

Impact of shortened rotations on rhizosphere microbial populations

Sally Hilton

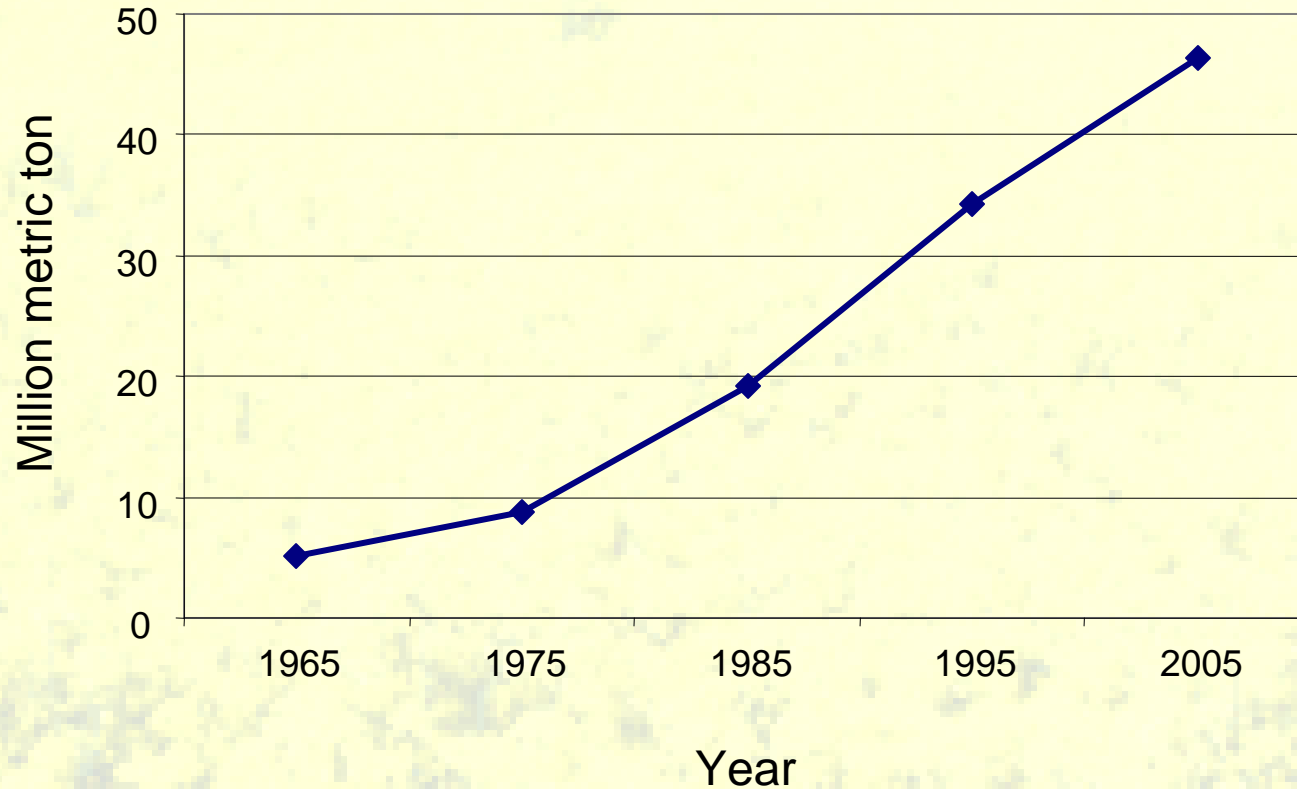
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Crop rotation

- Crop rotation is usual practice
 - maintain or improve soil fertility
 - reduce build-up of plant pathogens
- Trend towards shortened rotations
 - yield decline

Worldwide oilseed rape production



Rotation treatments

O = Oilseed rape
W = Wheat

- 1** Continuous rape (OOOO)
- 2** Continuous wheat (closest to) (OWWW)
- 3** Alternate wheat/rape (WOWO)
- 4** Rape after 2 years of wheat (OWWO)
- 5** First year of rape (WWWO)

