ALDER, CLARKE G.[1]* and OLIVER T. NEHER[2]. The Amalgamated Sugar Company, 138 West Karcher Road, Nampa, ID 83687 and [2]The Amalgamated Sugar Company, 1951 Saturn Way Suite 100, Boise, ID 83709. The efficacy of a penthiopyrad seed treatment on a Rhizoctonia resistant sugarbeet variety.

ABSTRACT

Penthiopyrad (Kabina®) is a broad-spectrum systemic fungicide for controlling foliar and soil borne plant fungi. It is marketed as a benefit to sugar beet producers through its ability to protect emerging seedlings from infection during the first weeks of plant stand establishment. *Rhizoctonia solani* is one of several soil borne fungi that frequently affect sugar beet crowns and taproots in the Treasure and Magic Valleys of Southern Idaho where much of the crop is furrow irrigated. It is an issue each year as growers strive to better manage their irrigation and has been a leading cause of yield and sugar loss wherever sugar beets are grown. In late 2013, the commercial use of penthiopyrad as a seed treatment for sugar beet was announced as a protection against seedling Rhizoctonia pressure.

In spring 2014, a trial was initiated at Weiser, ID to evaluate the efficacy of Kabina® as a seed treatment on sugar beets under natural inoculum conditions. Additional objectives of the trial were to 1) evaluate whether there is an overall advantage to planting seed treated with Kabina® on sugar beets already containing resistance to *R. solani* and 2) determine whether additional protection from a foliar fungicide is justified when using Kabina® as a seed treatment. Treatments were organized using two Roundup® ready seed varieties from the American Crystal Seed Company—one containing tolerance to *R. solani* (RR933) and one susceptible (RR892), and each variety contained four treatments: Untreated (U), Kabina® seed treatment only (K), Quadris® (azoxystrobin) only (Q), and Kabina® + Quadris® (KQ).

Six row plots were planted into clay loam soil at a depth of 0.5 inches on 8 April, 2014 using a six row Monosem vacuum planter. Stand counts were recorded weekly beginning at the first signs of emergence (to determine rate of emergence) until plots were thinned. A final stand count was also recorded at harvest to identify missing plants. At 42 days after germination all plots were hand-thinned to 170 beets/100 ft. of row. Agronomic practices were identical for both varieties and for the remainder of the cooperator’s field except for one additional in-season watering applied to the plots. Harvest was performed with a two row research harvester and only the two center rows of each plot were harvested. Disease incidence was rated at harvest using the IfZ rating scale from 1-9 with ratings of 1 having no disease and 9 being completely dead. Plots were also weighed and three tare samples were taken on the harvester after which the remaining beets were ground up and left in the field.

Differences in speed of emergence existed early however appeared only to be only variety driven (Table 1). Neither disease index nor yield had any significant differences between treatments. Some slight differences in sugar content were observed. Interestingly, RR933

produced significantly higher sugars in both the U and the K treated plots when compared to the RR892 with the same treatments. Differences in the amount of genetic Rhizoctonia resistance present in the two varieties could be a possible cause however, these data are not robust enough to rule out the possibility of the results being simply variety driven. There does appear to be a subtle trend (however not significant) in both varieties showing slightly higher sugar content on those plots treated with Quadris®. This could be a reflection of later season infection controlled by Quadris®. Since this trial was initiated with a grower/cooperator and naturally inoculated, some risk was assumed with low disease pressure being a possibility, and was likely the case, in this trial. Other data not presented suggest that there was likely a higher population of *Aphanomyces cochlioides*-affected sugar beets in the plots than those affected with *R. solani*. Working with grower-cooperators has its risks however we maintain that the benefits through cooperation with growers and exposure to true field settings often offer unique opportunities outside of simple trial data collection. In this case, data did not materialize as expected, however this trial will be repeated in subsequent crop years. Selection of the proper location will be the key if working with grower-cooperators in the future. *R. solani* is a problem that will continue to persist and we feel that Kabina® is still an important tool for growers/producers to have as a protection against early season Rhizoctonia infection.

Table 1. Stand, disease and yield data for penthiopyrad-treated sugar beets in Weiser, ID, 2014.

