California Wheat Commission

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PROJECT TITLE: Weed Management in California Wheat 2013-2014

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Abstract/Summary of Results and Conclusions

Broadleaf and grassy weeds are problematic in cereal production, posing challenges to growers in the selection of effective herbicides. Many growers are interested in combining different treatments in one tank mixture in order to cut costs and labor. However, when mixing different herbicides, new concerns about crop safety call for more research in tank mixture options. Research was conducted in the San Joaquin Valley in the 2013-2014 production season, generally focusing on the interactions between several different herbicides at varying rates, with and without a surfactant, when applied as a tank mixture. After trials were completed, it was noted that no treatment in any trial caused severe or lasting injury, and what little amount of injury there was did not significantly vary between trials. Simplicity grass and broadleaf herbicide was widely used and further research was done. Simplicity tank mixed with Express gave outstanding weed control and compared evenly with Express + MCPA + Axial tankmix. All treatments with ET and Shark gave greater injury than the Express treatment. All treatment combinations with Express gave good control of sheperdspurse, burning nettle, chickweed, and swinecress.

Introduction and Objectives

Wheat is one of the most important crops throughout California, and for small grain producers, weeds pose a significant problem that nearly always requires treatment. Although broadleaf and grassy weeds can be reduced by crop rotation and tillage, these cultural practices are being replaced by greater dependence on herbicides. In addition, this dependence raised concern about the evolution of herbicide-resistant weeds.

Recently, several new small grain herbicides have been released to the market and have been successfully used in different parts of the country. Growers in California are hesitant to use these herbicide combinations because they are unsure about the crop injury that could result from a chemical that they are unfamiliar with. Research in this area of the country was necessary to evaluate the safety of these new herbicides and to provide confidence for California growers.

Broadleaf and Grass Herbicide Tank-mix Weed Control in Wheat

This trial was conducted in Tulare, CA on November 27, 2013. Plot sizes were 8' x 25' with 4 replications. Herbicides used in the trial were Express, MCPA, Axial, 2,4-D, and Clarity. The treatments were applied by hand with a CO_2-pressurized backpack sprayer at 30 PSI, with TeeJet 8002 flat fan nozzles, and calibrated to deliver with a spray volume of 15 GPA at 3 mph. Spray height was maintained at 18 to 24 inches above wheat. Wheat was at the 4-6 leaf stage and 4-7 "tall. Weeds present at the time of application: shepherdspurse (*Capsella bursa-pastoris*) (1-2" tall), common chickweed (*Stellaria media*) (1-2" diameter), burning nettle (*Urtica urens*) (1/2-1" tall), and swinecress (*Coronopus didymus*) (1-2" tall). Evaluations were taken every 7 days after treatment (DAT). All treatment combinations with Express gave good control of sheperdspurse, burning nettle, chickweed, and swinecress. Due to frost we ended up with some frost damage on the crop. Treatments with Osprey had the most injury lasting 28 days.

Table 1.

Percent Wheat (*Triticum*) Injury						
		4-Dec	**11-Dec**	**18-Dec**	**1-Jan**	**15-Jan**
Treatments	**Rate/A**	**7 DAT**	**14 DAT**	**21 DAT**	**28 DAT**	**36 DAT**
1. Express + MCPA Amine + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	0	6	5	2
2. Express + MCPA Amine + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	0	5	5	2
3. Express + MCPA Amine + Axial	0.25 oz + 1 pt + 16.4 floz	0	0	5	5	3
4. Express + MCPA Amine + Axial	0.5 oz + 1 pt + 16.4 floz	0	0	6	5	2
5. Express + MCPA Amine + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	0	6	5	2
6. Express + MCPA Amine + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	0	5	5	2
7. Express + MCPA Amine + Axial	0.25 oz + 12 floz + 16.4 floz	0	0	5	5	2
8. Express + MCPA Amine + Axial	0.5 oz + 12 floz + 16.4 floz	0	0	5	5	2
9. Express + 2,4-D + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	0	5	5	3
10. Express + 2,4-D + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	0	6	5	2
11. Express + 2,4-D + Axial	0.25 oz + 1 pt + 16.4 floz	0	0	5	5	2
12. Express + 2,4-D + Axial	0.5 oz + 1 pt + 16.4 floz	0	0	6	5	3
13. Express + 2,4-D + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	0	5	5	2
14. Express + 2,4-D + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	0	5	5	2
15. Express + 2,4-D + Axial	0.25 oz + 12 floz + 16.4 floz	0	0	6	5	2
16. Express + 2,4-D + Axial	0.5 oz + 12 floz + 16.4 floz	0	0	6	5	3
17. Express + Clarity + Axial + NIS	0.25 oz + 4 floz + 16.4 floz + 0.25%	0	0	7	5	3
18. Express + Clarity + Axial + NIS	0.5 oz + 4 floz + 16.4 floz + 0.25%	0	0	7	5	3
19. Express + Clarity + Axial	0.25 oz + 4 floz + 16.4 floz	0	0	9	6	3
20. Express + Clarity + Axial	0.5 oz + 4 floz + 16.4 floz	0	0	7	5	3
21. UTC	-----	0	0	4	3	1

