

Is the infection rate of cyst and root-knot nematode eggs related to the saprotrophic competitiveness of different isolates of *Pochonia chlamydosporia*?

Imran A. Siddiqui^{1,2}, Simon D. Atkins² and Brian R. Kerry²

¹Govt. Degree College, Bufferzone, North Karachi, Karachi-75850, Pakistan.

²Nematode Interactions Unit, Rothamsted Research AL5 2JQ, U.K.

INTRODUCTION

Pochonia chlamydosporia is a facultative parasite of root-knot and cyst nematodes

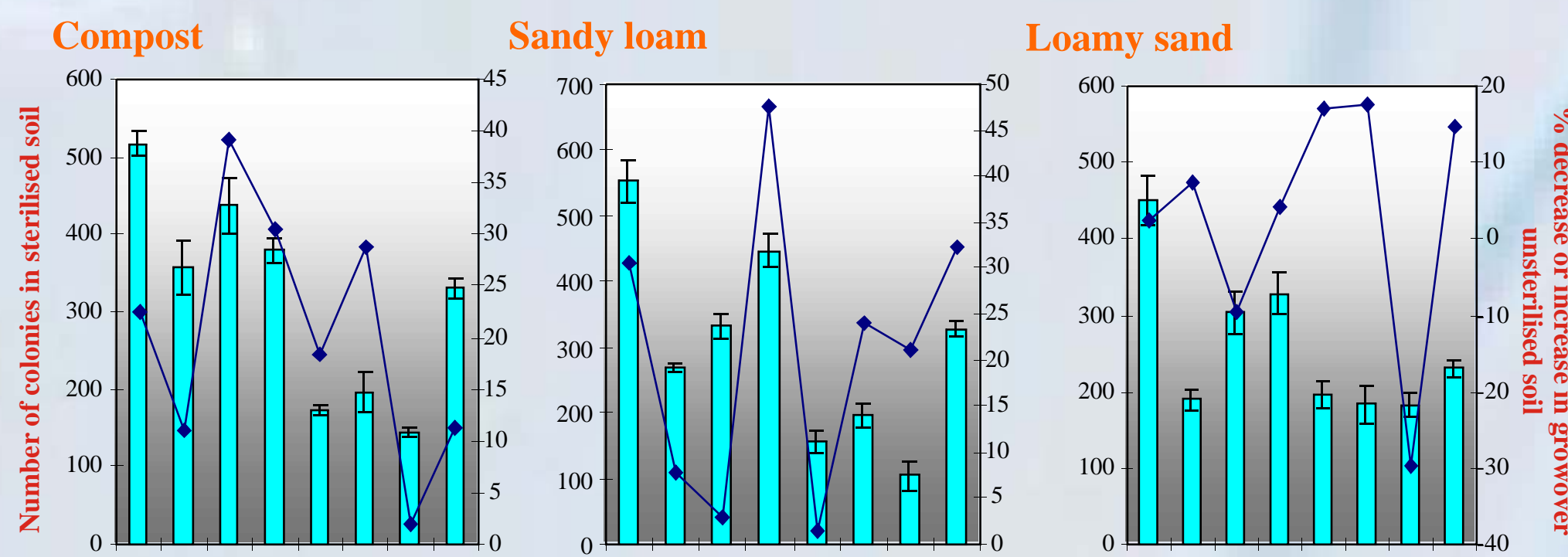
Little is known of the saprotrophic phase of the fungus, which is important for its establishment in the soil and rhizosphere

Successful exploitation of the fungus will depend on a comprehensive understanding of its biology, in particular identification of those attributes which determine virulence and saprotrophic competitiveness.

Spread in soil

The growth and spread of the isolates of *Pochonia chlamydosporia* in soils of different texture was assessed using a nylon mesh technique

