

Improved Weed Management in Grape Production

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Trial 1: Weed control in established grapes

Site Description

Conducted at the Kentland Farms, Blacksburg, Va
This study consisted of four rows of grapes, approximately 100 ft long, each row a different grape variety: Reliance, Vidal Blanc, Chamborcin, and Himrod.
Randomized complete block design, 4 reps, plots 6' by 15'

Application information

Under trellis weed control was evaluated at Kentland Farms, using a grape planting established in 1989. A single application of glyphosate was applied in the early spring, followed by Gramoxone Inteon plus nonionic surfactant on June 8, 2011. No preemergence herbicides were used during the 2011 growing season prior to this trial, all plots were very weedy. Treatments were applied on August 4, 2011 using a 2-nozzle boom, 8003 flat fan tips, 25 GPA, and 30 PSI, with 2-3 vines per plot. The following treatments were applied: Alion+Rely, Matrix+Rely, Chateau+Rely, Surflan+Rely, Princep+Rely, GoalTender+Rely, Neul11731 (iron chelate), Weed Pharm acetic acid, and an untreated control. Application conditions were 85 F, sunny, 25% cloud cover, winds NW at 0-5 mph. Horsenettle and groundcherry dominated the weed populations at this site, initial plant heights were 1 to 1.5 feet tall. The first rain event after application was 0.37 inches, which occurred on August 13th. The first frost occurred on October, 22, 2011.

All statistical analysis was conducted using SAS 9.2. ANOVA was used to separate means. A multiple comparison test (Fishers' Protected LSD) was used to further separate when p-values were less than 0.05.

Comments

Under trellis weed control is important for successful grape production. Alion+Rely, Matrix+Rely, Chateau+Rely, Surflan+Rely, Princep+Rely, GoalTender+Rely displayed good postemergence control. These treatments resulted in 80-88% overall burndown two days after treatment. Untreated plots had approximately 25 and 34% cover of both horsenettle and groundcherry, 2 perennial weeds, at 2 and 4 weeks after treatment (WAT), respectively. Alion+Rely, Matrix+Rely, Chateau+Rely, Surflan+Rely, Princep+Rely, GoalTender+Rely reduced the cover of these 2 weeds to 1 to 6%, depending on herbicide, at 2 WAT and to 6 to 16% at 4 WAT. Retreatment would be necessary as horsenettle and groundcherry were experiencing regrowth by 4 WAT. These tank mixes also showed effective crabgrass control at 4 WAT. Weed Pharm acetic acid and Neu11731 iron chelate were statistically less effective at overall burndown and control at 2 and 4 WAT. However at 2 weeks after treatment the iron chelate performed as well as the tank mixes at controlling horsenettle and groundcherry. Acetic acid and iron chelate would be of special interest to organic producers so more research is needed with these two products. Alion and Chateau afforded the greatest winter annual control including bittercress at 8, 10, 12, and 14 WAT.

Specific Results

Two days after treatment plots were evaluated for percent burndown of the entire plot, horsenettle and groundcherry. All herbicides, Alion, Matrix, Chateau, Surflan, Princep, GoalTender, tank mixed with Rely providing 80 to 88 percent burndown of entire plot, while Weed Pharm and iron chelate had significantly less effect, 26 and 45% respectively (Table 1).

Percent weed coverage (Table 2) and vine injury were recorded at 2 and 4 weeks after applications (injury data not shown since little to no injury was observed from any treatment). Horsenettle and groundcherry coverage was minimal with Alion, Matrix, Chateau, Surflan, Princep, and GoalTender. Horsenettle percent coverage ranged from 1-5% and 4-16%, at 2 and 4 weeks after treatment. Groundcherry control was comparable for all herbicides 2WAT. Weed Pharm and untreated plots were not significantly different at both 2 and 4 weeks after application. It must be noted that the iron chelate herbicide had a delayed effect; two weeks after treatment it performed as well as the tank mixed herbicides, however 4 weeks after treatment re-growth was considerable for both horsenettle and groundcherry.

