

The effect of organic amendments on clubroot (*Plasmodiophora brassicae*)

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ABSTRACT

Clubroot (*Plasmodiophora brassicae*) is an important disease of organic brassica crops. Organic soil amendments were added at realistic rates and times to infested organic soil in pot trials in order to evaluate their effect on the disease. Both chitin and straw amendments reduced disease incidence compared to other amendments but straw also reduced plant vigour.

Keywords: disease management; organic amendments; clubroot

INTRODUCTION

Organic soil amendments and conditioners, traditionally used by organic growers as part of soil fertility programmes, also have potential against a variety of disease problems (e.g. Lazarovits *et al.*, 2001). Clubroot is a serious disease of organic brassica crops, normally controlled by rotation, although resting spores are capable of remaining viable in soil for extended periods. Organic amendments might have potential for use in clubroot management programmes where the disease proves an intractable long-term problem. For that reason, this trial aimed to assess the ability of twelve organic soil amendments to suppress the occurrence and severity of clubroot symptoms on a susceptible brassica. A biological soil conditioner, containing *Pythium oligandrum*, was included for comparison. A summary of the results and their implications are briefly discussed in this paper.

MATERIALS AND METHODS

Infected soil was obtained from two HDRA reference farms and amendments added at realistic field application rates and timings. A plant bioassay was carried out using oil seed rape seedlings (var Broad Leaf Essex) in pots containing the amended soil. The trial design was a randomised complete block with six replicates kept under conditions likely to favour disease development. The seedlings were assessed for disease symptoms and vigour after six weeks using standard keys (Anon., 1976). The results of the trial were analysed using the SYSTAT 8.0 statistical package. Soil pH was measured at the beginning and end of the trial and N availability estimated in order to aid interpretation of results but neither is reported on in detail in this paper.

Table 1. Summary of trial results

Amendment	Clubroot (1-9)	Plant Vigour (1-9)	Stem Length (cm)	Root Length (cm)	Dry Plant Weight (g)
Vetch	4.8	2.3	18.3	8.0	0.83
Rye	4.4	2.7	18.8	6.9	0.77
Clover	4.7	2.7	19.1	7.2	0.83
Cabbage	4.5	2.7	18.4	7.8	0.73
Straw	1.7	7.0	9.3	11.5	0.19
Compost	5.2	3.0	17.3	7.7	0.76
Seaweed Meal	4.9	2.7	16.5	8.2	0.76
Chitin	1.1	2.0	19.3	10.5	0.84
Neem	6.2	3.0	18.3	6.1	0.82
Manure	4.9	3.0	18.1	6.9	0.84
Composted Manure	5.4	3.0	17.6	7.6	0.83
Calcified Seaweed	6.9	3.0	17.1	7.3	0.81
Polyversum	7.1	3.0	16.4	6.3	0.78
Untreated	5.9	2.5	17.8	7.1	0.84
significance	**** ^a	***	***	***	***
s.e.	0.46	0.26	0.44	0.53	0.03

^a *** 0.001 > p > 0.001 < p < 0.01 * 0.01 < p < 0.05 ns not significant

RESULTS AND DISCUSSION

There were significant differences between treatments for all the variables examined (Table 1). However, the differences tended to be across the range of treatments rather than between the amended and unamended (control) treatment indicating that some amendments tended to perform better and some worse than the unamended check. Straw and chitin generally reduced clubroot symptoms compared to other amendments. However, straw reduced seedling vigour considerably. Seedlings in both straw and chitin amended soil tended to have longer roots when compared to other amendments. The effects observed are probably due to a combination of pH effects on the disease and nutrient effects on the plant. The trial results indicate that amendments might play a role in clubroot management if the idea was developed in more detail.

REFERENCES

- Anon (1976) Manual of plant growth stage and disease assessment keys. ADAS Plant Pathology Laboratory, MAFF, UK.
- Lazarovits G; Tenuta M; Conn K L (2001) Organic amendments as a disease control strategy for soilborne diseases of high-value agricultural crops. *Australasian Plant Pathology*, **30**, 111-117.