIGATORS:
James W. Eckert, Dept. of Plant Sciences, UC Davis
Louis Boddy, MS student with A. Fischer, Dept. of Plant Sciences, UC Davis
Claudia Marchesi, PhD student with A. Fischer and R. Plant, Dept. of Plant Sciences, UC Davis
Aldo Merotto, PhD student with A. Fischer, Dept. of Plant Sciences, UC Davis
Fernando Pérez de Vida, PhD student with A. Fischer, Dept. of Plant Sciences, UC Davis
Maria Dolores Osuna, Postdoctoral Researcher with A. Fischer, Dept. of Plant Sciences, UC Davis
Hagai Yasur, Postdoctoral Researcher with A. Fischer, Dept. of Plant Sciences, UC Davis

Collaborating UC Scientists:
J.E. Hill, Cooperative Specialist, Dept. of Plant Sciences, UC Davis
R. Tjerdeema, Environmental Toxicology Dept., UC Davis
T. Tai, USDA, Dept. of Plant Sciences, UC Davis
C. Greer, Farm Advisor, Colusa-Glenn Co.
W.M. Canevari, Farm Advisor, San Joaquin Co.
R.G. Mutters, Farm Advisor, Butte Co.

Visiting Scientists:
Prof. Aida Ortiz, visiting scientist with A. Fischer, Dept. of Plant Sciences, UC Davis

Field Operations:
Steve Johnson, Research associate, Dept. of Plant Sciences, UC Davis
James Lang, Laboratory assistant, Dept. of Plant Sciences, UC Davis

COOPERATORS:
Grower Cooperators:
Thad Rodgers, Glenn Co.

LEVEL OF 2006 FUNDING: $102,628.90

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

1. To test and screen herbicides for efficacy, safety and compatibility for tank mixtures or sequential treatments in order to develop, in integration with agronomic practices, weed control packages for the main rice production systems in California.

2. To continue searching and testing new compounds with potential for addressing critical weed control issues to establish their suitability and proper fit into the rice management systems of California. Encourage introduction of promising new chemicals to the California market.

3. To develop new alternatives to weed control through the exploration of agronomic opportunities, rice/weed competition to minimize herbicide costs and environmental impacts. To measure rice yield impact of specific weed species and develop a predictive approach.

4. To develop an understanding of herbicide resistance in weeds, provide diagnosis, test herbicides, and develop effective alternatives to manage this problem.

SUMMARY OF 2006 RESEARCH, BY OBJECTIVE:

OBJECTIVE 1. *To test and screen herbicides for efficacy, safety and compatibility for tank mixtures or sequential treatments in order to develop, in integration with agronomic practices, weed control packages for the main rice production systems in California.*

Herbicide test plots were located at two different sites at the RES (RES) in Butte County, and one off-station site in Glenn County. One of the sites has Londax (bensulfuron-methyl)-resistant smallflower umbrellasedge. The off-station site has resistant late watergrass as the main weed problem. The site in Glenn County was planted May 17, while planting at the Station occurred May 26 and June 1. Yield data is being presented this season for comparison between treatments. Very little lodging was experienced making the grain harvest more reliable. Fertility management was adjusted to prevent lodging and poor harvest conditions with the plot combine.

All sprayed herbicide applications were made with a CO_2-pressurized (30 psi) hand-held sprayer equipped with a ten foot boom and 8003 nozzles, calibrated to apply 20 gallons of spray volume per acre. Applications with solid formulations were performed by evenly broadcasting the product over the plots.

Shark (carfentrazone)

Shark has been tested for several years on station and at off station sites in growers' fields and has demonstrated efficacy for controlling sedges and broadleaves. Because of problems in the past with non-target injury (i.e.- drift onto prunes), emphasis has been oriented towards using this product either in a DDA (direct-dry application) or DSA (direct-stream application). After testing both the 1.2 mm and the new 0.6 mm extruded 40DF formulation in 2005, FMC Corporation decided to change the consumer formulation from 1.2 to 0.6 mm. The new formulation has the same percent active ingredient per weight of product, but has twice as many particles for greater distribution in the field. The dry application into the water allows reduced potential for non-target drift, and to cover large acreages effectively for early weed control. Shark is particularly important to California rice since resistance to Londax (bensulfuron) is widespread. Shark is an effective tool in California rice as it can be applied in combination with other into-water herbicides, and in sequential weed control operations. Timing of application is critical for best efficacy and reduction of crop injury. Very

early applications of Shark caused severe rice establishment problems, while late applications may be less efficacious on the established sedges.

Shark (224 g ai/ha, 2-3 lsr) fb.[1] Super Wham (6726 g ai/ha, 1-3 Till) provided very good weed control and the highest grain yield in the continuous flood trial at Hamilton road (Table 1). Yield was greater than the Super Wham only treatment. Shark (224 g ai/ha, 2-3 lsr) applied same day as Granite GR (40 g ai/ha) also provided excellent weed control and high yield (Table 1). Combining Granite with Shark is a good management practice to protect Granite from ALS-resistance evolution in weeds. This treatment also had higher yield than the Granite GR only treatment. Cerano (673 g ai/ha, DOS) fb. Shark (224 g ai/ha, 2 lsr) had good broad-spectrum weed control and high yield in two experiments (Tables 3 & 11).

Prowl H_2O (pendimethalin)

Prowl is a selective herbicide for controlling annual grass (watergrass, barnyardgrass, sprangletop) and certain broadleaf weeds (smallflower umbrellasedge) as they germinate and emerge. As a meristematic inhibitor, it interferes with the plant's cellular division and early growth. Prowl H_2O has substituted Prowl EC on the supplemental label for drilled and dry seeded rice in California. Prowl H_2O is a new water based capsule suspension (CS) formulation. Wet/dry cycles cause the capsule wall to rupture and release the pendimethalin. Prowl H_2O needs to be applied to moist soil without any standing water. Flooding causes the chemical to degrade and loose efficacy; also volatility losses are more rapid when this herbicide is applied to wet soil surfaces. Prowl H_2O was tested in a drill seeded rice culture at the RES (Table 9). Prowl H_2O applied alone (1120 g ai/ha) as delayed pre emergent (DPRE) provided 58% watergrass/barnyardgrass control and 98% sprangletop control at 20 DAS but diminished to only 11% watergrass/barnyardgrass control and 68% sprangletop control by 60 DAS. Improved control of watergrass/barnyardgrass was achieved by following the Prowl H2O treatment with either Super Wham (6726 g ai/ha) or Regiment (12.5 g ai/ha) at 2-3 lsr. Prowl (1120 g ai/ha) applied alone at the 2-3 lsr did not provide control of watergrass/barnyardgrass or sprangletop. In both DPRE and 2-3 lsr there were emerged watergrass/barnyardgrass and sprangletop plants that are not controlled foliarly by this herbicide. Tank mixes of Prowl H_2O with Clincher (315 g ai/ha), or with Regiment (37 g ai/ha) plus Whip (32 g ai/ha) or with Super Wham (4484 g ai/ha) plus Whip (32 g ai/ha) improved the grass control and yield (Table 9). Super Wham, Regiment and Clincher in these tank mixes provide control of established grasses while Prowl prevents establishment of germinating grasses. Prowl generally works better in dry/drill seeded and aerobic conditions than in water saturated soils where it gets rapidly broken down. Thus in water seeded rice, Prowl works better when fields are drained and re-flood is slow or delayed.

IR-5878 WG (orthosulfamuron, water-dispersible granule)

Orthosulfamuron is an ALS inhibitor for broad-spectrum activity on susceptible watergrass and smallflower umbrellasedge. It has shown very little phytotoxicity to rice at all stages of growth. It does not appear to be efficacious on redstem. Testing has been done with a WG formulation for pinpoint applications and a GR for into the water treatments in continuously flooded rice culture.

[1] Abbreviations: fb. = followed by; lsr = leaf stage of rice; Till = tillers.

Both formulations appear to very safe on rice. Londax-resistant smallflower umbrellasedge is usually resistant to this herbicide.

IR-5878 WG was tested in a standard pinpoint trial, and in another experiment as pinpoint application in a basin that had been previously treated with Cerano. The two pinpoint studies had IR-5878 applications at the 3-4 lsr timing (Tables 7 & 16). In the standard pinpoint study the best weed control and yields were achieved by tank mixes of IR5878 (74.5 g ai/ha) with Abolish (3363 g ai/ha) or with propanil (4484 g ai/ha), or the mixture of IR5878 (105 g ai/ha) with propanil (4484 g ai/ha). Additionally, a three way tank mix of IR5878 (74.5 g ai/ha) propanil (4484 g ai/ha) and Whip (31.5 g ai/ha) provided broad spectrum weed control and good yield; the low rate of Whip is intended for control of sprangletop, while maintaining safety to rice.

IR-5878 GR (granular formulation)

IR5878 GR was tested in a continuously flooded experiment (Table 4). Most herbicide combinations with IR5878 performed well with good weed control and yields. The best treatments were: Cerano (673 g ai/ha, DOS) fb. IR5878 GR (74.5 g ai/ha, 1-2 lsr) fb. Grandstand (158 g ai/ha, 1-3 Till); Cerano (673 g ai/ha, DOS) fb. IR5878 GR (74.5 g ai/ha, 1-2 lsr) fb. Propanil (6726 g ai/ha, 1-3 Till); tank mix of Bolero and IR5878 GR (4540 + 74.5 g ai/ha respectively, 1-2 lsr) fb. Propanil (6726 g ai/ha, 1-3 Till); and Cerano (673 g ai/ha, DOS) fb. IR5878 GR (74.5 g ai/ha, 3-4 lsr). This last treatment at the 3-4 lsr was the only one that provided substantial early bulrush control. This is likely an application timing issue. Bulrush was not reported at the earlier treatment timing of 1-2 leaf and was 2 leaf at the 3-4 leaf timing. Best control of bulrush by IR5878 GR appears to be when two to three leaves are present assuring most of the seed in the germination zone have germinated. This is substantiated by good control of bulrush between 1 and 3 leaves in the 2005 experiment. This suggests application timing being linked to bulrush growth stage if this is the dominant weed needing control.

Granite GR (penoxsulam, granular formulation) alone and in combinations

Granite GR is an ALS inhibiting post-flood, post-emergence herbicide for selective control of susceptible watergrass/barnyardgrass (not active on sprangletop), broadleaf and sedge weeds in California rice. The granular formulation, Granite GR, was first available commercially during the 2005 season. This product was applied into the water at 40 g ai/ha 7-14 days after seeding. It was tested alone and in combination with Bolero, Cerano, propanil, Clincher and Shark in a trial observing rice yield response to doubling herbicide rates (Table 2). Most treatments provided good to excellent weed control. Plants at the 3 leaf stage exhibited noticeable root stunting by Granite. This effect was short lived and the plants recovered. The best yielding Granite combination was Cerano (448 g ai/ha, 1-2 DAS) fb. Granite GR (40 g ai/ha, 2.5-3 lsr) fb. Clincher (315 g ai ha, 3-4 lsr) fb. Stam (6720 g ai/ha, 1-3 Till). Other good treatments were: Granite (40 g ai/ha, 7-14 DAS) fb. Shark (224 g ai/ha, 3-4 lsr) fb. Clincher (315 g ai/ha, 3-4 lsr) fb. Stam (6720 g ai/ha, 1-3 Till), Bolero (4480 g ai/ha, 7-12 DAS) fb. Granite GR (40 g ai/ha, 2 lsr) fb. Clincher (315 g ai/ha, 3-4 lsr) fb. Stam (6720 g ai/ha, 1-3 Till). In our regular continuously flooded trial the best Granite treatment combination was Shark applied same day as Granite GR (224 g ai/ha and 40 g ai/ha, respectively, 2-3 lsr). Other combinations with good weed control and yield are: Granite (40 g ai/ha, 2-3 lsr) fb. Stam (6726 g ai/ha, 1-3 Till) and Granite GR (40 g ai/ha, 2.5 lsr) fb. Clincher (315 g ai/ha, 1-3 Till).

Severe rice stunting occurs with early applications of Granite GR. This was evidenced by a treatment of Granite GR (40 g ai/ha, 1.5 lsr) fb. Clincher (315 g ai/ha, 1-3 Till). The weed control was excellent and the yield was lower but not significantly different from the top performers. Some stunting was observed when Granite followed Bolero, but in this experiment there were no significant adverse effects of doubling the Granite rate on rice yield.

Granite SC (penoxsulam) alone and in combinations

Granite SC is a fluid formulation of penoxsulam for foliar application. It was labeled for California in 2006, but was in limited supply. It was tested in a pinpoint flood system with flood water dropped for an application at the 3-4 lsr (Table 6). The highest yielding treatment in the trial with excellent weed control was Clincher (315 g ai/ha, 3-4 lsr) fb. a tank mix of Granite SC and Stam (35 g ai/ha and 6726 g ai/ha respectively, 30-35 DAS). Other combinations with good broad spectrum weed control and good yield were: a tank mix of Clincher and Granite SC (315 g ai/ha and 35 g ai/ha, 3-4 lsr) fb. Stam (6726 g ai/ha, 1-2 Till), Granite SC (35 g ai/ha, 3-4 lsr) fb. Stam (6726 g ai/ha, 1-2 Till), a tank mix of Clincher and Granite SC (315 g ai/ha and 35 g ai/ha respectively, 3-4 lsr), and a tank mix of Granite SC and Stam (35 g ai/ha and 6726 g ai/ha respectively, 3-4 lsr). Sprangletop control failed in absence of Clincher.

OBJECTIVE 2. *To continue searching and testing new compounds with potential for addressing critical weed control issues to establish their suitability and proper fit into the rice management systems of California. Encourage introduction of promising new chemicals to the California market.*

In recognizing the need for developing herbicides to meet the cultural needs of growers throughout the state, our herbicide testing system was designed around the various types of irrigation schemes that growers use. These include: Continuous flood, pin-point flood and dry/drill seeding with establishment flush irrigation.

Continuous flood system combinations

Continuous flood trials were conducted at the Hamilton road site at the RES and at one resistant site on cooperator grower's land. Best yields in this system were obtained with herbicide programs providing at least 90% of broad-spectrum weed control during the first month after seeding rice (Figure 1). Sedges are relevant to yields, and poor sedge control impacted yields, as did weed control initiated by late post-emergence applications (1-3 Tiller stage of rice).

The Hamilton Road site has herbicide-susceptible weed species while the off station site has resistant late watergrass ("mimic"). In most cases, the applications were sequential comprising an initial application of Cerano, Granite GR, or Bolero/Abolish for watergrass control followed by an application of Shark, Londax, Super Wham, or Regiment at various timings (Table 1) to control broadleaves, sedges, and in some cases late-emerging watergrass plants or those missed by the early treatment. Granite GR is a newly available granular herbicide that was tested alongside other standard herbicides used by growers. At the RES, rice yields for most of the treatments were not

statistically different. Statistically lowest yields were stand alone reference treatments to demonstrate the value of sequential applications and not expected to control all weed species.

