CONTROLLING EARLY BLIGHT ON RUSSET NORKOTAH POTATOES

Steven R. James

Abstract

An experiment to evaluate the efficacy of the broad spectrum fungicide Quadris alternated with chlorothalonil on early blight was planted at the Powell Butte site of Central Oregon Agricultural Research Center on May 25, 1999. All of the fungicide treatments reduced the percent of the leaf area infected with early blight lesions as compared with the untreated check. The treatments that received the higher rate of Quadris (0.2 lb ai/a) had a lower percentage of leaf area infected with early blight than the plots treated with the lower rate of Quadris (0.1 lb ai/a), although this trend was not statistically significant. No statistically significant differences in yield were observed among the fungicide treatments.

Introduction

Early blight *(Alternaria solani)* is one of the most common annually occurring foliar diseases of potatoes in central Oregon. Early blight is most severe under alternately wet and dry conditions; consequently, the problem is observed frequently in sprinkler irrigated potato growing regions. If not controlled, it can reduce both tuber yield and quality in some cultivars, particularly Russet Norkotah and Shepody (Douglas and Garner, 1974; James, 1991).

New fungicide formulations and chemistry are being developed continually for the control of various foliar diseases on potatoes. Quadris (azoxystrobin), a broad-spectrum fungicide developed by Zeneca Ag Products, is the first of a new class of pesticidal compounds called B-methoxyacrylates, which are derived from naturally occurring strobilurins. The active portion of the azoxystrobin molecule was originally discovered in a mushroom *(Strobilurus tenacellus)* and was enhanced to make it stable in sunlight and to provide some degree of systemic activity. The chemistry works by inhibiting fungal mitochondrial respiration.

This study was designed to evaluate the efficacy of Quadris application rates alternated with chlorothalonil on the development of early blight on Russet Norkotah potatoes.

Materials and Methods

An experiment to evaluate the efficacy of the broad spectrum fungicide Quadris alternated with chlorothalonil (Bravo Weather Stik) on early blight was planted at the Powell Butte site of Central Oregon Agricultural Research Center on May 25, 1999. The experiment was planted with the cultivar Russet Norkotah and arranged in a randomized block design with four replications. Individual plots were 21 ft long by 9 ft wide (three rows) and were bordered on each end with the potato cultivar 'All Blue'. Each of the three rows in a plot contained 24 seed pieces, spaced nine inches apart. The experiment was fertilized, cultivated, sprinkler irrigated, and managed according to practices commonly used in central Oregon.

The following treatments were included in the study:

1) Quadris 0.1 lb a.i. per acre alternated with Bravo 1.13 lb ai per acre
2) Quadris 0.2 lb a.i. per acre alternated with Bravo 1.13 lb ai per acre
3) Bravo 1.13 lb a.i. per acre alternated with Quadris 0.1 lb ai per acre
4) Bravo 1.13 lb a.i. per acre alternated with Quadris 0.2 lb ai per acre
5) Dithane F-45 1.5 lb a.i. per acre
6) Untreated Check

The Quadris, Bravo and Dithane treatments were initially applied on July 26 at 75 percent row closure and continued every two weeks for the remainder of the growing season (August 9, August 23). Applications were made using a carbon dioxide-powered backpack sprayer delivering 30 gallons per acre at 32 psi with Teejet 8003 flat fan nozzles. Early blight was allowed to develop naturally during the course of the growing season. Each plant in the center plot row was rated for the percentage of the leaf area covered by early blight lesions using the Manual of Assessment Keys for Plant Diseases (James, 1971). Early blight observations commenced August 2 and continued weekly through August 30.

Vines were sprayed with Diquat on September 13 and September 20, 1999, and a 15-foot section from the middle row of each plot was harvested October 14, 1999. Plots were graded into four size and three grade categories. The total number of tubers per plot was determined and used to calculate the average tuber size.

Results

Early blight was first observed on the plants in the study area during the second week of August, 1999. The disease was observed in all treatments on the August 9, 1999 observation date (Table 1). Early blight progressed slowly during the first two weeks of August, but rapidly spread later in the month, especially in the untreated check plots. All of the fungicide treatments reduced the percent of the leaf area infected with early blight lesions as compared to the untreated check. That effect was statistically significant at the August 23 and August 30 evaluation dates (Tables 1 and 2). It was impossible to score the plots for early blight infection after August 30 because of natural vine maturity and senescence.