Percent coverage was also evaluated for Virginia copperleaf, red sorrel, and crabgrass at four weeks after treatment (Table 3). No treatment was significantly different for Virginia copperleaf, and red sorrel control. However, Alion, Matrix, Chateau, Surflan, Princep, and GoalTender showed greater crabgrass control than iron chelate or Weed Pharm treatments.

Table 1. Percent burndown 2 days after application.

treatment	application rate (lb a.i./A)	percent burndown	horsenettle	groundcherry
Alion + Rely	0.065 + 1.0	84	98	76
Matrix + Rely	0.063 + 1.0	80	94	76
Chateau + Rely	0.25 + 1.0	86	93	78
Surflan + Rely	3.0 + 1.0	80	94	74
Princep + Rely	2.0 + 1.0	88	95	84
GoalTender + Rely	1.0 + 1.0	85	89	85
Neu11731	4% v/v	45	40	24
Weed Pharm	25 gal/A	26	19	36
Untreated	-	0	0	0
LSD	-	24	15	26

Table 2. Percent weed cover 2 and 4 weeks after treatment.

treatment	2WAT		4WAT	
	horsenettle	groundcherry	horsenettle	groundcherry
Alion + Rely	3	4	11	13
Matrix + Rely	1	6	11	13
Chateau + Rely	2	5	4	13
Surflan + Rely	2	3	13	11
Princep + Rely	5	1	16	4
GoalTender + Rely	3	2	6	6
Neu11731	7	8	20	24
Weed Pharm	29	12	35	24
Untreated	26	23	29	39
LSD	15	11	12	12

Table 3. Percent cover 4 weeks after treatment.

	Va copperleaf	Red sorrel	crabgrass
Alion + Rely	3	3	0
Matrix + Rely	1	4	2
Chateau + Rely	0	0	0
Surflan + Rely	4	1	1
Princep + Rely	1	1	5
GoalTender + Rely	2	0	1
Neu11731	6	4	21
Weed Pharm	9	3	19
Untreated	6	5	10
LSD	6	4	9

On September 26, 2011, perennial and winter annual weeds were evaluated at 8, 10, 12, and 14 weeks after treatment. Dominate weed species on this date were henbit, hawkweed, bittercress, and Carolina geranium. Chateau, Alion, GoalTender, and Surflan had the numerically lowest weed cover at 8 WAT, while Alion and Chateau provided the greatest weed control at 14 WAT. Neu11731, Weed Pharm, and the untreated plots had significant biomass accumulated from summer weeds, which suppressed growth of winter annuals by 8 WAT. Red sorrel dominated these plots, even after the October 22 frost.

Untreated plots and plots treated with Weed Pharm and Neu11731 had significant summer weed biomass, which suppressed growth of winter weeds. This made statistical analysis confidence levels quite low. Bittercress treatment interaction was significant at $p < 0.05$ for 10, 12, and 14, WAT, but no difference was found between treated and untreated plots (Table 5).

Table 4. Percent winter annual weed cover 8 and 14 weeks after treatment.

	8 WAT ^z	14 WAT ^y
Alion + Rely	2	21
Matrix + Rely	7	46
Chateau + Rely	2	16
Surflan + Rely	4	46
Princep + Rely	11	63
GoalTender + Rely	2	38
Neu11731	13	63
Weed Pharm	17	61
Untreated	16	71
LSD	12	32

^zEvaluated on September 26, 2011

^yEvaluated on November 10, 2011

Table 5. Percent cover of perennial and winter annual weeds 10 and 12 WAT.