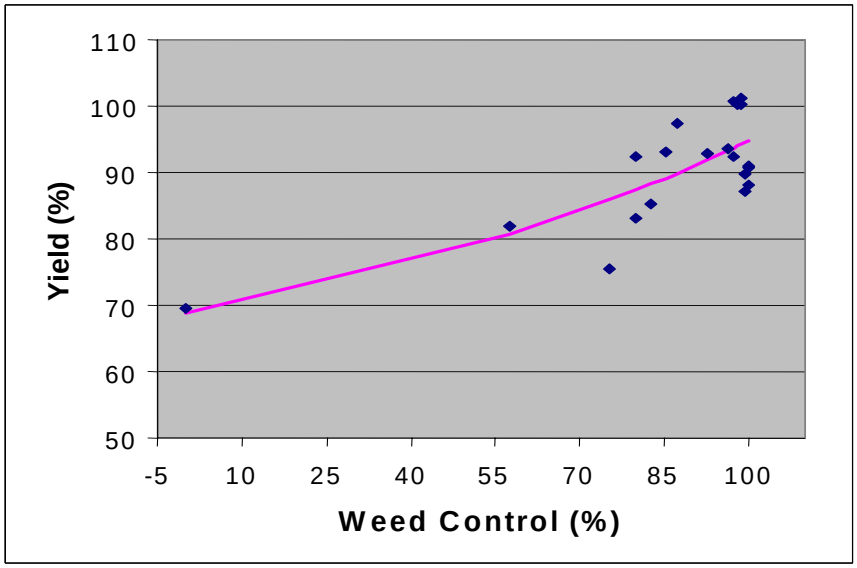

Figure 1. Rice yields (percent of the maximum yield) as affected by weed control efficacy expressed as percent of untreated plots (= 0% weed control) in water-seeded and continuously flooded rice. Weed control was evaluated one month after seeding rice.

The best treatments for weed control and yield are: Shark (224 g ai/ha, 2-3 lsr) fb. Super Wham (6726 g ai/ha, 1-3 Till); Abolish (4480 g ai/ha, as a pre-flood application on soil surface, PFS) fb. Super Wham (6726 g ai/ha, 1-3 Till); Granite GR (40 g ai/ha, 2-3 lsr) fb. Stam (6726 g ai/ha, 1-3 Till); Shark (224 g ai/ha) and Granite GR (40 g ai/ha) applied at 2-3 lsr; Bolero (4480 g ai/ha, 1-2 lsr) fb. Super Wham (6726 g ai/ha, 1-3 Till); Granite (40 g ai/ha, 2-3 lsr) fb. Clincher (315 g ai/ha, 1-3 Till); and Shark (224 g ai/ha, 2-3 lsr) followed by Clincher (315 g ai/ha, 1-3 Till). Good weed control and yield, but some stunting was observed when a PFS application of Abolish (4480 g ai/ha) was followed by 40 g ai/ha of Granite GR (2-3 lsr).

Cerano is a typical herbicide for this system providing broad-spectrum grass control applied from the day of rice seeding (DOS) up to the 1.5 lsr (or with watergrass not exceeding the 1.5 leaf stage). Excellent broad-spectrum weed control was obtained with Cerano (673 g ai/ha, DOS) followed by a foliar application of 6720 g ai/ha propanil at the 1-3 Till. If Cerano was instead followed by Regiment (37 g ai/ha; 1-3 Till), lower ricefield bulrush control and slight rice injury was observed, although yields were still acceptable. When Cerano was followed by 40 g ai/ha Granite GR, ricefield bulrush control was good, but herbicide symptoms on rice were more noticeable (Table 1).

The " mimic" site in Glenn County. At this resistant late watergrass site, three main treatment basins were set up. Each had one baseline into-the-water application of Cerano, Granite GR or Weco 632 SC (a new experimental chemical). All follow-up treatments were foliar sprays at the 4-5 lsr with water lowered (not drained) for weed foliage exposure (table 17). One of the best treatments was Weco 632 SC (800 g ai/ha, DOS) fb. Super Wham (6726 g ai/ha, 4-5 lsr). The Weco 632 SC provided near complete control of broadleaf and sedge weeds early on and weakened the watergrass.

The Super Wham controlled the recovering watergrass. Other good treatments were the base application of Cerano (673 g ai/ha, DOS) fb. Granite SC (40 g ai/ha, 4-5 lsr), Shark (112 g ai/ha, 4-5 lsr), Super Wham (6726 g ai/ha, 4-5 lsr) or Regiment (37 g ai/ha, 4-5 lsr). The Granite GR basin had less control of the resistant watergrass and, therefore, lower yields. Best results were obtained with Granite GR (40 g ai/ha, 2-3 lsr) fb. Super Wham (6720 g ai/ha, 4-5 lsr).

Cerano caused on average about 5% stand reduction. About 10% stand reduction was observed in the Weco 632 fb. Super Wham sequence. Rice appeared to recover in all cases.

Pin-point flood system combinations

Pin-point flood trials were conducted at the susceptible watergrass site at the RES and at the resistant watergrass site in Glenn County. Both trials were drained eight days prior to initial application and then re-flooded two days after application. Follow up applications of foliar herbicides requires lowering of water to achieve 70% weed exposure for effective coverage of weed foliage.

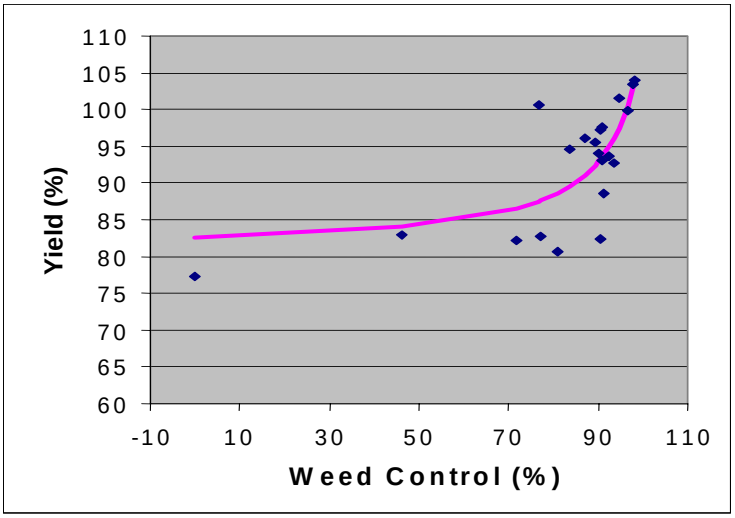

Figure 2. Rice yields (percent of the maximum yield) as affected by weed control efficacy expressed as percent of untreated plots (= 0% weed control) in water-seeded rice, where fields are temporarily drained to allow for weed foliage exposure to early foliar application of herbicides. Experiment seeded on June 1; weed control was evaluated on Aug 2.

Main weeds at the Hamilton road site and the resistant site were late watergrass, ricefield bulrush, smallflower umbrellasedge, sprangletop, and ducksalad. Weed interference is often tougher in a system where water is drained for even a brief period (note the steeper slope of the curve in Figure 2 compared to that in Figure 1), which encourages germination and growth of certain species. Thus smallflower umbrellasedge and sprangletop can pose additional problems in this system as compared to continuously flooded rice. Poor control of these weeds resulted in lower yields. Only broad-spectrum weed control approaching 95% ensured yields close to the maximum possible. Many of the treatments tested at the susceptible RES site had similar yields (Table 6). The following treatment combinations gave good weed control and yield: Clincher (315 g ai/ha, 3-4 lsr) fb. a tank

mix of Stam and Granite SC (4484 and 35 g ai/ha respectively, 30-35 DAS); a tank mix of Clincher and Granite SC (315 and 35 g ai/ha respectively, 3-4 lsr) fb. Stam (6726 g ai/ha, 30-35 DAS); Granite SC (35 g ai/ha, 3-4 lsr) fb. Stam (6726 g ai/ha, 1-2 Till); Clincher (315 g ai/ha, 3-4 lsr) fb. Stam (6726 g ai/ha, 1-2 Till); a tank mix of Super Wham and Whip (6726 and 32 g ai/ha, 3-4 lsr); Super Wham tank mixed with Abolish (4480 + 4480 g ai/ha, 3-4 lsr). Clincher (315 g ai/ha, 3-4 lsr) fb. Regiment (37 g ai/ha, 1-2 Till) had good broad spectrum weed control except for being weak on smallflower umbrellasedge. Regiment (30 g ai/ha, 3-4 lsr) provided good watergrass control but was weak on smallflower umbrellasedge and missed sprangletop. Regiment (30 g ai/ha, 3-4 lsr) fb. Super Wham (6726 g ai/ha, 1-2 Till) provided good broad spectrum control except sprangletop. A tank mix of Regiment and Whip (30 + 32 g ai/ha, 3-4 lsr) gave excellent watergrass control and also sprangletop control but still missed smallflower umbrellasedge. Regiment (30 g ai/ha) tank mixed with MCPA (560 g ai/ha) controlled smallflower umbrellasedge but missed sprangletop. The tank mix of Regiment and Abolish (30 + 3360 g ai/ha respectively, 3-4 lsr) provided broad spectrum control but was not very effective on smallflower umbrellasedge or sprangletop. Granite, propanil (super Wham, Wham or stam) and Regiment do not control sprangletop, and unless Whip, Clincher or Abolish are part of the program, control of this weed will be poor.

The best broad-spectrum control and yields were obtained at the resistant site with the following combinations: Super Wham (6726 g ai/ha, 3-4 lsr) fb. Clincher (315 g ai/ha, 1 Till); Clincher (315 g ai/ha, 3-4 lsr) fb. Super Wham (6726 g ai/ha, 1 Till); Granite SC (35 g ai/ha, 3-4 lsr) fb. Stam (6726 g ai/ha, 1 Till); Regiment (44.5 g ai/ha, 3-4 lsr) fb. Super Wham (6726 g ai/ha, 1 Till); Super Wham (6726 g ai/ha, 1 Till); a tank mix of Regiment and Abolish (37 and 3360 g ai/ha, 3-4 lsr) fb. Super Wham (6726 g ai/ha, 1 Till), but the Super Wham treatment was likely skipped due to no control of bulrush. Control of resistant late watergrass in these programs was largely due to the presence of propanil (Super Wham, Wham or Stam) in the combination.

Drill seeded system

Rice seed was drilled into dry ground, then flush-irrigated for establishment. Additional flush irrigations were applied to insure good establishment. Standing water inhibits establishment of the rice that is drilled into the soil. The main weeds in this system were watergrass, ricefield bulrush, smallflower umbrellasedge and sprangletop. Our herbicide programs were successful in providing substantial control (80% or more) of sedges and broadleaf weeds, such that those remaining uncontrolled did not have consistent impact on yields (bunch of data points at the top right corner of Figure 3a. However, yields in this system were strongly driven by the efficacy of grass control, and top yields were attainable once about 95% control of grasses had been obtained (Figure 3b).

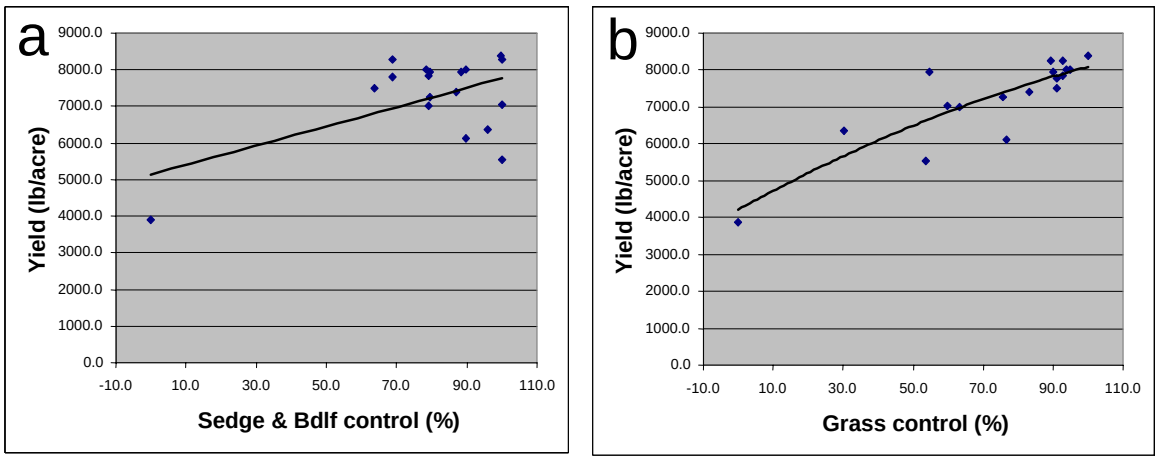

Figure 3. Rice yields (percent of the maximum yield) as affected by weed control efficacy expressed as percent of untreated plots (= 0% weed control) in drill-seeded rice; a) relationships between yields and sedge & broadleaf control under variable grass infestations; b) relationship between yields and grass weed control under variable sedge & broadleaf infestations. Experiment seeded on June 1; weed control was evaluated on Aug 2.

Herbicide timing included delayed pre-emergent (DPRE) after the first flush of irrigation, early post emergent (EPE) with rice at the 2-3 lsr, and post permanent flood (PPF) with rice at the 1-2 tiller stage. The best yielding treatment and best broad-spectrum weed control was achieved by a foliar application of Shark (168 g ai/ha, 3-4 lsr) fb. Clincher (315 g ai/ha, PPF). The early application of Shark was key to provide good control of smallflower umbrellasedge; a similar treatment (Clincher fb. Super Wham) failed to suppress this weed early in the season and yielded 1000lb/A less. Other good treatments were: Granite SC (35 g ai/ha, 2 lsr) fb. Clincher (315 g ai/ha, PPF); Abolish (4480 g ai/ha, DPRE) fb. Super Wham (6726 g ai/ha, 2-3 lsr); a tank mix of Prowl H_2O, Super Wham and Whip (1120, 4484 and 32 g ai/ha respectively, 2-3 lsr); Abolish (4480 g ai/ha, DPRE) fb. a tank mix of Regiment and Abolish (30 and 3360 g ai/ha respectively, 2-3 lsr); Prowl H_2O plus Regiment plus Whip (1120 + 37 + 32 g ai/ha, 2-3 lsr); Prowl H_2O plus Clincher (1120 + 315 g ai/ha respectively, 2-3 lsr); Prowl H_2O (1120 g ai/ha, DPRE) fb. Super Wham (6726 g ai/ha, PPF); Abolish (4480 g ai/ha, DPRE) fb. Regiment (12.5 g ai/ha, 2-3 lsr); Regiment plus Abolish (25 + 3360 g ai/ha respectively, 2-3 lsr) fb. Clincher (315 g ai/ha, PPF). Herbicides ensuring good control of all three sprangletop, smallflower umbrellasedge and *Echinochloa* are essential for this system.