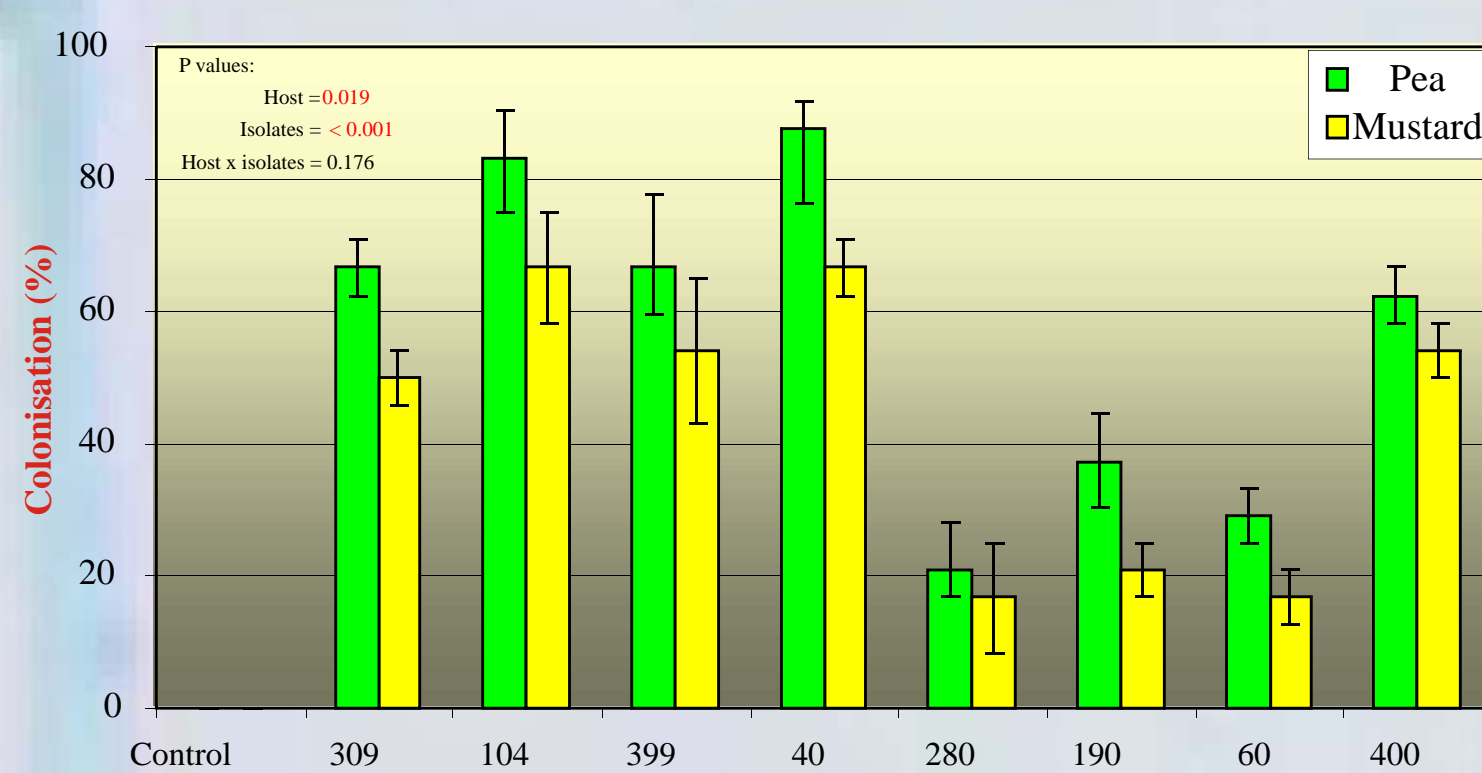
Ref: Lumsden 1980; Kerry 1991



Growth of different isolates of *Pochonia chlamydosporia* on semi-selective medium (columns represent the number of colonies while lines represent percentage decrease (+ve) or increase (-ve) in growth)

