

# **Management of Corky Ringspot Disease in Potato Using Vydate C-LV**

**Irrigated Trial  
Rice, MN 2009**



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# Management of Corky Ringspot Disease Using Oxamyl (Vydate C-LV)

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## Summary

Five oxamyl (Vydate C-LV) programs were evaluated on six different potato varieties near Rice, MN during 2009 to determine if combinations of oxamyl applied in-furrow at planting, at crop emergence, three weeks after crop emergence, and six weeks after crop emergence could effectively reduce incidence and severity of Corky Ringspot (CRS). All oxamyl programs reduced the incidence and severity of CRS in all varieties tested compared to the non-treated control, but only those programs with an in-furrow at-planting treatment resulted in commercially acceptable levels of CRS. During 2009, non-treated plots had 33% severe damage from CRS. Waiting until crop emergence (44 days after planting) to begin oxamyl treatments reduced the percentage of severe damage to 19%, but was still unacceptable. However, when treatments began at planting, severe damage was reduced to commercially acceptable levels of 1% or less. There was no difference in incidence or severity of CRS between any of the oxamyl programs that included an in-furrow application. In-furrow applications of oxamyl did not reduce the final crop emergence in any of the varieties tested, but further work to evaluate the effect of oxamyl on tubers per hill, total yield, and process quality are warranted.

## ***Introduction:***

Corky Ringspot (CRS) is a disease of potato caused by Tobacco Rattle Virus (TRV) and is vectored by stubby-root nematodes. CRS symptoms can vary between varieties, but necrotic rings or spots in the tuber tissue are common (Figure 1). Damage by CRS is scored as an internal defect and can significantly reduce usable yield or lead to crop rejection if not managed properly. While this disease has been known to occur in many areas of the United States, it has only recently been reported in Minnesota (Gudmestad et al., 2008) and North Dakota (David et al., 2009). Previous work in Oregon, Washington, and Colorado has shown that the fumigant 1,3-dichloropropene (Telone II) can effectively control CRS, but may be cost prohibitive in Minnesota and North Dakota. Recent studies in Oregon (Charlton et al., 2010) report that the nematicide, oxamyl (Vydate C-LV), can reduce the incidence of CRS in potato when chemigated through the irrigation system. The current study was initiated to determine if low-volume (10 gpa or less) applications of oxamyl (Table 1) could reduce CRS symptoms in Russet Burbank, Russet Norkotah, Umatilla Russet, Dakota Pearl, Red Norland, and Yukon Gold at harvest and following four months storage.



Figure 1. Corky Ringspot Symptoms on Russet Burbank



Figure 2. Corky Ringspot Symptoms on Dakota Pearl

Table 1. Timing and rate (lb/acre) of oxamyl treatments evaluated in 2009.

Treatment <sup>1</sup>	In-furrow at planting	Banded at crop emergence	3 weeks after crop emergence	6 weeks after crop emergence
Non-treated	--	--	--	--
0, 44, 65, 86	1 lb	1 lb	1 lb	1 lb
44, 65, 86	--	1 lb	1 lb	1 lb
0, 44, 65	1 lb	1 lb	1 lb	
0(2X), 65, 86	2 lb		1 lb	1 lb
0(2X), 44(2X)	2 lb	2lb		

<sup>1</sup> Application dates in days after planting (DAP): 0 DAP indicates in-furrow application; 44 DAP occurred at crop emergence; remaining DAP dates occurred at three-week intervals thereafter; (2X) indicates a doubled rate of 2.0 lb a.i./acre.

### General Materials and Methods:

This study was conducted in a commercial corn field near Rice, MN, which has a history of CRS. The area was previously cropped to field corn in 2008 and potato in 2007.

**Fertility** – During row marking, 40N- 50P- 160K- 25S- 1.5B- .75Zn 0.1B was applied as a dry band 2” below where the seed piece was planted. An additional 60 and 115 lbs nitrogen/acre was applied on 19 May and 10 June, respectively, as 46-0-0.

**Pest management** - Pink rot (*Phytophthora erythroseptica*) was controlled by applying 0.42 oz/ 1000 linear ft row Ridomil Gold EC (mefenoxam). Early and Late blight were controlled with mancozeb and chlorothalonil fungicides. Early season Colorado potato beetle and aphid control was achieved with an in-furrow application of 12 oz/acre of Belay (chlorothianidin).

## ***Treatment Materials and Methods***

**Plot design, planting, and harvest** – A two-factor split-plot design was utilized and treatments were assigned in a randomized complete block design with four replications. Main plots were oxamyl treatment and were 4 potato rows wide and 55 feet long. The split plot was potato variety and was 1 potato row wide and 15 feet long. Certified potato seed of all varieties evaluated were hand cut into 2-2.5 ounce pieces on 27 April, treated with Maxim MZ, and suberized for 9 days at 50°F and 95% relative humidity. Plots were planted on 6 May with a 2-row, assist-feed Harriston planter and harvested on 20 October using a single-row Grimme harvester.