OBJECTIVE 3. *To develop new alternatives to weed control through the exploration of agronomic and ecophysiological opportunities to minimize herbicide costs and environmental impacts. To measure rice yield impact of specific weed species and develop a predictive approach.*

Herbicide Resistance Weed Management Systems in Rice using Alternative Stand Establishment Techniques. The following alternative rice establishment systems have been developed and evaluated since 2004: 1) conventional water-seed rice, 2) conventional drill-seeded rice, 3) water-seeded rice after spring tillage and a stale seedbed, 4) water-seeded rice after a stale seedbed without spring tillage, and 5) drill-seeded rice after a stale seedbed without spring tillage. These systems have demonstrated their potential for manipulating the kinds of

weed species that emerge with rice. Thus problematic weeds can be avoided or, alternatively, controlled by new herbicides for which they do not have resistance. Pendimethalin and glyphosate are not used in water-seeded rice, but can control weed biotypes resistant to herbicides used in conventional water-seeded rice. Again, as in 2004 and 2005, there were drastic differences in weed recruitment among systems, thus aquatic sedge and broadleaf weeds dominated the water-seeded systems, while the aerobic seedbeds of the drill-seeded systems favored grasses (*Echinochloa* spp. and sprangletop). In the two previous years, the stale seedbed technique (promotion of weed emergence with irrigation flushes, fb. pre-plant burn-down application of glyphosate at 1.2 lbs. a.e./a) had been extremely useful in depleting weed populations from the upper soil layer and, thus, markedly diminishing the amounts of weeds emerging with the crop. If this technique was fb. no or limited soil disturbance prior to seeding rice, very little weed control was needed thereafter. However, success with this technique depends on keeping seedbeds moist and allowing sufficient time for most weeds to emerge prior to glyphosate application. This year, however, there was not sufficient time and seedbed moisture for substantial weed emergence. Consequently, few weeds were present when the burn-down control was applied. The stale-seedbed technique reduced total weed infestation by 24% in the water-seeded systems compared to the conventional treatment. The concept of limiting soil disturbance to prevent weed recruitment contributed an additional 27% to weed reduction. Thus, the lowest weed infestation occurred where rice was water-seeded after a stale seedbed without spring tillage. Conventional drill-seeded systems typically result in heavy weed recruitment, and although using stale-seedbed and minimum soil disturbance reduced weed recruitment by 60%, there were still many weeds present in System 5:

Weed recruitment under different stand establishment systems (plants per square foot)

System	*Echinochloa*	Sptp.[1]	Bulrush	Smallflower	Ducksalad	Redstem
1. Water seed conventional	1 (2)[2]	0 (0)	19 (12)	26 (18)	6 (4)	12 (8)
2. Drill seeded, no till, stale	31 (16)	19 (8)	0 (0)	0 (0)	0 (0)	0 (0)
3. Water seeded, no till, stale	0 (0)	0 (0)	2 (1)	5 (2)	19 (11)	5 (3)
4. Water seeded, spring till, stale	0 (0)	0 (0)	1 (1)	32 (15)	7 (2)	8 (5)
5. Drill seeded conventional	97 (44)	27 (16)	0 (0)	2 (3)	0 (0)	0 (0)

[1] Sptp., bearded sprangletop; bulrush, ricefield bulrush; smallflower, smallflower umbrellasedge.
[2] Values in parentheses are standard errors of the mean.

Subsequently, the drill-seeded systems were treated with Clincher (13 oz/a) + propanil (4 lb a.i./a) + Prowl H_2O (2 pt/a) applied at the 3 lsr, and the water-seeded systems received propanil (6 qt/a) + Granite SC (2 oz/a) at the 4 lsr. The conventional water-seeded system required an additional 4 lb a.i. propanil/a. Weeds were thus controlled from all plots. Rice yields in previous years did not differ among these establishment systems. Therefore, the alternative rice establishment systems evaluated in this study may be used to effectively manipulate weed species recruitment and enable the use of herbicides that may control weed biotypes resistant to herbicides used in conventional water-seeded systems. Success in weed suppression is

maximized if sufficient weed emergence is promoted prior to burn-down in the stale seedbed technique and with no spring tillage. Modeling of weed recruitment and growth is being evaluated to identify rotation options that may reduce the seed-banks of problematic weed species. Results from this research will be used to develop innovative integrated weed management programs for California rice by breaking weed life cycles through rotation of stand establishment methods, alternating herbicide modes of action, as well as effective crop interference.

Relating rice traits to competitiveness with watergrass and yield: a Path and QTL analysis. *Echinochloa phyllopogon* (STAPF) KOSS. Resistance to herbicides in the most important weeds threatens the sustainability of California rice. Weed-competitive rice cultivars could be a low-cost and safe non-chemical addition to an integrated weed management program. Tradeoffs between competitiveness and productivity and inconsistent trait expression under weedy and weed-free conditions could complicate the breeding of competitive rice cultivars. A two-year competition experiment was conducted in the greenhouse involving eight rice cultivars and two weed competition regimes (presence or absence of late watergrass) to examine the effects of rice weed-suppressive ability and tolerance to weed competition (weed tolerance) on rice yield. Competition reduced average rice yield from 32% to 48%, and watergrass biomass from 44% to 77%. Path analysis suggested that enhancing rice weed-suppressive ability and weed tolerance while minimizing possible productivity tradeoffs should promote early (12 d after seeding) growth and light-capture traits followed by moderate growth rates before heading and a vigorous grain filling period. Crop growth rate (CGR) after heading was a relevant determinant of yield (direct path: 0.82, $P < 0.01$) and correlated ($r = 0.30$, $P < 0.01$) with weed tolerance. Late biomass accumulation was negatively correlated with harvest index and CGR during ripening ($r = -0.46$, $P < 0.01$); thus, late-season competitiveness can lower productivity. Rice traits conferring competitiveness were correlated across weed competition regimes ($r = 0.36$ to 0.81, $P < 0.01$). However, significant cultivar by competition and cultivar by year interactions suggest that selection efficiency would be greater when traits are identified under competition and in different environments. This study relates to the phenotypic expression of traits for competitiveness. Breeding competitive cultivars will require additional knowledge on trait heritability, genetic correlations with competitiveness, and on the effects of the environment upon gene expression. Although competition studies should involve the entire life span of species, it is known that weed competition with rice is critical during early stages of crop growth. Following these findings, and given that watergrass competition with rice is critical during early stages of crop growth, a second study focused on the identification and interrelationships among traits for early vigor. A greenhouse experiment with watergrass and 21 rice genotypes grown in monoculture was conducted in 2000 and 2001. the experiment involved three destructive harvests for growth analysis at 12 DAS (4-5 leaf stage), 24 DAS (early tillering) and 36 DAS (mid to late tillering). The growth characteristics of watergrass and rice seedlings differed. At establishment, rice seedlings had greater values for most growth traits. However, watergrass had superior growth rates, and gradually became taller than the semidwarf genotypes used in these studies. Therefore, rice that emerges simultaneously with watergrass would not be able to overtop and shade this weed, making watergrass suppression through rice competition difficult unless watergrass emergence can be delayed and rice seedling vigor (early biomass accumulation) is enhanced. Clustering analysis found that seedling leaf area was a good discriminator between cultivar clusters differing in early vigor. Seedling height was not

associated with the clustering of genotypes into high vigor groups. Early tillering was associated with fast growing genotypes, and was correlated with root biomass, total biomass and leaf area. These results suggest that rice early vigor, as a component of overall competitiveness, can be enhanced through selection for leafier, rapidly elongating, and highly tillered plants. A third study attempted the identification of quantitative-trait loci (QTL) associated with rice traits for early vigor and competitiveness against watergrass as identified in the two previous studies. A population of 137 F2 recombinant inbred lines derived from a cross between M-202 and IR50 were grown in the field in monoculture during 2003 and 2004. Phenotyping for seedling and vegetative vigor traits was performed at 20, 30 and 60 days after seeding (DAS). A genetic linkage map was generated using available molecular data for this population that had been obtained using 180 microsatellite markers showing polymorphism for the progenitors, Path analysis was used to clarify the relationships among diverse variables, including molecular markers, in hypothetical cause-effect models. We located about 40 putative genetic loci associated with rice traits related to plant vigor and competitiveness. Results from this research would be useful for using marker-aided selection to facilitate the identification of genotypes with superior vigor and competitiveness, and for combining these characteristics into a highly productive ideotype.

Red or Weedy Rice. Foci of red or weedy rice infestation had been detected in 2005. This season new detections were reported. In collaboration with the Rice Experiment Station and UC Cooperative Extension Farm Advisor Christopher Greer we proceeded to collect accessions from the few sites were these infestation had been reported. Seed was collected from individual plants from each population and tissue samples are being subjected to molecular analysis. A first selfed generation from each plant has been also obtained for further work. Plants will be grown next season for morphological and further molecular characterization. We aim at elucidating the distribution and diversity of these occurrences. Genetic studies will also reveal the extent of outcrossing into commercial rice that may have already occurred. This information will guide help industry design containment strategies. We are advising farmers on red rice identification and control.

OBJECTIVE 4. *To develop an understanding of herbicide resistance in weeds, provide diagnosis, test herbicides, and develop effective alternatives to manage this problem.*

Diagnostic and detection of herbicide resistance. We continue to screen potentially resistant grass samples (late watergrass, early watergrass and barnyardgrass) submitted by growers and PCAs against known susceptible and resistant lines. Testing this past season included Cerano, Regiment, Clincher, Bolero, Ordram, Granite and propanil applied at the standard field rate and ½ the standard rate. We implemented a new reporting method that we believe will help growers interpret their results. This includes a picture showing the individual treatment effects on their sample compared with the known susceptible and resistant lines. The percent control (i.e. control referred as percent of the mean of untreated plants for the same biotype) and standard error was labeled below each treatment. Response from growers was positive in that they liked seeing the effect on the grass along with the level of control. Various resistance patterns were observed in all submitted samples, which included barnyardgrass, early, and late watergrass accessions

Mechanisms and distribution of herbicide resistance in weeds of rice. We continued our work to characterize the dispersion of herbicide-resistant watergrass and to associate that dispersion to landscape, crop, and weed management variables. We use GPS, geostatistics and molecular markers for this work. Studies on gene flow, outcrossing, mechanisms of resistance and cross resistance in smallflower umbrellasedge, have been completed and are being analyzed. Studies on mechanisms of late watergrass (LWG) resistance to penoxsulam and clomazone are in progress. Dose-response experiments with thiobencarb and the cytochrome P4540 inhibitor ABT demonstrated that this herbicide may be the driver of resistance evolution in this species by selection for LWG biotypes capable to detoxify multiple herbicides. Work with penoxsulam and clomazone aim at corroborating this hypothesis. Penoxsulam is a new acetolactate synthase (ALS) inhibitor herbicide for use in rice. An LWG population presumed resistant (R) to penoxsulam was collected in CA rice fields. Whole-plant bioassays investigated LWG response to penoxsulam and the possible involvement of cyt P450 monooxygenases in LWG resistance to penoxsulam using the cyt P450 inhibitor malathion (previous studies had already shown cyt P450-mediated resistance to thiobencarb, bispyribac-sodium and bensulfuron-methyl in this population). The ratio (R/S) of the GR50 values of the resistant to susceptible plants was 9.8 for penoxsulam. Results suggest cyt P450 involvement in LWG resistance to penoxsulam. ALS activity assays demonstrated that resistance in R-LWG is not due to reduced ALS sensitivity. Low level of resistance to clomazone was found in dose response studies with three late watergrass biotypes collected in rice fields of the Sacramento Valley (Figure 4). This level of resistance corresponds to escapes seen in the field under conventional treatment in farms heavily infested with a resistant biotype of this weed. The dose-response studies were conducted under flooded conditions, with a four inch flood, and the weed at the one-leaf stage of growth. Fresh weight was harvested 20 days after treatment. Growth reduction (50%) values were significantly lower for the susceptible biotype compared to the resistant biotypes. Application of clomazone in combination with organophosphate insecticides (that are cytochrome P450 inhibitors) had protective and synergistic effects on LWG. Effects differed between R and S biotypes suggesting that an oxidative step is required for activation and toxicity of this herbicide, and that an enhanced metabolic ability may endow higher clomazone tolerance in the R biotype. Studies are under way to clarify the mechanism of resistance. Studies are under way to clarify the metabolic routes of herbicide degradation associated with resistance to these herbicides in LWG.

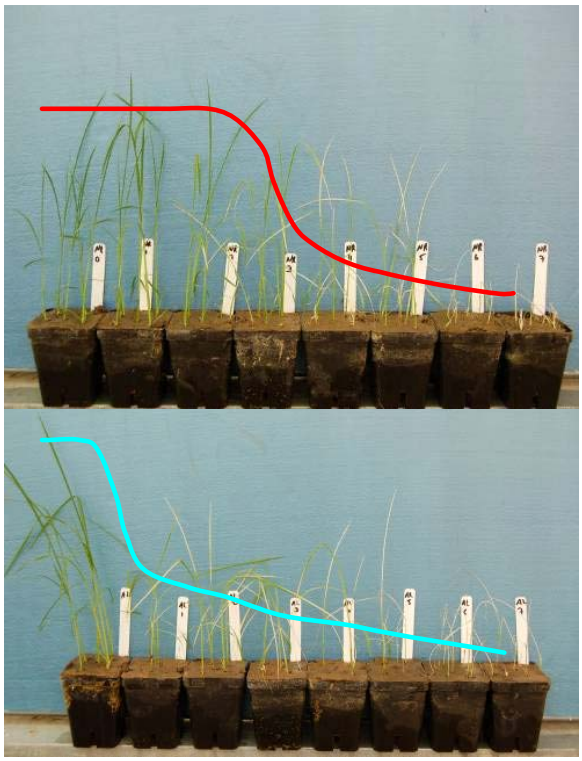

Figure 4. Response of herbicide-resistant (top) and -susceptible (bottom) late watergrass to increasing rates (from left to right) of Cerano.

PUBLICATIONS OR REPORTS:

BAKKALI, Y., J. P. RUIZ-SANTAELLA, A. J. FISCHER, AND R. DE PRADO. 2006. Late Watergrass (*Echinochloa phyllopogon*): Mechanisms Involved in The Resistance to Fenoxaprop-p-Ethyl. Journal of Agricultural and Food Chemistry 54: In press.

BUSI, R., VIDOTTO, F., A. J. FISCHER, M.D. OSUNA, R. DE PRADO, AND A. FERRERO. 2006. Patterns of Resistance to ALS Herbicides in Smallflower Umbrella Sedge (Cyperus difformis) and Ricefield Bulrush (Schoenoplectus mucronatus). Weed Technology. 2006. Volume 20: In press.

FISCHER, A.J. AND J.E. HILL. 2006. Weed control programs. In: Rice Production Workshop 2006. UC Cooperative Extension, Davis, CA. Pp.9.1-9.10. Available online at : http://www.plantsciences.ucdavis.edu/uccerice/

FISCHER, A.J., J.W. ECKERT, J. E. HILL, L. BODDY, M.D. OSUNA RUIZ, C. MARCHESI, J. LANG, AND S. JOHNSON. 2006. Rice Weed Control: Herbicide Performance, Combinations, New Chemicals, and Weed Management; managing herbicide resistance using alternative rice sand establishment techniques. In: California cooperative Rice Research foundation, University of California, and U.S.D.A. (eds.) Rice Field Day. Pp. 32-39.

HILL, J.E., A.J. FISCHER, C.A. GREER, AND R.G. MUTTERS. 2006. Herbicide resistance stewardship in rice. UC Cooperative Extension. Davis, CA. Available at: http://www.plantsciences.ucdavis.edu/uccerice/

MOECHNIG, M.J., A.J. FISCHER, J.E. HILL. 2006. Herbicide resistance management in continuous rice using alternative establishment techniques. In; Proc.59th Meeting of the Western Society of Weed Science, March 14-16, Reno, Nevada. (In press).

