POINDEXTER[1], S., RUPPAL[2], D.A., KIRK[3], W. [1]Michigan State University Extension Sugar Beet Educator / *Sugarbeet Advancement,* [2] Eastern District Sales Manager, Hilleshog Sugar Beet Seed and [3] Ast. Professor, Plant Pathology, Michigan State University. [1] Michigan State University Extension, One Tuscola Street, Suite 100, Saginaw, MI 48607. [2] 5146 Rogers Road Akron, MI 48701. [3] Michigan State University Plant Biology Lab, East Lansing, MI 48824-1312. **IMPACT OF STROBILURIN FUNGICIDE ON YIELD OF SUGAR BEETS WITH NATURAL INOCULATION OF RHIZOCTONIA CROWN ROT.**

ABSTRACT

Rhizoctonia Crown Rot of sugar beets is a significant problem in many of the sugar beet producing areas of the United States. The objective of this study was to determine the effect of Strobilurin Fungicide (Quadris/Amistar, Syngenta Crop Protection, Inc.) on control of Rhizoctonia Crown Rot and yield. This research was conducted in fields with naturally high levels of Crown Rot Inoculums. Most research currently is/or has been produced utilizing artificial inoculation techniques. Two varieties were used, one that is resistant to Rhizoctonia Crown Rot (RH-5) and a susceptible (E-17). Common treatments and rates were added in year two and three.

OBJECTIVE

1. To determine efficacy of Quadris/Amistar on control of Rhizoctonia Crown Rot (R. Solani-2-2).

2. Determine best timing and placement of fungicide for optimum control under natural inoculation.

3. Compare fungicidal control of Rhizoctonia on susceptible and resistant varieties.

4. Determine Economic Impact of Control.

MATERIALS AND METHODS

Farm sites were identified in 2002, 2003 and 2004 that have had a long history of both sugar beet production and heavy incidence of Rhizoctonia Crown Rot (R. Solani AG-2-2). Trials were planted with a six row planter in a complete randomized block, replicated four times at each location. Harvest was done with grower equipment and scale weights were taken utilizing ten ton beet carts with calibrated digital read out scales. Six row strips were harvested at each location. Row length varied by location but no row length was less than 250 feet. Two sugar/quality samples were taken on each replication (eight total per treatment) In years 2002-2003 Quadris fungicide was used and in 2004 a switch was made to Amistar. Quadris was applied at rate 10.5 ounces per acre and Amistar was applied at 3.3 ounces per acre. Products were applied in-furrow (T-Banded) with eight gallons of water in a six inch band. Foliar products were applied in a ten inch band with ten gallons of water. Low rate Amistar treatments were applied in 2004 at a 2.2 ounce per acre rate. Plant emergence counts were taken at approximately 10, 20 and 30 days after emergence. Two 50 foot rows (100 feet total) in each replication were marked for emergence and harvest stand counts. The level of Rhizoctonia infestation was determined by counting dead or dying beets in the center four rows of the six harvest rows. Counts were taken in mid to late August based on 1200 foot of row.

RESULTS AND DISCUSSION

Studies were conducted at three locations with high natural inoculum levels over three years. Significant treatment differences occurred between varieties, fungicide placement and timings under high Rhizoctonia pressure (see tables one, two and three). Rhizoctonia resistant varieties coupled with an in-furrow application always produced the highest tonnage and RWSA when comparing all treatments. Susceptible varieties in combination with in-furrow and 6-8 leaf produced only marginally better yields in two trials (see tables one and two) than in-furrow alone. Applications at the 6-8 leaf stage were significantly better than check but not as good as the in-furrow. Split rate applications (half rate two timings) produced yield and control similar to one time applications at the full rate. Research treatments were expanded in 2004 to include treatments of earlier application timings from pre emergence, at emergence, 2-4, 4-6, and 6–8 leaf stage. At emergence or pre emergence applications were not effective. In-furrow applications, though very effective, tended to slow emergence. However, final stands were not significantly affected. In-furrow treatments did not show any effect on seedling disease.

