

# Russet Burbank Vine Management in Southern Alberta – 2<sup>nd</sup> Year

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## Purpose

In southern Alberta, diquat (Reglone™) is typically applied as a chemical desiccant. Recently, there has been interest in using vine rollers to mechanically damage vines to enhance vine kill, improve canopy penetration of diquat, compact soil, close soil cracks and reduce tuber greening. Our goal is to determine the rate of tuber bulking following various vine kill strategies. Also, we will study the effects of various methods of vine killing on tuber quality (specific gravity, stem-end discoloration and fry quality).

## Objectives

- To determine how much bulking occurs in potato tubers between Reglone™ application(s) and harvest.
- To compare rates of vine desiccation between Liberty™ application, single and split Reglone™ applications alone or following vine rolling.
- To determine the extent to which the method and rate of vine killing affects tuber quality (maturity, specific gravity, stem-end discoloration, fry quality).

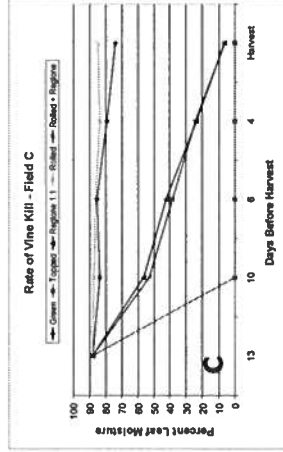
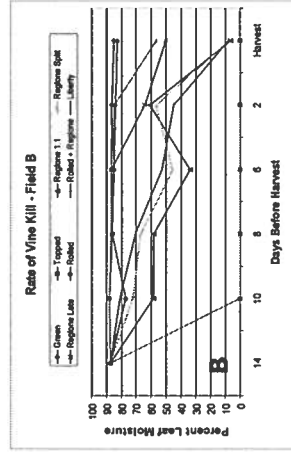
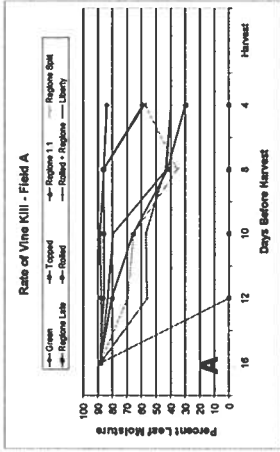


Figure 3: Moisture was determined from the fourth leaf of plants in each treatment area at intervals between application of desiccant and harvest as an indicator of the rate of vine kill.

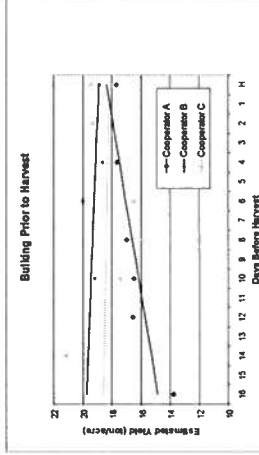
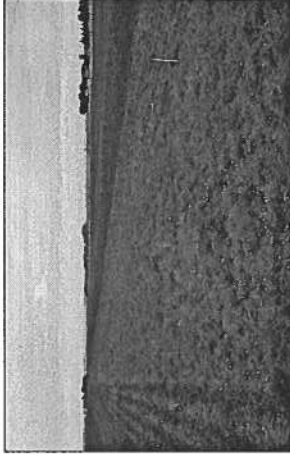


Figure 1: Yield estimates based on samples from untreated areas of each field hand-dug at intervals for two weeks prior to harvest.