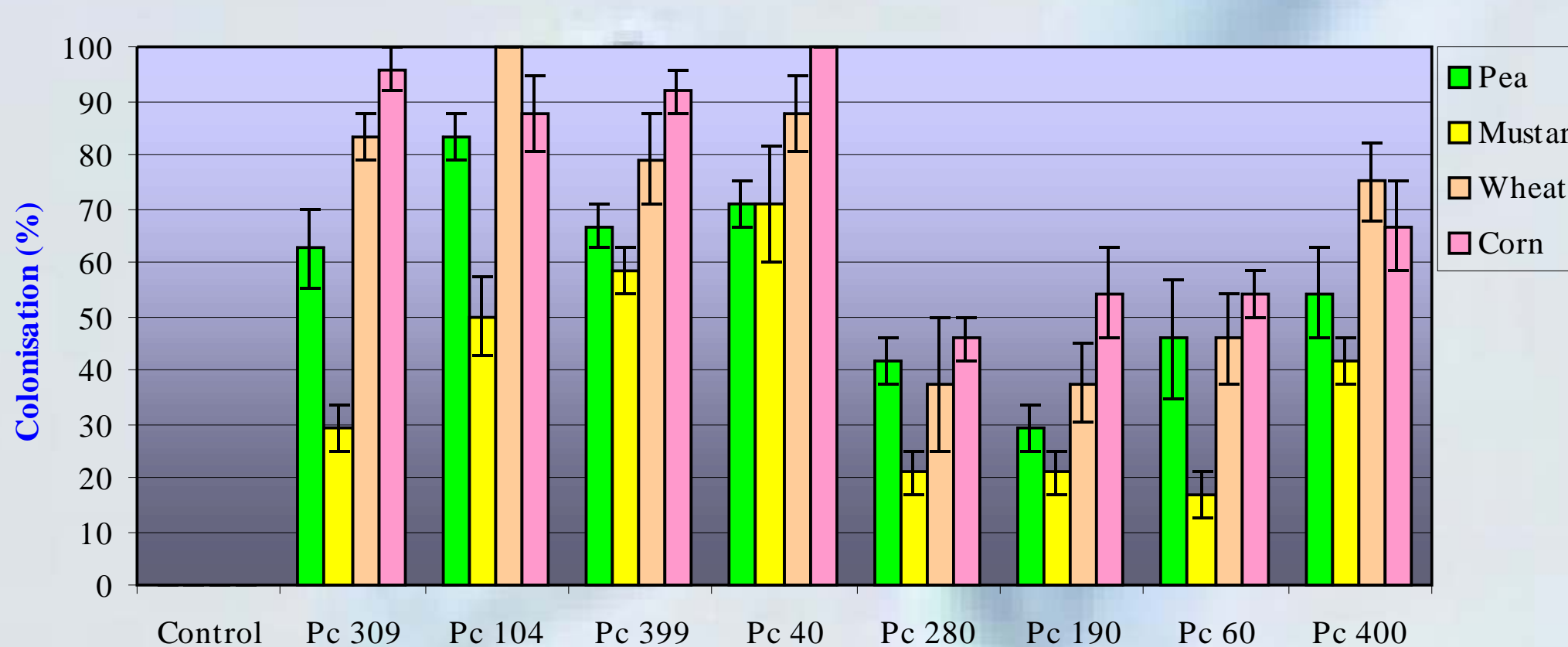
Rhizosphere colonisation

Potential of different isolates of *Pochonia chlamydosporia* to colonise mustard and pea rhizospheres in sterilised sandy loam soils



Extent of colonisation of pea and mustard rhizospheres by different *Pochonia chlamydosporia* isolates in sterilised sandy loam soil