CONCLUSION

Quadris/Amistar applications to sugar beets can significantly reduce Rhizoctonia Root and Crown Rot and improve yield (see table four). Under high levels of natural inoculation, in-furrow treatment yields were superior to checks of both resistant and susceptible varieties. Applications of fungicide at the 6-8 leaf stage definitely improved yield but were not as good as in-furrow applications. In-furrow applications coupled with 6-8 leaf applications on susceptible varieties produced slightly better yields but not significantly better yields than in-furrow alone. Foliar applications applied earlier than the 6-8 leaf stage (2-6 leaf stage) produced as good or better yields as the 6-8 leaf stage. Optimum timing of foliar applications may be prior to the 6-8 leaf stage and closer to the 4-6 leaf stage. At emergence and pre emergence applications were not effective. Rhizoctonia resistant varieties with no treatment, yielded and had similar levels of Rhizoctonia when compared to a highly susceptible varieties with an in-furrow treatment. In-furrow and 2-4 leaf applications on a Rhizoctonia resistant variety reduced levels of diseased plants by 93% when compared to susceptible check. Quadris/Amistar treatments for most effective control should be applied before or at the time of infection to be most effective. Sugarbeet Advancement trial data from 18 trials over four years on all susceptible varieties and infection levels indicate a good to excellent economical return with an application of Quadris/Amistar at the 6-8 leaf stage on medium to heavy Rhizoctonia infestation and marginal response on low levels (see table five).

Table 1. – QUADRIS/RHIZOCTONIA TRIAL - 2002

TREATMENT	RWSA	Actual Yield T/A	Rhiz. Beets 1200 Ft.
RH-5 In-Furrow	5918	23.68	22
RH-5 Check	5377	22.07	132
E-17 In-Furrow 6 to 8 Leaf	5132	20.80	171
E-17 In-Furrow	4838	19.78	231
E-17 6 to 8 Leaf	4388	17.34	428
E-17 Check	4084	15.13	612
LSD 5%	902	2.08	161

Table 2. – QUADRIS/RHIZOCTONIA TRIAL - 2003

TREATMENT	RWSA	Actual Yield T/A	Rhiz. Beets 1200 Ft.
RH-5 In-Furrow	5591	21.40	148
E-17 In-Furrow / 6-8 Leaf	4381	17.37	353
E-17 In-Furrow	4290	16.71	539
E-17 2-4 Leaf / 6-8 Leaf Split	3843	15.23	551
E-17 2-4 Leaf	3683	15.00	632
RH-5 Check	3433	13.52	636
E-17 6-8 Leaf	3305	13.43	651
E-17 Check	1514	6.44	1453
L S D (5%)	568	2.29	249

Table 3. – AMISTAR/RHIZOCTONIA TRIAL - 2004

TREATMENT	RWSA	Actual Yield T/A	Rhiz. Beets 1200 Ft.
RH-5 In-Furrow	4682	17.44	22
RH-5 (2-4 Leaf)	4658	17.06	23
RH-5 Check	4640	16.83	103
E-17 Lo Rate (2-4 Leaf)	4324	15.72	340
E-17 In-Furrow	4290	15.77	290
E-17 (4-6 Leaf)	3939	14.25	377
E-17 (6-8 Leaf)	3856	13.85	339
E-17 (2-4 Leaf)	3792	14.06	389
E-17 Emergence	3679	13.66	479
E-17 Pre-Emergence	3494	12.89	503
E-17 Check	3436	12.66	647
L S D (5%)	644	1.96	139

Table 4. – COMBINED RHIZOCTONIA FUNGICIDE TRIALS

TREATMENT	RWSA	T/A	RWST	% Sugar	% CJP	Population 100 Ft. Row 10	20	30	Harvest	Rhiz.* Beets 1200 Ft.
						Day				
RH-5 In-Furrow	5397	20.84	260	17.69	94.48	66	213	242	215	64
RH-5 Check	4483	17.47	258	17.64	94.29	104	234	257	191	290
E-17 In-Furrow	4473	17.42	256	17.78	94.28	50	220	265	200	353
E-17 6-8 Leaf	3850	14.86	259	17.88	94.41	96	248	263	170	473
E-17 Check	3011	11.40	259	17.31	94.62	89	239	266	99	904
AVERAGE	4243	16.40	259	17.66	94.42	81	231	259	175	417
LSD (5%)	1131	4.01	NS	NS	NS	NS	30	NS	39	303
LSD (10%)	912	3.23	NS	NS	.28	51	24	NS	32	244

Table 5. – RESPONSE OF QUADRIS/AMISTAR APPLICATION AT DIFFERENT RHIZOCTONIA INFECTION LEVELS

Rhizoctonia Infection Level	# of Locations	RWSA		TONS		% Sugar		Gross $ Return*
		Check	6-8 Leaf	Check	6-8 Leaf	Check	6-8 Leaf	
Low	8	5221	5515	20.64	21.49	17.73	17.92	$37
Medium	5	4638	5076	17.59	18.84	18.29	18.42	$55
Heavy	5	3472	4473	13.42	17.16	17.60	18.05	$127