The ability of naturally derived oils and disinfectants to inactivate SARS CoV-2

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01.

Introduction and Precedence

Essential Oils as Antiviral Disinfectants

Volatile molecules

- Terpenes
  - Monoterpenes
  - Sesquiterpenes

(E Silva et al., 2021)

Precedence

- Viruses susceptible to Essential oils in literature
  - Human Herpes Virus
  - Influenza Virus
  - Coxackie Virus
  - Coronaviruses

(Reichling, 2021; Romeo et al., 2022)

Mechanisms

- Masking binding domains
- Degrading capsid
- Adjusting cellular and endosomal pH
- Targeting genome
- Interfering with signaling pathways

(Reichling, 2021)

Essential Oils against SARS CoV-2

Tea tree oil has been shown to be effective against feline coronavirus (FCoVII) and human coronavirus OC43 (OC43)

(Romeo et al., 2022)

Thyme oil was effective against SARS CoV-2 in a vapor phase study.

(Şakalar & Ertürk, 2023)

Several oil including lemon oil, geranium oil, citronell oil and others, have been studied for clinical applications against the viral spike protein in silico and in virtro.

(Reichling, 2021)

02.

Materials and Methods

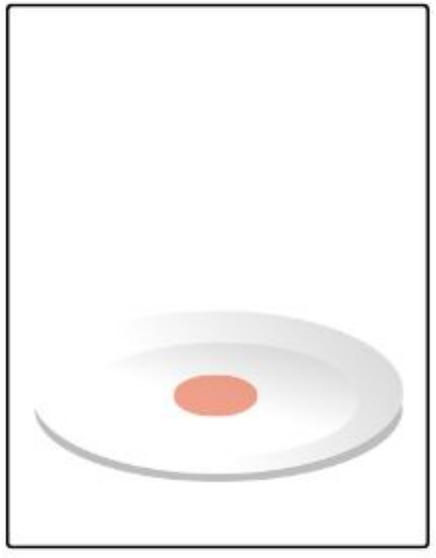
Disinfectants Used

Disinfectant 1	**Alcohol denat.**, Water, Caprylic/capric triglyceride, Eugenia caryophyllus (Clove) bud oil, Citrus limon (Lemon) peel oil, Cinnamomum zeylanicum (Cinnamon) bark oil, Eucalyptus radiata leaf oil, Rosmarinus officinalis (Rosemary) leaf oil, Lecithin, Quillaja saponaria extract
Disinfectant 2	Water, **Alkyl polyglucoside, Sodium methyl 2-sulfolaurate, Disodium 2-sulfolaurate**, Eugenia caryophyllus (Clove) bud oil, Citrus limon (Lemon) peel oil, Cinnamomum zeylanicum (Cinnamon) bark oil, Eucalyptus radiata leaf oil, Rosmarinus officinalis (Rosemary) leaf oil, Tetrasodium glutamate diacetate
Disinfectant 3	Clove (Syzygium aromaticum) bud oil, Lemon (Citrus limon) peel oil, Cinnamon, (Cinnamomum verum) bark oil, Eucalyptus (Eucalyptus radiata) leaf oil, Rosemary (Rosmarinus officinalis) leaf oil
Disinfectant 4	Cymbopogon nardus (Citronella) oil, Rosmarinus officinalis (Rosemary) leaf oil, Cymbopogon flexuosus (Lemongrass) oil, Melaleuca alternifolia (Tea tree) leaf oil, Lavandula hybrida (Lavandin) oil, Myrtus communis (Myrtle) oil