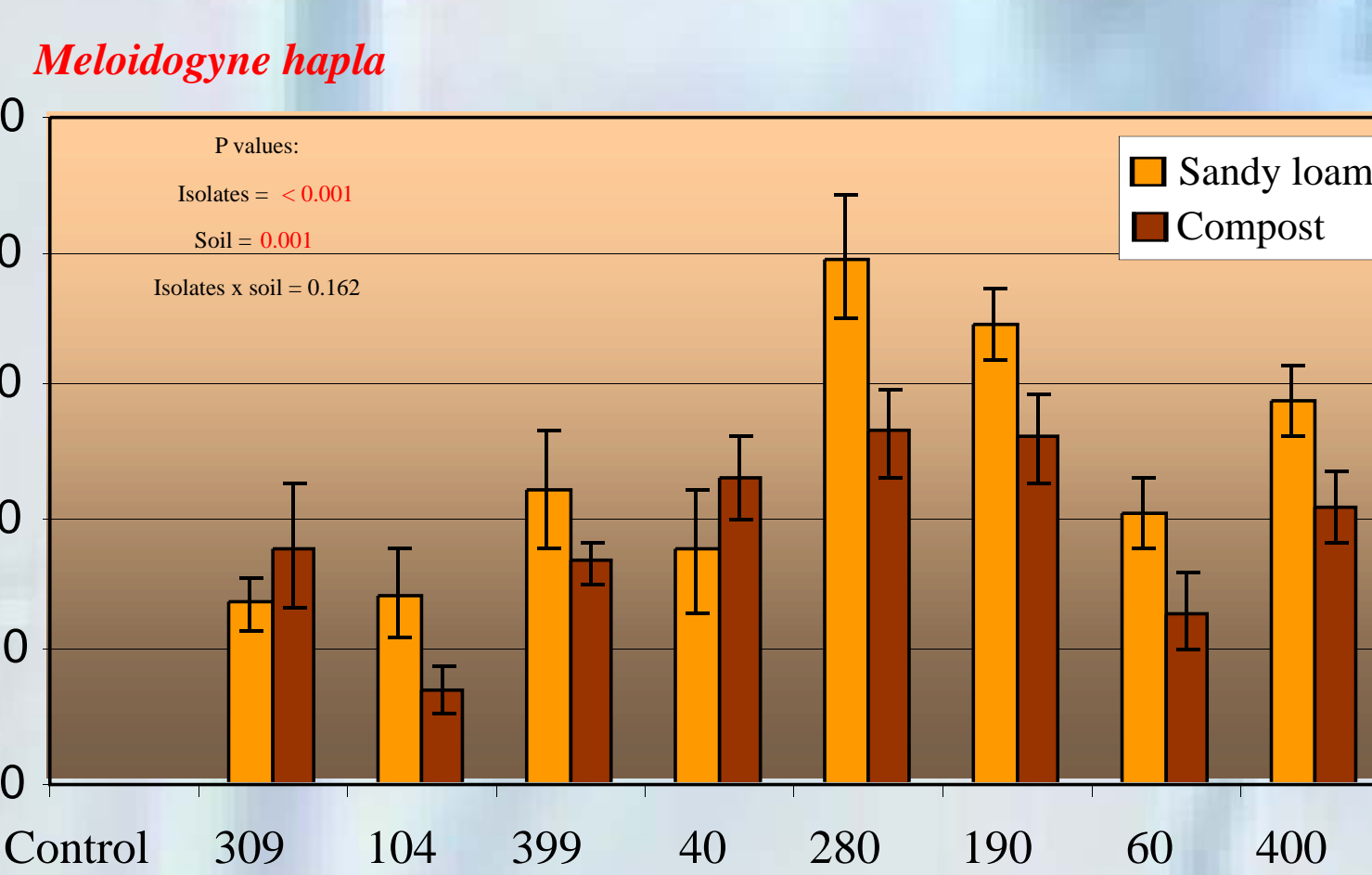
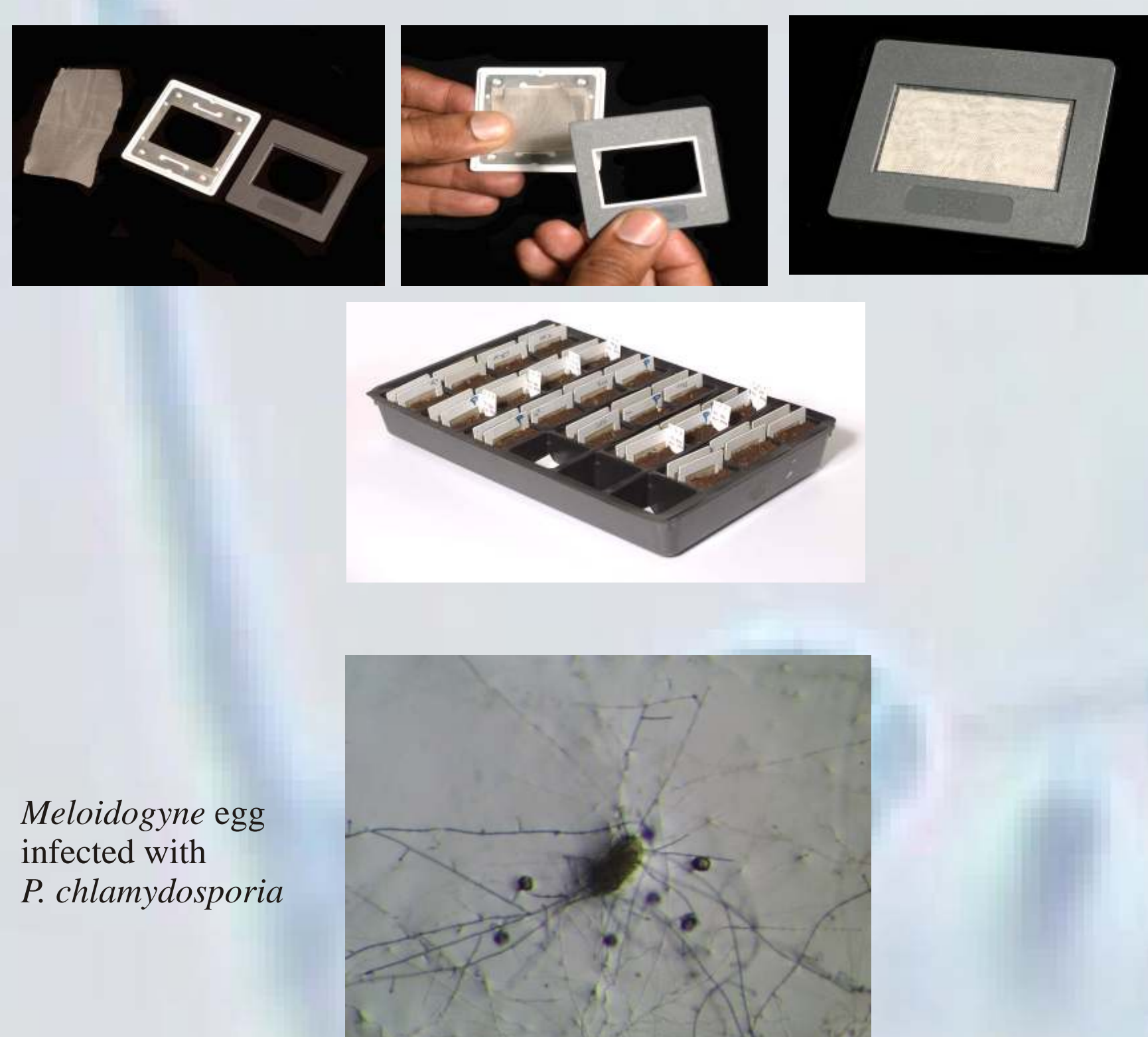
Potential of *Pochonia chlamydosporia* isolates to colonise rhizospheres of monocot and dicot plants in sterilised sandy loam soil