PÉREZ DE VIDA, F.B., E.A. LACA, D.J. MACKILL, G.M. FERNÁNDEZ, AND A. J. FISCHER. 2006. Relating rice traits to weed competitiveness and yield: a path analysis *Weed Science,* 54:1122–1131.

RUIZ-SANTAELLA, J.P., R. DE PRADO, J. WAGNER, A.J. FISCHER, AND R. GERHARDS. 2006. Resistance mechanisms to cyhalofop-butyl in a biotype of *Echinochloa phyllopogon* (Stapf) Koss. from California Journal of Plant Diseases and Protection XX, 95-100

CONCISE GENERAL SUMMARY OF RELEVANT RESULTS OF THIS YEAR'S RESEARCH:

Our field program includes the testing of current and new herbicides, their mixtures and sequential combinations for the rice growing systems that currently prevail in California. We also have a strong emphasis towards the diversification and sustainability of weed management in rice, thus we continued work on a long-term field experiment with new alternative rice stand establishment systems in order to develop novel but feasible solutions for controlling herbicide-resistant weeds. Experiments were conducted on the Rice Experiment Station's (RES) and at a cooperating grower's field heavily infested with herbicide-resistant watergrass (" mimic").

Continuous flooded rice. Sprangletop and smallflower umbrellasedge are generally not a problem when a continuous flood is maintained. The combination of Cerano fb. propanil, Granite GR, or Regiment provided excellent broad-spectrum control at our susceptible[2] site. Combinations of Granite GR fb. either propanil or Clincher also provided broad-spectrum control at the susceptible site. Granite and Regiment should not be combined, since both have the same mode of action (ALS inhibitors) and this would encourage the evolution of resistance. Other excellent broad-spectrum combinations were: Bolero fb. propanil or Abolish (PFS[3]) fb. either propanil or Granite GR. Shark applied into-the-water at the same time as Granite GR or fb. propanil also provided excellent broad-spectrum control. Cerano causes mild to severe bleaching of rice but the crop usually grows out of it. Regiment and Granite GR may cause stunting and darkening of rice; some root growth stunting may also occur temporarily after application. The crop seems to recover from these effects, but Granite should not be applied earlier than at the 2 leaf stage.

Pinpoint flood management. Rice was water seeded and the water drained to expose weeds for early foliar herbicide treatments; our fields were then re-flooded. The drainage period generally allows weeds like sprangletop, barnyardgrass, and smallflower umbrellasedge to germinate in the

[2] Susceptible refers to the absence of resistant weeds.
[3] PFS, pre-flood application onto the soil surface.

aerobic environment. Residual herbicides can be especially helpful when drain time is prolonged due to time needed to re-flood large fields. The best broad-spectrum treatments were: Granite SC fb. propanil; Clincher fb. propanil; a tank mix of Clincher and Granite SC fb. propanil ; Clincher fb. a tank mix of propanil and Granite SC; propanil tank mixed with Abolish, although slight injury to rice was noted initially. The Regiment + Abolish tank mixture applied at the 3-4 lsr continues to produce excellent watergrass control due to the synergistic nature of this mixture. This treatment also controlled sprangletop. Regiment alone provides excellent control of watergrass at this location. Six oz/a Whip tank mixed with 6qt propanil at the 3-4 lsr provided good weed control including sprangletop.

Drill-seeded rice. Rice M206 was drill seeded and flushed with water three times for establishment, then a final permanent flood (3-4 inches) was applied when rice was at the 5 leaf stage. The main weeds in this system were watergrass and sprangletop. The best treatment was foliar applied Shark fb. Clincher (PPF[4]), which provided the best broad-spectrum control. Abolish (DPRE[5]) fb. a tank mix of Regiment and Abolish provided 94% control of watergrass and 96% control of sprangletop. Abolish (DPRE) fb. Super Wham was also an excellent treatment, although watergrass control was weaker. Clincher fb. Super Wham controlled watergrass by 93% and sprangletop by 80%. Granite SC fb. Clincher was also an outstanding broad-spectrum treatment. Prowl H_2O alone applied as a delayed pre-emergent (DPRE) controlled 58% of the watergrass and 98% of the sprangletop initially, however, this control diminished over time. Control was improved when Prowl was fb. foliar-active herbicides like propanil or Regiment.

New herbicides. Granite SC worked very well as a foliar formulation of the same active ingredient used in Granite GR (penoxsulam). IR5878 GR and IR5878 WG are ALS inhibitors for broad-spectrum control, including activity on *Echinochloa* spp., with some residual effect. Control of Londax-resistant smallflower umbrellasedge was poor and required the mixture with Super Wham or Abolish. Other new experimental compounds have also been tested this season. To avoid resistance, ALS inhibitors should not be used together in a program.

Herbicide resistance herbicide programs: Experiments were conducted at a site heavily infested with herbicide-resistant late watergrass ("mimic"), which in addition to the usual resistance pattern to most grass herbicides, also escapes control by Cerano and Granite. In continuous flood, Cerano fb. propanil was the best broad-spectrum treatment. Granite GR fb. Regiment treatment is not recommended due to both being ALS inhibiting herbicides. In the pinpoint flood experiment Super Wham fb. Clincher was the best treatment for the second year controlling watergrass by 93% and sprangletop by 100%, but long-term control of bulrush was poor. It is likely that the bulrush continued to germinate after the propanil application. Regiment tank mixed with Abolish controlled watergrass by 88% and sprangletop by 89%. Regiment fb. Super Wham still provided 86% watergrass control two months after application, while Super Wham controlled "mimic" by 61% and suppressed most other weeds except sprangletop.

---

[4] PPF, post permanent flood; postemergence application after permanent flood is established.

[5] DPRE, preemergence application after rice seeds have imbibed water 7days after initial irrigation flush; rice had not yet emerged and watergrass was at the 0.5 leaf stage).

Managing Herbicide Resistance using Alternative Rice Stand Establishment Techniques. The alternative rice establishment systems have been developed involving drill, water seeding, no-till options, and the use of the stale-seedbed technique (promotion of weed emergence with irrigation flushes, followed by pre-plant burn-down application of glyphosate). Again, as in 2004 and 2005, these systems demonstrated their potential for drastically altering the kinds of weed species that emerge with rice by breaking weed cycles and introducing new herbicides for which they do not have resistance (pendimethalin and glyphosate). Thus, aquatic sedge and broadleaf weeds dominated the water-seeded systems, while the aerobic seedbeds of the drill-seeded systems favored grasses (*Echinochloa* spp. and sprangletop). The stale seedbed technique has been extremely useful in depleting weed populations from the upper soil layer and, thus, markedly diminishing the amounts of weeds emerging with the crop. If this technique was followed by no or limited soil disturbance prior to seeding rice, very little weed control was needed thereafter. Success depends on keeping seedbeds moist and allowing sufficient time for most weeds to emerge prior to glyphosate application. This year, however, there was not sufficient time and seedbed moisture for substantial weed emergence. Consequently, few weeds were present when the burn-down control was applied. The stale-seedbed technique reduced total weed infestation by 24% in the water-seeded systems compared to the conventional treatment. Limiting soil disturbance to prevent weed recruitment contributed an additional 27% to weed reduction. Thus, the lowest weed infestation occurred where rice was water-seeded after a stale seedbed without spring tillage. Conventional drill-seeded rice is typically very weedy, and although using stale-seedbed and minimum soil disturbance reduced weed recruitment by 60%, there were still many weeds present. Subsequently, the drill-seeded systems were treated with herbicides at the 3 lsr, and the water-seeded systems at the 4 lsr. The conventional water-seeded system required an additional 4 lb a.i. propanil/a for complete weed control. Rice yields in previous years did not differ among these establishment systems. Therefore, the alternative rice establishment systems evaluated in this study may be used to effectively manipulate weed species recruitment and enable the use of herbicides that may control weed biotypes resistant to herbicides used in conventional water-seeded systems.

Other ongoing studies include assessing the distribution and identity of red rice detections, and the elucidation of mechanisms of resistance to Granite and Cerano. We continue to work with growers, the Rice Experiment Station, UC Cooperative Extension, and industry to bring options for sustainable weed management to California growers.

Table 1. Continuous flood trial

Treatment	Rate	Timing[3]	Application date		Crop injury[1]				Weed Control[2]											Yield (lb/A)
					7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	
	(g ai/ha)		1st	2nd	1st trt		2nd trt		20-Jun				12-Jul				2-Aug			4-Oct
Untreated[4]	---	---							19	10	18	21	30	10	11	19	24	5	9	6843
Cerano	673	DOS	1-Jun		5	9			100	0	73	15	95	0	65	0	86	0	75	8076
Cerano fb. Superwham + COC	673 fb. 6726 + 1.25% v/v	DOS fb. 1-3 Til	1-Jun	26-Jun	5	14	0	0	100	0	69	19	98	98	90	71	100	38	100	9144
Cerano fb. Regiment + NIS	673 fb. 37 + .125% v/v	DOS fb. 1-3 Til	1-Jun	26-Jun	5	11	0	0	100	18	76	21	99	49	88	61	100	53	63	8394
Cerano fb. Granite GR	673 fb. 40	DOS fb. 2-3 lsr	1-Jun	11-Jun	5	8	1	0	100	89	98	100	100	99	100	100	100	95	63	8679
Cerano fb. Granite GR	448 fb. 40	DOS fb. 2.5 lsr	1-Jun	11-Jun	5	9	1	0	100	81	98	100	100	98	98	100	100	93	100	8592
Granite GR	40	2-3 lsr	11-Jun		0	0			100	100	94	100	98	100	100	100	98	99	100	8948
Granite GR fb. Stam 80 EDF + COC	40 fb. 6726 + 2.5% v/v	2-3 lsr fb. 1-3Til	11-Jun	26-Jun	0	0	0	0	100	98	78	100	99	95	93	100	98	98	100	9892
Granite GR fb. Clincher + COC	40 fb. 315 + 2.5% v/v	1.5 lsr fb. 1-3 Til	6-Jun	26-Jun	0	0	0	0	100	100	100	100	100	83	100	100	100	88	100	9095
Granite GR fb. Clincher + COC	40 fb. 315 + 2.5% v/v	2-3 lsr fb. 1-3 Til	11-Jun	26-Jun	0	0	0	0	100	59	44	100	99	86	91	100	95	85	75	9233
Abolish fb. Granite GR	4480 fb. 40	PFS fb. 2-3 lsr	30-May	11-Jun	0	0	0	1	100	100	98	100	100	100	100	100	100	100	100	8974
Shark fb. Granite GR (fb. Foliar if needed)	224 fb. 40	2-3 lsr	11-Jun		0	0			100	80	60	100	99	100	93	100	95	100	98	9882
Bolero fb. Superwham + COC	4480 fb. 6726 + 1.25% v/v	1-2 lsr fb. 1-3 Til	6-Jun	26-Jun	0	0	0	0	100	64	39	100	99	100	28	100	96	100	36	9599
Abolish fb. SuperWham + COC	4480 fb. 6726 + 1.25% v/v	PFS bf. 1-3 til	30-May	26-Jun	1	0	0	0	100	38	53	100	99	100	84	100	99	95	88	9935
Superwham+ Grandstand+ COC	6726 + 280 + 1.25% v/v	1-3 Til	26-Jun		5	0			NA	NA	NA	NA	73	100	53	64	70	100	49	9185
Shark fb. Clincher + COC	224 fb. 315 + 1.25% v/v	2-3 lsr fb. 1-3 Til	11-Jun	26-Jun	0	0	0	0	46	13	13	88	79	53	56	74	74	56	88	9095
Shark fb. SuperWham + COC	224 fb. 6726 + 1.25% v/v	2-3 lsr fb. 1-3 Til	11-Jun	26-Jun	0	0	1	0	40	38	40	80	60	100	93	99	54	100	94	9976
SuperWham + COC	6726 + 1.25% v/v	1-3 Til	26-Jun		0	0			NA	NA	NA	NA	54	100	43	43	71	100	56	8180
Regiment + NIS	37 + .125% v/v	1-3 Til	26-Jun		0	0			NA	NA	NA	NA	76	100	18	43	71	96	88	7431
Ordram 15G + Londax	4480 fb. 71	1-2 lsr	6-Jun		0	0			100	100	98	100	99	100	100	96	100	100	100	8841
LSD (P=0.05)																				1575

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Abolish applied May 30 to dry soil prior to flood
2. Trial seeded June 1, 2006 with 150 lbs per acre of M206
3. Trial managed as a permanent flood with flood water at 4-5 inches.
4. No weeds were visible when Cerano was applied on day of seeding June 1.
   Watergrass was 2 leaf, ducksalad was 2 leaf on June 6.
   Watergrass was 2 leaf, ricefield bulrush was 2 leaf, smallflower umbrellasedge was 2 leaf, ducksalad was 2 leaf on June 11.
   Watergrass was 5 leaf - 2 tiller, ricefield bulrush was 4 leaf, ducksalad was 3-4 leaf and waterhyssop was 10 leaf on June 26.
5. Spray applications made with 20 gallons/acre using 8003 nozzles.
6. Weather conditions on May 30: Air temperature 85^{o} F, wind 0-2 MPH from the west, southwest.
   Weather conditions on June 1: Air temperature 85^{o} F, wind 0-1 MPH from the south.
   Weather conditions on June 6: Air temperature 81^{o} F, wind 4-5 MPH from the southwest.
   Weather conditions on June 11: Air temperature 78^{o} F, wind 1-4 MPH from the northwest.
   Weather conditions on June 26: Air temperature 86^{o} F, wind 3-5 MPH from the south.