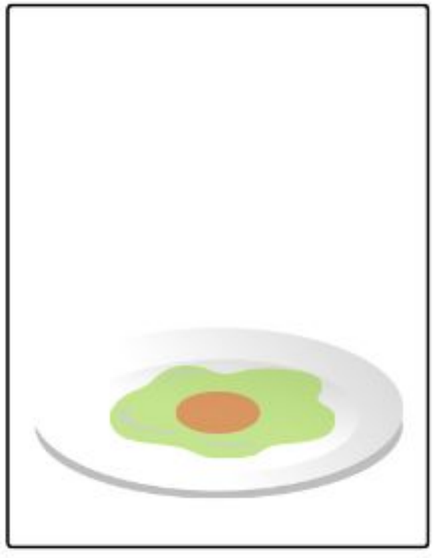
Procedure

1 → 2 → 3 → 4 → 5

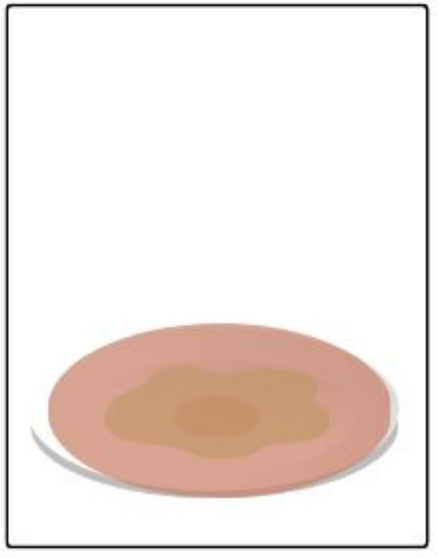
1 DRY VIRUS ON GLASS CARRIER



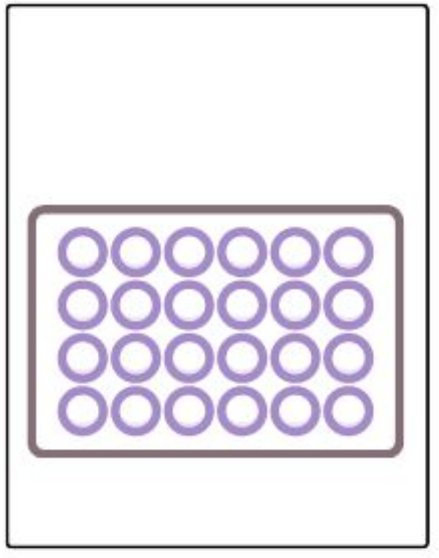
2 ADD DISINFECTANT AND SET TIMER



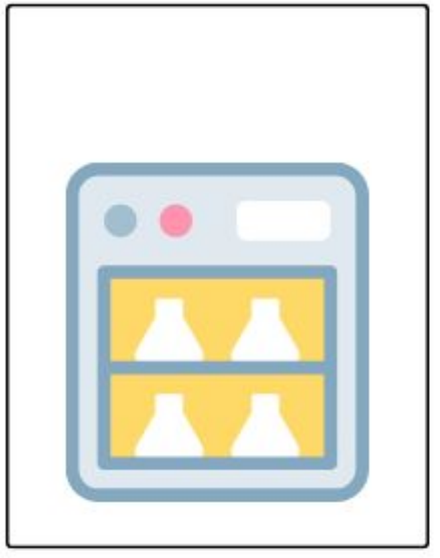
3 ADD NEUTRALIZER TO STOP DISINFECTANT



4 DILUTE AND INFECT CELLS



5 INCUBATE AND PLAQUE ASSAY



Post experiment

Plaque Assay

Calculator plaque forming units (viable virus particles) per carrier.

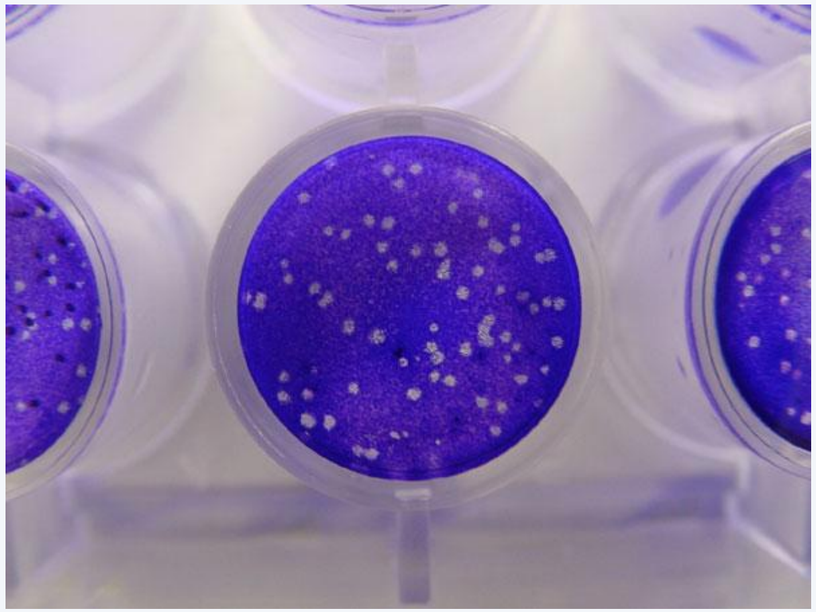
Results Replicated

Results were replicated over several days with three replicates each day

Statistical Analysis

Percent and log reduction calculated as well as error, p-value, and R^2.