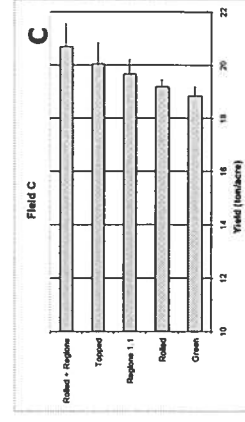
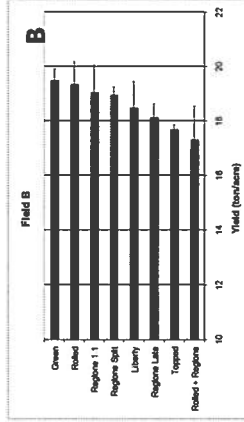
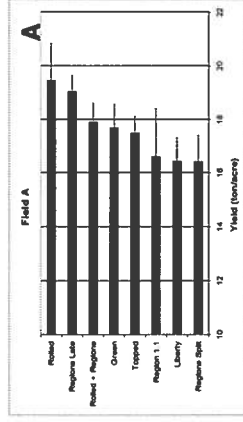
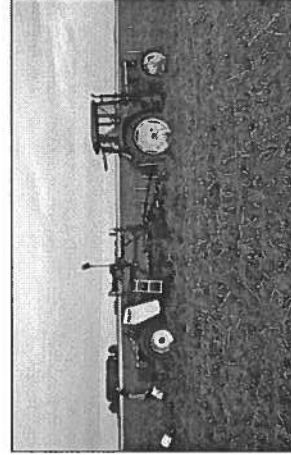


Figure 4: Yield (ton/acre) of tubers from 4 replicated 50' x 2 row samples in each treatment area at harvest.

## Project Plan and Treatments

The study was conducted in three commercial fields of Russet Burbank potatoes in the Taber and Cranford areas. Prior to harvest, vines were killed by single and split applications of Reglone™, alone and in combination with vine rolling. These treatments were compared with complete vine removal, green harvesting and Liberty™ application to establish rates of tuber bulking and vine desiccation following vine kill. Tuber yield, grade and quality will also be assessed for each treatment.

- Green Harvest - control (for determination of bulking)
- Topped - stems removed 14 days before harvest (14 dbh)
- Reglone 240™ - 1.2 L/ac - single application (14 dbh)
- Reglone 240™ - 0.8 L/ac (14 dbh) + 0.6 L/ac (7 dbh)
- Reglone 240™ - 1.2 L/ac - single application (7 dbh)
- Liberty™ - (14 dbh)
- Reglone + Liberty™ - 1.2 L/ac (14 dbh)
- Liberty™ - 1.2 L/ac (14 dbh)

## Acknowledgements

This project was supported through funding by the Potato Growers of Alberta and Alberta Agriculture, Food and Rural Development, and in-kind contributions of GBU Farms Ltd., Miyangga Farms Ltd., Perry Produce Ltd., Green Power, Syngenta, and Aventis.

## Note

Preliminary data from the 2001 field season was presented at the 2001 PGA Annual Meeting. We are still processing data from the 2002 field season. Specific gravity, size distribution, shrinkage and tuber quality will be assessed in the coming months. Data from at least two years will be evaluated before any general recommendations will be made.

## Observations

- Rolling resulted in similar leaf moisture to that in the untreated area of the field. Liberty generally resulted in a slower rate of desiccation than Reglone, yet the final leaf moisture values were similar. Reglone applications with and without rolling, and split applications of Reglone resulted in the same degree of desiccation. Late application of Reglone results in only partial vine kill.
- In 2002, no bulking was observed in two cooperator fields during the two weeks before harvest, but in one cooperator's field bulking averaged 0.14 ton/ac per day in the area of the field not desiccated.
- The treatment giving the greatest yield varied with each field. In all three fields, the maximum difference in yields between treatments was only 2 ton/acre. The yield response largely depends on the status of the potato crop in each field. Yields obtained from most treatments were not significantly different from the control (green) or from one another.

# Russet Burbank Vine Management in Southern Alberta

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## Purpose

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## Objectives

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- To determine the extent to which the method and rate of vine killing affects tuber quality (maturity, specific gravity, stem-end discoloration, fry quality).