Table 2. Dow continuous flood (yield)

							Crop injury[1]			% Weed Control[2]									
Treatement	Rate	Timing[3]	Application date				7 DAT	14 DAT	7 DAT	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	Yield (lb/A)
	(g ai/ha)		1st	2nd	3rd	4th	1st trt		2nd trt	20-Jun				12-Jul				2-Aug			6-Oct
Untreated[4]	---	---								11	10	25	13	19	4	14	16	10	4	9	7765
Cerano fb. Clincher + COC fb. Stam + COC	673 fb. 315 + 1.25% v/v fb. 6720 + 2.5% v/v	1-2 DAS fb. 3-4 lsr fb. 1-3Till	2-Jun	14-Jun	26-Jun		9	0		98	0	78	0	100	30	65	40	100	40	98	9631
Cerano fb. Clincher + COC fb. Stam + COC	1346 fb. 315 + 1.25% v/v fb. 6720 + 2.5% v/v	1-2 DAS fb. 3-4 lsr fb. 1-3Till	2-Jun	14-Jun	26-Jun		25	28		100	13	95	43	100	25	100	16	100	0	100	9368
Cerano fb. Granite GR fb. Clincher + COC fb. Stam +	448 fb. 40 fb. 315 + 1.25% v/v fb. 6720 +	1-2 DAS fb. 7-14 DAS **(2.5-3 lsr)** fb. 3-4 lsr fb. 1-3Till	2-Jun	12-Jun	14-Jun	26-Jun	5	0	0	100	91	100	100	100	100	100	100	100	100	100	9749
Granite GR fb. Clincher + COC fb. Stam + COC	40 fb. 315 + 1.25% v/v fb. 6720 + 2.5% v/v	7-14 DAS **(2.5-3 lsr)** fb. 3-4 lsr fb. 1-3Till	12-Jun	14-Jun	26-Jun		0			100	95	6	100	100	100	54	100	98	100	50	9291
Granite GR fb. Clincher + COC fb. Stam + COC	80 fb. 315 + 1.25% v/v fb. 6720 + 2.5% v/v	7-14 DAS **(2.5-3 lsr)** fb. 3-4 lsr fb. 1-3Till	12-Jun	14-Jun	26-Jun		0			100	89	76	100	100	98	100	100	100	91	100	10102
Bolero 15G fb. Clincher + COC fb. Stam + COC	4480 fb. 315 + 1.25% v/v fb. 6720 + 2.5% v/v	7-12 DAS **(2 lsr)** fb. 3-4 lsr fb. 1-3Till	9-Jun	14-Jun	26-Jun		0	0		94	86	0	100	93	78	45	100	100	98	23	9299
Bolero 15G fb. Clincher + COC fb. Stam + COC	8960 fb. 315 + 1.25% v/v fb. 6720 + 2.5% v/v	7-12 DAS **(2 lsr)** fb. 3-4 lsr fb. 1-3Till	9-Jun	14-Jun	26-Jun		0	0		100	85	25	100	100	100	5	100	100	98	0	8467
Bolero 15G fb. Granite GR fb.Clincher + COC fb. Stam	480 fb. 40 fb. 315 + 1.25% v/v fb. 6720 +	7-12 DAS **(2 lsr)** fb. 7-14 DAS **(2.5-3 lsr)** fb. 3-4 lsr	9-Jun	12-Jun	14-Jun	26-Jun	0	0	0	100	89	60	100	100	98	79	100	100	100	68	8760
Granite GR fb. Shark fb. Clincher + COC fb. Stam +	40 fb. 224 fb. 315 + 1.25% v/v fb. 6720 +	7-14 DAS **(2.5-3 lsr)** fb. 3-4 lsr fb. 1-3Till	14-Jun	26-Jun			0			100	91	15	100	100	96	80	100	100	98	68	9723
COC	+ 2.5% v/v	3-4 lsr fb. 1-3Till	14-Jun	26-Jun						100	—	0	0	99	96	56	31	100	75	31	8328
LSD (P=0.05)																					1483.8

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop) AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded
2. Trial managed as a continuous flood with 3-4 inches.
3. No weeds visible on June 2.
   Watergrass was 2 leaf, ricefield bulrush was 2 leaf smallflower umbrellasedge was 2 leaf and ducksalad was 2 leaf on June 9.
   Watergrass was 2 leaf, ricefield bulrush was 2 leaf smallflower umbrellasedge was 2 leaf and ducksalad was 2 leaf on June 12.
   Watergrass was 3 leaf, ricefield bulrush was 3-4 leaf smallflower umbrellasedge was 2-3 leaf and ducksalad was 3 leaf on June 14.
   Watergrass was 5 leaf, ricefield bulrush was 4 leaf and ducksalad was 3-4 leaf on June 26.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 2: Air temperature 66° F, wind 3-6 MPH from the southeast.
   Weather conditions on June 9: Air temperature 77° F, wind 2-5 MPH from the west, northwest.
   Weather conditions on June 12: Air temperature 72° F, wind 5-8 MPH from the southeast.
   Weather conditions on June 14: Air temperature 84° F, wind 2-5 MPH from the southwest.
   Weather conditions on June 26: Air temperature 86° F, wind 2-5 MPH from the south.

Table 3. FMC continuous flood

Treatment	Rate		Timing[3]	Date		Crop injury[1]				Weed Control[2]											Yield (lb/A)
						7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	LEEFA	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	
	(g ai/ha)	Prod./a		1st	2nd	1st trt		2nd trt		20-Jun					12-Jul				2-Aug			6-Oct
Untreated[4]	--		--							10	3	8	9	10	13	6	16	13	11	5	8	7611
Cerano fb. F6117 2SC	673 fb. 84	12lb fb. 4.8oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	6	6	0	100	100	6	75	100	96	0	94	100	96	0	100	7921
Cerano fb. F6117 2SC	673 fb. 112	12lb fb. 6.4oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	6	6	0	100	100	19	98	100	98	0	100	100	96	0	100	8416
Cerano fb. F6117 2SC	673 fb. 168	12lb fb. 9.6oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	9	9	0	100	100	19	100	100	98	0	100	100	100	13	100	9005
Cerano fb. F6117 2SC	673 fb. 224	12lb fb. 12.8oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	8	8	0	100	100	81	100	100	94	94	100	100	96	69	100	9578
Cerano fb. F6117 2SC	673 fb. 336	12lb fb. 19.2	DOS fb. 2 lsr	1-Jun	8-Jun	10	6	6	0	100	100	100	100	100	94	100	100	100	95	100	100	9213
Cerano fb. Shark H2O 40 DF	673 fb. 224	12lb fb. 8oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	6	6	0	100	100	81	100	98	93	48	100	100	94	45	100	9452
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 84	12lb fb. 8oz + 4.8oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	5	5	0	100	100	100	100	100	95	90	100	100	94	84	100	9432
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 112	12lb fb. 8oz + 6.4oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	3	3	0	100	100	100	100	100	94	86	100	100	93	90	100	9282
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 168	12lb fb. 8oz + 9.6oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	5	5	0	100	100	100	100	100	96	96	100	100	98	75	100	8751
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 224	12lb fb. 8oz + 12.8oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	4	4	0	100	100	100	100	100	98	100	100	100	95	93	100	9329
Cerano fb. F8426 13.5% WDG	673 fb. 224	12lb fb. 1.5lb	DOS fb. 2 lsr	1-Jun	8-Jun	10	0	3	0	100	100	75	100	100	98	43	100	100	96	35	100	8988
Cerano fb. F8426 3.4% WDG	673 fb. 224	12lb fb. 5.9lb	DOS fb. 2 lsr	1-Jun	8-Jun	10	4	4	0	100	100	81	100	100	98	45	100	100	99	40	100	9209
Cerano fb. Londax	673 fb. 71	12lb fb. 1.68oz	DOS fb. 2 lsr	1-Jun	8-Jun	10	6	6	0	100	100	69	100	100	98	90	100	98	100	83	100	9204
LSD (P=0.05)																						774

[1] % Stand (Percent stand reduction), % Stunting (Percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad) LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] DOS (day of seeding), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 150 lbs per acre of M206
2. Trial managed as a continuous flood with 3-4 inches.
3. No weeds visible on June 1.
   Watergrass was 2 leaf, ricefield bulrush was 2 leaf, smallflower umbrellasedge was 2 leaf and ducksalad was 2 leaf on June 8.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 1: Air temperature 79^{o} F, wind 0-4 MPH from the south.
   Weather conditions on June 8: Air temperature 76^{o} F, wind 2-3 MPH from the south.

Table 4. Isagro continuous flood

Treatment	Rate	Timing[3]	Date			Crop injury[1]				% Weed Control[2]											Yield (lb/A)
						7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	
	(g ai/ha)		1st	2nd	3rd	1st trt		2nd trt		20-Jun				12-Jul				2-Aug			6-Oct
Untreated[4]	--	--								10	13	11	6	6	5	16	53	16	5	10	7265
IR-5878 GR	74.5	1-2 lsr	6-Jun			0	0			61	19	13	100	13	30	25	68	13	50	15	7669
Granite GR	40	2.5 lsr	11-Jun			0	0			100	41	56	100	98	90	78	100	98	98	75	9012
Cerano fb. IR-5878 GR	673 fb. 74.5	DOS fb. 1-2 lsr	1-Jun	6-Jun		NA	6	8	0	79	0	90	75	90	29	75	88	91	30	75	9016
Cerano fb. IR-5878 GR	673 fb. 74.5	DOS fb. 3-4 lsr	1-Jun	12-Jun		NA	8	0	0	100	63	95	100	90	94	94	100	95	75	75	9154
IR-5878 GR + Bolero	74.5 + 4540	1-2 lsr	6-Jun			0	0			56	0	25	100	5	0	21	100	28	26	63	7396
IR-5878 GR fb. Super Wham + COC	74.5 fb. 6726 + 1.25% v/v	1-2 lsr fb. 1-3 Tiller	6-Jun	27-Jun		0	0	0		63	0	25	100	28	65	41	75	53	100	50	9022
IR-5878 GR fb. Super Wham + COC	101 fb. 6726 + 1.25% v/v	1-2 lsr fb. 1-3 Tiller	6-Jun	27-Jun		0	0	0		73	0	19	75	44	23	19	49	75	100	25	8468
IR-5878 GR fb. Clincher + COC	74.5 fb. 315 + 1.25 % v/v	1-2 lsr fb. 1-3 Tiller	6-Jun	27-Jun		0	0	0		66	0	0	100	65	48	20	93	93	26	0	8126
IR-5878 fb. Super Wham + Whip + COC	74.5 fb. 6726 + 31.5 + 1.25% v/v	1-2 lsr fb. 1-3 Tiller	6-Jun	27-Jun		0	0	0		63	0	20	75	93	21	5	93	73	100	53	8848
Cerano fb. IR-5878 GR fb. Super Wham + CO	673 fb. 74.5 fb. 6726 + 1.25% v/v	DOS fb. 1-2 lsr fb. 1-3 Tiller	1-Jun	6-Jun	27-Jun	NA	8	6	0	100	0	100	100	96	46	85	98	98	63	73	9343
Bolero + IR-5878 GR fb. Super Wham + COC	4540 + 74.5 fb. 6726 + 1.25% v/v	1-2 lsr fb. 1-3 Tiller	6-Jun	27-Jun		0	0	0		68	13	0	100	58	58	53	100	65	100	73	9109
Cerano fb. Super Wham + COC	673 fb. 6726 + 1.25% v/v	DOS fb. 1-3 Tiller	1-Jun	27-Jun		NA	10	0		78	0	90	43	98	31	98	9	100	53	100	9283
Cerano fb. IR-5878 GR fb. Grandstand + COC	673 fb 74.5 fb. 158 + 1.25% v/v	DOS fb. 1-2 lsr fb. 1-3 Tiller	1-Jun	6-Jun	27-Jun	NA	6	10	0	98	0	85	98	90	36	86	71	91	45	75	9446
IR-5878 GR fb. Grandstand + COC	74.5 fb. 158 + 1.25% v/v	1-2 lsr fb. 1-3 Tiller	6-Jun	27-Jun		0	0	0		85	0	0	100	10	29	5	95	0	74	0	7960
Cerano fb. IR-5878 GR	673 fb. 101	DOS fb. 1-2 lsr	1-Jun	6-Jun		NA	9	6	0	100	15	88	76	91	0	85	86	95	0	95	8794
																					1002
LSD (P=0.05)																					

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice), DPRE (pre emergent), EPE (early post emergent), PPF (post permanent flood).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 150 lbs per acre of M206
2. Trial managed as a continuous flood.
3. Watergrass was 2 leaf, ducksalad was 2 leaf on June 6.
   Watergrass was 2-3 leaf, bulrush was 2 leaf, smallflower was 2 leaf, ducksalad was 2 leaf on June 11.
   Watergrass was 2-3 leaf, bulrush was 2 leaf, smallflower was 2 leaf, ducksalad was 2 leaf on June 12.
   Watergrass was 1-3 tiller, bulrush was 4 leaf, smallflower was 4 leaf, ducksalad was 3 leaf, waterhyssop was 4 leaf and redstem was 4 leaf on June 27.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 1: Air temperature 79^{o} F, wind 0-4 MPH from the south.
   Weather conditions on June 6: Air temperature 81^{o} F, wind 4 MPH from the southwest.
   Weather conditions on June 11: Air temperature 77^{o} F, wind 6 MPH from the southwest.
   Weather conditions on June 12: Air temperature 68^{o} F, wind 10 MPH from the southeast.
   Weather conditions on June 27: Air temperature 86^{o} F, wind 3-5 MPH from the south.

Table 5 . Dow pinpoint flood

Treatment	Rate	Timing[3]	Date		Crop injury[1]				Weed Control[2]											Yield (lb/A)
					7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	CYPDI	HETLI	BAORO	ECHPH	CYPDI	HETLI	BAORO	LEFFA	ECHPH	CYPDI	HETLI	LEFFA	
	(g ai/ha)		1st	2nd	1st trt		2nd trt		20-Jun				12-Jul					31-Jul				4-Oct
Untreated[4]	---	---							9	25	5	5	11	18	5	3	34	11	23	5	6	6072
Granite SC + COC	35 + 2.5% v/v	2-3 lsr	14-Jun		0	0			88	89	75	100	85	95	100	100	43	99	81	100	0	8268
Granite SC + COC	50 + 2.5% v/v	2-3 lsr	14-Jun		0	0			90	94	96	100	89	98	100	100	45	100	81	100	0	8178
Granite SC + COC	50 + 2.5% v/v	4-5 lsr	22-Jun		0	0			NA	NA	NA	NA	90	96	100	100	43	100	86	100	0	8099
Granite SC + COC	70 + 2.5% v/v	4-5 lsr	22-Jun		0	0			NA	NA	NA	NA	95	93	100	100	48	100	81	100	0	7397
Regiment + NIS	38 + 0.125 % v/v	4-5 lsr	22-Jun		4	3			NA	NA	NA	NA	93	81	74	100	55	100	68	74	0	6907
Regiment + NIS	76 + 0.125 % v/v	4-5 lsr	22-Jun		11	5			NA	NA	NA	NA	93	96	98	100	40	100	79	98	0	7545
Clincher + COC fb. Stam 80 EDF	315 +1.25% v/v fb. 6720 + 1.25% V/V	2-3 lsr fb. 4-5 lsr	14-Jun	22-Jun	0	0	0	0	80	—	—	—	100	100	98	75	93	100	84	98	75	8808
LSD (P=0.05)																						957.4

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 150 lbs per acre of M206
2. Trial managed as a pinpoint flood with flood water drained June 7 reflood June 22.
3. Watergrass was 3 leaf, ricefield bulrush was 4 leaf smallflower umbrellasedge was 2-3 leaf and ducksalad was 3 leaf on June 14.
   Watergrass was 1-2 till, ricefield bulrush was 4 leaf smallflower umbrellasedge was 2-3 leaf and ducksalad was 3 leaf on June 22.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 14: Air temperature 84^{0} F, wind 2-3 MPH from the southwest.
   Weather conditions on June 22: Air temperature 77^{0} F, wind 4-5 MPH from the northwest.