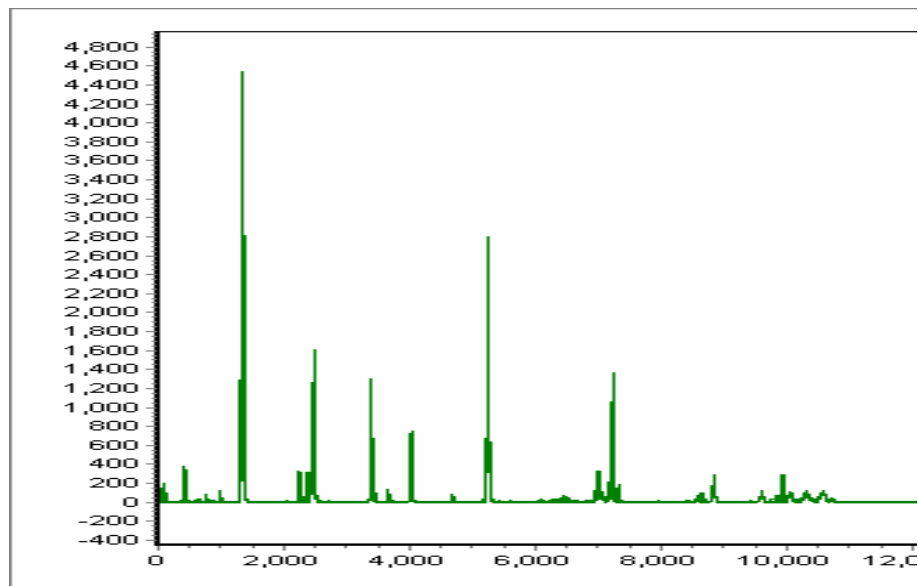
DNA analysis



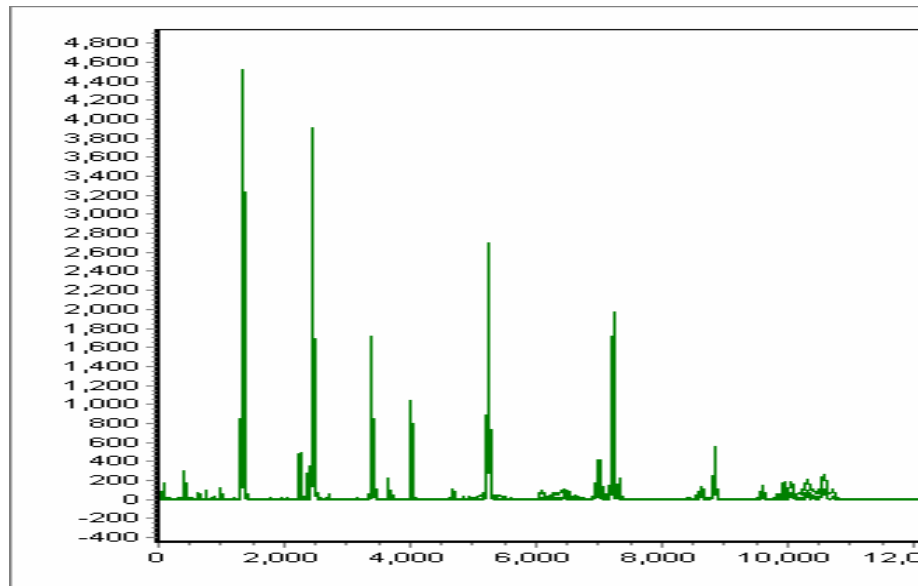
- DNA extracted from rhizosphere (fine roots and adhering soil) and bulk soil.
- The ribosomal RNA gene was amplified using generic fungal (ITS1f and ITS4r) labelled primers from the internal transcribed spacer (ITS) or bacterial (63f and 1087r) primers from 16s rRNA.
- The amplified PCR products were digested and used in Terminal Restriction Fragment Length Polymorphism (TRFLP) analysis, and cloned and sequenced to determine the taxonomic group of the organisms.

Overlay of four replicate Bacterial Rhizosphere traces

Wheat
(OWWW)