**Oxamyl treatments** – The in-furrow application of oxamyl was applied in a 6-inch band at the bottom of the furrow using 7 gpa water at planting. The crop emergence application was applied on 9 June (44 days after planting, DAP) in 10gpa water using a backpack CO<sub>2</sub> sprayer (Figure 3). The three and six week post-emergence applications were applied on 30 June (65 DAP) and 21 July (86DAP), respectively, in 10 gpa water using a backpack CO<sub>2</sub> sprayer.

**CRS evaluations** – Following harvest, all potatoes were transported to the USDA Potato Worksite in East Grand Forks, MN, and tubers from individual plots were equally split into two samples. The first sample was evaluated immediately following harvest and the second sample will be evaluated after 4 months storage. Twenty-five randomly selected tubers from each plot were cut into ½” transverse sections (Figure 4) and the number of spots over 1/8” in diameter were counted. Incidence, damage, and severe damage were defined as tubers having more than one, three – six, and more than six spots, respectively (USDA, 2008).

**Statistical analysis** – Analysis of variance was performed using PROC GLM in SAS v.9.3 and when significant, means were separated using least significant differences.

## ***Results:***

### **Effect of oxamyl treatment on crop emergence**

Analysis of variance indicated there was no interaction between oxamyl treatment and potato variety on crop emergence. As a result, the main effect is reported here. Crop emergence ranged from 91 – 96% of seed pieces planted and was not influenced by oxamyl treatment (Table 1). This indicates that neither 1 or 2 lb ai/a oxamyl applied in-furrow at planting reduced the number of plants emerged compared to treatments without oxamyl.



**Figure 3. Application of oxamyl in 10 gpa water at crop emergence**



**Figure 4. Tubers cut into transverse sections to evaluate for Corky Ringspot symptoms**

### **Effect of oxamyl treatment on incidence and severity of Corky Ringspot**

Analysis of variance indicated that the effect of oxamyl treatment on the incidence and severity of CRS damage was not dependent upon potato variety. As a result the main effects of oxamyl treatment across all varieties tested are reported (Table 2).

**Incidence:** Corky ringspot disease was observed in 56% of tubers when not treated with oxamyl in 2009. While none of the oxamyl treatments eliminated CRS symptoms, they all significantly reduced the CRS incidence compared to the non-treated control. Initiating oxamyl treatment at emergence resulted in 33% incidence, and was further reduced to below 4% when treatment began at planting. There was no difference between the four treatments that included an in-furrow application of oxamyl.

**Damage:** The percentage of tubers with damage as defined by the USDA was 42% when no oxamyl was applied. All oxamyl treatments significantly reduced damaged tubers compared to the non-treated control. When the oxamyl treatment began at crop emergence, the percentage of tubers scored with damage was 25%, and was further reduced below 3% when treatments began at planting. There was no difference between the four treatments that included an in-furrow application of oxamyl.

**Severe Damage:** The percentage of tubers with severe damage as defined by the USDA was 33% when not treated. All oxamyl treatments significantly reduced severely damaged tubers compared to the non-treated control, but only those treatments with an in-furrow application resulted in commercially acceptable levels of CRS.

**Table 2. Effect of Oxamyl treatment on crop emergence, incidence, damage, and severe damage caused by Corky Ringspot**

Treatment <sup>1</sup>	Emergence (%)	Incidence <sup>2</sup> (%)	Damage <sup>3</sup> (%)	Severe Damage <sup>4</sup> (%)
Non-treated	94	56	42	33
0, 44, 65, 86	94	1	1	0
44, 65, 86	94	33	25	19
0, 44, 65	91	2	1	1
0(2X), 65, 86	96	2	1	0
0(2X), 44(2X)	93	3	2	1
LSD ( $\alpha=0.10$ )	ns <sup>5</sup>	6.5 <sup>6</sup>	6.5	6

<sup>1</sup> Application dates in days after planting (DAP): 0 DAP indicates in-furrow application; 44 DAP occurred at crop emergence; remaining DAP dates occurred at three-week intervals thereafter; (2X) indicates a doubled rate of 2.0 lb a.i./acre.

<sup>2</sup>Percent tubers with 1 or more spots, <sup>3</sup>Percent tubers with 3 – 6 spots, <sup>4</sup>Percent tubers with 6 or more spots.

<sup>5</sup>ns = values within this column are not significantly different. <sup>6</sup>Values in columns with a numerical LSD value are significantly different if the difference between the two values is equal-to or greater-than the LSD value.

### **Conclusion:**

The results from this trial indicate that low-volume applications of oxamyl can effectively reduce the incidence and severity of CRS symptoms in Russet Burbank, Russet Norkotah, Umatilla Russet, Dakota Pearl, Red Norland, and Yukon Gold when evaluated at harvest. Initiating applications 44 days after planting at crop emergence appears to miss early season TRV infection, resulting in unacceptable levels of CRS. All oxamyl programs that included an in-furrow treatment resulted in commercially acceptable levels of CRS. Preliminary results from this trial indicate that if in-furrow and crop emergence treatments oxamyl rates are increased to 2 lb ai/a., subsequent foliar applications may be unnecessary. However, further work is required to confirm or reject this hypothesis.