## Project Plan and Treatments

The study was conducted in two commercial fields of Russet Burbank potatoes with different maturity levels. Prior to harvest, vines were killed by single and split applications of Reglone™, alone and in combination with vine rolling. These treatments were compared with complete vine removal, green harvesting and Liberty™ application to establish rates of tuber bulking and vine desiccation following vine kill. Tuber yield, grade and quality will also be assessed for each treatment.

- Green Harvest - control (for determination of bulking)
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- Reglone 240™ - 1.2 L/ac - single application (14 dbh)
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- Reglone 240™ - 1.2 L/ac - single application (7 dbh)
- Rolled - (14 dbh)
- Rolled + Reglone 240™ - 1.2 L/ac (14 dbh)
- Liberty™ - 1.2 L/ac (14 dbh)

## Acknowledgements

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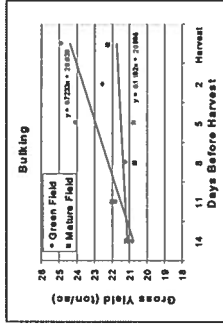
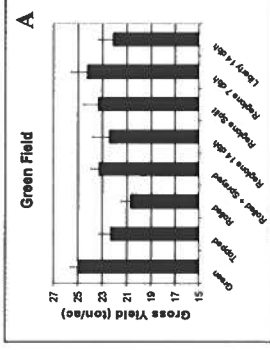


Figure 1: Estimated yield of tubers sampled from the green harvest treatment at three day intervals for two weeks prior to harvest in each field.

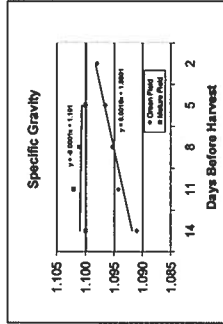


Figure 2: Specific gravity of green samples collected from the green harvest treatment at three day intervals for two weeks prior to harvest in each field.

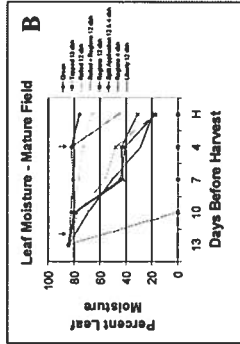
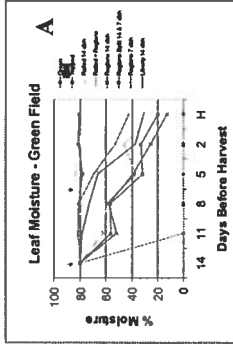
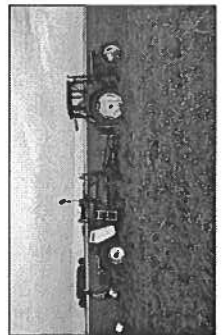
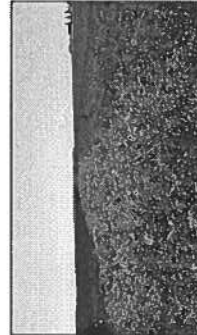
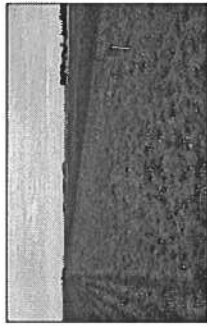


Figure 3: Moisture present in fourth leaf of plants in each treatment area between application of desiccant and harvest.

## Observations

- Tubers continued to bulk in the green harvest treatment an average of 0.7 ton/ac per day in the green field, but very little bulking was observed in the mature field in the 14 days prior to harvest.
- Specific gravity remained relatively stable in the green harvest treatment in the mature field prior to harvest. Specific gravity steadily increased in the green harvest treatment in the green field in the 14 days prior to harvest.
- The rate of desiccation with Liberty was very similar to the rate of desiccation with Reglone in the mature field, however, Liberty resulted in a slower rate of desiccation than Reglone in the green field.
- In the green field, the highest yield was observed in the green harvest treatment. Spraying at 7 dbh allowed for the most bulking among the desiccated treatments, but was not significantly different from other desiccated treatments.
- In the mature field, the rolled and sprayed treatment resulted in the highest yield. Other desiccation treatments resulted in less tuber bulking.
- Rolling alone reduced tuber yield in both fields, possibly because of renewed vegetative growth in the mechanically damaged plants.

