

A ONE-YEAR STUDY ON THE EFFECTIVENESS OF VYDATE L[®] (OXAMYL) TO CONTROL THRIPS IN ONIONS WHEN INJECTED INTO A DRIP-IRRIGATION SYSTEM

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Introduction

Onion thrips (*Thrips tabaci*) and western flower thrips (*Frankliniella occidentalis*) are the main insect pests on onions grown in the Treasure Valley of Idaho and eastern Oregon. In this region about 3,000 acres of onions are grown under drip irrigation. Because of the increased yield and quality of onions grown under drip irrigation, this management system is increasing on lands that were formerly marginal for onion production. It is a common practice to inject the systemic insecticide Vydate L[®] (*oxamyl*) into the drip lines on a weekly or biweekly basis to control thrips. Most growers also apply two to six foliar insecticide applications in addition to the Vydate applications. Growers using conventional furrow irrigation commonly use four to six foliar insecticide applications for thrips control. Drip irrigation growers believe there is an economic advantage to the additional Vydate applications even though the additional cost is about \$150/acre. This trial was designed to determine the effectiveness of Vydate at two different application rates and in combination with two foliar insecticide programs.

Materials and Methods

The trial was conducted at the Malheur Experiment Station on an Owyhee silt loam soil previously planted to wheat. Onion (cv: 'Redwing'; Bejo Seeds, Oceano, CA) was planted on March 24 with a planting configuration of 6 rows on an 88-inch bed. The rows were spaced 3 inches apart. The seeding rate was 150,000 seeds/acre. Lorsban 15G[®] was applied broadcast over the bed at a rate of 22.2oz/1,000 ft of bed for maggot control. Three lines of drip tape were placed on the bed, one tape between two onion rows. The drip tape (T-tape, T-Systems International, Inc., San Diego, CA) had a flow rate of 0.22 gal/min/100 ft of tape. Irrigation water was applied when the soil water potential reached -20 kPa. Water potential was determined by granular matrix sensors (GMS, Watermark Soil Moisture Sensors, Irrrometer Co., Riverside, CA) installed at 8-inch depth.

The experimental design was a randomized complete block design with four replications. The plot size was 2 88-inch beds (14.7 ft) by 34 ft in length.

Vydate was injected into the main irrigation line by a positive displacement injector (Dosmatic Model A30, Dosmatic USA, Inc., Carrollton, TX). Prior to injecting Vydate, 95 percent sulfuric acid was injected at a ratio of 1:6,248 acid to water to acidify the water to pH 4. The Vydate was added to water acidified to pH 4 and injected immediately after the initial acid treatment. The initial acid treatment required 20 minutes to inject into the treated plots followed by a 7-hour Vydate application.

Each drip tape was positioned halfway between 2 rows, at a 2-inch depth in soil. The Vydate-treated plots received water from a separate delivery hose so that Vydate could be injected into the system as necessary. There were 7 treatments including an untreated check, a grower standard insecticide program, an alternative insecticide program consisting of spinosad (Success[®]) and azadirachtin (Aza-Direct[®]), Vydate at 1.0 qt/acre applied weekly, a 2-week delayed start of Vydate at 1.0 qt/acre, a weekly application of 1.0 qt/acre Vydate plus the grower standard insecticide program and a 1.0 qt / acre Vydate plus the alternative control program. Aza-Direct and Success have shown promise under conventional systems by suppressing thrips and allowing predatory insect populations to build to the point where they control thrips. As a systemic applied through the drip system, Vydate has the potential to enhance this program. The application dates and treatment rates are shown in Table 1. The Vydate-late treatment was initiated on June 11.

Thrips counts were made weekly by counting the total number of thrips on 15 plants in each plot. Onions were harvested on September 23 and graded on September 30. A visual evaluation for iris yellow spot virus was taken on August 23.

Results and Discussion

Table 2 lists the weekly thrips counts for the various treatments. There were significant differences in 6 of the 12 weeks, with most occurring during the latter part of the growing season. The season-long average also had significant differences. The Vydate and Vydate-late treatments were similar to each other and both were significantly better at thrips control than the untreated check. All of the treatments with foliar-applied insecticides (the standard and alternate treatments) were significantly better than the treatments with Vydate alone or the untreated check. There did not appear to be any benefit to adding Vydate to onions treated with foliar insecticides. Figure 1 compares the thrips population of the standard, alternative, and untreated check treatments. Thrips populations increased beyond the economic threshold (15 thrips/plant) after mid-June with the Vydate-only treatments. Figure 2 compares the addition of Vydate to the foliar treatments. Figure 3 compares the two Vydate-only treatments to the rest of the treatments.