Table 2.

Shepherdspurse (*Capsella bursa-pastoris*) Percent Control						
		4-Dec	11-Dec	18-Dec	1-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	28 DAT	36 DAT
1. Express + MCPA Amine + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	2	8	48	65	91
2. Express + MCPA Amine + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	2	11	48	65	93
3. Express + MCPA Amine + Axial	0.25 oz + 1 pt + 16.4 floz	2	9	38	68	88
4. Express + MCPA Amine + Axial	0.5 oz + 1 pt + 16.4 floz	2	10	43	65	91
5. Express + MCPA Amine + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	2	10	45	55	90
6. Express + MCPA Amine + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	2	10	45	59	91
7. Express + MCPA Amine + Axial	0.25 oz + 12 floz + 16.4 floz	2	8	50	54	95
8. Express + MCPA Amine + Axial	0.5 oz + 12 floz + 16.4 floz	4	10	53	64	89
9. Express + 2,4-D + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	3	10	50	59	90
10. Express + 2,4-D + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	2	10	50	60	88
11. Express + 2,4-D + Axial	0.25 oz + 1 pt + 16.4 floz	2	10	50	61	93
12. Express + 2,4-D + Axial	0.5 oz + 1 pt + 16.4 floz	1	8	45	65	91
13. Express + 2,4-D + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	2	10	58	64	94
14. Express + 2,4-D + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	3	9	43	53	85
15. Express + 2,4-D + Axial	0.25 oz + 12 floz + 16.4 floz	2	9	48	50	94
16. Express + 2,4-D + Axial	0.5 oz + 12 floz + 16.4 floz	2	10	55	58	90
17. Express + Clarity + Axial + NIS	0.25 oz + 4 floz + 16.4 floz + 0.25%	2	14	58	63	94
18. Express + Clarity + Axial + NIS	0.5 oz + 4 floz + 16.4 floz + 0.25%	2	11	38	46	89
19. Express + Clarity + Axial	0.25 oz + 4 floz + 16.4 floz	2	11	40	48	91
20. Express + Clarity + Axial	0.5 oz + 4 floz + 16.4 floz	1	3	55	60	89
21. UTC	-----	0	0	0	0	0

Table 3.

Burning Nettle (*Urtica urens*) Percent Control						
		4-Dec	11-Dec	18-Dec	1-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	28 DAT	36 DAT
1. Express + MCPA Amine + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	2	1	30	30	90
2. Express + MCPA Amine + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	10	80	90	98
3. Express + MCPA Amine + Axial	0.25 oz + 1 pt + 16.4 floz	0	1	20	45	90
4. Express + MCPA Amine + Axial	0.5 oz + 1 pt + 16.4 floz	0	10	45	90	100
5. Express + MCPA Amine + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	0	-	-	-
6. Express + MCPA Amine + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	5	-	-	-
7. Express + MCPA Amine + Axial	0.25 oz + 12 floz + 16.4 floz	0	8	-	-	-
8. Express + MCPA Amine + Axial	0.5 oz + 12 floz + 16.4 floz	0	0	-	90	100
9. Express + 2,4-D + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	1	50	55	90
10. Express + 2,4-D + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	0	-	80	100
11. Express + 2,4-D + Axial	0.25 oz + 1 pt + 16.4 floz	2	8	40	50	95
12. Express + 2,4-D + Axial	0.5 oz + 1 pt + 16.4 floz	0	0	-	-	-
13. Express + 2,4-D + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	2	0	-	-	-
14. Express + 2,4-D + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	0	-	-	-
15. Express + 2,4-D + Axial	0.25 oz + 12 floz + 16.4 floz	0	0	50	90	100
16. Express + 2,4-D + Axial	0.5 oz + 12 floz + 16.4 floz	0	0	30	35	90
17. Express + Clarity + Axial + NIS	0.25 oz + 4 floz + 16.4 floz + 0.25%	0	0	60	75	100
18. Express + Clarity + Axial + NIS	0.5 oz + 4 floz + 16.4 floz + 0.25%	0	0	-	-	-
19. Express + Clarity + Axial	0.25 oz + 4 floz + 16.4 floz	0	0	-	-	-
20. Express + Clarity + Axial	0.5 oz + 4 floz + 16.4 floz	0	0	-	-	-
21. UTC	-----	0	0	0	0	0