	Beets /100 ft. Row			Disease Index	Clean Yield	Sugar	ERS
Treatment[1]	7 DAG	21 DAG	42 DAG	%	t/a	%	Lbs/a
892 Quadris	4.67 b	25.57 b	19.83 a	31.50 a	50.01 a	14.44 bcd	12621 ab
892 Kabina + Quadris	5.08 b	25.63 b	18.08 a	33.05 a	46.52 a	14.41 cd	11734 b
892 Kabina	5.25 b	28.64 b	19.08 a	36.59 a	49.79 a	14.25 d	12468 ab
892 Untreated	5.75 b	26.68 b	19.83 a	34.06 a	47.94 a	14.30 d	12017 ab
933 Quadris	18.33 a	39.66 a	20.75 a	29.72 a	49.65 a	15.15 a	13259 ab
933 Kabina + Quadris	20.58 a	39.14 a	19.58 a	23.79 a	52.36 a	15.09 a	13821 a
933 Kabina	22.25 a	41.99 a	21.33 a	30.20 a	51.88 a	15.03 ab	13747 a
933 Untreated	20.83 a	41.82 a	19.92 a	31.42 a	51.12 a	14.98 abc	13567 ab
Tukey's HSD (P=.10)	6.473	3.070	3.670	.1829	6.9216	.6025	1979.976

[1] Treatment abbreviations are:
Q-Quadris application only
K-Kabina® seed treatment only
U-Untreated seed
KQ-Plots containing Kabina® seed treatment and Quadris application

ALDER, CLARKE G. Crop Consultant, The Amalgamated Sugar Company, 138 West Karcher Road, Nampa, ID 83687. The economics of skipping a glyphosate application on Roundup ready sugarbeets.

ABSTRACT

The advancement that is Roundup Ready Technology is one of the most significant changes in the history of the sugar beet crop. In decades past, growers have applied a myriad of herbicides in order to bring a healthy crop of sugar beets through to harvest. Due to the success of the technology, nowadays it is much more uncommon to find an unhealthy sugar beet crop due to weed competition. Since its introduction however, an increasing number of cases have occurred where sugar beet producers have become complacent, believing that fewer applications of glyphosate are necessary each season for a clean crop. In some instances, significant yield reduction has occurred as a result. By skipping or putting off necessary timely applications of the glyphosate, growers/producers are not maximizing yield and are allowing opportunities for resistant weeds to mature and reproduce. This trial began as a local educational tool for growers in the Treasure Valley of Idaho, but provides useful information for all sugar beet growers who are attempting to weigh the costs of particular applications of glyphosate against any yield loss they may incur by skipping the application.

Working with grower-cooperators, two trials were conducted during 2013 and 2014 under natural environmental conditions in Weiser and Payette, Idaho respectively. Six-row by 24 ft (7.3 m) plots were laid out shortly after planting at each site. All maintenance was done by the grower-cooperator except for spraying treatments. At both sites, seeds were planted during early April, into a sandy loam soil to a stand of 240 beets/100ft (30.5 m) using either a six-row Monosem vacuum planter or a 6-row Beck planter. Treatments were composed of several different programs containing varying numbers of applications of Roundup® Powermax (Table 1). Applications included 32 fl oz/a pre emergence (P), 26 fl oz/a post emergence at 2 leaf (2L), 26 fl oz/a post emergence at 8 leaf (8L), and 22 fl oz/a at row closure (RC). All applications contained a 3% v/v ammonium sulfate water conditioner adjuvant (Kicker Plus). Applications were done using a bicycle sprayer equipped with Teejet 11002 flat-fan nozzles spaced 22 in (56 cm) apart and calibrated to deliver 15 GPA (140 L/h) at 30 psi. In mid-September the two center rows of each plot were harvested using a custom research harvester. Weights for yield, sugar and tare samples were all taken on the harvester after which the remaining beets were ground up and left in the field.

