Essential oils phytotoxicity assessment on potato leaves prior to *in vivo* tests against late blight disease

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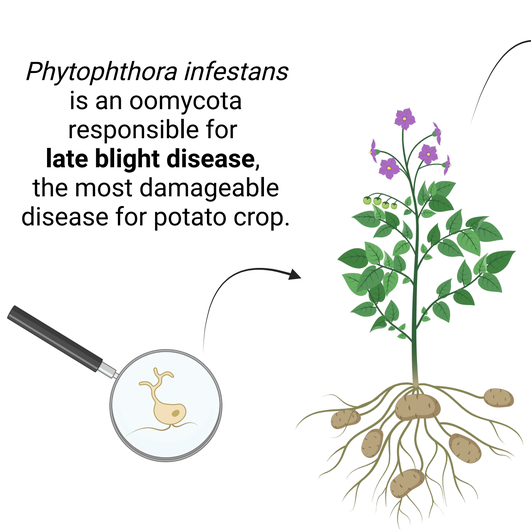
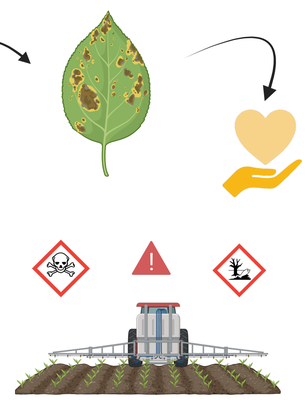
INTRODUCTION

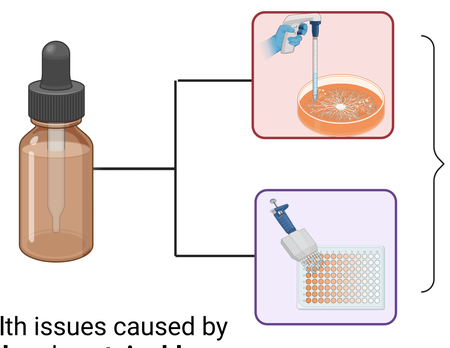
Phytophthora infestans is an oomycota responsible for **late blight disease**, the most damageable disease for potato crop.





Facing environmental and health issues caused by synthetic pesticides, **natural** and **sustainable** alternatives for crop protection must be proposed

Three promising **essential oils** were previously selected for their anti-oomycete potential after testing their properties against ***mycelium growth*** and ***spore germination***



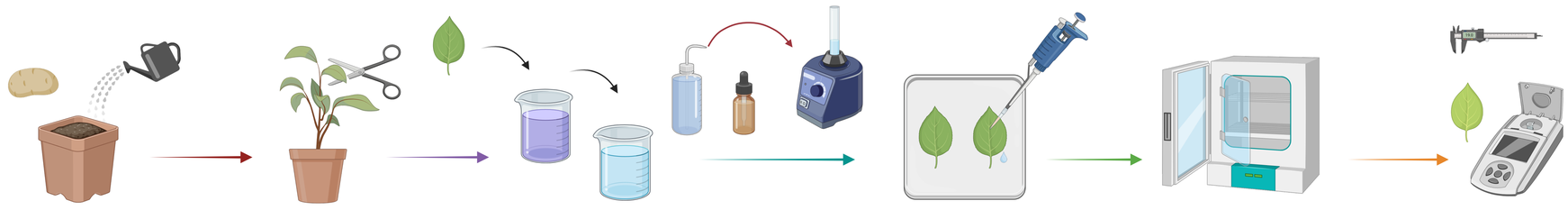
In planta experiments will be carried out to confirm protective properties of essential oils against late blight

Phytotoxicity must be assessed to select the appropriate essential oils concentration : effective against the pathogen but safe for the host plant

OBJECTIVE

Assessing the phytotoxicity of promising essential oils against *Phytophthora infestans* on potato detached leaves before testing their protective properties *in vivo* against late blight disease

