The Importance of weeds in a virus - nematode interaction

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Introduction

When virus infected nematodes feed on plant roots, they spread Tobacco Rattle Virus (TRV) to crops and weeds. As weed roots may act as a resevoir for the virus, does the presence of weeds increase the problem for organic farmers? Two sites where TRV has recently been a problem were compared. An organic site and an intensively managed site where herbicide is used.

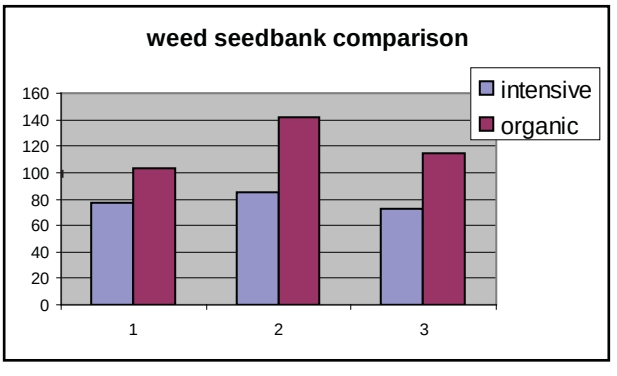
Tobacco Rattle Virus infected potato

Lynn collected soil samples

Weed seedbanks

Weeds emerging from soil samples were counted and significant difference was found between the sites, (P=0.026).

There were more weeds in the seedbank at the organic site



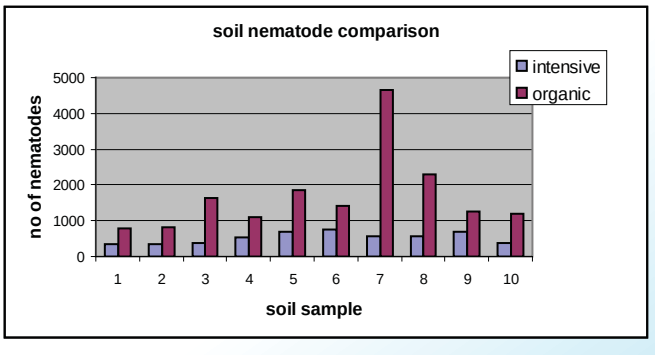
Intensive management seedbank

Organic management seedbank

Soil Nematodes

Nematodes were extracted from 300g soil samples and the counts showed significant difference between the sites (P<0.001).

There were more nematodes at the organic site

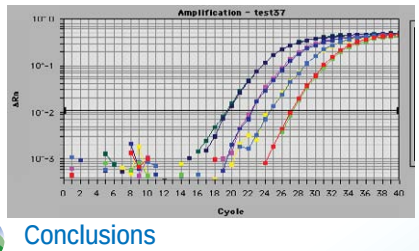


soil nematodes

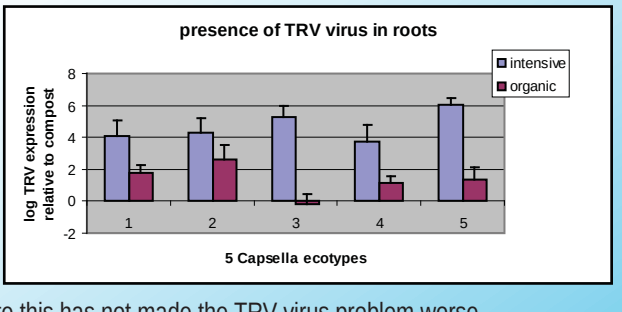
Capsella bursa pastoris pot experiment

Capsella bursa pastoris (a common arable weed) was grown on soil from each site and the roots were then tested using RT-PCR for presence of the virus. There was significant difference between the sites (P<0.001).

Virus was found at the intensive site.
No virus was found at the organic site
(no statistical difference from compost control).



RT-PCR was carried out using ABI (Applied BioSystems 7500 Fast real-time PCR system).



Conclusions

This experiment suggested that in spite of the presence of weeds at the organic site this has not made the TRV virus problem worse. After 5 years of low in-put farming, TRV was not detected. Healthy soil with high populations of diverse nematodes and soil invertebrates may have reduced the populations, through density dependent competition and predation, of the species of nematode which transmits the virus.

References

- Mumford,R.A., Walsh, K., Barker, I., Boonham, N. (2000) *Phytopathology* 90, 448-453.

- Iannetta P.P.M., Begg, G.S., Hawes, C., Young M., Russell, J., Squire, G.R. (2007) *Physiologia Plantarum* 129, 542-554.

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