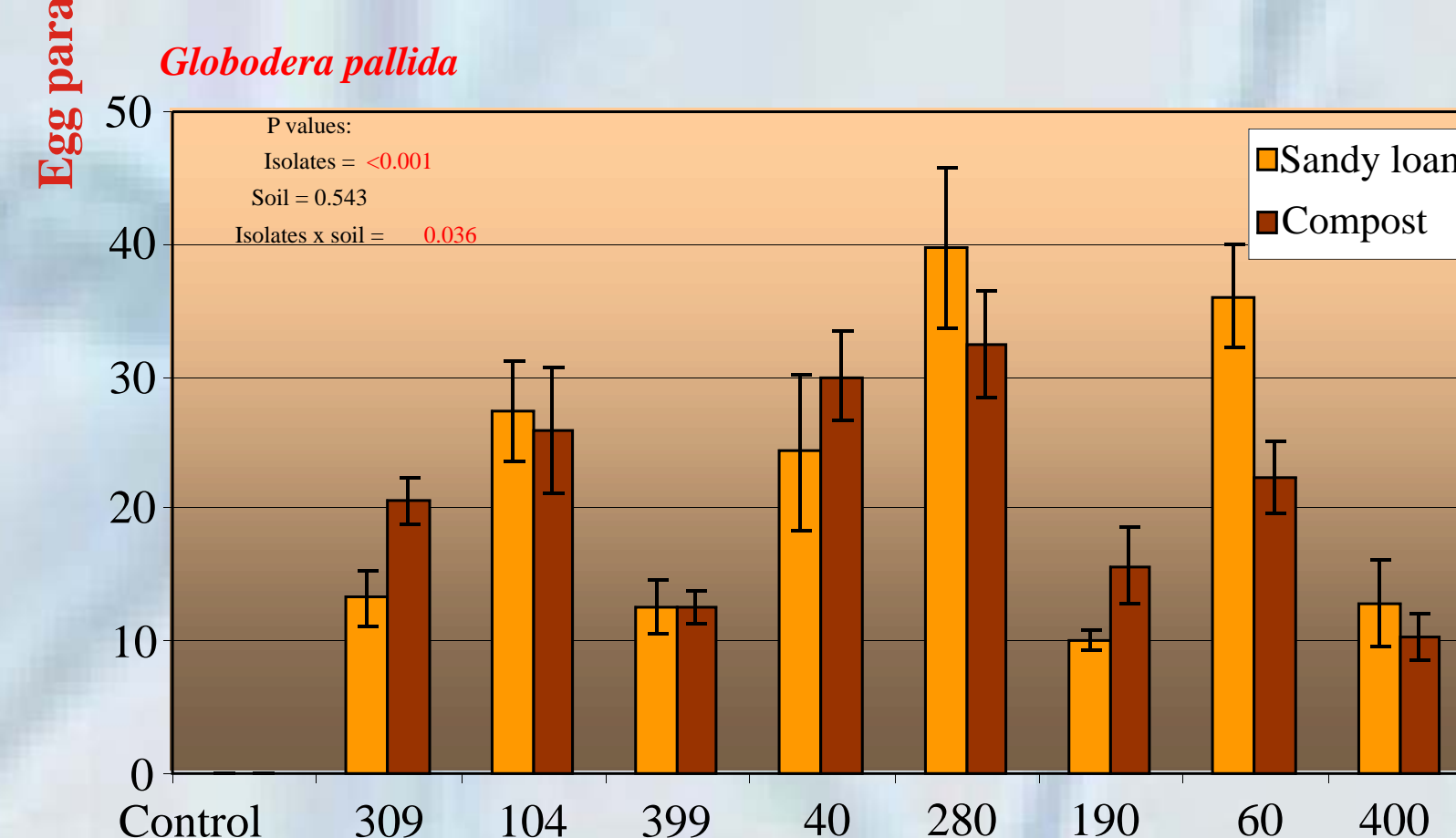
Extent of colonisation by different *Pochonia chlamydosporia* isolates of pea, mustard (dicots), wheat and corn (monocots) rhizospheres in sterilised sandy loam soil. (*P* values: Host = <0.001; Isolates = <0.001; Host x Isolates = 0.002)

