# Relationship between root lesion nematodes and potato yields

*J. Kimpinski[1] and K.B. McRae[2]*

Numbers of ***Pratylenchus penetrans*** in experimental potato plots were recorded at planting over a seven-year period. Subsequent tuber yield increases (cv. Superior) after treatment with aldicarb in comparison to untreated plots were recorded also. A straight-line relationship gave an estimate of expected yield increases after treatment. Further studies at other locations and with other cultivars should make numerical relationships of this type useful for a nematode advisory service.

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Sur une période de sept ans, on a noté au moment de la plantation le nombre de ***Pratylenchus penetrans*** présents dans des parcelles expérimentales de pommes de terre. On a aussi consigné les augmentations de rendement en tubercules (cv. Superior) après un traitement à l'aldicarbe en comparaison avec les parcelles non traitées. Une relation linéaire permet d'évaluer l'augmentation de rendement après traitement. Des études plus poussées à d'autres endroits et avec des cultivars différents devraient permettre à un service de consultation sur les nematodes d'utiliser ces relations numériques.

## Introduction

The deleterious effect of the root lesion nematode, *Pratylenchus penetrans* (Cobb) Filipjev and Sch. Stek. 1941, on potatoes has been demonstrated in Michigan (Bernard and Laughlin 1976, Vitosh *et al.* 1980) and Ontario (Olthof and Potter 1973, Olthof *et al.* 1985). A previous investigation on Prince Edward Island showed that tuber yields improved when fields harboring large populations of ***P. penetrans*** were treated with a nematicide (Kimpinski 1982). The extent of the yield increases in the above studies appeared to be related to the size of the root lesion nematode populations at planting. This paper examines the relationship between numbers of ***P. penetrans*** at planting and the resulting percentage tuber yield increases of potatoes (cv. Superior) in experimental plots treated with aldicarb as compared to untreated plots.

## Materials and methods

Aldicarb (Temik 15G) was applied at planting in the furrow at 2.24 kg/ha a.i. in each of the seven years. Small whole tubers of Elite III seed were planted in late May or early June at 30 cm intervals in rows **6** m long and 0.9 m apart. There were 4 rows in each plot and the 2 centre rows were harvested in the middle of October. Yield measurements were limited to tubers with no obvious defects in the weight range of 113-340 g (4-12 oz). Recommended cultural and fertilizer practices were followed. Endosulfan and mancozeb were applied as needed for insect and late blight control, respectively. Diquat was applied as a top killer. The soil was a fine sandy loam with an approximate particle size distribution of 70% sand, 20% silt, and 10% clay, and a pH range of 5.1-6.0.

The number of nematodes in soil just prior to treatment was estimated by removing 10 cores, 20 cm in depth from each plot. Each sample was thoroughly mixed and a 50-g subsample was placed in a Baermann pan (Townshend 1963). After 7 days at room temperature, root lesion nematodes which had emerged from soil were counted at 60X with a stereomicroscope. Nematode data were expressed as numbers per kg of dry soil and transformed to logarithms for statistical computations. Yield increases in aldicarb-treated plots as compared to untreated plots were expressed as percentages and transformed to angles (arcsines). Means for the correlation and regression computations were based on at least 4 replicates in each year.

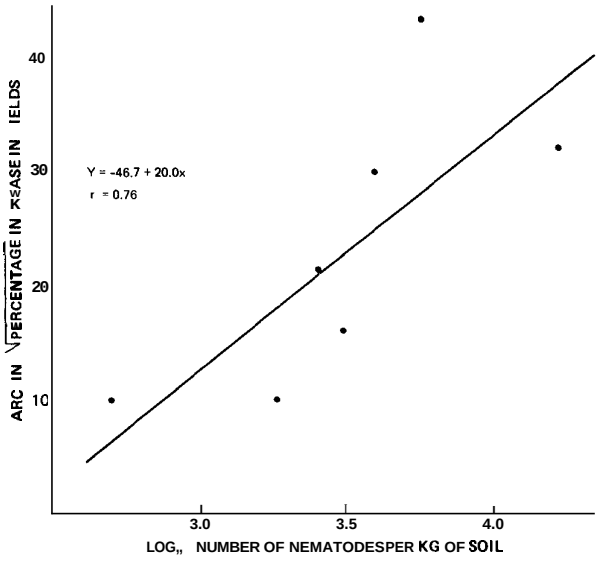


Figure 1. Relationship over seven years between percentage increase of yields in potato cv. Superior after treatment with aldicarb at 2.24 kilograms active ingredient per hectare and numbers of ***Pratylenchus penetrans*** in soil at planting.

[1] ***Nematologist, Agriculture Canada Research Station, Charlottetown, P.E.I. C1A 7M8.***

[2] ***Regional Statistician, Agriculture Canada Research Station, Kentville, N.S. B4N 1J5.***

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Table 1. Numbers of ***Pratylenchus penetrans*** at planting and corresponding yield increases of potato cv. Superior after treatment with aldicarb.

| Year | Numbers of Nematodes per kg of dry soil at planting | Yield increase* (%) |
|---|---|---|
| 1980 | 500 | 3 |
| 1981 | 1900 | 3 |
| 1982 | 2500 | 13 |
| 1979 | 3100 | 8 |
| 1983 | 3900 | 25 |
| 1978 | 6000 | 47 |
| 1984 | 17000 | 28 |

* Difference between untreated plots and plots treated at planting with aldicarb at 2.24 kg active ingredient per hectare.

## Results and discussion

Table 1 shows the numbers of *P.* penetrans at planting and the corresponding yield increases in Superior potatoes when aldicarb was applied in experimental plots over a seven-year period at the Charlottetown Research Station. Large yield increases were realized when aldicarb was applied to plots which contained 3900 or more nematodes per kg of soil at planting. Figure 1 describes the same relationship when percentage yield increases after treatment and given levels of nematodes at planting were transformed to angles (arcsines) and logarithms, respectively.

Most field samples from the Maritime provinces which are processed at the Charlottetown Research Station contain between 1,000 and 10,000 root lesion nematodes per kg of soil. Therefore, the expected yield gain after treatment could be estimated from this straight-line relationship, if information were available on the size of nematode populations at planting. It is likely that a curvilinear relationship would be more appropriate when nematode populations are very large. However, it should be stressed that the sampling scheme in this study provided estimates only to within about 50% of the true population mean (Proctor and Marks 1974). Further studies at other locations with varying soil and weather conditions, and with other cultivars should alleviate some of the variability. In the meantime, estimates of potential yield gains or losses, and advice on nematicide treatments should be dispensed with a cautionary note.

## Literature cited

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