There were no differences in percent leaf area infected between the treatments that began with Quadris versus those that began with Bravo. The treatments that received the higher rate of Quadris had less leaf area infected with early blight than the plots treated with the lower rate of Quadris, although this trend was not statistically significant.

Table 3 summarizes the percentage of plants with any early blight lesions. By August 30, 100 percent of the plants in the check treatment were infected with early blight. At that date, significantly fewer fungicide treated plants were infected than the untreated plants.

Fungicide effects on yield and tuber size of Russet Norkotah potatoes are summarized in Table 4. No statistically significant differences in yield were observed among the fungicide treatments.

Table 1. Fungicide effects on the total leaf area infected with early blight in Russet Norkotah potatoes, Powell Butte, Oregon, 1999.

		Total Leaf Area Infected with Early Blight (%)				
Treatment	Rate (lb ai/A)	Aug. 2	Aug. 9	Aug. 16	Aug. 23	Aug. 30
Quadris/Bravo	0.1/1.13	0.00	0.20	0.64	3.86	6.22
Quadris/Bravo	0.2/1.13	0.00	0.01	0.22	2.22	4.82
Bravo/Quadris	1.13/0.1	0.00	0.03	0.47	3.43	5.74
Bravo/Quadris	1.13/0.2	0.00	0.20	0.88	2.03	4.40
Dithane	1.5	0.00	0.03	0.28	2.02	5.72
Check		0.00	0.38	1.58	9.35	32.64
LSD 5%		NS	NS	NS	4.14	9.59

Table 2. Fungicide effects on the area under the disease progress curve (AUDPC) of early blight in Russet Norkotah potatoes, Powell Butte, Oregon, 1999.

		AUDPC				
Treatment	Rate (lb ai/A)	Aug. 9	Aug. 16	Aug. 23	Aug. 30	Total
Quadris/Bravo	0.1/1.13	0.69	1.55	11.29	8.25	21.78
Quadris/Bravo	0.2/1.13	0.05	0.72	7.02	9.08	16.87
Bravo/Quadris	1.13/0.1	0.09	1.57	10.35	8.07	20.08
Bravo/Quadris	1.13/0.2	0.69	2.38	4.04	8.31	15.42
Dithane	1.5	0.09	0.89	6.08	12.96	20.03
Check		1.32	4.23	27.18	81.51	114.24
LSD 5%		NS	NS	13.04	21.70	33.56

Table 3. Fungicide effects on the percent of plants with early blight lesions in Russet Norkotah potatoes, Powell Butte, Oregon, 1999.

		Plants with Early Blight Lesions (%)				
Treatment	Rate (lb ai/A)	Aug. 2	Aug. 9	Aug. 16	Aug. 23	Aug. 30
Quadris/Bravo	0.1/1.13	0.0	6.9	18.1	65.3	73.6
Quadris/Bravo	0.2/1.13	0.0	1.4	5.6	51.4	69.5
Bravo/Quadris	1.13/0.1	0.0	2.8	15.3	58.3	69.4
Bravo/Quadris	1.13/0.2	0.0	5.5	20.8	56.9	80.6
Dithane	1.5	0.0	2.8	9.7	56.9	88.9
Check		0.0	12.5	44.4	97.2	100.0
LSD 5%		NS	NS	17.7	21.1	10.4

Table 4. Fungicide treatment effects on yield and tuber size of Russet Norkotah potatoes, Powell Butte, OR, 1999.

Treatment	Yield (cwt/a) Total	Ones	Undersize	Culls	Tuber Size (oz)
Quadris/Bravo	318	251	39	24	7.5
Quadris/Bravo	362	299	33	25	8.7
Bravo/Quadris	337	277	38	22	7.5
Bravo/Quadris	334	287	37	10	7.1
Dithane	350	308	30	12	7.6
Check	332	276	43	13	6.6
LSD 5%	NS	NS	NS	NS	NS

Literature Cited

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