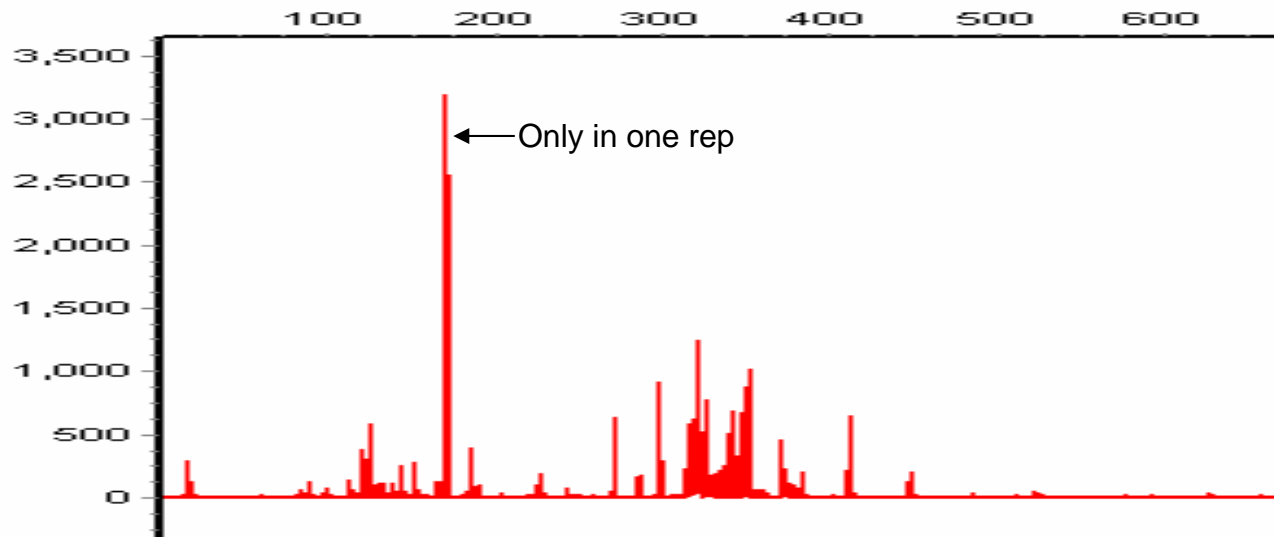


OSR
(0000)

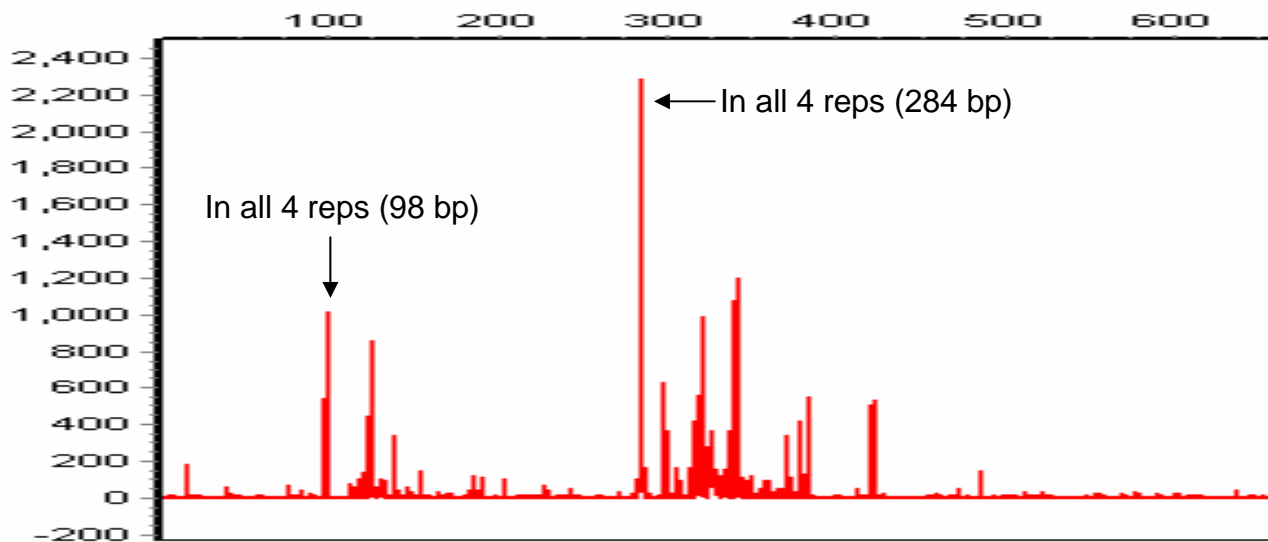


Overlay of four replicate Fungal Rhizosphere traces

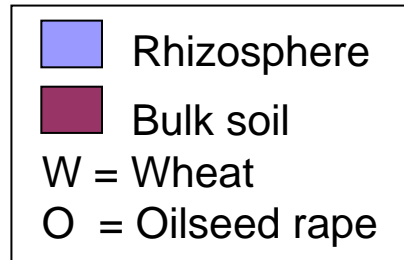
Wheat
(OWWW)



OSR
(O000)



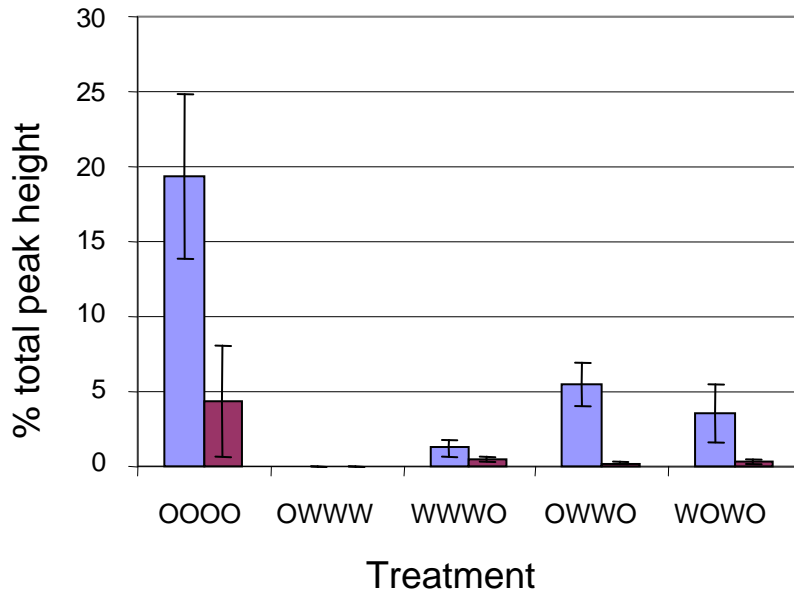
TRFLPs (fungal species) showing significant differences between treatments