Table 4.

Common Chickweed (*Stellaria media*) Percent Control						
		4-Dec	11-Dec	18-Dec	1-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	28 DAT	36 DAT
1. Express + MCPA Amine + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	3	23	56	96
2. Express + MCPA Amine + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	5	19	45	96
3. Express + MCPA Amine + Axial	0.25 oz + 1 pt + 16.4 floz	0	6	25	80	99
4. Express + MCPA Amine + Axial	0.5 oz + 1 pt + 16.4 floz	0	4	23	60	96
5. Express + MCPA Amine + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	4	16	61	93
6. Express + MCPA Amine + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	4	19	50	99
7. Express + MCPA Amine + Axial	0.25 oz + 12 floz + 16.4 floz	0	5	33	54	99
8. Express + MCPA Amine + Axial	0.5 oz + 12 floz + 16.4 floz	0	4	18	44	91
9. Express + 2,4-D + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	6	33	60	94
10. Express + 2,4-D + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	8	35	68	94
11. Express + 2,4-D + Axial	0.25 oz + 1 pt + 16.4 floz	0	7	26	78	98
12. Express + 2,4-D + Axial	0.5 oz + 1 pt + 16.4 floz	0	4	25	49	95
13. Express + 2,4-D + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	5	26	59	98
14. Express + 2,4-D + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	7	25	56	90
15. Express + 2,4-D + Axial	0.25 oz + 12 floz + 16.4 floz	0	4	29	61	96
16. Express + 2,4-D + Axial	0.5 oz + 12 floz + 16.4 floz	0	6	25	71	96
17. Express + Clarity + Axial + NIS	0.25 oz + 4 floz + 16.4 floz + 0.25%	0	4	20	54	94
18. Express + Clarity + Axial + NIS	0.5 oz + 4 floz + 16.4 floz + 0.25%	0	5	26	60	93
19. Express + Clarity + Axial	0.25 oz + 4 floz + 16.4 floz	0	5	28	43	95
20. Express + Clarity + Axial	0.5 oz + 4 floz + 16.4 floz	0	1	21	51	96
21. UTC	-----	0	0	0	0	0

Table 5.