Table 6. Pinpoint flood trial

				Crop injury[1]						Weed Control[2]														
Treatment	Rate	Timing[3]	Date	% Stand	% Stunting	7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	CYPDI	HETLI	BAORO	ECHPH	CYPDI	HETLI	BAORO	LEFFA	ECHPH	SCPMU	CYPDI	HETLI	LEFFA	Yield (lb/A)
	(g ai/ha)		1st 2nd	1st trt				2nd trt		20-Jun				12-Jul					2-Aug					4-Oct
Untreated[4]										9	9	8	5	11	18	10	3	9	14	3	25	10	9	6369
Granite SC + Stam + COC	35 + 6726 + 2.5% v/v	3-4 lsr	15-Jun	0	1	1	0			79	96	99	100	96	100	100	100	63	100	100	94	100	4	7730
Granite SC + COC fb. Stam + COC	35 + 2.5% v/v fb. 6726 + 2.5% v/v	3-4 lsr fb. 1-2 Til	15-Jun 27-Jun	0	0	0	0	0	0	88	95	96	100	93	100	100	100	78	100	75	100	100	43	8378
Clincher + Granite SC + COC	315 + 35 + 2.5% v/v	3-4 lsr	15-Jun	0	0	0	0			89	76	90	100	95	85	95	75	98	100	100	56	95	90	7685
Clincher + COC fb. Stam + COC	315 + 1.25% v/v fb. 6726 + 2.5% v/v	3-4 lsr fb. 1-2 Til	15-Jun 27-Jun	0	0	0	0	0	0	74	71	45	55	99	100	88	100	95	100	100	100	88	90	8241
Clincher + COC fb. Regiment + NIS	315 + 2.5% v/v fb. 37 + .125% v/v	3-4 lsr fb. 1-2 Til	15-Jun 27-Jun	0	0	0	0	1	0	65	48	18	25	93	81	95	100	98	100	100	53	95	100	6789
Clincher + Granite SC + COC fb. Stam + COC	280 + 35 + 2.5% v/v fb. 6726 + 2.5% v/v	3-4 lsr fb. 30-35 DAS	15-Jun 27-Jun	0	0	0	0	0	0	49	91	91	100	94	100	100	100	95	100	100	100	100	90	8534
Clincher + COC fb. Stam + Granite SC + COC	280 + 2.5% v/v fb. 4484 + 35 + 2.5% v/v	3-4 lsr fb. 30-35 DAS	15-Jun 27-Jun	0	0	0	0	0	0	83	—	—	—	96	100	100	100	94	100	100	100	100	100	8582
Clincher + COC	315 + 2.5% v/v	3-4 lsr	15-Jun	0	0	0	0			73	—	—	—	89	—	—	—	100	75	—	—	—	99	6844
Regiment + Abolish	30 + 3360	3-4 lsr	15-Jun	0	0	5	0			90	83	94	100	91	85	81	100	88	100	100	36	81	53	7932
Regiment + NIS fb. Super Wham + COC	30 + .125% v/v fb. 6726 + 1.25% v/v	3-4 lsr fb. 1-2 Til	15-Jun 27-Jun	1	1	3	0	0	0	89	94	95	99	84	100	99	100	66	100	100	100	99	36	8013
Regiment + NIS	30 + 0.125% v/v	3-4 lsr	15-Jun	0	0	1	0			91	84	85	99	90	88	91	100	54	100	100	13	91	21	7806
Regiment + NIS + UAN	30 + 0.125% v/v + 2% v/v	3-4 lsr	15-Jun	0	0	9	0			96	96	91	100	88	81	84	75	50	75	100	35	84	13	6826
Regiment + Whip + NIS	30 + 32 + 0.125% v/v	3-4 lsr	15-Jun	0	0	3	0			95	95	96	100	89	45	76	100	91	100	100	13	76	80	6775
Regiment + MCPA + NIS	37 + 560 + .125% v/v	1-2 Til	27-Jun	0	0	0	0			NA	NA	NA	NA	93	100	99	100	61	100	100	78	99	15	7308
MCPA + NIS	560 + .125% v/v	1-2 Til	27-Jun	0	0	0	0			NA	NA	NA	NA	—	99	83	100	—	—	100	93	83	—	6653
Super Wham + Abolish + COC	4484 + 4484 + 1.25% v/v	3-4 lsr	15-Jun	0	6	10	0			95	100	98	100	90	93	73	100	96	100	100	80	73	98	7873
SuperWham + Whip + COC	6726 + 32 + 1.25% v/v	3-4 lsr	15-Jun	0	3	3	0			93	98	84	100	93	86	19	100	94	100	100	38	19	91	8292
SuperWham + MCPA + COC	6726 + 560 + 1.25% v/v	1-2 Til	27-Jun	0	0	5	0			NA	NA	NA	NA	94	100	83	100	75	100	100	100	83	54	8044
SuperWham + COC	6726 + 1.25% v/v	1-2 Til	27-Jun	0	0	0	0			NA	NA	NA	NA	94	100	75	100	80	100	100	100	75	41	7753
Wham 60 DF + COC	6726 + 1.25% v/v	1-2 Til	27-Jun	0	0	0	0			NA	NA	NA	NA	89	98	96	100	86	100	100	100	96	50	7645
LSD (P=0.05)																								1096

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 150 lbs per acre of M206
2. Trial managed as a pinpoint flood with flood water drained June 7 reflood June 17.
3. Watergrass was 3 leaf, ricefield bulrush was 4 leaf, smallflower umbrellasedge was 2-3 leaf and ducksalad was 3 leaf on June 15.
   Watergrass was 2 tiller, ricefield bulrush was 5 leaf, smallflower umbrellasedge was 3 leaf, ducksalad was 4 leaf, sprangletop was 5 leaf on June 27.
5. Spray applications made with 20 gallons/acre using 8003 nozzles.
6. Weather conditions on June 15: Air temperature 73^{o} F, wind 0-2 MPH from the northwest.
   Weather conditions on June 27: Air temperature 86^{o} F, wind 3-5 MPH from the south.

Table 7. Isagro pinpoint flood

Treatment	Rate		Timing[3]	Date		Crop injury[1]				% Weed Control[2]														Yield (lb/A
						7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	CYPDI	HETLI	BAORO	ECHPH	LEFFA	CYPDI	HETLI	BAORO	AMMCO	ECHPH	CYPDI	LEFFA	HETLI	
	(g ai/ha)	Prod./a		1st	2nd	1st trt		2nd trt		20-Jun				11-Jul						31-Jul				3-Oct
Untreated[4]	--	--	--							15	5	6	4	6	9	8	10	4	1	6	6	7	5	7114
IR-5878 WG + Kinetic	74.5 + 0.15% v/v	2.1 oz/A + 0.15% v/v	3-4 lsr	15-Jun		0	0			93	95	64	98	86	18	86	19	33	63	70	0	0	0	6662
Granite SC + Kinetic	35 + 0.15% v/v	2.0 oz/A + 0.15% v/v	3-4 lsr	15-Jun		0	0			28	100	95	98	95	41	85	99	99	100	100	45	0	0	7892
IR-5878 WG + Kinetic fb. Clincher + COC	74.5 + 0.15% v/v fb. 315 + 1.25% v/v	2.1 oz/A + 0.15% v/v fb. 15 oz/A + 1.25% v/v	3-4 lsr fb. 1-3 Tiller	15-Jun	27-Jun	0	0	0	0	79	100	85	100	99	98	98	40	69	25	100	23	96	0	7685
IR-5878 WG + Super Wham + COC	74.5 + 4484 + 1.25% v/v	2.1 oz/A + 4 qt/A + 1.25% v/v	3-4 lsr	15-Jun		5	0			91	100	99	99	94	83	91	54	93	100	96	25	44	0	7613
IR-5878 WG + Abolish	74.5 + 3363	2.1 oz/A + 3 pt/A	3-4 lsr	15-Jun		3	0			83	74	60	95	95	75	93	38	100	100	61	21	63	0	8185
IR-5878 WG + Prowl H20	74.5 + 1118	2.1 oz/A + 2.1 pt/A	3-4 lsr	15-Jun		1	0			79	85	39	75	94	63	75	25	100	98	66	0	14	0	7382
IR-5878 WG + Super Wham + Prowl H2O + COC	74.5 + 4484 + 1118 + 1.25% v/v	2.1 oz/A + 4 qt/A + 2.1 pt/A + 1.25% v/v	3-4 lsr	15-Jun		1	0			83	98	88	100	98	84	99	54	95	100	95	4	50	0	7736
IR-5878 WG + Super Wham + Whip + COC	74.5 + 4484 + 31.5 + 1.25% v/v	2.1 oz/A + 4 qt/A + 6 oz/A + 1.25% v/v	3-4 lsr	15-Jun		8	0			93	100	99	100	99	96	76	53	75	100	91	3	98	0	8181
IR-5878 WG + Shark + Kinetic fb. Clincher + COC	74.5 + 28 + 0.15 v/v fb. 315 + 1.25% v/v	2.1 oz/A + 1.0 oz/A + 0.15% v/v fb. 15 oz/A + 1.25% v/v	3-4 lsr fb. 1-3 Tiller	15-Jun	27-Jun	0	0	0	0	86	95	84	100	100	100	99	29	75	100	100	51	91	0	6609
IR-5878 WG + Kinetic fb. Grandstand + COC	74.5 + 0.15% v/v fb. 158 + 1.25% v/v	2.1 oz/A + 0.15% v/v fb. 6.0 oz/A + 1.25% v/v	3-4 lsr fb. 1-3 Tiller	15-Jun	27-Jun	1	0	0	0	95	100	74	75	95	50	98	48	90	100	83	49	14	0	7204
IR-5878 WG + Kinetic	105 + 0.15% v/v	3.0 oz/A + 0.15% v/v	3-4 lsr	15-Jun		3	0			94	99	90	98	89	48	68	36	80	38	53	0	10	0	7030
IR-5878 WG + Super Wham + COC	105 + 4484 + 1.25% v/v	3.0 oz/A + 4 qt/A + 1.25% v/v	3-4 lsr	15-Jun		4	0			89	100	98	100	94	75	93	44	75	100	73	3	24	0	8013
LSD (P=0.05)																								1015

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice), DPRE (pre emergent), EPE (early post emergent), PPF (post permanent flood).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 150 lbs per acre of M206
2. Trial managed as a pinpoint flood, water dropped June 10 and final flood on June 17.
3. Watergrass was 3 leaf, bulrush was 4 leaf, smallflower was 2-3 leaf, ducksalad was 3 leaf on June 15.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 15: Air temperature 73^{0} F, wind 1-2 MPH from the northwest.

Table 8. Bayer pinpoint flood

Treatment	Rate	Timing[3]		Date	Injury[1]		Weed Control[2]										Yield (lb/A)
					7 DAT	14 DAT	ECHPH	CYPDI	HETLI	ECHPH	CYPDI	HETLI	LEFFA	ECHPH	CYPDI	LEFFA	
	(g ai/ha)			1st	1st trt		20-Jun			12-Jul				2-Aug			3-Oct
Untreated[4]	---	---					13	9	8	5	16	11	10	14	43	29	6357
Ricestar HT	66	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	51	—	—	80	—	—	91	55	—	93	6508
Ricestar HT	86	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	61	—	—	93	—	—	96	65	—	99	5808
Ricestar HT + Regiment + Kinetic	86 + 37.5 + 0.25% v/v	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	80	95	95	98	81	71	95	93	0	99	8239
Regiment + Kinetic	37.5 + 0.25% v/v	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	81	85	85	90	96	94	18	86	45	0	7624
Ricestar HT + propanil + COC	86 + 4484 + 0.25% v/v	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	81	94	98	99	76	80	95	78	36	93	7808
propanil + COC	4484 + 0.25% v/v	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	56	94	96	96	96	88	66	93	91	40	8715
Whip 360	66	Early till SPTP	no earlier than 3-4lsr	14-Jun	0.0	0.0	55	—	—	76	—	—	75	48	—	71	6911
LSD (P=0.05)																	1725

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 150 lbs per acre of M206
2. Trial managed as a pinpoint flood with flood water drained June 6 reflood June 16.
3. Watergrass was 3 leaf, ricefield bulrush was 4 leaf, bulrush 4 leaf, smallflower umbrellasedge was 2-3 leaf, ducksalad was 3 leaf and sprangletop was 1 tiller on June 14.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 14: Air temperature 84^{0} F, wind 0-2 MPH from the southwest.

Table 9. Drill seeded trial

Treatment	Rate	Timing[3]	Date		Crop injury[1]				Weed Control[2]													Yield (lb/A)
					7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	CYPDI	LEFFA	ECHPH	CYPDI	HETLI	LEFFA	ECHPH	SCPMU	CYPDI	HETLI	LEFFA	
	(g ai/ha)		1st	2nd	1st trt		2nd trt		20-Jun				12-Jul				2-Aug					3-Oct
Untreated[4]	---	---							28	5	33	4	25	11	25	48	10	26	10	25	30	3887
Abolish	4480	DPRE	6-Jun		0	0			54	100	100	100	58	100	75	85	21	100	100	75	95	6130
Abolish fb. Super Wham + COC	4480 fb. 6726 + 1.25 % v/v	DPRE fb. 2-3 lsr	6-Jun	14-Jun	0	0	3	0	71	100	100	100	93	100	50	95	74	75	100	50	99	8266
Abolish fb. Regiment + NIS	4480 fb. 12.5 + 0.125% v/v	DPRE fb. 2-3 lsr	6-Jun	14-Jun	0	0	0	0	83	100	100	100	84	100	75	94	71	75	100	75	100	7848
Abolish fb. Regiment + Abolish + NIS	4480 fb. 30 + 3360 + 0.125% v/v	DPRE fb. 2-3 lsr	6-Jun	14-Jun	0	0	5	0	91	100	100	100	94	100	75	96	80	100	100	75	100	8006
Prowl H2O	1120	DPRE	6-Jun		0	0			58	93	93	98	46	75	100	63	11	100	100	100	68	5541
Prowl H2O fb. Super Wham + COC	1120 fb. 6726 + 1.25 % v/v	DPRE fb. 2-3 lsr	6-Jun	14-Jun	0	0	3	0	90	100	100	100	79	99	50	81	98	100	100	50	40	7943
Prowl H2O fb. Regiment + NIS	1120 fb. 12.5 + 0.125% v/v	DPRE fb. 2-3 lsr	6-Jun	14-Jun	0	0	0	0	91	99	99	100	76	95	100	70	89	100	100	100	50	7046
Shark fb. Clincher + COC	168 fb. 315 + 1.25% v/v	3-4 lsr fb. PPF	22-Jun	10-Jul	0	0	0	0	NA	NA	NA	NA	95	98	100	96	100	100	99	100	100	8387
Clincher + COC fb. Superwham + COC	280 +1.25% v/v fb. 6726 + 1.25% v/v	3-4 lsr fb. PPF	22-Jun	10-Jul	0	0	1	0	NA	NA	NA	NA	86	45	75	90	93	100	84	75	80	7387
Regiment + Abolish fb. Clincher + COC	25 + 3360 fb. 315 + 1.25 % v/v	2-3 lsr fb. PPF	14-Jun	10-Jul	3	0	1		94	98	95	100	68	86	50	64	100	75	100	50	88	7792
Abolish + Super Wham + COC	4480 + 4484 + 1.25 % v/v	2-3 lsr	14-Jun		4	0			96	100	100	100	94	98	50	93	83	100	100	50	73	7257
Prowl H2O	1120	2-3 lsr	14-Jun		0	0			25	88	63	100	36	85	100	44	31	100	75	100	30	6362
Prowl H2O + Clincher + COC	1120 + 315 + 1.25 % v/v	2-3 lsr	14-Jun		0	0			96	63	63	100	95	54	100	96	90	75	95	100	90	7932
Prowl H2O + Super Wham + Whip + CO	1120 + 4484 + 32 + 1.25 % v/v	2-3 lsr	14-Jun		4	0			96	100	100	100	84	98	75	93	96	75	96	75	93	8019
Prowl H2O + Regiment + Whip + NIS	1120 + 37 + 32 + 0.125 % v/v	2-3 lsr	14-Jun		5	0			90	86	89	94	95	71	50	96	98	75	69	50	89	7508
Granite SC + Clincher + COC fb. SuperWham + COC (if needed)	35 + 280 + 1.25% v/v fb. 6726 + 1.25 % v/v	2-3 lsr fb. PPF if needed	14-Jun	10-Jul	0	0	1		76	75	75	100	91	98	75	90	94	75	100	75	53	7012
Granite SC + COC fb. Clincher + COC	35 + 1.25 % v/v fb. 315 + 1.25 % v/v	2lsr fb. PPF	14-Jun	13-Jul	1	0			94	100	99	88	63	88	100	33	100	100	100	100	86	8269
																						1311