The trial in 2013 at the Weiser location did not experience enough weed pressure to generate any viable data, therefore only the data from the Payette location in 2014 is presented. There were no significant differences in sugar beet stand or sugar content between any treatments and the untreated (Table 2). Weed control 90 days after row closure treatments were applied (DAT) was significantly lower for treatments containing only one or two glyphosate applications per season. Conversely, treatments containing three or more applications had excellent control and did not differ significantly. Sugar beet root yield had the greatest amount of variation. The untreated plot had significantly lower yield than any other treatment which shows that any amount of weed control is better than none at all. Interestingly, when treatments are grouped into those containing a pre emergence application and those that do not, treatments

containing pre emergence applications as part of their program did not experience as much yield loss as those without. This shows the importance of weed control early in the life of the crop and is in agreement with other research showing the similar results. From an economics standpoint, the amount saved by skipping a glyphosate treatment does not outweigh the amount left on the table through root yield loss in most cases, (Table 3) especially when the treatments skipped are during the earlier part of the growing season.

Growers are relying on data from research now more than in the past. Putting the data into a usable format, for example, financial costs to the growers, is extremely important and will further facilitate acceptance and application of future research results as growers are able to understand the possible implications of their own decisions.

Table 1. Table of glyphosate applications

Treatment	Program
Trt 1	Untreated
Trt 2	P, 2L, 8L, RC
Trt 3	P, 8L, RC
Trt 4	P, RC
Trt 5	2L, 8L, RC
Trt 6	8L, RC
Trt 7	RC

Table 2. Yield, stand count, and visual weed control data on sugar beets treated with glyphosate at different timings in Payette, 2014.

	Stand 30 DAE[1]	Control 30 DAT[23]	Control 90 DAT	Sugar	Yield
Treatment	Beets/100 ft. row	%			t/A
Untreated	178	0 e[5]	0e	26.52	8.36 d
P, 2, 8, RC[4]	184	100 a	100 a	15.97	43.44 a
P, 8, RC	185	100 a	100 a	15.56	42.16 ab
P, RC	186	97 c	99 b	15.90	41.13 ab
2, 8, RC	171	100 a	100 a	16.08	43.85 a
8, RC	170	99 b	100 a	15.54	38.29 b
RC	178	96 c	95 c	15.59	33.84 b
LSD (P=.10)	11.11	4.39	4.2	10.56	4.3

[1] Days after emergence
[2] Days after treatment
[3] Days after final row closure treatment
[4] Applications timings included pre emergence (P), 2 leaf stage (2), 8 leaf stage (8), and row closure (RC)

Table 3. Financial loss due to yield reduction in sugar beet crop at the Payette location in 2014.

	Treatments containing pre emergence applications[1]			Treatments with no pre emergence applications[2]			
	TRT 2	TRT 3	TRT 4	TRT 5	TRT 6	TRT 7	Untreated[3]
Yield Reduction	None	3%	5.6%	0%	12.7%	22.8%	80.7%
Yield (T/ac)	43.44	42.16	41.13	43.85	38.29	33.84	8.367
Return[4]	$195,480	$189,720	$185,085	$197,325	$172,305	$152,280	$37,652
Herbicide Cost[5]	$7,755	$5,827	$3,899	$5,697	$3,769	$1,841	$0
“Savings”	$0	$1,928	$3,856	$0	$1,928	$3,856	$7,755
Total Gross	**$187,725**	**$183,893**	**$181,186**	**$191,628**	**$168,536**	**$150,439**	**$37,652**
Difference[6]	$0	($3,832)	($6,539)	$0	($23,092)	($41,189)	($153,976)
Actual Lost Income[7]	$0	($1,904)	($2,683)	$0	($21,164)	($37,333)	($146,221)

[1] The totals listed in these treatments are in relation to treatment 2.
[2] The totals listed in these treatments are in relation to treatment 5.
[3] The totals for the untreated plots are in relation to treatment 2.
[4] Return is based on a fixed price of $45 per ton of beets and hypothetical 100 acre farm
[5] Herbicide costs included a custom applicator at $8.85/ac and chemical prices per ounce of roundup plus ammonium sulfate water conditioner.
[6] This is the difference from the total gross from the column with no yield loss.
[7] Difference subtract herbicide savings.