## Note

We are still processing data from the 2001 field season. Size distribution, skin set and tuber quality will be assessed in the coming months. Also, at least one more field season will be required before broad recommendations can be made.

Figure 4: Yield of tubers from each treatment area at harvest.

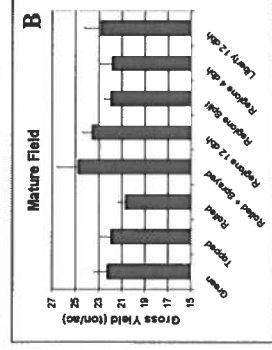


Figure 4: Yield of tubers from each treatment area at harvest.

A - green field; B - mature field.

# A Comparison of Treatments for Control of *Rhizoctonia* on Potatoes – 2<sup>nd</sup> Year



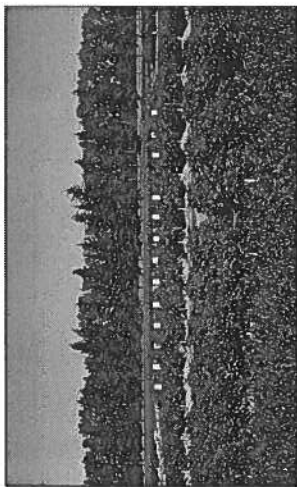
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## Purpose

*Rhizoctonia solani* reduces potato yields as a result of stem and stolon cankers and reduces marketability by causing black scurf on tubers. Few commercial chemical treatments are available to Canadian growers, but a number of products are registered in the U.S. Today's consumers are more and more conscious of food safety and environmental issues, yet still expect an abundant food supply of high quality. New control products utilize natural biochemistry and beneficial microorganisms to control plant diseases. The purpose of this research project is to assess the effectiveness of several biocontrol products, including Alberta isolates of *Trichoderma*, for control of *R. solani* and to compare these with chemical control products about to enter the Canadian market place.

## Objective

- To compare various biocontrol and chemical seed piece treatments for efficacy at controlling *R. solani* on fresh market potatoes



## Project Plan and Treatments

Yukon Gold and Russet Burbank potatoes with visible black scurf/sclerotia were planted in six replicated blocks of 30 ft. rows at the Crop Diversification Centre in Brooks, AB. Guard rows were planted in the outside rows of each block to minimize edge effects. Each block consisted of the following treatments:

- Control - black scurf on seed, no seed treatment
- Check - no black scurf on seed
- Maxim PSP (fluidoxonil) seed treatment
- Quadris (azoxystrobin) in furrow at planting
- Maxim PSP + Quadris in furrow
- Trichoderma* in furrow at planting
- Senator (thiophanate-methyl) seed piece treatment
- ENG0500, rate 1 seed piece treatment
- ENG0500, rate 2 seed piece treatment
- L1210-A1, rate 1 seed piece treatment
- L1210-A1, rate 2 seed piece treatment
- L1049-A1 + G7050-00 seed piece treatment
- 94815A seed piece treatment
- 94815B foliar treatment
- 94815C seed piece and foliar treatments

Date of emergence, stand counts and stem counts were taken during the season. At approximately 50 days after planting, 10 hills were hand dug and stem canker was assessed. The remaining potatoes were top killed in late August and harvested in September. Tubers were graded and samples of 25 marketable tubers were assessed for black scurf.

## Acknowledgements

This project was supported through funding by the Potato Growers of Alberta, Alberta Agriculture, Food and Rural Development, Syngenta, Heads Up Plant Protectors, Gustafson and Engage Agro.

