Weed Control In Roundup Ready™ Rice

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Introduction

Roundup Ready rice *(Oryza sativa)* is a biologically improved M202 containing a gene for tolerance to Roundup Ultra™ herbicide (glyphosate). Roundup Ultra controls a broad-spectrum of rice weeds including those that are resistant to current broadleaf, sedge and grass herbicides.

Monsanto Company in cooperation with Northern California trade partners, the Rice Experiment Station and the University of California, Davis are currently developing the Roundup Ready rice weed control system. Line selection, efficacy and water management trials have been conducted since 1998.

Adoption of new cultural practices in rice production may be possible with Roundup Ready weed control systems. For example, flush management 30-40 days after roller or drill seeding may improve seedling vigor and ultimately yields. Conservation Tillage may also be made more practical using a Roundup Ready weed control system.

Results from the 2000 University of California, Davis efficacy trial are presented below.

Materials and Methods

Plot design was a randomized complete block with four replicates per treatment. Plots were 10 feet wide and 20 feet long. Seeding of Roundup Ready M202 rice was completed on June 2, 2000. Seeding rate was 150 pounds per acre.

Single foliar applications of Roundup Ultra at three rates (0.38, 0.75 or 1.12 lbs AE/A [pounds of acid equivalent per acre])* were made at 1-2 tillers 24 days after seeding (DAS), 2-4 tillers (28 DAS) or mid-tillering (34 DAS).

Sequential foliar applications of Roundup Ultra (0.38 followed by 0.75, 0.75 followed by 0.75 and 0.75 followed by 1.12 lbs AE/A) were made at the 3 leaf stage of rice (13 DAS) followed by mid-tillering (34 DAS) or 4-6 leaf stage of rice (17 DAS) followed by tillering (40 DAS). See further explanation of sequential treatments in Table 1.

Table 1. Timing of Sequential Treatments

Roundup Ultra Rates (AE/A)	3 lsr[1] 13 DAS	4-6 lsr 17 DAS	mid-tillering 34 DAS	tillering 40 DAS
0.38 followed by 0.75	X		X	
0.75 followed by 0.75	X		X	
0.75 followed by 1.12	X		X	
0.38 followed by 0.75		X		X
0.75 followed by 0.75		X		X
0.75 followed by 1.12		X		X

[1] Leaf Stage of Rice (lsr)

Rice paddy water depth was one to two inches at the time of all applications. Weed species present were watergrass *(Echinochloa crusgalli [L.] Beauv.)* and ricefield bulrush *(Scirpus mucronatus L.).* Ricefield bulrush foliage began to emerge above the water line at the 4-6 leaf stage of rice (17 DAS). Evaluations were made 10, 30 and 60 days after treatment (DAT) using a 0 - 100% scale.

All applications were made with a CO_2 backpack sprayer using 8001 flat fan nozzles and a spray volume of 10 GPA at 20 PSI.

Results

Ricefield bulrush was submerged and not controlled 10 days after treatment (DAT) with the first application made in sequential treatments at the 3 leaf stage of rice (13 DAS) or at the 4-6 leaf stage of rice (17 DAS). Watergrass control (10 DAT) at the same stages of rice growth ranged from 74% to 100% indicating partial submergence. Full control of both species was achieved after each sequential treatment at 30 and 60 DAT.

Watergrass control with single treatments (0.75 or 1.12 lbs AE/A) applied at 2-4 tillers (28 DAS) or mid-tillering (34 DAS) was 100% (30 DAT) and ranged from 98%-100% (60 DAT). Using the same treatments, ricefield bulrush control ranged from 93%-100% (30 DAT) and 95%-100% (60 DAT).

Watergrass control with single treatments (0.38 lbs AE/A) applied at 2-4 tillers (28 DAS) or mid-tillering (34 DAS) ranged from 95%-99% (30 DAT) and from 85%-86% (60 DAT). Using the same treatments, ricefield bulrush control ranged from 90%-100% (30 DAT) and from 90%-100% (60 DAT).

Watergrass control with single treatments (0.375 lbs AE/A) applied at 1-2 tillers (24 DAS) was 85% (30 DAT) and 69% (60 DAT). Using the same treatment, ricefield bulrush control was 70% (30 DAT) and 71% (60 DAT).

Treatment detail is presented in Table 2.

Conclusions

All sequential treatments provided commercially acceptable season long weed control in Roundup Ready rice.

Single treatments (0.75 and 1.12 lbs AE/A) applied at 2-4 tillers or mid-tillering also provided commercially acceptable season long weed control in Roundup Ready rice.

In 2001, yield analysis will help further refine rates and application timing.

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* Equivalent to 1, 2 and 3 pints of Roundup Ultra per acre.

TABLE 2. ROUNDUP READY RICE WEED CONTROL (%)

Treatment	Roundup Ultra (lbs AE/A)	Application Timing	Watergrass (ECHOR) 10 DAT	30 DAT	60 DAT	Ricefield Bulrush (SCPMU) 10 DAT	30 DAT	60 DAT
1	0	Percent Cover	41	45	51	18	15	16
2	0.38	1-2 tillers (24 DAS)	85	85	69	58	70	71
3	0.75	1-2 tillers (24 DAS)	98	99	100	68	83	73
4	1.12	1-2 tillers (24 DAS)	99	100	100	76	65	63
5	0.38	2-4 tillers (28 DAS)	95	95	85	100	90	90
6	0.75	2-4 tillers (28 DAS)	100	100	98	98	93	95
7	1.12	2-4 tillers (28 DAS)	100	100	100	98	100	100
8	0.38	mid-tillering (34 DAS)	80	99	86	100	100	100
9	0.75	mid-tillering (34 DAS)	94	100	100	98	100	100
10	1.12	mid-tillering (34 DAS)	99	100	100	100	100	100
11	0.38 0.75	3 lsr (13 DAS) mid-tillering (34 DAS)	74	100	100	0	100	100
12	0.75 0.75	3 lsr (13 DAS) mid-tillering (34 DAS)	88	100	100	0	100	100
13	0.75 1.12	3 lsr (13 DAS) mid-tillering (34 DAS)	75	100	100	0	100	100
14	0.38 0.75	4-6 lsr (17 DAS) tillering (40 DAS)	85	100	100	0	100	100
15	0.75 0.75	4-6 lsr (17 DAS) tillering (40 DAS)	100	100	100	0	100	100
16	0.75 1.12	4-6 lsr (17 DAS) tillering (40 DAS)	96	100	100	6	100	100