



Early Detection and Spread of Tomato Powdery Mildew (TPM) in Commercial Greenhouses

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Introduction

- The UK produces approximately 90,000 T of tomatoes a year¹.
- Erysiphe neolycopersici* (TPM) and *Botrytis cinerea* are the main diseases.
- The diseases lead to reduced yields, decreased quality of tomatoes and, if left unattended, plant death.
- Growers spray the crop prophylactically to avoid TPM.
- For better disease management we aim to detect pathogens before they infect the plant and reduce unnecessary spraying.

Objectives

- Explore the patterns of distribution of TPM in commercial glasshouses
- Determine the optimal position for spore traps for early detection of TPM & *B. cinerea* under UK glasshouse conditions

Methods

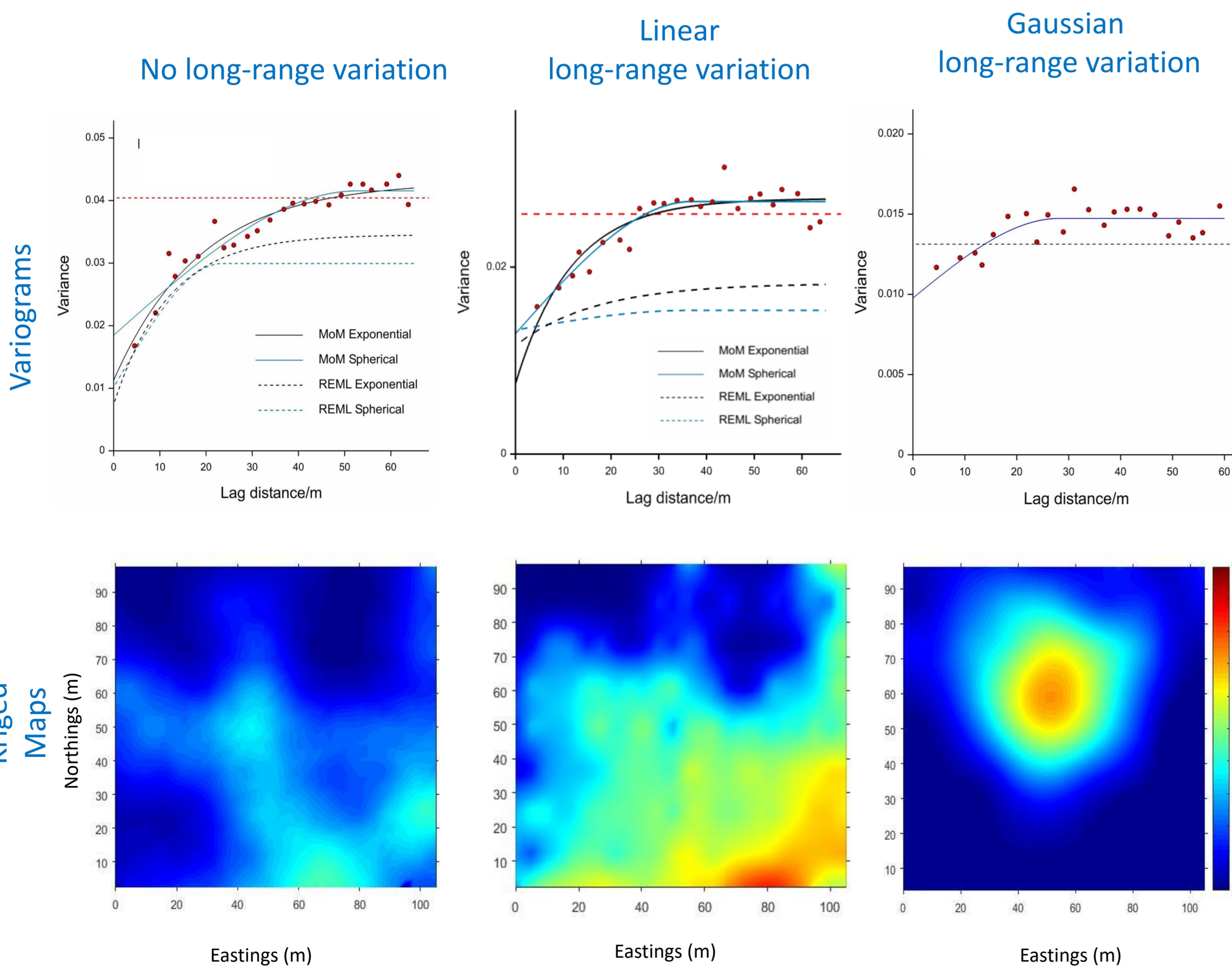
- Monitored TPM in four commercial glasshouses (each 1Ha) in the UK.
- Disease scored visually on the IPGRI scale (1-9) every two weeks between June – November 2021.
- Mapped disease by kriging.
- Sampled spores using rotor rods for 10 days in 4 blocks and 3 replicates in time over the season.
- Analysed daily spore counts using molecular techniques for *B. cinerea*.