Figure 1: Stem canker ratings (0 = none to 5 = girdled) at 50 days after planting were used to calculate a weighted stem canker index.

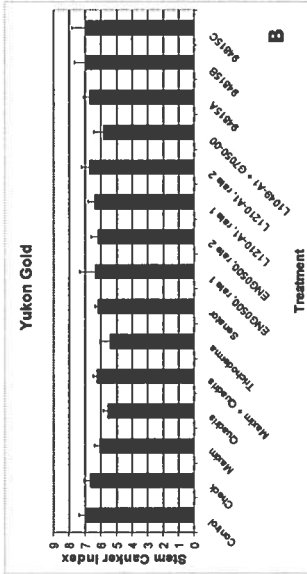
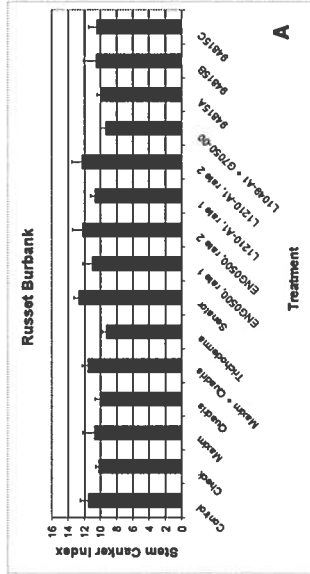
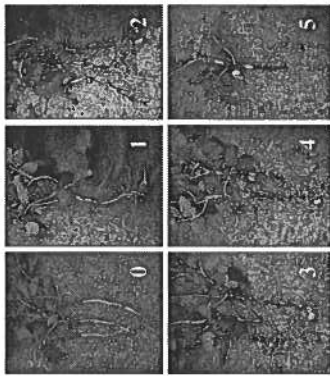


Figure 2: Stem canker index (0 = none to 100 = all girdled) for Russet Burbank (A) and Yukon Gold (B) potatoes treated with various products for control of *Rhizoctonia*.

## Note

Preliminary data from the 2001 growing season were presented at the 2001 PGA Annual Meeting. We are still processing data from the 2002 field season. Data from 2001 and 2002 must be evaluated before broad recommendations can be made.

## Observations - Yukon Gold

- Emergence dates were not significantly different between control plants and treatments.
- Stem canker index values were quite low in 2002. As a result, differences between treatments are not dramatic. Maxim PSP, Quadris, Trichoderma, ENG0500, L1210-A1, L1049 + G7050-00 and 94815 treatments reduced stem canker in Russet Burbank potatoes relative to the control. Most treatments reduced stem canker in Yukon Gold relative to the control.
- Total yield was not significantly different between treatments, however, the mean total yield was greatest from Russet Burbank seed treated with Maxim PSP, L1210-A1 and Trichoderma, L1210-A1 and Yukon Gold seed treated with Maxim + Quadris, Trichoderma, L1210-A1 and L1049-A1 + G7050-00 and Yukon Gold foliage treated with 94815.
- Black scurf on the potatoes will be evaluated between 1 and 3 months in storage.

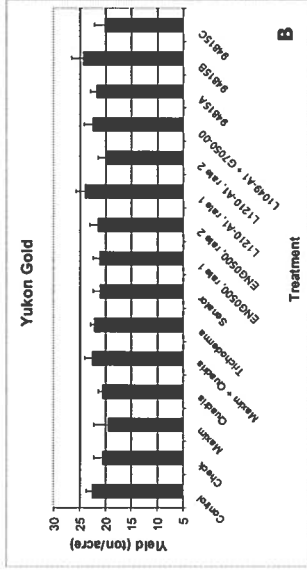
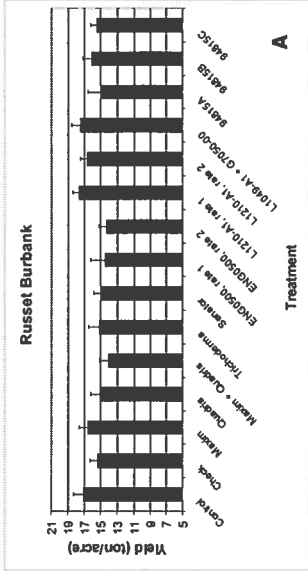
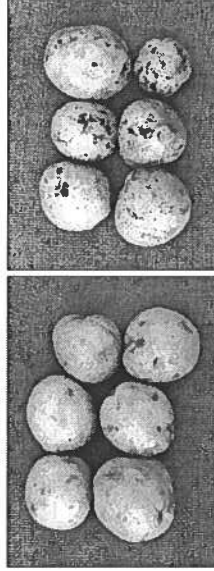