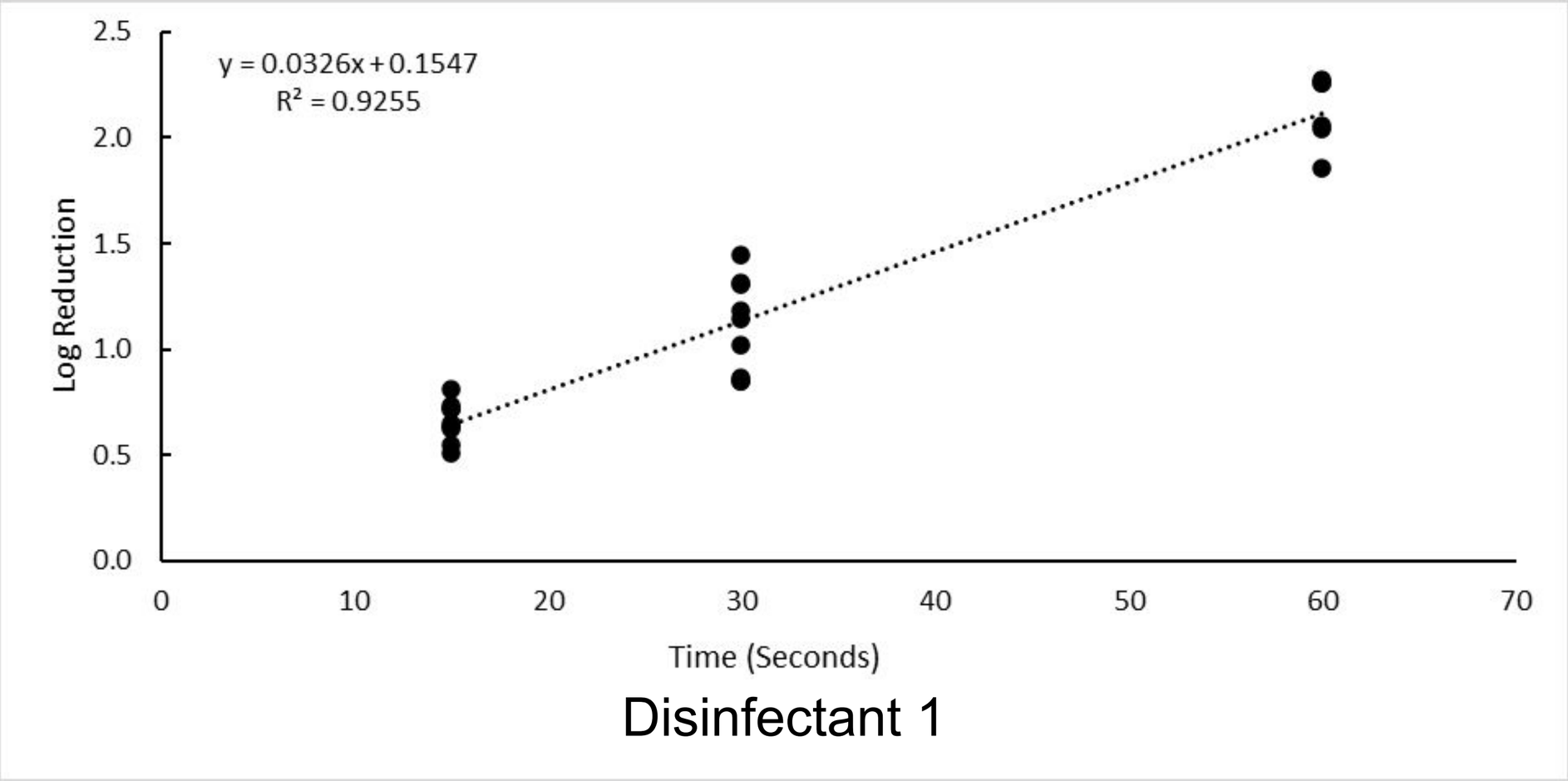
Plaque assay example



03.