Egg parasitism

Determination of parasitism by *P. chlamydosporia* isolates of eggs of root-knot and cyst nematodes in different soils using a baiting technique



Differences between *Pochonia chlamydosporia* isolates in their ability to parasitise *Meloidogyne hapla* eggs using a baiting technique



Differences between *Pochonia chlamydosporia* isolates in their ability to parasitise *Globodera pallida* eggs using a baiting technique

<i>Pochonia chlamydosporia</i> isolates used in this study		
Isolate	Source	Host
Pc 309	Zimbabwe	Root-knot nematode
Pc 104	UK	<i>Heterodera goettingiana</i>
Pc 399	China	Root-knot nematode
Pc 40	UK	<i>H. schachtii</i>
Pc 280	Jersey	<i>Globodera pallida</i>
Pc 190	Kenya	Root-knot nematode
Pc 60	UK	<i>H. avenae</i>
Pc 400	Bulgaria	Root-knot nematode

RESULTS

- Colony counts indicated that isolates spread and survived differentially.
- Soil texture and condition (sterilised or non-sterilised) influenced the survival and spread of the isolates.
- Isolate Pc 60 was the best saprotrophic competitor in compost and loamy sand soils whilst isolate Pc 280 competed well in sandy loam soil.

There were marked differences between isolates in the colonisation of mustard and pea rhizospheres in sterilised sandy loam soils.

Isolates colonised pea roots more than mustard roots probably due to the fact that mustard plants produce antimicrobial compounds.

Isolates of *P. chlamydosporia* colonised the rhizosphere of dicot more than

Egg infection by the fungus was greater in sandy loam soils compared to compost. In general, *P. chlamydosporia* is a less aggressive parasite if nutrients are readily available to support saprotrophic growth.

Parasitism of *M. hapla* eggs was greater for isolate Pc 280, while less for Pc104 and Pc309, regardless of the soil texture.

Isolates Pc 280 and Pc 60 (originally isolated from cyst nematodes) infected many *G. pallida* eggs while parasitism was less for isolates Pc399, Pc400 and Pc190 (originally isolated from root-knot nematodes), suggesting that individual isolates have host preferences.

CONCLUSIONS

Results from this study indicate that there is no simple relationship between saprotrophic competitiveness and virulence in isolates of *Pochonia chlamydosporia*.

Some isolates were good rhizosphere colonisers but poor parasites suggesting that virulence may have a fitness cost. However, some isolates were both good saprotrophic competitors and virulent; such isolates were selected for further evaluation as potential biological control agents.

References

- Lumsden, R.D. (1980) A nylon fabric technique for studying the ecology of *Pythium aphanidermatum* and other fungi in soil. *Phytopathology* 71: 282-285
- Kerry, B.R. (1991) Methods for studying the growth and survival of the nematophagous fungus, *Verticillium chlamydosporium* Goddard, in soil. *IOBC Bulletin XIV/2*, 34-38.

Acknowledgments

Rothamsted Research receives grant-aided support from the UK Biotechnology and Biological Science Research Council. I.A. Siddiqui was supported by funding from Rothamsted International