LSD (P=0.05)

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice), DPRE (pre emergent), EPE (early post emergent), AFF (after final flush), PPF (post permanent flood).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 100 lbs per acre of M206
2. Trial managed as a drill/dry seeded with initial flush on June 1, additional flushes on June 12 and June 27 with final flood on July 6.
3. Grass was 0.5 leaf, smallflower was 0.5 leaf on June 6.
   Watergrass was 2-3 leaf, ricefield bulrush was 2 leaf, smallflower was 2 leaf on June 14.
   Watergrass was 1-2 tiller, bulrush was 4 leaf, smallflower was 4 leaf, redstem was 4 leaf, ducksalad was 2 leaf, waterhyssop was 4 leaf on June 22.
   Watergrass was 3 tiller, sprangletop was heading on July 10.
   Watergrass was 3 tiller, sprangletop was heading on July 13.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 6: Air temperature 81^{o} F, wind 1-3 MPH from the southwest.
   Weather conditions on June 14: Air temperature 84^{o} F, wind 2-4 MPH from the southwest.
   Weather conditions on June 22: Air temperature 77^{o} F, wind 2-5 MPH from the northwest.
   Weather conditions on July 10: Air temperature 65^{o} F, wind 2-4 MPH from the south, southeast.
   Weather conditions on July 13: Air temperature 76^{o} F, wind 2 MPH from the south, southwest.

Table 10. Western Farm Service - drill seeded

Treatment	Rate	Timing[3]	Date	injury[1] 7 DAT	injury[1] 14 DAT	Weed Control[2] ECHPH	SCPMU	CYPDI	AMMCO	ECHPH	CYPDI	LEFFA	ECHPH	CYPDI	LEFFA	Yield (lb/A)
	(g ai/ha)		1st	1st trt		20-Jun				12-Jul			2-Aug			3-Oct
Untreated[4]	---	---				21	3	18	25	35	18	64	18	11	10	4604
WFSTGA (solvent base)	897	PFS	30-May	NA	0	59	88	74	100	40	81	88	41	74	95	6662
WFSTGA (solvent base)	1794	PFS	30-May	NA	0	91	75	75	100	84	94	95	64	79	98	7348
WFSTGB (water base)	953	PFS	30-May	NA	0	85	44	44	100	68	35	90	39	25	86	5093
WFSTGB (water base)	1906	PFS	30-May	NA	0	73	93	88	100	71	75	93	65	68	98	6795
WFSTGA (solvent base) + clomazone 1	897 + 266	PFS	30-May	NA	0	86	98	88	100	55	95	94	34	68	100	6733
WFSTGA (solvent base) + clomazone 1	1794 + 426	PFS	30-May	NA	0	88	45	48	100	68	66	93	59	30	100	5993
WFSTGB (water base) + clomazone 1	953 + 266	PFS	30-May	NA	0	84	93	85	100	56	73	94	36	70	98	5670
WFSTGB (water base) + clomazone 1	1906 + 426	PFS	30-May	NA	0	83	75	75	100	74	70	95	50	64	100	7058
Prowl	1110	PFS	30-May	NA	0	80	99	99	100	61	91	95	53	70	99	6948
clomazone	852	PFS	30-May	NA	1	61	74	24	100	11	55	93	13	23	70	3871
LSD (P=0.05)																1604

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded June 1, 2006 with 100 lbs per acre of M206
2. Trial managed as a drill/dry seeded with initial flush on June 1, additional flushes on June 12 and June 27 with final flood on July 6.
3. No weeds for pre-flood applications.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on May 30: Air temperature 85^{o} F, wind 0-3 MPH from the west, southwest.

Table 11. FMC continuous flood J-9

					Crop injury[1]				Weed Control[2]												Yield (lb/A)
Treatment	Rate	Timing[3]	Date		7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	ECHPH	SCPMU	HETLI	BAORO	AMMCO	ECHPH	SCPMU	HETLI	BAORO	AMMCO	
	(g ai/ha)				1st trt		2nd trt		14-Jun			5-Jul					25-Jul					5-Oct
Untreated[4]	--	--							5	26	5	14	43	53	21	11	8	50	4	4	9	5048
Cerano fb. F6117 2SC	673 fb. 84	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	25	100	99	28	75	29	24	99	4	100	100	0	4767
Cerano fb. F6117 2SC	673 fb. 112	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	13	100	100	10	75	28	46	100	0	100	100	25	3762
Cerano fb. F6117 2SC	673 fb. 168	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	23	75	100	23	75	59	50	99	5	75	100	0	4939
Cerano fb. F6117 2SC	673 fb. 224	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	43	100	99	21	93	78	61	99	29	100	100	25	6190
Cerano fb. F6117 2SC	673 fb. 336	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	13	100	100	21	100	85	50	99	15	100	100	25	6091
Cerano fb. Shark H2O 40 DF	673 fb. 224	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	73	100	100	61	100	75	81	100	60	100	100	75	8062
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 84	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	75	55	100	98	85	100	100	100	98	75	100	100	100	9194
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 112	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	81	100	99	78	100	100	100	98	70	100	100	88	7548
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 168	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	83	100	98	73	100	100	94	98	64	100	100	70	7978
Cerano fb. Shark H2O 40 DF + F6117 2SC	673 fb. 224 + 224	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	65	100	96	70	88	70	75	89	50	100	100	50	7638
Cerano fb. F8426 13.5% WDG	673 fb. 224	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	73	75	100	99	40	100	55	64	100	24	100	100	25	7930
Cerano fb. F8426 3.4% WDG	673 fb. 224	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	83	100	98	73	100	73	94	98	60	100	100	63	7719
Cerano fb. Londax	673 fb. 71	DOS fb. 2 lsr	26-May	8-Jun	0	0	0	0	100	78	100	99	96	100	99	98	100	91	100	100	75	8849
																						2335

[1] % Stand (Percent stand reduction), % Stunting (Percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad) LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] DOS (day of seeding), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 26, 2006 with 150 lbs per acre of M 205
2. Trial managed as a continuous flood with 3-4 inches.
3. No weeds visible on May 26.
   Watergrass was 2 leaf, ricefield bulrush was 2-3 leaf, smallflower umbrellasedge was 2-3 leaf and ducksalad was 2 leaf on June 5.
   Watergrass was 4 leaf, ricefield bulrush was 4 leaf, smallflower umbrellasedge was 3 leaf, ducksalad was 3 leaf, redstem was 2 leaf and waterhyssop was 4-6 leaf on June 14.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on May 26: Air temperature 72^{o} F, wind 4-6 MPH from the south.
   Weather conditions on June 5: Air temperature 72^{o} F, wind 1-2 MPH from the southwest.
   Weather conditions on June 14: Air temperature 74^{o} F, wind 3-5 MPH from the southwest.

Table 12. Valent continuous flood J-9

					Crop injury[1]				Weed Control[2]																Yield (lb/A)
Treatment	Rate	Timing[3]	Application date		7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	BAORO	AMMCO	ECHPH	SCPMU	HETLI	BAORO	AMMCO	SAGMO	ECHPH	SCPMU	HETLI	BAORO	AMMCO	
	(g ai/ha)		1st	2nd	1st trt		2nd trt		14-Jun					5-Jul						25-Jul					5-Oct
Untreated[4]	---	---							4	14	5	8	3	26	28	10	34	5	3	21	23	6	3	9	5338.0
Bolero fb. Regiment + NIS	4480 fb. 28 + .25% v/v	1-2 lsr fb. 5-6 lsr	1-Jun	14-Jun	0	0	0	1	100	71	75	100	100	94	28	70	75	100	38	91	25	0	100	100	7941.0
Bolero fb. Regiment + NIS + UAN	4480 fb. 28 + .25% v/v + 2.0%	1-2 lsr fb. 5-6 lsr	1-Jun	14-Jun	0	0	3	1	100	83	94	100	100	96	54	73	100	100	44	89	30	54	75	94	8105.0
Bolero	3360	1-2 lsr	1-Jun		0	0			100	33	93	100	100	80	33	31	100	100	38	78	3	0	100	88	6579.0
Shark	112	1-2 lsr	1-Jun		0	0			—	35	75	79	100	14	1	0	53	25	100	30	8	38	100	13	6225.0
Cerano	336	DOS-0.5 lsr	26-May		0	0			100	25	61	13	100	90	26	63	33	65	44	70	46	25	75	33	7152.0
Bolero + Shark fb. Regiment	3363 + 224 fb. 39 + .25% v/v	1-2 lsr fb. 5-6 lsr	1-Jun	14-Jun	0	0	3	4	100	31	90	98	100	91	56	93	100	100	100	90	36	99	100	100	7967.0
V-10142 (imazosulfuron)	560.1	1-2 lsr	1-Jun		0	0			100	100	100	98	100	100	94	98	81	100	19	89	66	38	100	19	6601.0
LSD (P=0.05)																									1801.3

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 26, 2006 with 150 lbs per acre of M205
2. Trial managed as a permanent flood with flood water at 4-5 inches.
3. No weeds were visible when Cerano was applied on day of seeding May 26.
   Watergrass was 1.5 leaf, ricefield bulrush was 1 leaf, ducksalad was 2 leaf and smallflower umbrellasedge was 2 leaf on June 1.
   Watergrass was 4 leaf, ricefield bulrush was 4 leaf, ducksalad was 3 leaf, waterhyssop 4-6 leaf and red stem was 2 leaf on June 14.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on May 26: Air temperature 69^{o} F, wind 5-6 MPH from the south.
   Weather conditions on June 1: Air temperature 85^{o} F, wind 1-2 MPH from the south.
   Weather conditions on June 14: Air temperature 74^{o} F, wind 4-6 MPH from the southwest.

Table 13. Wilbur-Ellis continuous flood J-9

				Injury[1]		Weed Control[2]													
Treatment	Rate	Timing[3]	Application date	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	BAORO	AMMCO	ECHPH	SCPMU	HETLI	BAORO	AMMCO	ECHPH	SCPMU	HETLI	AMMCO	Yield (lb/A)
	(g ai/ha)		1st	1st trt		14-Jun					5-Jul					25-Jul				5-Oct
Untreated[4]	---	---				14	20	5	6	4	26	66	16	14	6	21	33	9	11	6224
Weco 632 SG	600	0.5 lsr	30-May	6	0	91	60	45	36	43	0	26	0	45	83	0	4	0	0	5841
Weco 632 SG	700	0.5 lsr	30-May	5	0	95	90	58	73	59	5	46	9	46	35	9	41	0	0	7044
Weco 632 SG	600	1 lsr	1-Jun	0	0	94	50	40	35	50	0	25	13	53	100	0	6	0	25	6687
Weco 632 SG	700	1 lsr	1-Jun	0	0	94	71	45	73	70	0	38	0	55	50	0	23	0	38	6265
Weco 632 SG	600	2 lsr	5-Jun	0	0	89	45	76	29	48	0	20	6	45	75	0	5	6	38	5542
Weco 632 SG	700	2 lsr	5-Jun	0	0	84	74	31	76	44	0	53	0	70	75	0	13	13	19	6252
LSD (P=0.05)																				1742

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad),LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 26, 2006 with 150 lbs per acre of M205
2. Trial managed as a permanent flood with flood water at 4-5 inches.
3. No weeds were visible on May 30.
   Watergrass was 1 leaf, ricefield bulrush 1 leaf, smallflower umbrellasedge 2 leaf and ducksalad 3 leaf on June 1.
   Watergrass was 2 leaf, ricefield bulrush 2-3 leaf, smallflower umbrellasedge 2-3 leaf and ducksalad 2 leaf on June 5.
5. Spray applications made with 20 gallons/acre using 8003 nozzles.
6. Weather conditions on May 30: Air temperature 82^{o} F, wind 1-4 MPH from the west.
   Weather conditions on June 1: Air temperature 81^{o} F, wind 1-4 MPH from the southwest.
   Weather conditions on June 5: Air temperature 72^{o} F, wind 1-2 MPH from the southwest.

Table 14. Wilbur-Ellis continuous flood J-9

Treatment	Rate	Timing[3]	Application date	Injury[1]		Weed Control[2]															Yield (lb/A)
				7 DAT	14 DAT	ECHPH	SCPMU	HETLI	BAORO	ECHPH	SCPMU	HETLI	BAORO	AMMCO	SAGMO	ECHPH	SCPMU	HETLI	AMMCO	SAGMO	
	(g ai/ha)		1st	1st trt		14-Jun				5-Jul						25-Jul					5-Oct
Untreated[4]	---	---				4	9	5	10	29	36	20	28	4	4	21	10	18	5	4	5683
Weco 632 SC	600	DOS-0.5 lsr	26-May	0	0	100	0	38	100	8	3	0	88	100	100	13	0	0	13	100	5444
Weco 632 SC	700	DOS-0.5 lsr	26-May	0	0	100	0	23	100	35	15	0	98	75	100	30	13	0	0	100	6563
Weco 632 SC	800	DOS-0.5 lsr	26-May	0	0	100	25	56	100	43	53	6	100	75	100	43	19	18	0	100	8138
Weco 632 SG	700	DOS-0.5 lsr	26-May	0	0	100	19	0	19	0	5	0	30	50	100	34	0	0	0	100	7190
Weco 632 EG	700 + 308	1-2 lsr	2-Jun	0	4	100	0	56	28	70	21	0	44	100	50	75	21	0	50	50	7717
Weco 632 SC + Command (tank mix)	700 + 308	0.5 lsr	1-Jun	0	0	100	100	99	100	94	95	93	100	100	100	93	98	88	91	100	10595
Weco 632 SG	700	0.5 lsr	1-Jun	0	0	100	38	13	0	6	15	0	0	100	25	16	13	0	13	25	7725
LSD (P=0.05)																					2075

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 26, 2006 with 150 lbs per acre of M205
2. Trial managed as a permanent flood with flood water at 4-5 inches.
3. No weeds were visible on day of seeding May 26.
   Watergrass was 1.5 leaf, ricefield bulrush was 1 leaf, smallflower umbrellasedge was 2 leaf and ducksalad was 2 leaf on June 1.
   Watergrass was 1.5 leaf, ricefield bulrush was 2 leaf, smallflower umbrellasedge was 2 leaf and ducksalad was 2 leaf on June 2.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on May 26: Air temperature 72^{o} F, wind 4-6 MPH from the south.
   Weather conditions on June 1: Air temperature 81^{o} F, wind 1 MPH from the southwest.
   Weather conditions on June 2: Air temperature 73^{o} F.