treatment	10 WAT ^z				12 WAT ^y			
	henbit	hawkweed	bittercress	geranium	henbit	hawkweed	bittercress	geranium
Alion	2	1	2.	2	3	1	4	2
Matrix	8	4	3	5	9	7	7	6
Chateau	2	0	0	1	4	0	2	1
Surflan	7	1	4	4	8	2	8	6
Princep	6	1	10	7	13	6	12	7
Goal Tender	6	3	4	2	7	3	4	2
Neu11731	6	2	10	5	15	2	20	5
Weed Pharm	10	2	10	4	10	2	15	5
untreated	8	5	5	3	10	5	45	8
LSD	8	3	7	5	9	5	10	6

^zEvaluated on October 10, 2011

^yEvaluated on October 24, 2011

Table 6. Percent cover of perennial and winter annual weeds 14 WAT.

Treatment	Henbit	Hawkweed	Bittercress	Carolina geranium
Alion	8	1	7	2
Matrix	14	7	12	6
Chateau	8	0	4	1
Surflan	10	2	14	17
Princep	19	2	16	9
Goal Tender	11	4	10	5
Neu11731	31	3	22	5
Weed Pharm	22	2	23	5
untreated	7	5	10	8
LSD	13	6	11	11

^xEvaluated on November 10, 2011

Trial 2. Preemergence herbicide evaluation in the field

Site Description

Conducted at the station, Virginia Beach, pH 5.5, 3.1% organic matter, State loam soil
 Seeded with broadleaf weeds prior to treatment
 RCB 4 reps plots 6' by 20'
 Fertilized with urea 10 lbs/6000 sq ft.

Application information

Treated 7/23 76 F air temperature, 83% relative humidity, wind 0 MPH, 100% cloud cover
 used a 4-nozzle boom, 8003 flat fan tips, 25 GPA, 30 PSI
 Irrigated 6 hours after treatment

Comments

Weed control increased as the rate of Treevix or indaziflam (Alion) increased. At the higher rate, Treevix gave good to excellent control of field bindweed (from seed), prickly sida, velvetleaf, and redroot pigweed, but poor control of morningglory, jimsonweed, southern crabgrass, and yellow foxtail. At the higher rate, indaziflam gave excellent control of prickly sida, velvetleaf, jimsonweed, common lambsquarters, redroot pigweed, and southern crabgrass but poor control of morningglory. Chateau, Karmex, and Matrix gave good to excellent control of the broadleaf weeds in this trial. Weeds were not uniformly distributed or in a high density for certain species. Redroot pigweed was primarily in rep 1.

Table 7. Weed counts per plot 18 days after treatment (DAT).

Treatment	Rate		Number per plot 8/10 18 DAT (seeded)					Morningglory	
			Vetch	Field bindweed	Prickly sida	Velvet- leaf	Ivyleaf	Pitted + tall	
Untreated			5.5	32.8	27.5	28.5	57.0	60.5	
Treevix	1	oz/a	10.3	6.8	17.8	16.5	33.5	44.3	
Treevix	2	oz/a	11.3	0.3	1.3	3.3	8.5	18.8	
Indaziflam	0.033	lb ai/a	0.0	10.3	13.3	8.8	24.5	29.0	
Indaziflam	0.067	lb ai/a	0.0	13.8	0.0	0.0	13.3	22.8	
Chateau	0.25	lb ai/a	8.0	0.0	0.0	0.0	1.8	5.0	
Karmex	2.0	lb ai/a	5.0	0.0	0.0	0.0	2.0	6.3	
Matrix	4	oz/a	3.3	0.0	0.0	0.0	0.3	0.8	
LSD (P=.05)			11.3	18.3	14.6	13.9	16.5	25.1	

Table 8. Weed counts per plot 18 and 34 days after treatment (DAT).