Swinecress (*Coronopus didymus*) Percent Control						
		4-Dec	11-Dec	18-Dec	1-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	28 DAT	36 DAT
1. Express + MCPA Amine + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	3	23	56	96
2. Express + MCPA Amine + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	5	19	45	96
3. Express + MCPA Amine + Axial	0.25 oz + 1 pt + 16.4 floz	0	6	25	80	99
4. Express + MCPA Amine + Axial	0.5 oz + 1 pt + 16.4 floz	0	4	23	60	96
5. Express + MCPA Amine + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	4	16	61	93
6. Express + MCPA Amine + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	4	19	50	99
7. Express + MCPA Amine + Axial	0.25 oz + 12 floz + 16.4 floz	0	5	33	54	99
8. Express + MCPA Amine + Axial	0.5 oz + 12 floz + 16.4 floz	0	4	18	44	91
9. Express + 2,4-D + Axial + NIS	0.25 oz + 1 pt + 16.4 floz + 0.25%	0	6	33	60	94
10. Express + 2,4-D + Axial + NIS	0.5 oz + 1 pt + 16.4 floz + 0.25%	0	8	35	68	94
11. Express + 2,4-D + Axial	0.25 oz + 1 pt + 16.4 floz	0	7	26	78	98
12. Express + 2,4-D + Axial	0.5 oz + 1 pt + 16.4 floz	0	4	25	49	95
13. Express + 2,4-D + Axial + NIS	0.25 oz + 12 floz + 16.4 floz + 0.25%	0	5	26	59	98
14. Express + 2,4-D + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	7	25	56	90
15. Express + 2,4-D + Axial	0.25 oz + 12 floz + 16.4 floz	0	4	29	61	96
16. Express + 2,4-D + Axial	0.5 oz + 12 floz + 16.4 floz	0	6	25	71	96
17. Express + Clarity + Axial + NIS	0.25 oz + 4 floz + 16.4 floz + 0.25%	0	4	20	54	94
18. Express + Clarity + Axial + NIS	0.5 oz + 4 floz + 16.4 floz + 0.25%	0	5	26	60	93
19. Express + Clarity + Axial	0.25 oz + 4 floz + 16.4 floz	0	5	28	43	95
20. Express + Clarity + Axial	0.5 oz + 4 floz + 16.4 floz	0	1	21	51	96
21. UTC	-----	0	0	0	0	0

Broadleaf and Grass Herbicide Tank-Mixture Study in Wheat

This study was conducted in Tulare, CA on November 27, 2013. Plot sizes were 8' x 25' with 4 replications. Herbicides used in the trial were Express, MCPA, Axial, Simplicity, and Osprey. The application was applied by hand with a CO_2-pressurized backpack sprayer at 30 PSI, with TeeJet 8002 flat fan nozzles, and calibrated to deliver with a spray volume of 15 GPA at 3 mph. Spray height was maintained at 18 to 24 inches above wheat. Wheat was at the 4-6 leaf stage and 4-7 "tall. Weed present at the time of application: shepherdspurse (*Capsella bursa-pastoris*) (1-2" tall), common chickweed (*Stellaria media*) (1-2" diameter), burning nettle (*Urtica urens*) (1/2-1" tall), and swinecress (*Coronopus didymus*) (1-2" tall). Evaluations were taken every 7 days after treatment (DAT). We chose this field because the PCA said it was loaded with wild oat however they never showed up. Due to frost we ended up with some frost damage on the crop. Evaluations were made for broadleaves and we are still compiling the data.

Table 1.

Percent Wheat (*Triticum*) Injury					
		4-Dec	**11-Dec**	**18-Dec**	**1-Jan**
Treatments	**Rate/A**	**7 DAT**	**14 DAT**	**21 DAT**	**28 DAT**
1. Express + NIS	0.5 oz + 0.25%	0	0	5	3
2. Simplicity + NIS	6.75 floz + 0.25%	0	0	9	5
3. Osprey + NIS	4.75 oz + 0.25%	0	0	11	6
4. Axial + NIS	16.4 floz + 0.25%	0	0	5	3
5. Express + Simplicity + NIS	0.25 oz + 6.75 floz + 0.25%	0	0	9	6
6. Express + Simplicity + NIS	0.375 oz + 6.75 floz + 0.25%	0	0	7	5
7. Express + Simplicity + NIS	0.5 oz + 6.75 floz + 0.25%	0	0	9	5
8. Express + Osprey + NIS	0.25 oz + 4.75 oz + 0.25%	0	0	9	6
9. Express + Osprey + NIS	0.375 oz + 4.75 oz + 0.25%	0	0	10	7
10. Express + Osprey + NIS	0.5 oz + 4.75 oz + 0.25%	0	0	14	8
11. Express + Axial + NIS	0.25 oz + 16.4 floz + 0.25%	0	0	5	3
12. Express + Axial + NIS	0.375 oz + 16.4 floz + 0.25%	0	0	5	2
13. Express + Axial + NIS	0.5 oz + 16.4 floz + 0.25%	0	0	5	2
14. Express + MCPA + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	0	7	5
15. Untreated	-----	0	0	5	3