METHOD



Plant growing from seedlings tubers of variety Bintje in soil

Sampling of potato leaves from intermediate foliage stage

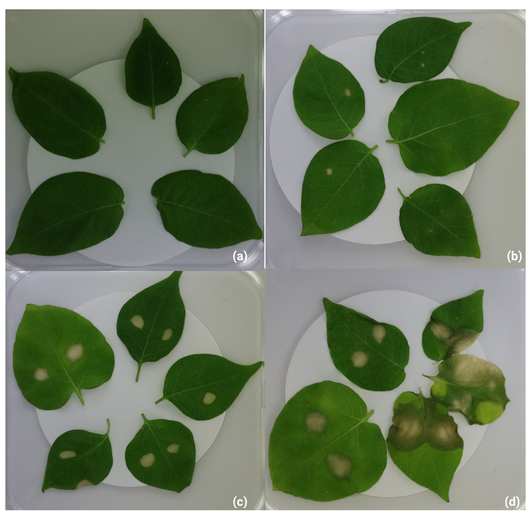
Successive rinsing in sterile water baths

Drop deposit of 20 µL in ≠ [EO] emulsified in water with Tween20

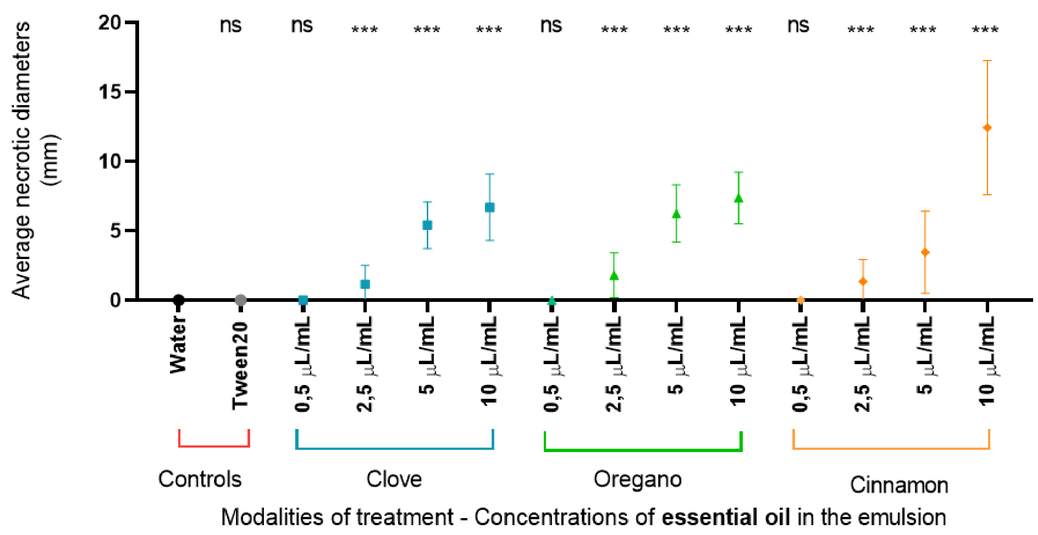
Incubation for 4 days at 18°C, 8/16h photoperiod and saturating humidity