Table 15. Valent pinpoint flood J-9

				Injury[1]		Weed Control[2]												
Treatment	Rate	Timing[3]	Application date	7 DAT	14 DAT	ECHPH	SCPMU	CYPDI	HETLI	BAORO	AMMCO	SAGMO	ECHPH	SCPMU	CYPDI	HETLI	LEFFA	Yield (lb/A)
	(g ai/ha)		1st	1st trt		5-Jul							25-Jul					9-Oct
Untreated[4]	---	---				14	7	3	14	14	6	4	18	9	3	3	3	7257
Regiment + NIS	37 + 0.25% v/v	4-5 lsr	14-Jun	9	4	94	98	100	45	70	70	83	98	70	100	40	40	9007
Regiment + UAN + NIS	37 + 2.0% v/v + 0.25% v/v	4-5 lsr	14-Jun	8	3	99	95	100	49	98	89	94	95	88	100	50	29	7683
Regiment + Abolish	37 + 3360	4-5 lsr	14-Jun	1	0	95	75	94	49	100	89	33	94	60	85	38	100	8931
Nominee	37 + 1482	4-5 lsr	14-Jun	8	0	94	89	99	61	74	50	50	98	43	100	48	100	8597
V-10142 + Dyne-A Pak(UAN 1% + Kinetic 0.12	112 + 1.0% v/v	4-5 lsr	14-Jun	0	0	73	98	85	50	95	45	23	63	98	50	0	85	7931
V-10142 + Dyne-A Pak(UAN 1% + Kinetic 0.12	168 + 1.0% v/v	4-5 lsr	14-Jun	0	0	76	96	98	8	85	39	68	59	69	46	6	89	7168
V-10142 + Dyne-A Pak(UAN 1% + Kinetic 0.12	224 + 1.0% v/v	4-5 lsr	14-Jun	1	0	73	100	100	34	70	73	19	53	74	64	0	63	7698
V-10142 + Dyne-A Pak(UAN 1% + Kinetic 0.12	280 + 1.0% v/v	4-5 lsr	14-Jun	0	1	74	94	84	25	73	21	63	55	95	9	25	59	7684
V-10142 + Dyne-A Pak(UAN 1% + Kinetic 0.12	336 + 1.0% v/v	4-5 lsr	14-Jun	0	0	71	95	90	29	98	41	19	53	98	25	13	63	8495
Sempra + NIS	70 + 0.25% v/v	4-5 lsr	14-Jun	0	0	79	96	100	23	73	74	74	61	71	91	38	68	8743
Abolish	3360	4-5 lsr	14-Jun	0	0	63	51	98	0	99	98	0	44	48	61	0	94	7967
Regiment + NIS	37 + 0.25% v/v	4-5 lsr	14-Jun	8	3	98	90	89	36	86	69	55	99	63	100	21	70	8011
Abolish	1482	4-5 lsr	14-Jun	1	0	41	70	100	13	99	89	38	30	25	41	0	88	7778
LSD (P=0.05)																		1197

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] PFS (pre-flood surface), PPI (pre-plant incorporated), fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 25, 2006 with 150 lbs per acre of M205
2. Trial managed as a pinpoint flood with water dropped several days prior to applications and reflood two days after applications.
3. Watergrass was 4 leaf, ricefield bulrush 4 leaf, ducksalad 3 leaf, redstem 2 leaf, waterhyssop 4-6 leaf and smallflower was 2-3 leaf on June 14.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 14: Air temperature 74^{o} F, wind 4-5 MPH from the southwest.

Table 16. Isagro IR5878 following Cerano J-9

Treatment	Rate	Timing[3]	Date			Crop injury[1]				% Weed Control[2]										Yield (lb/A)
						7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	CYPDI	ECHPH	SCPMU	CYPDI	HETLI	BAORO	ECHPH	SCPMU	AMMCO	
	(g ai/ha)		1st	2nd	3rd	1st trt		2nd trt		14-Jun			5-Jul					25-Jul			9-Oct
Cerano	673	DOS	26-May			5	0			13	3	4	6	5	3	2	11	6	5	0	8162
Cerano fb. IR-5878 WG + Kinetic	673 fb. 74.5 + 0.15% v/v	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	83	63	28	51	55	25	75	73	40	70	75	7124
Cerano fb. Granite + Kinetic	673 fb. 35 + 0.15% v/v	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	93	100	73	95	73	34	100	98	84	96	100	7956
Cerano fb. IR-5878 WG + Super Wham + COC	673 fb. 74.5 + 4484 + 1.25% v/v	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	96	100	95	59	63	68	0	83	45	44	98	8031
Cerano fb. IR-5878 WG + Abolish	673 fb. 74.5 + 3363	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	85	99	71	96	80	81	56	94	74	93	100	7845
Cerano fb. IR-5878 WG + Prowl H2O	673 fb. 74.5 + 1118	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	96	99	69	95	48	35	63	71	90	68	63	7450
Cerano fb. IR-5878 WG + Prowl H2O + Super Wham + COC	673 fb. 74.5 + 1118 + 3360 + 1.25%	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	95	100	95	95	75	78	50	96	95	9	88	7541
Cerano fb. IR-5878 WG + Shark + Kinetic	673 fb. 74.5 + 28 + 0.15% v/v	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	80	100	93	78	65	44	100	83	59	64	100	7915
Cerano fb. IR-5878 WG + Kientic fb. Grandstand + COC	673 fb. 74.5 + 0.15% v/v fb. 158 + 1.25% v/v	DOS fb. 3-4 lsr fb. 1-3 Tiller	26-May	8-Jun	20-Jun	5	0	0	3	95	100	60	94	74	73	88	81	88	90	100	7563
Cerano fb. IR-5878 WG + Kinetic	673 fb. 105 + 0.15% v/v	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	90	100	63	68	73	69	100	78	53	80	88	7790
Cerano fb. IR-5878 WG + Super Wham + COC	673 fb. 105 + 4484 + 1.25% v/v	DOS fb. 3-4 lsr	26-May	8-Jun		5	0	0	0	98	100	98	81	44	76	50	84	49	70	88	7830
LSD (P=0.05)																					1419

[1] % Stand (percent stand reduction), % Stunting (percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice), DPRE (pre emergent), EPE (early post emergent), PPF (post permanent flood).

[4] Control weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 26, 2006 with 150 lbs per acre of M205
2. Trial managed as a pinpoint flood after initial water hold for Cerano. Water drained June 6 and final flood on June 11.
3. Bulrush was 2 leaf, smallflower was 2 leaf, ducksalad was 2 leaf on June 6.
   Watergrass was 1-3 tiller, ricefield bulrush was 3-4 leaf, smallflower was 3-4 leaf, ducksalad was 4 leaf and waterhyssop was 4 leaf on June 20.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 8: Air temperature 74^0 F, wind 0-3 MPH from the southwest.
   Weather conditions on June 20: Air temperature 71^0 F, wind 1-2 MPH from the southwest.

Table 17. Continuous flood trial at resistant site.

					Crop injury[1]				% Weed Control[2]												
Treatment	Rate	Timing[3]	Dates		7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	BAORO	AMMCO	ECHPH	SCPMU	HETLI	AMMCO	ECHPH	SCPMU	HETLI	AMMCO	Yield/Acre (14%)
	(g ai/ha)		1st	2nd	1st trt		2nd trt		6-Jun					26-Jun				25-Jul				21-Sep
Cerano	673	DOS	18-May		5	0	NA	NA	100	0	20	0	100	15	23	43	11	10	38	1	8	5532.0
Cerano fb. Superwham + COC	673 fb. 6726 + 1.25% v/v	DOS fb. 4-5 lsr	18-May	16-Jun	5	0	13	3	100	0	20	0	100	100	90	73	98	96	100	98	100	6847
Cerano fb. Regiment + NIS	673 fb. 37 + 0.125% v/v	DOS fb. 4-5 lsr	18-May	16-Jun	5	0	0	0	100	0	20	0	100	85	64	80	88	93	81	100	93	6738
Cerano fb. Granite SC + COC	673 fb. 40 + 2.5% v/v	DOS fb. 4-5 lsr	18-May	16-Jun	5	0	0	1	100	0	20	0	100	93	70	100	84	93	100	100	100	8128
Cerano fb. Shark	673 fb. 112	DOS fb. 4-5 lsr	18-May	16-Jun	5	0	0	3	100	0	20	0	100	75	74	63	100	86	95	100	100	7036
LSD (P=0.05)																						2104
Granite GR	40	2-3 lsr	2-Jun		0	0	NA	NA	40	50	40	100	0	30	6	3	4	53	8	0	4	3084
Granite GR fb Regiment + NIS	40 fb. 37 + 0.125% v/v	2-3 lsr fb. 4-5 lsr	2-Jun	16-Jun	0	0	0	0	40	50	40	100	0	65	63	100	100	33	95	100	100	4974
Granite GR fb. SuperWham + COC	40 fb 6726 + 1.25% v/v	2-3 lsr fb. 4-5 lsr	2-Jun	16-Jun	0	0	0	0	40	50	40	100	0	95	69	100	100	55	100	100	100	5689
LSD (P=0.05)																						3380
Weco 632 SC	800	DOS-0.5 lsr	18-May		0	0	NA	NA	100	100	100	100	100	60	0	3	1	65	0	0	0	5425
Weco 632 SC fb Granite SC + COC	800 fb. 40 + 1.25% v/v	DOS-0.5 lsr fb. 4-5 lsr	18-May	16-Jun	0	0	0	0	100	100	100	100	100	76	100	100	100	53	100	100	100	4037
Weco 632 SC fb. SuperWham + COC	800 fb. 6726 + 1.25% v/v	DOS-0.5 lsr fb. 4-5 lsr	18-May	16-Jun	0	0	0	0	100	100	100	100	100	98	100	100	100	83	100	100	100	8267
LSD (P=0.05)																						2050

These numbers represent the percent weed coverage in the plot for further treatments (basin control)

[1] % Stand (Percent stand reduction), % Stunting (Percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice), PFS (pre-flood surface), PPI (pre-plant incorporated).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 17, 2006 with 150 lbs per acre of M104.
2. Trial managed as a continuous flood.
3. No weeds visible when Cerano basin and benzofenap basin treated May 18.
   Watergrass was 3 leaf, bulrush was 2-3 leaf, arrowhead was 2 leaf on May 31.
   Watergrass was 2-3 leaf, bulrush was 2 leaf, ducksalad was 1 inch June 16.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on May 18: Air temperature 77^{o} F, wind 5-6 MPH from the south.
   Weather conditions on May 31: Air temperature 83^{o} F, wind 1-2 MPH from the south.
   Weather conditions on June 16: Air temperature 61^{o} F, wind 4 MPH from the northeast.

Table 18. Pinpoint trial at resistant site

Treatment	Rate	Timing[3]	Date	Crop injury[1]				% Weed Control[2]												Yield/Acre (14%)
				7 DAT	14 DAT	7 DAT	14 DAT	ECHPH	SCPMU	HETLI	CYPDI	BAORO	LEFFA	ECHPH	SCPMU	CYPDI	HETLI	AMMCO	LEFFA	
	(g ai/ha)			1st trt		2nd trt		6-Jul						25-Jul						21-Sep
Untreated[4]								54	19	58	5	5	9	50	19	26	3	4	16	2547
Granite SC + COC fb. Stam + COC	35 + 1.25% v/v fb. 6726 + 1.25% v/v	3-4 lsr fb. 1 Til	2-Jun 19-Jun	3	0	1	0	86	90	98	98	100	15	85	63	100	100	75	8	6470
Clincher + COC fb. Regiment + NIS	315 + 1.25% v/v fb. 37 + .125% v/v	3-4 lsr fb. 1 Til	2-Jun 19-Jun	4	0	3	1	39	19	20	94	63	98	35	40	0	100	75	100	4937
Regiment + Abolish fb. SuperWham + COC	37 + 3360 fb. 6726 + 1.25% v/v	3-4 lsr fb. 1 Til	2-Jun 19-Jun	4	0	3	0	96	25	85	98	100	100	88	0	100	75	63	89	6064
Regiment + NIS fb. Super Wham + COC	44.5 + 0.125% v/v fb. 4484 + 1.25% v/v	3-4 lsr fb. 1 Til	2-Jun 19-Jun	9	4	4	0	90	63	76	73	100	80	86	41	100	100	50	65	6409
Clincher + COC fb. Super Wham + COC	315 + 1.25% v/v fb. 6726 + 1.25% v/v	3-4 lsr fb. 1 Til	2-Jun 19-Jun	1	0	4	0	75	51	63	94	53	100	71	81	68	100	100	99	6834
Super Wham + COC fb. Clincher + COC	6726 + 1.25% v/v fb. 315 + 1.25% v/v	3-4 lsr fb. 1 Til	2-Jun 19-Jun	1	0	3	0	93	88	69	50	100	100	95	31	100	25	75	98	7397
Regiment + NIS	37 + .25% v/v	1 Til	19-Jun	4	0			64	38	60	100	88	45	51	38	44	75	75	20	4725
Regiment + NIS + UAN	37 + .25% v/v + 2.0% v/v	1 Til	19-Jun	4	0			74	0	43	75	100	25	58	16	48	75	50	6	4625
Super Wham + COC	6726 + 1.25% v/v	1 Til	19-Jun	6	0			65	6	33	100	100	18	61	70	100	50	75	5	6189
LSD (P=0.05)																				1731

Propanil application must have been missed

[1] % Stand (Percent stand reduction), % Stunting (Percent stunting of rice), % Injury (percent injury to rice)

[2] ECHPH (Late watergrass), SCPMU (Rice field bulrush), CYPDI (Small flower Umbrellaplant), HETLI (Duck salad), LEFFA (Sprangletop), BAORO (Waterhyssop), AMMCO (Redstem), SAGMO (California arrowhead)

[3] fb. (followed by), lsr (leaf stage of rice), Til (tillers of rice), PFS (pre-flood surface), PPI (pre-plant incorporated).

[4] Untreated weed control values represent % cover by the respective weed species

Trial Information

1. Trial seeded May 17, 2006 with 150 lbs per acre of M104.
2. Trial managed as a pinpoint flood with drain on May 31 and reflood June 4.
3. Watergrass was 2-3 leaf, bulrush was 4 leaf, smallflower ws 1-2 leaf, ducksalad was 3 leaf on June 2. Watergrass was 3 tiller, smallflower was 3-4 leaf, ducksalad was flowering on June 19.
4. Spray applications made with 20 gallons/acre using 8003 nozzles.
5. Weather conditions on June 2: Air temperature 90^{o} F, wind 3 MPH from the south.
   Weather conditions on June 19: Air temperature 82^{o} F, wind 1-2 MPH from the northeast.