Table 3 shows the yield differences. The foliar treatments all significantly increased total yield while decreasing yield of medium bulbs. There was not a significant difference in total yield between the Vydate-only treatments and the untreated check.

Iris yellow spot virus (IYSV), which is thrips transmitted, appeared in the trial during August. A visual evaluation of the onions for IYSV showed significantly less infection in the Vydate plus Aza-Direct plus Success treatment compared to the Vydate-alone treatments or to the untreated check (Table 4).

Conclusion

Vydate injected into a drip-irrigation system does give some thrips control, although not sufficient to increase yields over the untreated check. Both the standard and alternative insecticide treatments increased thrips control and yield over the untreated check and the Vydate-only treatments. There was a trend for the Vydate plus alternative treatment to produce better size and yield and it was significant for the colossal and super-colossal-sized bulbs. Vydate applied through the drip system may enhance a foliar insecticide program but did not give adequate control by itself.

Table 1. Application dates for drip- and foliar-applied insecticides for thrips control on drip irrigated onions, Malheur Experiment Station, Oregon State University, Ontario, OR 2005.

Date	Drip application		Foliar application			
	Product	Rate/acre	Product	Rate/acre	Product	Rate/acre
5/26	Vydate	1.0 qt				
6/2	Vydate	1.0 qt				
6/6			Warrior	3.84 oz	Aza-Direct	20.0 oz
					Success	10.0 oz
6/11	Vydate	1.0 qt				
6/15	Vydate	1.0 qt	Warrior	3.84 oz	Aza-Direct	20.0 oz
			MSR	2.0 pt	Success	10.0 oz
			Lannate	3.0 pt		
6/21	Vydate	1.0 qt				
6/22			Warrior	3.84 oz	Aza-Direct	20.0 oz
			MSR	2.0 pt	Success	10.0 oz
6/27	Vydate	1.0 qt				
6/29			Warrior	3.84 oz	Aza-Direct	20.0 oz
			Lannate	3.0 pt	Success	10.0 oz
7/4	Vydate	1.0 qt				
7/8			Warrior	3.84 oz	Aza-Direct	20.0 oz
			MSR	2.0 pt	Success	10.0 oz
7/11	Vydate	1.0 qt				
7/21	Vydate	1.0 qt				
7/22			Warrior	3.84 oz	Aza-Direct	20.0 oz
			Lannate	3.0 pt	Success	10.0 oz
8/1			Warrior	3.84 oz	Aza-Direct	20.0 oz
			Lannate	3.0 pt	Success	10.0 oz

Table 2. Weekly thrips counts for drip irrigated onions treated with Vydate® alone and with foliar insecticides, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

	25-May	1-Jun	8-Jun	13-Jun	21-Jun	28-Jun	6-Jul	14-Jul	20-Jul	26-Jul	3-Aug	10-Aug	Average
	-----thrips/plant-----												
Vydate-late	2.4	8.7	12.8	30.6	53.8	42.0	109.0	192.4	170.5	247.9	48.6	16.2	77.9
Vydate-alt	1.6	6.3	3.5	22.5	32.0	16.0	63.3	111.6	67.0	59.4	16.7	9.0	34.1
Vydate	1.8	6.0	9.0	21.7	49.8	49.6	69.2	257.6	208.9	171.9	41.0	13.1	75.0
Vydate+standard	1.6	4.9	5.8	22.1	53.1	20.3	34.5	143.2	107.1	75.5	18.6	13.3	41.7
Alternative	1.5	4.8	3.4	20.4	35.4	19.2	50.5	84.1	48.4	58.3	19.5	9.3	29.6
Standard	2.0	4.9	3.9	19.5	39.3	15.2	34.2	123.1	70.0	75.6	16.9	12.5	34.7
Untreated check	2.5	5.3	10.0	20.3	44.7	37.0	61.0	265.1	276.2	409.1	73.6	13.7	101.5
LSD(0.05)*	ns [†]	ns	5.8	ns	ns	13.2	45.2	ns	60.4	143.3	23.7	ns	19.7

*Least Significant Difference at alpha = 0.05.

[†]Not significantly different.

