Change in the *Rhizoctonia solani* index on the stems and stolons of four potato cultivars during the growing season

R.C. Zimmer[1]

A survey, for the incidence of Rhizoctonia *solani* infection of stems and stolons, was taken on 12 commercial potato fields from June to August in 1982. In general the number of stems decreased during the survey period, while the Rhizoctonia Index (R.I.) increased markedly from June to July and levelled off from July to August. The levelling off of the R.I. on the stems may have been influenced by the amount of girdling and pruning. Although stolon pruning increased from July to August the number of stolons and tubers also increased.

Can. *Plant Dis. Surv. 68:1, 5-6, 7988.*

Douze champs de pommes de terre commerciaux ont été examinés entre juin et août 1982 afin d'établir la fréquence d'infection des tiges et des stolons par *Rhizoctonia solani.* En général, le nombre de tiges a diminué au cours de la durée de l'enquête, tandis que l'indice d'infection par *Rhizoctonia* a augmenté de façon notable de juin à juillet et s'est stabilisé de juillet à août. La stabilisation de l'indice d'infection des tiges par *Rhizoctonia* pourrait être attribuable à l'ampleur de l'émondage et à la quantité d'incisions annulaires. Même si l'émondage des stolons a pris de l'ampleur de juillet à août, le nombre de stolons et de tubercules a Bgalementaugmenté.

Introduction

Numerous field studies have been carried out on various aspects of Rhizoctonia disease of potatoes. Recent investigations indicate that stem canker originates early in the development of the shoots and once the shoots have emerged the stems become less susceptible (6), whereas stolons become increasingly susceptible throughout growth (2). Other research has shown that stem canker as well as stolon infection increased between successive samplings during July and September (4). Hide et *al.* (5) showed that only severe infection by *Rhizoctonia solani* Kuhn. decreased the number of main stems per plant in cv. Majestic, however, disease assessments were not made over a period of time during the growing season. Hide and Bell (3) found that shoot emergence and stem population were not usually affected, although in one experiment, inoculating with R *solani* decreased numbers of stems/plant at one location but not at another.

To determine the incidence of R *solani* infection of stems and stolons at different growth stages on four potato cultivars, a survey of twelve commercial potato fields in Manitoba was made in 1982 during the period, June to August.

Methods

Twelve fields of two large potato producers in southern Manitoba, comprising four cultivars, were selected for survey in 1982. The fields were assessed on June 4, July 14 and August 12. Twenty plants were collected from each field on each date by selecting five consecutive plants from each of four widely spaced locations. The degree of R *solani* infection on stems (Table 1) and stolons (Table 2) included the number of healthy stems or stolons and the stems or stolons cankered, girdled or pruned. A Rhizoctonia Index (R.I.) was calculated using the formula (1):

$$\text{R.I.} = \frac{\Sigma(\text{Class}^2 \times \text{number of stems or stolons per infection class})}{\text{Total number of stems or stolons}}$$

Since stolon development was not far enough advanced by June 4, assessments of stolons were made only on July 14 and August 12. Because production practices varied amongst fields no attempt was made to make statistical comparisons of cultivars.

Results and discussion

In general, the results of this survey indicate that the number of stems decreased during the period June to August across all cultivars, while the R.I. increased markedly from June to July and then levelled off from July to August. The levelling off of the R.I. from July to August may have been influenced by the amount of girdling and pruning of stems. The amount of girdling and pruning remained level in Russet Burbank and Pontiac and decreased in Norland and Norchip.

It may be that the increase in R.I. from June to July caused some reduction of stem numbers. It also may be that other factors affected stem production. Toosey (7) reported that spacing between plants should be taken into account in attempting to explain numbers of main stems that develop. In this study plant spacing did not seem to be important as it varied amongst cultivars and a decrease in stem number occurred for all cultivars.

Although stolon pruning had increased from July to August in all cultivars the number of stolons and tubers also had increased except for Norland. In cultivars Norland and Pontiac stolon production appeared to correlate somewhat with change in the R.I., whereas in Norchip and Russet Burbank as R.I. increased stolon numbers increased. Because of the diversity of production practices such as crop rotation, fungicide treatment of mother tubers, row spacing, date of seeding, and fertilizer and herbicide application by the producers in this survey, comparison of cultivars is difficult. Similar trends occurred on plants from similar mother tubers planted in 1982 in plots at the Morden Research Station in which potatoes had not previously been grown.

[1] Agriculture Canada, *Research* Station, Morden, *Manitoba, ROG 1JO.*
Accepted for *publication* October *29, 1987.*

Table 1. Mean index of *Rhizoctonia solani* infection (± SEM) on stems of potato cultivars under commercial production in southern Manitoba in 1982[1].

	Rhizoctonia Index			Total No. of Stems /Mother Tuber		
Cultivar	June	July	August[2]	June	July	August
Norland	1.9±0.1	3.5k0.8	3.8±0.4	6.4	6.0	4.5
Norchip	1.7±0.2	3.3±1.1	3.2±0.6	4.7	3.7	3.9
Russet Burbank	1.7-10.8	4.2k1.1	3.8±1.2	4.7	4.3	4.0
Pontiac	1.7±0.4	2.6±1.4	2.3±0.9	5.2	3.8	3.7

1 Number of plants sampled per cultivar: Norland - 80, Norchip - 80, Russet Burbank - 40, Pontiac - 40
2 Sampling dates: June 4, July 14, August 12

Table 2. Mean index of *Rhizoctonia solani* infection (± SEM) on stolons of four potato cultivars under commercial production in southern Manitoba in 1982'.

	Rhizoctonia Index		Total No. of Stolons /Mother Tuber	
Cultivar	July	August	July	August
Norland	3.3±0.8	4.8±0.6	35.6	33.9
Norchip	2.033.1	2.8±0.2	14.6	20.6
Russet Burbank	3.4±0.1	3.8±0.4	10.2	28.7
Pontiac	5.2±0.1	4.2±0.3	23.4	25.5

1 Number of plants sampled per cultivar: Norland - 80, Norchip - 80, Russet Burbank - 40,.Pontiac - 40
2 Sampling dates: July 14, August 12

Acknowledgement

The author thanks the students of the Summer Youth Job Corps Program for their assistance in collecting the data.

Literature cited

1. Davis, J.R. and M.D. Groskopp. 1979. Influences of the Rhizoctonia disease on the production of the Russet Burbank potato. Amer. Pot. J. 56:253-264.
2. Glendenning, D. 1965. Some aspects of the infection of potato stolons by *Rhizoctonie soleni.* European Potato J. 8:189-190.
3. Hide, G.A. and F. Bell. 1978. Healthier seed potatoes. I. Effects of inoculating stem cutting stocks with *Polyscytalum pustulans* and *Rhizoctonie soleni* on growth yield and diseases. Ann. Appl. Biol. 90:417-425.
4. Hide, G.A. and G.R. Cayley. 1982. Chemical techniques for control of stem canker and black scurf *Rhizoctonie soleni* disease of potatoes. Ann. Appl. Biol. 100:105-116.
5. Hide, G.A., J.M. Hirst and O.J. Stedman. 1973. Effects of black scurf *Rhizoctonie* soleni on potatoes. Ann. Appl. Biol. 74: 139-148.
6. van Emden, J.H. 1965. *Rhizoctonie solani:* Results of recent experiments. European Potato J. 8: 188-189.
7. Toosey, R.D. 1963. The influence of sprout development at planting on subsequent growth and yield. *In:* The growth of the Potato, eds., J.D. Irvins and F.L. Milthorpe. Butterworths, London.