Chlorophylle fluorescence and necrosis measurements

RESULTS

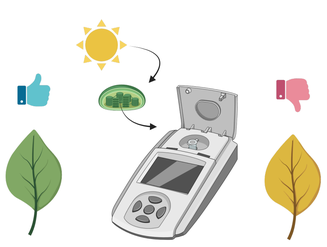


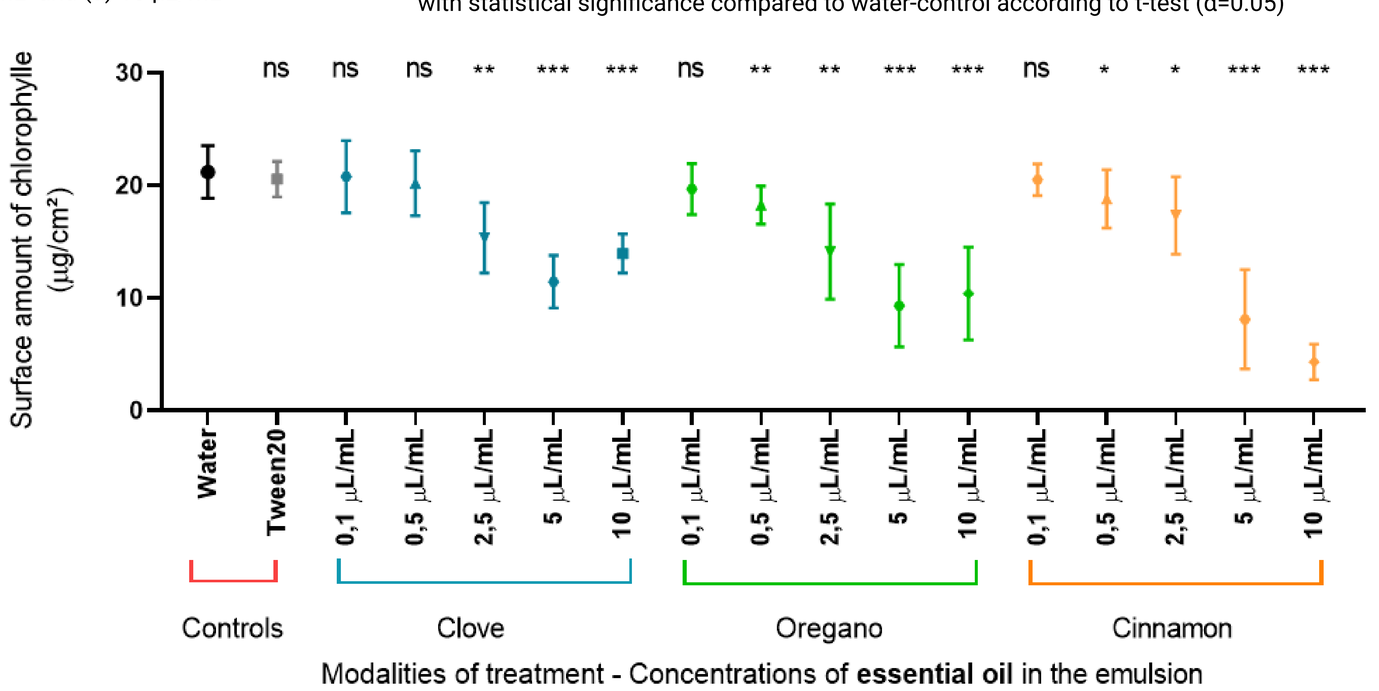
Potato leaves after 4 days of incubation with drop treatments of cinnamon essential oils emulsions at (a) control ; (b) 2,5 µL/mL ; (c) 5 µL/mL and (d) 10 µL/mL



Average necrotic diameters on potato detached leaves after various treatments of essential oil emulsion with statistical significance compared to water-control according to t-test (α=0.05)

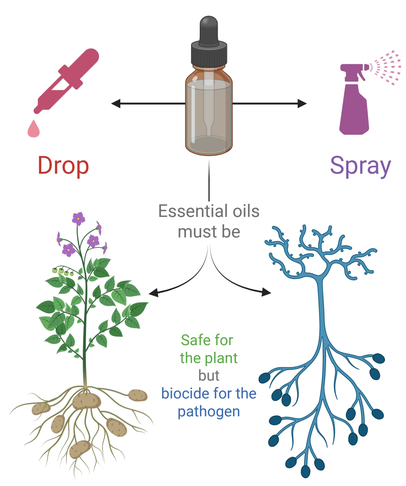
Surface amounts of cholorophylle were measured using DUALEX. The ability of chlorophyll to absorb light is quantified by fluorometry and gives an indication of photosystem state and thus, of plant condition





Surface amount of chlorophyll on potato detached leaves after drop treatments of different concentrations of essential oil emulsions with statistical significance compared to water-control according to t-test (α=0.05)

CONCLUSION



Clove, oregano, and cinnamon essential oils exhibited *in vitro* antifungal activity against *P. infestans*. These emulsions showed no sign of phytotoxicity below 0.5 µL/mL, defining this concentration as a threshold for further *in planta* applications, balancing efficacy and plant safety.

REFERENCES

Werrie, P.-Y.; Durenne, B.; Delaplace, P.; Fauconnier, M.-L. Phytotoxicity of Essential Oils: Opportunities and Constraints for the Development of Biopesticides. A Review. *Foods***2020**, *9* (9), 1291.

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