Italian Ryegrass Tank-Mixture Study in Wheat

This study was conducted in Visalia, CA on February 14, 2014. Plot sizes were 10' x 25' with 4 replications. Herbicides used in the trial were Express, MCPA, Axial, Simplicity, and Osprey. The applications were applied by hand with a CO_2-pressurized backpack sprayer at 30 PSI, with TeeJet 8002 flat fan nozzles, and calibrated to deliver with a spray volume of 15 GPA at 3 mph. Spray height was maintained at 18 to 24 inches above wheat. Wheat was at the 6-8 leaf stage and 6-10 "tall. Weed present at the time of application: Italian ryegrass (*Lolium multiflorum*) (2-4" tall). Evaluations were taken every 7 days after treatment (DAT). Grower sprayed for broadleaves 2-3 weeks prior. Injury was highest with Osprey combinations. Italian ryegrass was poor because applications were made when there was still heavy dew. This was the fault of the researchers.

Table 1.

Percent Wheat (*Triticum*) Injury				
		21-Feb	**7-Mar**	**14-Mar**
Treatments	**Rate/A**	**7 DAT**	**21 DAT**	**28 DAT**
1. Express + NIS	0.5 oz + 0.25%	0	0	0
2. Simplicity + NIS	6.75 floz + 0.25%	0	5	2
3. Osprey + NIS	4.75 oz + 0.25%	0	9	4
4. Axial + NIS	16.4 floz + 0.25%	0	0	0
5. Express + Simplicity + NIS	0.25 oz + 6.75 floz + 0.25%	0	6	3
6. Express + Simplicity + NIS	0.375 oz + 6.75 floz + 0.25%	0	6	3
7. Express + Simplicity + NIS	0.5 oz + 6.75 floz + 0.25%	0	5	3
8. Express + Osprey + NIS	0.25 oz + 4.75 oz + 0.25%	0	10	6
9. Express + Osprey + NIS	0.375 oz + 4.75 oz + 0.25%	0	10	6
10. Express + Osprey + NIS	0.5 oz + 4.75 oz + 0.25%	0	10	6
11. Express + Axial + NIS	0.25 oz + 16.4 floz + 0.25%	0	0	0
12. Express + Axial + NIS	0.375 oz + 16.4 floz + 0.25%	0	0	0
13. Express + Axial + NIS	0.5 oz + 16.4 floz + 0.25%	0	0	0
14. Express + MCPA + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	0	0
15. Untreated	-----	0	0	0

Table 2.

Italian ryegrass (*Lolium multiflorum*) Percent Control				
		21-Feb	7-Mar	14-Mar
Treatments	Rate/A	7 DAT	21 DAT	28 DAT
1. Express + NIS	0.5 oz + 0.25%	0	25	44
2. Simplicity + NIS	6.75 floz + 0.25%	0	25	36
3. Osprey + NIS	4.75 oz + 0.25%	0	16	41
4. Axial + NIS	16.4 floz + 0.25%	0	38	59
5. Express + Simplicity + NIS	0.25 oz + 6.75 floz + 0.25%	0	21	34
6. Express + Simplicity + NIS	0.375 oz + 6.75 floz + 0.25%	0	30	43
7. Express + Simplicity + NIS	0.5 oz + 6.75 floz + 0.25%	0	23	39
8. Express + Osprey + NIS	0.25 oz + 4.75 oz + 0.25%	0	34	54
9. Express + Osprey + NIS	0.375 oz + 4.75 oz + 0.25%	0	33	53
10. Express + Osprey + NIS	0.5 oz + 4.75 oz + 0.25%	0	34	50
11. Express + Axial + NIS	0.25 oz + 16.4 floz + 0.25%	0	35	60
12. Express + Axial + NIS	0.375 oz + 16.4 floz + 0.25%	0	36	63
13. Express + Axial + NIS	0.5 oz + 16.4 floz + 0.25%	0	34	60
14. Express + MCPA + Axial + NIS	0.5 oz + 12 floz + 16.4 floz + 0.25%	0	36	59
15. Untreated	-----	0	0	0