Results

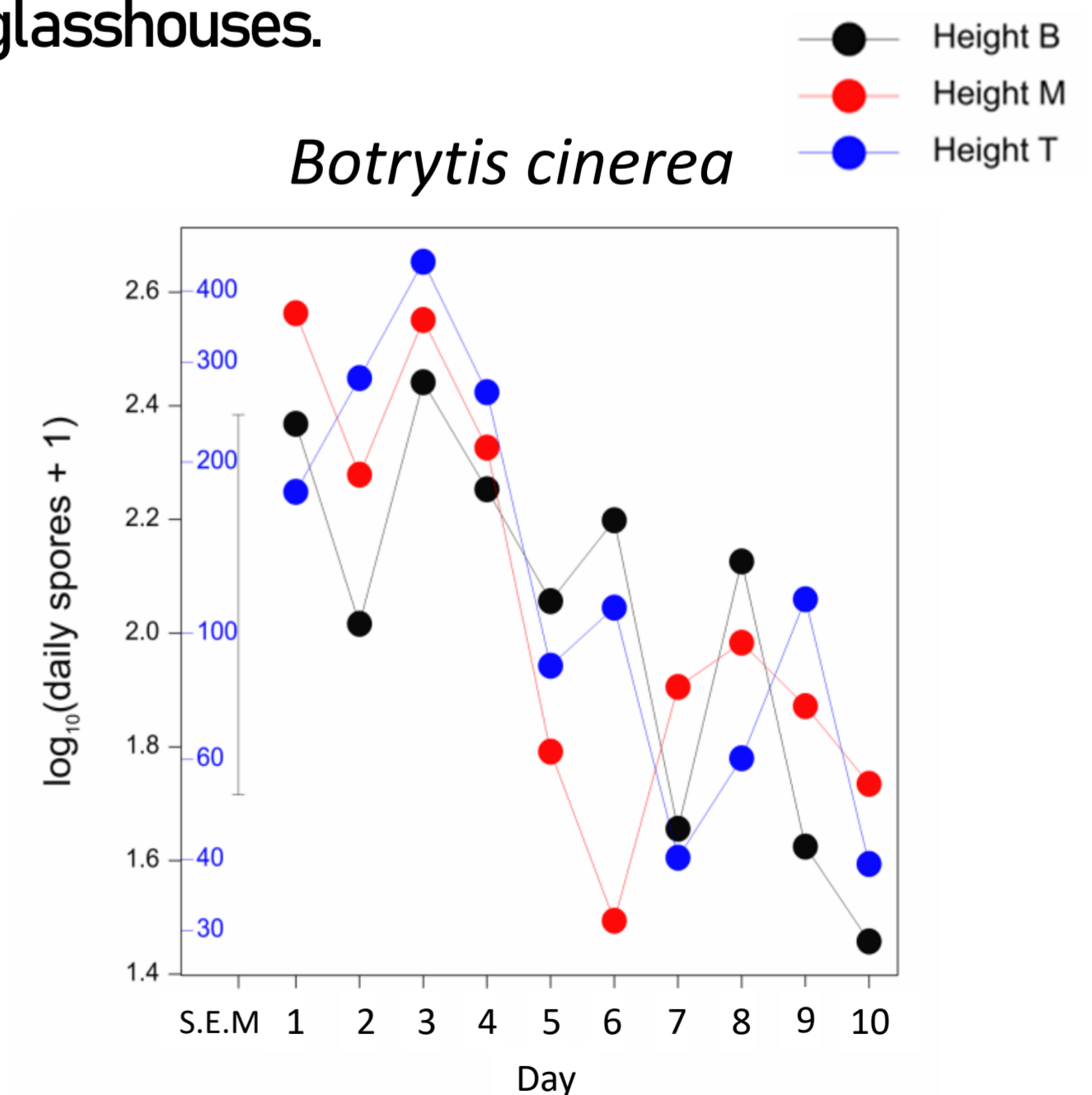
TPM was modelled based on the visual symptoms monitored in the glasshouses. The models suggest that disease is introduced mainly through the main pathway used by workers and machinery. The variograms represent the short-range variation patterns, and the kriged maps are the final representation of the disease with long-range and short-range variation factored in. The kriged maps below correspond to the variograms above.

Table shows average spore counts for *B. cinerea* over 10 days in each block within two glasshouses and replications of the experiment in time.



Block	Replication		
	1	2	3
1	6.9	3928.4	0.0
2	9.5	573.3	0.0
3	0.7	237.7	0.0
4	0.6	680.4	0.0

B. cinerea results showing that height is not an important factor when sampling in glasshouses.



Conclusion

- Long-range disease patterns are either linear or Gaussian.
- Short-range variation extends between 20-60m
- Disease is introduced through the main pathways used by personnel and machinery
- Position and time of spore trapping is more important than the height at which the spore trap is positioned

Future Work

- Model the progression of *Erysiphe neolycopersici* overtime in commercial glasshouses.
- Confirm whether proximity to the disease foci are the main causes of differences in spore counts.