Table 3. Total yield of Vydate[®]-treated onions grown under drip irrigation, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

Treatment	Onion yield			Total Yield
	Medium	Jumbo	Colossal + Supercolossal	
	-----cwt/acre-----			
Vydate late	126.0	394.8	4.3	525.1
Vydate + alternative	38.9	700.2	32.9	772.0
Vydate	120.9	381.9	1.6	504.4
Vydate + standard	48.0	614.2	16.9	679.1
Alternative	34.6	648.3	24.9	707.8
Standard	43.3	697.8	9.9	751.1
Untreated check	133.1	338.7	0.0	471.9
LSD (0.05)*	35.6	152.6	15.3	103.1

*Least Significant Difference at alpha = 0.05.

Table 4. Iris yellow spot virus (IYSV) evaluation in Vydate[®]-treated onions grown under drip irrigation, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

Treatment	Severity [†] IYSV
Vydate late	4.3
Vydate + alternative	2.5
Vydate	4.6
Vydate + standard	4.1
Alternative	2.6
Standard	3.1
Untreated check	4.8
LSD (0.05)*	0.7

*Least Significant Difference at alpha = 0.05.

[†]Rating 1 = no virus, 5 = severe virus symptoms.

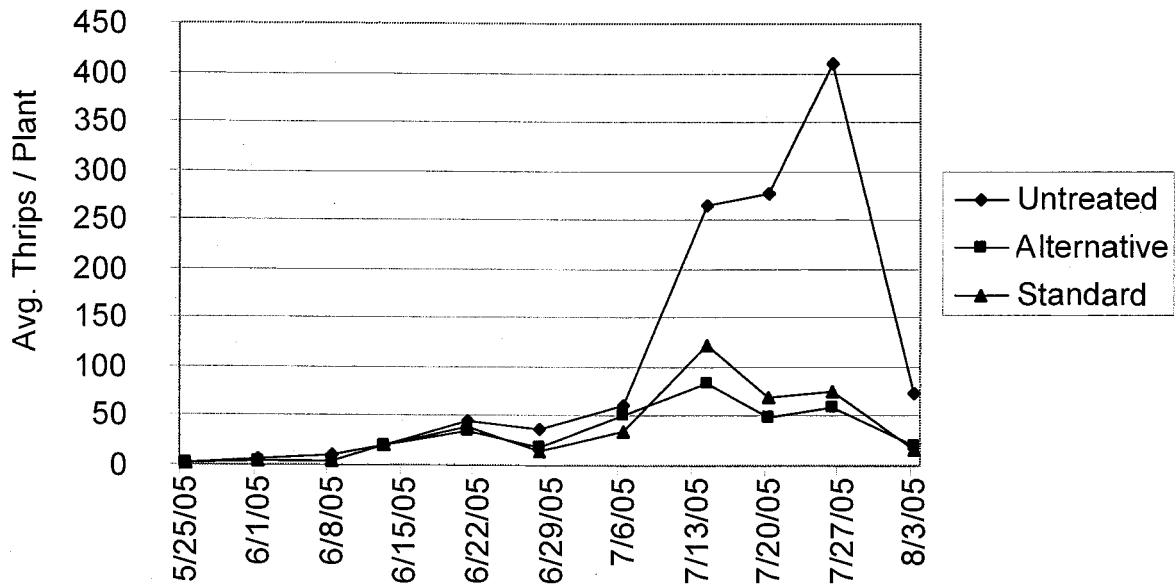


Figure 1. Weekly thrips populations on onions grown under drip irrigation and treated with Vydate[®]-applied through the drip system and foliar-applied insecticides, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