Herbicide Control Study in Wheat

This study was conducted in Tulare, CA on November 27, 2013. Plot sizes were 8' x 25' with 4 replications. Herbicides used in the trial were Express, MCPA, Axial, Simplicity, and Osprey. The applications were applied by hand with a CO_2-pressurized backpack sprayer at 30 PSI, with TeeJet 8002 flat fan nozzles, and calibrated to deliver with a spray volume of 15 GPA at 3 mph. Spray height was maintained at 18 to 24 inches above wheat. Wheat was at the 4-6 leaf stage and 4-7 “tall. Weed present at the time of application: shepherdspurse (*Capsella bursa-pastoris*) (1-2” tall), common chickweed (*Stellaria media*) (1-2” diameter), burning nettle (*Urtica urens*) (1/2-1” tall), and swinecress (*Coronopus didymus*) (1-2” tall). Evaluations were taken every 7 days after treatment (DAT). All treatments, except for the grass herbicide Axial gave good to excellent control of the all the broadleaves evaluated in the study. Simplicity tank mixed with Express gave outstanding weed control and compared evenly with Express + MCPA + Axial tankmix.

Table 1.

Percent Wheat (*Triticum*) Injury						
		4-Dec	11-Dec	18-Dec	8-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	41 DAT	48 DAT
1. Simplicity + NIS	6.75 floz + 0.5%	0	0	9	6	2
2. Simplicity + AMS + NIS	6.75 floz + 1.5 lb ai + 0.5%	0	0	10	9	4
3. Simplicity + COC	6.75 floz + 1.25%	0	0	9	5	2
4. Osprey + AMS + NIS	4.75 oz + 1.5 lb ai + 0.5%	0	0	13	6	3
5. Axial	16.4 floz	0	0	4	3	1
6. Simplicity + Express + NIS	6.75 floz + 0.25 oz + 0.5%	0	0	11	6	3
7. Simplicity + Express + NIS	6.75 floz + 0.5 oz + 0.5%	0	0	11	6	3
8. Express + MCPA + Axial	0.25 oz + 16 floz + 16.4 floz	0	0	9	5	2
9. Express + MCPA + Axial	0.5 oz + 16 floz + 16.4 floz	0	0	5	4	2
10. Untreated	-----	0	0	3	2	1

Table 2.

Shepherdspurse (*Capsella bursa-pastoris*) Percent Control						
		4-Dec	11-Dec	18-Dec	8-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	41 DAT	48 DAT
1. Simplicity + NIS	6.75 floz + 0.5%	5	35	74	88	98
2. Simplicity + AMS + NIS	6.75 floz + 1.5 lb ai + 0.5%	5	30	65	80	94
3. Simplicity + COC	6.75 floz + 1.25%	5	29	53	80	96
4. Osprey + AMS + NIS	4.75 oz + 1.5 lb ai + 0.5%	5	28	54	84	97
5. Axial	16.4 floz	0	0	0	0	0
6. Simplicity + Express + NIS	6.75 floz + 0.25 oz + 0.5%	5	16	40	76	95
7. Simplicity + Express + NIS	6.75 floz + 0.5 oz + 0.5%	5	16	63	85	98
8. Express + MCPA + Axial	0.25 oz + 16 floz + 16.4 floz	5	16	39	71	93
9. Express + MCPA + Axial	0.5 oz + 16 floz + 16.4 floz	5	24	54	79	95
10. Untreated	-----	0	0	0	0	0

Table 3.

Burning Nettle (*Urtica urens*) Percent Control						
		4-Dec	11-Dec	18-Dec	8-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	41 DAT	48 DAT
1. Simplicity + NIS	6.75 floz + 0.5%	1	29	84	93	98
2. Simplicity + AMS + NIS	6.75 floz + 1.5 lb ai + 0.5%	2	30	85	95	98
3. Simplicity + COC	6.75 floz + 1.25%	1	36	81	93	99
4. Osprey + AMS + NIS	4.75 oz + 1.5 lb ai + 0.5%	2	35	84	98	100
5. Axial	16.4 floz	0	0	0	0	0
6. Simplicity + Express + NIS	6.75 floz + 0.25 oz + 0.5%	2	38	80	94	100
7. Simplicity + Express + NIS	6.75 floz + 0.5 oz + 0.5%	3	44	85	95	100
8. Express + MCPA + Axial	0.25 oz + 16 floz + 16.4 floz	2	33	73	90	99
9. Express + MCPA + Axial	0.5 oz + 16 floz + 16.4 floz	2	35	75	89	98
10. Untreated	-----	0	0	0	0	0

Table 4.