Treatment	Rate		Number per plot (seeded)					
			8/10 18 DAT			8/26 34 DAT		
			Common ragweed	Jimson- weed	Common lambsquarters	Common ragweed	Jimson- weed	Common lambsquarters
Untreated			2.3	11.8	6.5	2.3	9.8	6.5
Treevix	1	oz/a	1.5	16.0	1.8	1.5	16.0	1.8
Treevix	2	oz/a	0.0	9.3	0.0	0.0	8.8	0.0
Indaziflam	0.033	lb ai/a	0.0	0.0	0.0	0.0	0.0	0.0
Indaziflam	0.067	lb ai/a	0.0	0.0	0.0	0.0	0.0	0.0
Chateau	0.25	lb ai/a	0.0	0.0	0.0	0.0	0.0	0.0
Karmex	2.0	lb ai/a	0.0	0.0	0.0	0.0	0.0	0.0
Matrix	4	oz/a	0.0	0.0	0.0	0.0	0.0	0.0
LSD (P=.05)			2.1	12.4	4.4	2.1	11.6	4.4

Table 9. Weed counts per plot 18 days after treatment (DAT).

Treatment	Rate	Number per plot 8/10 18 DAT (Natural population)				
		Mixed morningglory	Redroot pigweed	Southern crabgrass	Yellow nutsedge	Yellow foxtail
Untreated		1.8	42.3	33.0	9.5	26.0
Treevix	1 oz/a	5.5	7.3	40.8	10.0	23.3
Treevix	2 oz/a	9.8	2.3	30.3	15.8	18.3
Indaziflam	0.033 lb ai/a	4.8	7.0	5.3	6.3	7.3
Indaziflam	0.067 lb ai/a	2.0	0.5	0.3	12.8	3.5
Chateau	0.25 lb ai/a	0.8	0.0	0.5	6.3	0.0
Karmex	2.0 lb ai/a	5.0	0.3	1.0	5.0	1.3
Matrix	4 oz/a	0.5	4.8	5.8	3.0	14.3
LSD (P=.05)		10.8	24.8	22.0	9.2	16.0

Table 10. Weed counts Number per plot 8/26 34 DAT

Crop Variety Description	Vetch	Field bindweed	Prickly sida	Velvet-leaf
Untreated	0.3	25.5	27.5	28.5
Treevix 1 oz/a	5.5	6.3	12.0	15.0
Treevix 2 oz/a	4.0	0.3	1.3	3.3
Indaziflam 0.033 lb ai/a	0.0	15.5	13.3	3.3
Indaziflam 0.067 lb ai/a	0.0	12.3	0.0	0.0
Chateau 0.25 lb ai/a	0.5	0.0	0.0	0.0
Karmex 2.0 lb ai/a	0.0	0.0	0.0	0.0
Matrix 4 oz/a	0.0	0.0	0.0	0.0
LSD (P=.05)	NS	14.2	15.4	11.2

Table 11. Weed control 63 DAT.

Treatment	Rate	Percent control 9/14 63 DAT				
		Prickly sida	Velvet- leaf	Morningg ivy+pitted+tall	Jimson- weed	Redroot pigweed
Untreated		33	8	0	28	0 41
Treevix	1 oz/a	28	28	8	40	80 80
Treevix	2 oz/a	80	78	20	30	60 90
Indaziflam	0.033 lb ai/a	45	85	0	100	70 80
Indaziflam	0.067 lb ai/a	98	100	33	100	90 98
Chateau	0.25 lb ai/a	100	100	78	100	100 100
Karmex	2.0 lb ai/a	95	100	74	100	95 89
Matrix	4 oz/a	100	100	94	100	80 95
LSD (P=.05)		43	27	38	40	(rep 1) 30

Table 12. Weed cover. Percent cover 9/15 64 DAT

Treatment	Rate	Percent cover 9/15 64 DAT		
		Yellow nutsedge	Southern crabgrass	Yellow foxtail
Untreated		2	18	15
Treevix	1 oz/a	8	21	31
Treevix	2 oz/a	5	17	18
Indaziflam	0.033 lb ai/a	4	8	10
Indaziflam	0.067 lb ai/a	6	3	8
Chateau	0.25 lb ai/a	7	6	5
Karmex	2.0 lb ai/a	5	6	6
Matrix	4 oz/a	4	9	5
LSD (P=.05)		NS	13	16