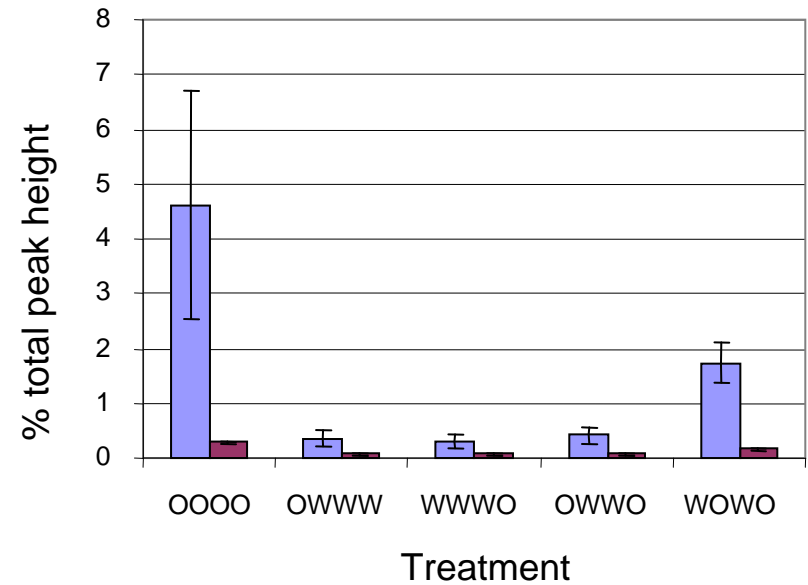
Olpidium brassicae (100 %)

Pyrenochaeta lycopersici (95 %)

TRFLP 284 bp



TRFLP 98 bp



Field trials 2008/9



← Rape after 2 yr wheat

→ Continuous rape

Acknowledgments



Peter Mills

John Whipps

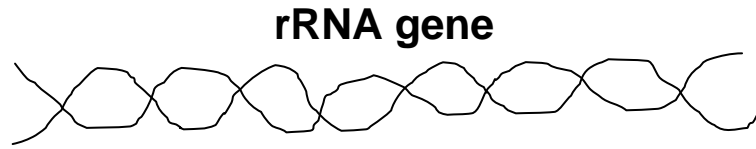
Gary Bending

Dave Chandler

Amanda Bennett

TRFLP

Capillary electrophoresis



Amplified by PCR



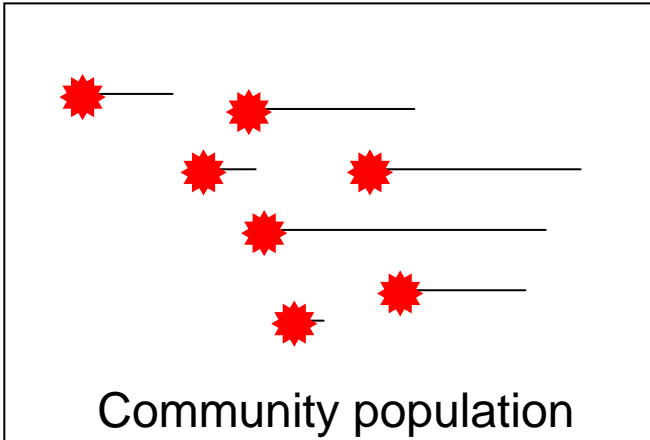
GCGC



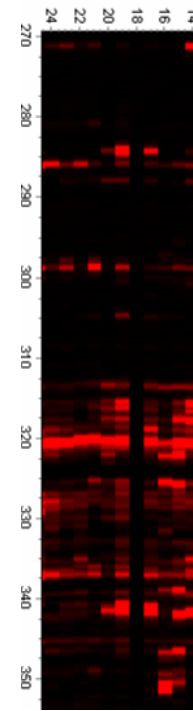
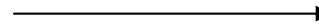
GCG



Digested with restriction enzyme



Community population



Chromatogram