Common Chickweed (*Stellaria media*) Percent Control						
		4-Dec	11-Dec	18-Dec	8-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	41 DAT	48 DAT
1. Simplicity + NIS	6.75 floz + 0.5%	0	13	24	78	99
2. Simplicity + AMS + NIS	6.75 floz + 1.5 lb ai + 0.5%	0	14	25	80	100
3. Simplicity + COC	6.75 floz + 1.25%	0	10	24	80	99
4. Osprey + AMS + NIS	4.75 oz + 1.5 lb ai + 0.5%	0	11	25	79	96
5. Axial	16.4 floz	0	0	0	0	0
6. Simplicity + Express + NIS	6.75 floz + 0.25 oz + 0.5%	0	10	23	76	98
7. Simplicity + Express + NIS	6.75 floz + 0.5 oz + 0.5%	0	11	30	84	98
8. Express + MCPA + Axial	0.25 oz + 16 floz + 16.4 floz	0	10	21	74	100
9. Express + MCPA + Axial	0.5 oz + 16 floz + 16.4 floz	0	13	26	75	99
10. Untreated	-----	0	0	0	0	0

Table 5.

Swinecress (*Coronopus didymus*) Percent Control						
		4-Dec	11-Dec	18-Dec	8-Jan	15-Jan
Treatments	Rate/A	7 DAT	14 DAT	21 DAT	41 DAT	48 DAT
1. Simplicity + NIS	6.75 floz + 0.5%	0	13	48	74	93
2. Simplicity + AMS + NIS	6.75 floz + 1.5 lb ai + 0.5%	0	11	49	71	86
3. Simplicity + COC	6.75 floz + 1.25%	0	13	46	71	86
4. Osprey + AMS + NIS	4.75 oz + 1.5 lb ai + 0.5%	0	10	45	70	89
5. Axial	16.4 floz	0	0	0	0	0
6. Simplicity + Express + NIS	6.75 floz + 0.25 oz + 0.5%	0	14	40	65	81
7. Simplicity + Express + NIS	6.75 floz + 0.5 oz + 0.5%	0	10	38	63	79
8. Express + MCPA + Axial	0.25 oz + 16 floz + 16.4 floz	0	14	44	71	81
9. Express + MCPA + Axial	0.5 oz + 16 floz + 16.4 floz	0	13	48	73	89
10. Untreated	-----	0	0	0	0	0

Italian Ryegrass Herbicide Study in Wheat

This study was conducted in Visalia, CA on February 14, 2014. Plot sizes were 10' x 25' with 4 replications. Herbicides used in the trial were Express, MCPA, Axial, Simplicity, and Osprey. The application was applied by hand with a CO_2-pressurized backpack sprayer at 30 PSI, with TeeJet 8002 flat fan nozzles, and calibrated to deliver with a spray volume of 15 GPA at 3 mph. Spray height was maintained at 18 to 24 inches above wheat. Wheat was at the 6-8 leaf stage and 6-10 “tall. Weed present at the time of application: Italian ryegrass (*Lolium multiflorum*) (2-4” tall). Evaluations were taken every 7 days after treatment (DAT). Grower sprayed for broadleaves 2-3 weeks prior. Injury was highest with Osprey combinations. Italian ryegrass was poor because applications were made when there was still heavy dew. This was the fault of the researchers.

Table 1.

Percent Wheat (*Triticum*) Injury				
		21-Feb	7-Mar	14-Mar
Treatments	Rate/A	7 DAT	21 DAT	28 DAT
1. Simplicity + NIS	6.75 floz + 0.5%	0	5	3
2. Simplicity + AMS + NIS	6.75 floz + 1.5 lb ai + 0.5%	0	5	3
3. Simplicity + COC	6.75 floz + 1.25%	0	5	3
4. Osprey + AMS + NIS	4.75 oz + 1.5 lb ai + 0.5%	0	9	5
5. Axial	16.4 floz	0	0	0
6. Simplicity + Express + NIS	6.75 floz + 0.25 oz + 0.5%	0	5	3
7. Simplicity + Express + NIS	6.75 floz + 0.5 oz + 0.5%	0	5	3
8. Express + MCPA + Axial	0.25 oz + 16 floz + 16.4 floz	0	0	0
9. Express + MCPA + Axial	0.5 oz + 16 floz + 16.4 floz	0	0	0
10. Untreated	-----	0	0	0