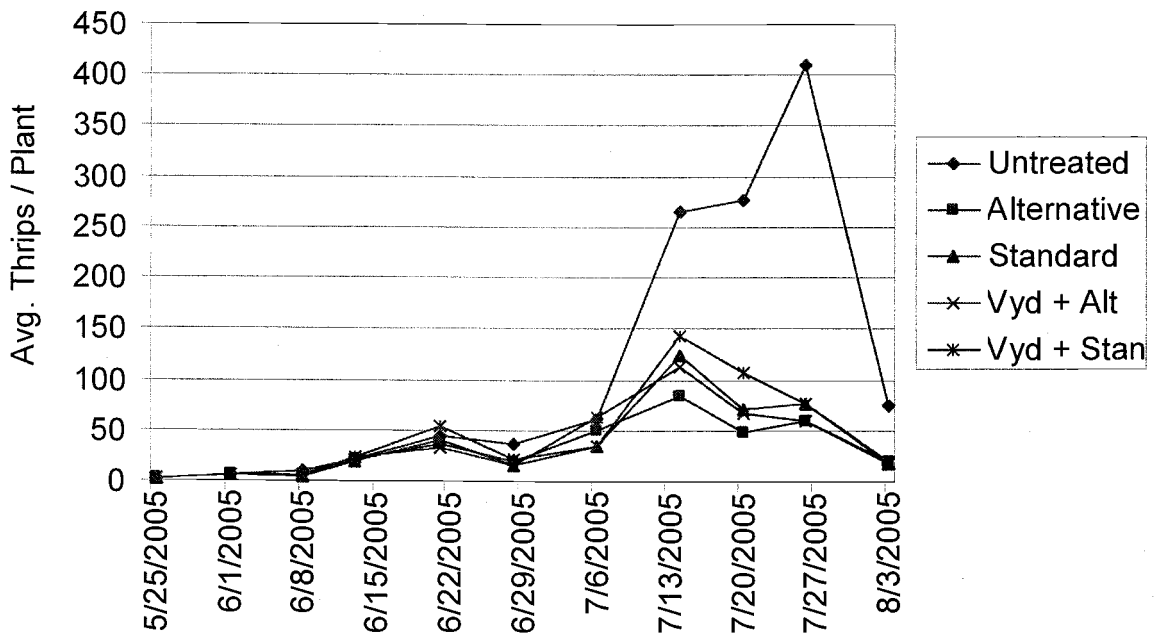


Figure 2. Weekly thrips populations on onions grown under drip irrigation and treated with Vydate[®]-applied through the drip system and foliar-applied insecticides, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

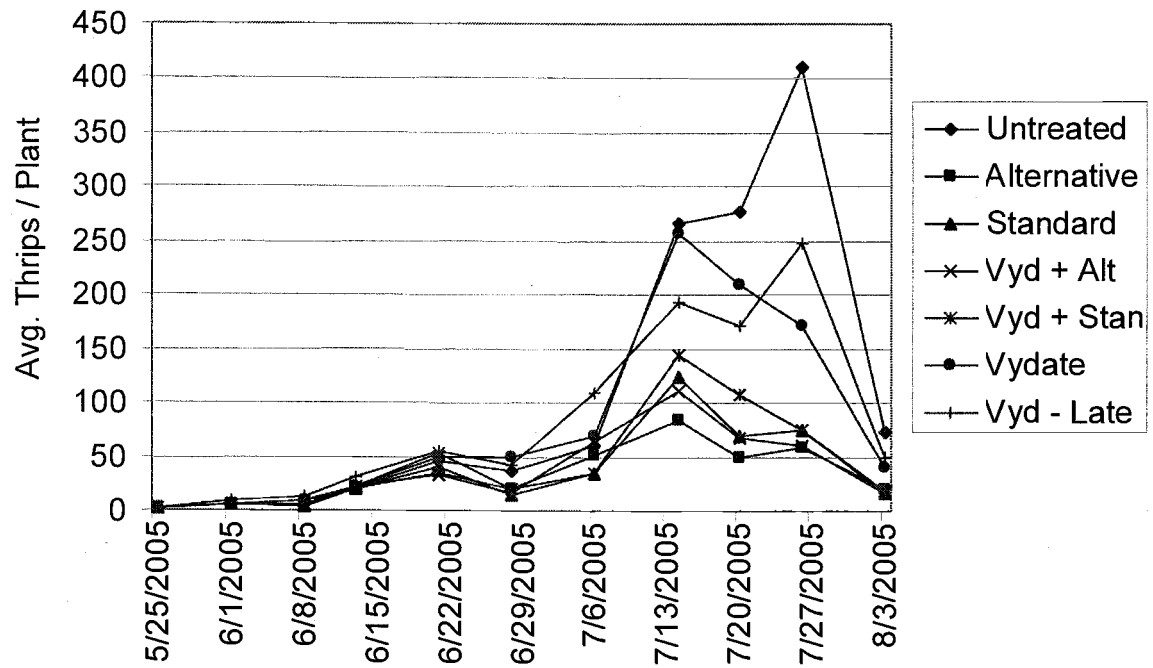


Figure 3. Weekly thrips populations on onions grown under drip irrigation and treated with Vydate[®]-applied through the drip system and foliar-applied insecticides, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.