Figure 3: Total yield (ton/acre) of Russet Burbank (A) and Yukon Gold (B) potatoes from plants remaining after stem canker data was obtained. Plants were harvested at approximately 100 days after planting.



# A Comparison of Biocontrol and Chemical Seed Piece Treatments for Control of Rhizoctonia on Potatoes

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## Purpose

*Rhizoctonia solani* reduces potato yields as a result of stem and stolon cankers and reduces marketability by causing black scurf on tubers. Few commercial chemical treatments are available to Canadian growers, but a number of products are registered in the U.S. Today's consumers are more and more conscious of food safety and environmental issues, yet still expect an abundant food supply of high quality. New control products utilize natural biochemistry and beneficial microorganisms to control plant diseases. The purpose of this research project is to assess the effectiveness of several biocontrol products, including Alberta isolates of *Trichoderma*, for control of *R. solani* and to compare these with chemical control products about to enter the Canadian market place.

## Objectives

- To compare various biocontrol and chemical seed piece treatments for efficacy at controlling *R. solani* on fresh market potatoes.
- To determine if *Trichoderma* spp. isolated from soils in southern Alberta are effective as biocontrol agents for *R. solani* on fresh market potatoes.

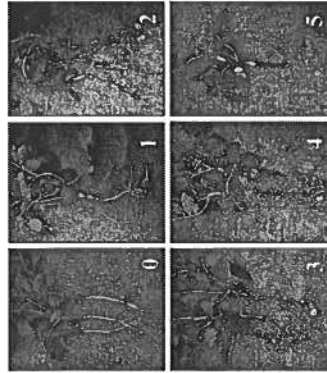


Figure 1: Stem canker ratings calculated from stem canker scores (0 = none to 5 = girdled) for individual stems of 8 Yukon Gold plants per treatment at approximately 50 days after planting.

## Project Plan and Treatments

Yukon Gold, Norland, Russet Burbank and Penta potatoes were planted in four replicated blocks of 20 ft. rows at the Crop Diversification Centre in Brooks, AB. Guard rows were planted in the outside rows of each block to minimize edge effects. Each block consisted of the following treatments:

- Control - no seed treatment
- Control + *R. solani* inoculum
- Quadris (azoxystrobin) in furrow at planting + *R. solani* inoculum
- Maxim PSP (fludioxonil) seed treatment + *R. solani* inoculum
- Maxim PSP + Quadris in furrow + *R. solani* inoculum
- Blocker (penachloronitrobenzene) in furrow at planting + *R. solani* inoculum
- Senator (biphenylate-methyl) seed piece treatment + *R. solani* inoculum
- ENG0516 (thiophanate-methyl + ?) seed piece treatment + *R. solani* inoculum
- CDSC30 (*Trichoderma*) in furrow at planting + *R. solani* inoculum
- 94815A seed piece treatment + *R. solani* inoculum
- 94815B seed piece treatment + *R. solani* inoculum
- 94815C seed piece treatment + *R. solani* inoculum

Date of emergence, stand counts and stem counts were taken during the season. At approximately 50 days after planting, 8 hills were hand dug and stem canker was assessed. The remaining potatoes were top killed in September and harvested. Tubers were graded and samples of 50 marketable tubers were assessed for black scurf.