Broadleaf Control Study in Wheat

This study was conducted in Tulare, CA on November 27, 2013. Plot sizes were 8' x 25' with 4 replications. Herbicides used in the trial were Express, MCPA, Axial, 2,4D, and Clarity. Application was applied by hand with a CO_2-pressurized backpack sprayer at 30 PSI, with TeeJet 8002 flat fan nozzles, and calibrated to deliver with a spray volume of 15 GPA at 3 mph. Spray height was maintained at 18 to 24 inches above wheat. Wheat was at the 4-6 leaf stage and 4-7 "tall. Weed present at the time of application: shepherdspurse (*Capsella bursa-pastoris*) (1-2" tall), common chickweed (*Stellaria media*) (1-2" diameter), burning nettle (*Urtica urens*) (1/2-1" tall), and swinecress (*Coronopus didymus*) (1-2" tall). Evaluations were taken every 7 days after treatment (DAT). All treatments with ET and Shark gave greater injury than the Express treatment. Weed populations and evaluation had considerable variability in this site.

Table 1.

Percent Wheat (*Triticum*) Injury					
		4-Dec	11-Dec	18-Dec	1-Jan
Treatments	Rate/A	7DAT	14DAT	21DAT	28DAT
1. ET + Axial	1.0 floz + 16.4 floz	15	20	19	11
2. ET + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	9	13	18	11
3. ET + Shark + Axial	0.5 floz + 0.5 oz + 16.4 floz	23	28	31	11
4. ET + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	14	19	23	11
5. ET + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	14	19	21	10
6. Shark + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	14	19	20	13
7. Shark + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	18	25	29	14
8. Shark + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	13	20	24	13
9. Express + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	0	0	5	5
10. Untreated	-----	0	0	5	2

Table 2.

Shepherdspurse (*Capsella bursa-pastoris*) Percent Control					
		4-Dec	11-Dec	18-Dec	1-Jan
Treatments	Rate/A	7DAT	14-DAT	21-DAT	28-DAT
1. ET + Axial	1.0 floz + 16.4 floz	45	60	61	63
2. ET + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	45	54	59	66
3. ET + Shark + Axial	0.5 floz + 0.5 oz + 16.4 floz	59	81	85	95
4. ET + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	44	69	75	86
5. ET + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	46	80	83	87
6. Shark + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	56	95	98	100
7. Shark + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	73	94	98	100
8. Shark + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	56	92	96	99
9. Express + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	0	4	51	73
10. Untreated	-----	0	0	0	0

Table 3.

Burning Nettle (*Urtica urens*) Percent Control					
		4-Dec	11-Dec	18-Dec	1-Jan
Treatments	Rate/A	7DAT	14-DAT	21-DAT	28-DAT
1. ET + Axial	1.0 floz + 16.4 floz	80	98	100	100
2. ET + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	65	98	100	100
3. ET + Shark + Axial	0.5 floz + 0.5 oz + 16.4 floz	93	100	100	100
4. ET + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	77	97	100	100
5. ET + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	68	99	100	100
6. Shark + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	90	100	100	100
7. Shark + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	91	100	100	100
8. Shark + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	90	100	100	100
9. Express + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	0	0	60	80
10. Untreated	-----	0	0	0	0

Table 4.

Swinecress (*Coronopus didymus*) Percent Control					
		4-Dec	11-Dec	18-Dec	1-Jan
Treatments	Rate/A	7DAT	14-DAT	21-DAT	28-DAT
1. ET + Axial	1.0 floz + 16.4 floz	38	28	40	49
2. ET + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	41	56	66	69
3. ET + Shark + Axial	0.5 floz + 0.5 oz + 16.4 floz	63	76	86	89
4. ET + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	43	65	68	73
5. ET + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	36	53	55	58
6. Shark + Express + Axial	0.5 floz + 0.5 oz + 16.4 floz	50	93	98	99
7. Shark + MCPA + Axial	0.5 floz + 16 floz + 16.4 floz	70	94	96	98
8. Shark + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	50	89	93	95
9. Express + Prowl H2O + Axial	0.5 floz + 3 pts + 16.4 floz	0	4	43	45
10. Untreated	-----	0	0	0	0

Budget: Funding was used almost entirely for employee labor/benefits with a small amount used for supplies.