# Efficacy of non-synthetic seed treatments against anthracnose (*Colletotrichum lupini*) in white lupin

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## Introduction

### Lupin anthracnose

Seed-borne disease caused by fungus *Colletotrichum lupini* (Decker, 1947; Nirenberg et al., 2002)

Main challenge to lupin cultivation worldwide (Talhinhas et al., 2016)

### Current control of disease

Use of clean seeds, crop rotation, breeding (Talhinhas et al., 2016)

Post-harvest treatment of seeds if production of clean seeds not possible

Various physical and chemical seed treatments tested against lupin anthracnose, but no clear effective method identified

**Fig. 1.** Twisting of stems and necrosis in petiole caused by anthracnose in white lupin (Talhinhas et al., 2016)

## Objectives

a) Identify **effective seed treatment** that reduces *C. lupini* in seed without impairing seed vigour

b) Assess **practical relevance** of promising seed treatments

c) Identify **suitable method for detection** of viable pathogen in plants/ seeds

## Materials and Methods

**28 seed treatments**: hot water (4 conditions), steam (5), dry heat (4), electron (5), plant-based (2), microbial (2) and controls (6)

**Germination assay** } 4 replications
**Pot-based disease assessment experiment** } RCBD

## Results

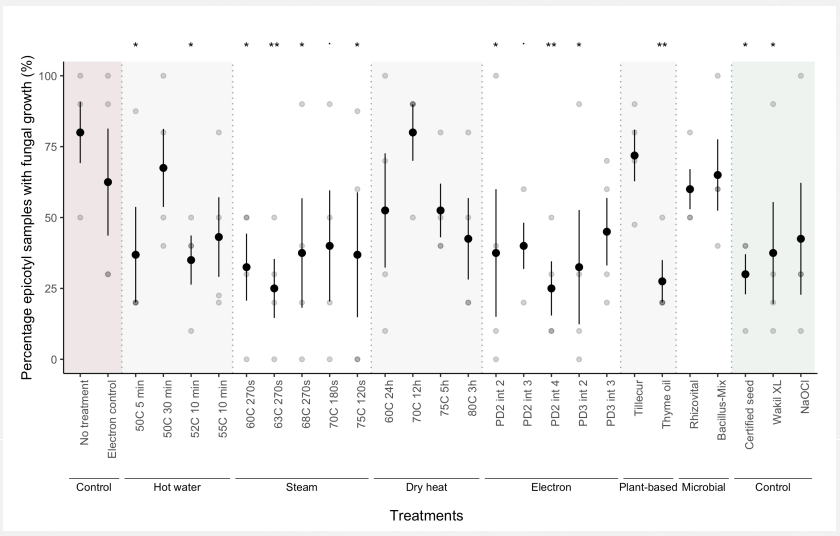


**Fig. 2.** Mean percentages of epicotyl samples on growth medium that displayed fungal growth for different treatments.

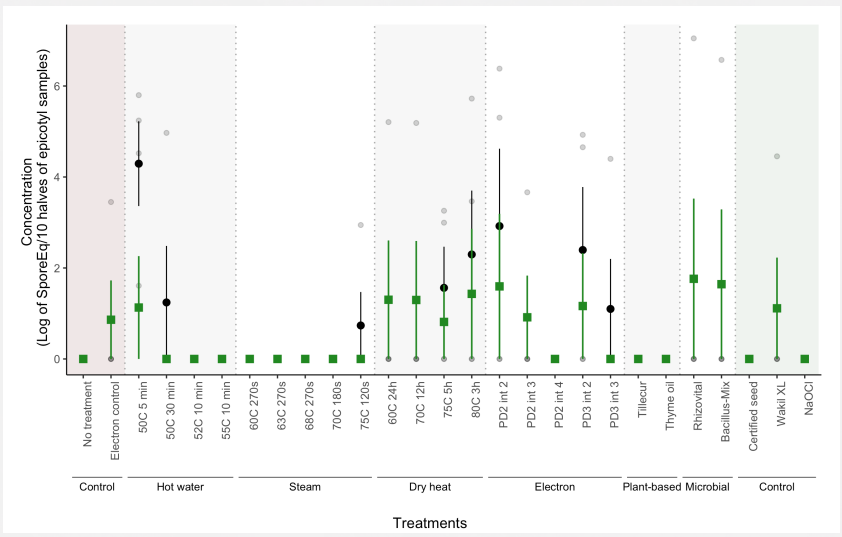


**Fig. 3.** Mean concentrations of *Colletotrichum* spp. SporeEq/10 pooled epicotyl halves of different treatments. Green squares show mean treatment concentrations when both technical replicates of qPCR gave a signal; black points include concentrations when only one technical replicate gave a signal.

## Conclusion

No treatment with significant efficacy against *Colletotrichum* spp. identified, but **steam treatments** and to lesser extent dry heat 75°C/5h, electron penetration depth 3 and intensity 3, and thyme oil showed **promise for follow-up research**

**No impairment of seed vigour** with these treatments → Field emergence?

**High variation within replicates** and **low pathogen levels** → Use highly-infected seeds and/or extend plant growth period

Only NaOCl control significantly impaired seed germination, normal seed germination and seedling early vigour (not shown)

No significant differences using visual disease assessment of plants (not shown)

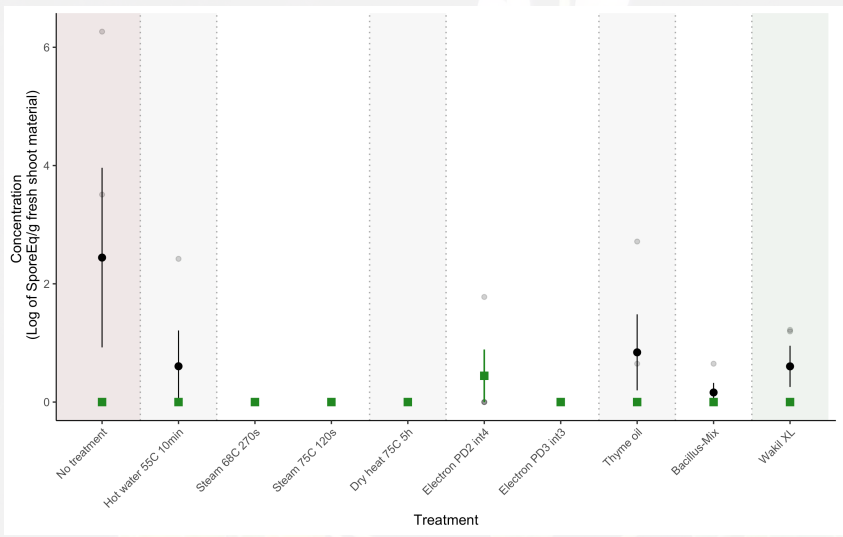


**Fig. 4.** Mean log-transformed concentrations of *Colletotrichum* spp. SporeEq/g fresh shoot material of different treatments in pot experiment. Green squares show mean treatment concentrations when both technical replicates of qPCR gave a signal; black points include concentrations when only one technical replicate gave a signal.

## References

Decker. 1947. *Plant Disease Reporter* **31**, 270-271.

Nirenberg et al. 2002. *Mycologia* **94**, 307-320.

Talhinhas et al. 2016. *Journal of Plant Pathology* **98**, 5-14.

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