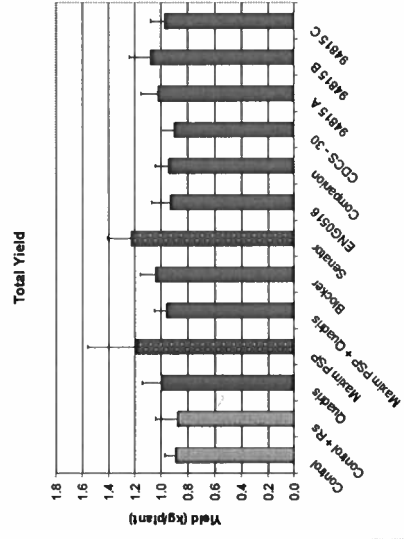
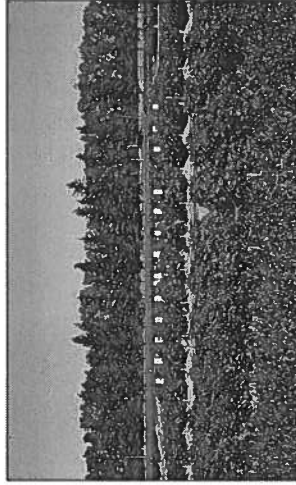
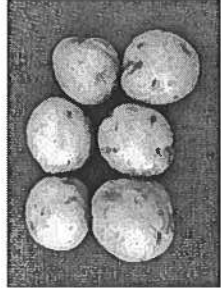


Figure 2: Total yield (kg/ha) of Yukon Gold tubers from plants remaining after stem canker data was obtained. Plants were harvested at approximately 130 days after planting.

## Acknowledgements

This project was supported through funding by the Potato Growers of Alberta and Alberta Agriculture, Food and Rural Development, Syngenta, Heads Up Plant Protection, and Engage Agro. In-kind contributions were provided by BASF, Growth Products, Soil Technologies Corp., and Bioworks, Inc.



## Black Scurf

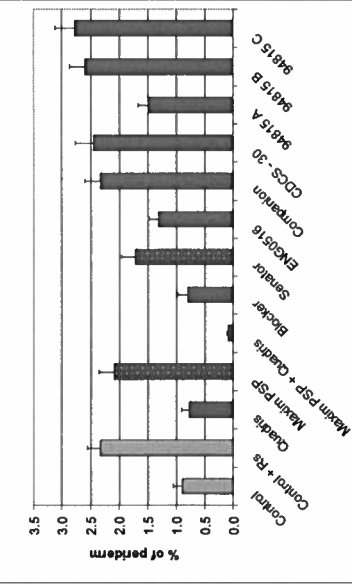


Figure 3: Average black scurf (percentage of periderm) observed on a sample of 50 marketable Yukon Gold tubers approximately one month after harvest.

## Observations - Yukon Gold

- Emergence dates were not significantly different between control plants and treatments.
- All of the chemical treatments reduced the mean stem canker index relative to the inoculated control. Maxim PSP alone or in combination with Quadris in furrow resulted in the lowest stem canker index. Two biological controls, CDSC 30 and 94815C also reduced mean stem canker index relative to the inoculated control.
- Total yield was not significantly different between treatments, however, the mean total yield was greatest from seed treated with Maxim PSP or Senator.
- There were significant differences in black scurf severity between treatments. All of the chemical treatments except Maxim PSP resulted in less black scurf than the inoculated control. The least black scurf was observed on tubers treated with both Maxim PSP and Quadris in furrow. Among the biocontrol products tested, only 94815A reduced black scurf relative to the inoculated control.

## Note

We are still processing data from the 2001 field season. Only data from the Yukon Gold samples are presented here. Also, at least one more field season will be required before broad recommendations can be made.