Trial 2 continued

Application information

Retreated 10/13 72 F air temperature 45% relative humidity wind 5 MPH NW sunny 10% cloud cover 0.6" rain 1 DAT (Initial application 7/23)

Comments

No weed control was apparent with Treevix. Alion provided excellent winter annual weed control. By June, yellow nutsedge and common lambsquarters invaded the Alion-treated plots, although Alion gave excellent white clover control at this time, as well as spotted (prostrate) spurge control in July. Alion at the higher rate appeared to give excellent southern crabgrass control in June when compared to Chateau-treated plots. There was not much yellow nutsedge or southern crabgrass in the untreated plots in July, probably due to the dense stand of white clover.

Table 13. Weed counts 133 days after treatment (DAT).

Treatment	Rate		Number per plot 133 DAT				
			Italian Ryegrass	Henbit	Purple Deadnettle	Hairy Bittercress	Buttercup
Untreated			15.5	20.3	6.3	13.5	20.0
Treevix	1	OZ/A	37.3	35.3	9.5	14.3	31.5
Treevix	2	OZ/A	21.0	21.8	10.3	8.8	16.8
Alion	0.033	LB A/A	0.5	0.3	0.0	0.0	0.5
Alion	0.067	LB A/A	0.0	0.0	0.0	0.0	0.0
Chateau	0.25	LB A/A	0.8	0.0	0.0	0.0	0.0
Karmex	2.0	LB A/A	0.5	12.8	2.5	0.0	0.3
Matrix	4	OZ/A	5.5	4.8	1.0	3.8	1.8
LSD (P=.05)			12.1	24.3	7.7	9.1	27.4

Table 14. Weed counts.

Number per plot 133 DAT2

Treatment	Rate	Swinecress		Vetch	Speedwell	Carolina geranium
Untreated			22.3	7.5	12.8	10.0
Treevix	1	OZ/A	17.3	5.3	17.0	15.8
Treevix	2	OZ/A	22.5	5.5	12.0	5.8
Alion	0.033	LB A/A	0.0	0.0	0.0	0.0
Alion	0.067	LB A/A	0.0	0.0	0.0	0.3
Chateau	0.25	LB A/A	0.0	0.3	0.0	0.0
Karmex	2.0	LB A/A	7.0	2.0	12.0	0.0
Matrix	4	OZ/A	18.0	0.0	11.0	11.8
LSD (P=.05)			17.2	2.8	8.7	8.3

Table 15.

Percent cover 241 DAT2

Description			Weed cover	Yellow nutsedge	White clover	Common lambquarters	Yellow foxtail	Southern crabgrass
Untreated			81	2	35	2	2	6
Treevix	1	OZ/A	80	2	30	1	1	5
Treevix	2	OZ/A	78	3	36	3	2	5
Alion	0.033	LB A/A	55	13	3	10	5	3
Alion	0.067	LB A/A	23	16	0	2	2	1
Chateau	0.25	LB A/A	58	7	12	0	4	7
Karmex	2.0	LB A/A	58	9	7	6	3	6
Matrix	4	OZ/A	68	2	16	5	3	7
LSD (P=.05)			15	6	18	6	3	2

Table 16. Weed cover.

Treatment	Rate	Percent cover 283 DAT2			
		Yellow nutsedge	Spotted spurge	Common lambsquarter	Southern crabgrass
Untreated		7	25	2	8
Treevix	1 OZ/A	11	28	2	9
Treevix	2 OZ/A	12	16	3	8
Alion	0.033 LB A/A	14	3	6	12
Alion	0.067 LB A/A	24	1	1	2
Chateau	0.25 LB A/A	6	2	0	46
Karmex	2.0 LB A/A	12	2	1	16
Matrix	4 OZ/A	4	6	6	21
LSD (P=.05)		10	21	5	14