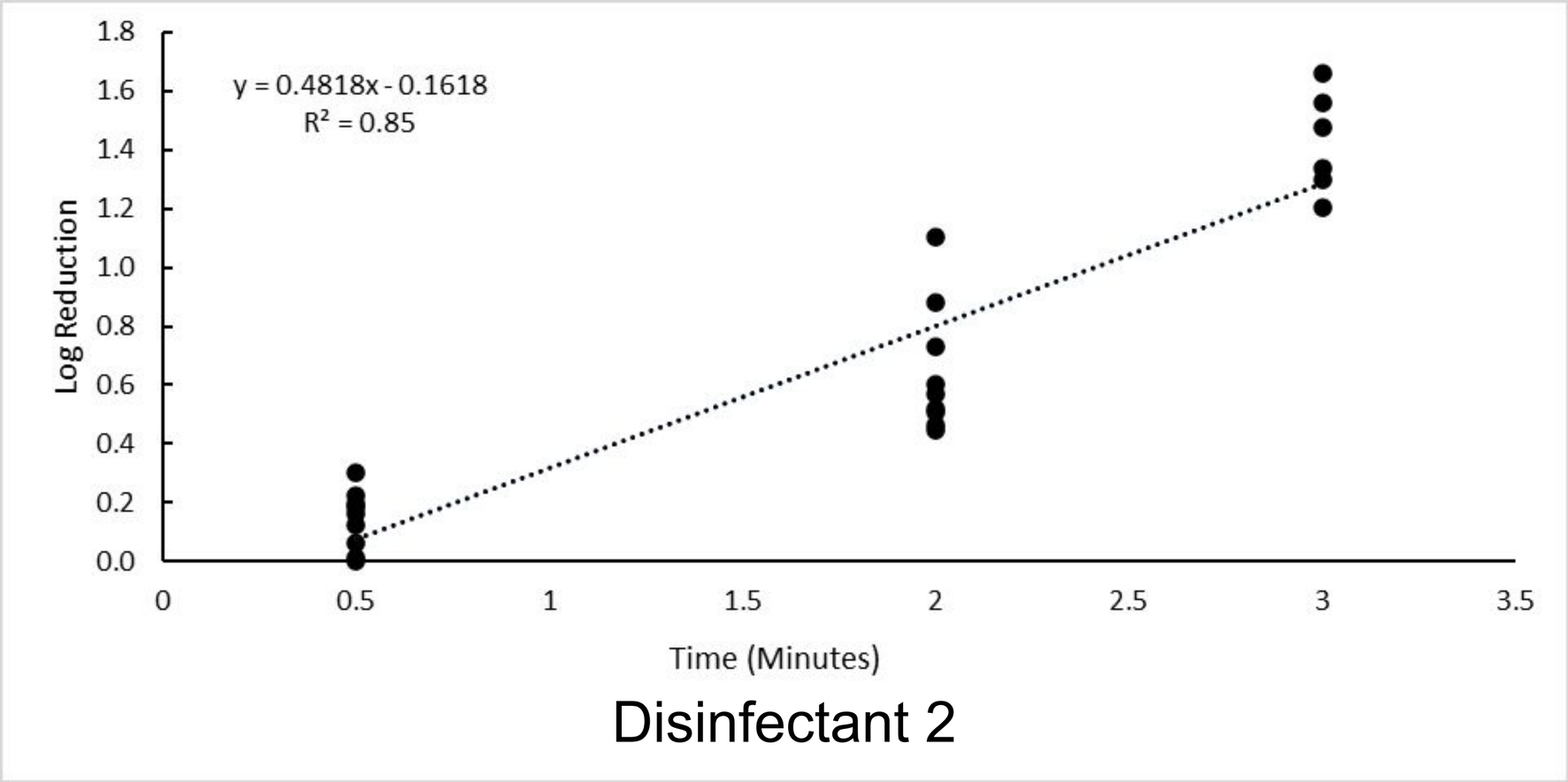
Results

Disinfectant 1

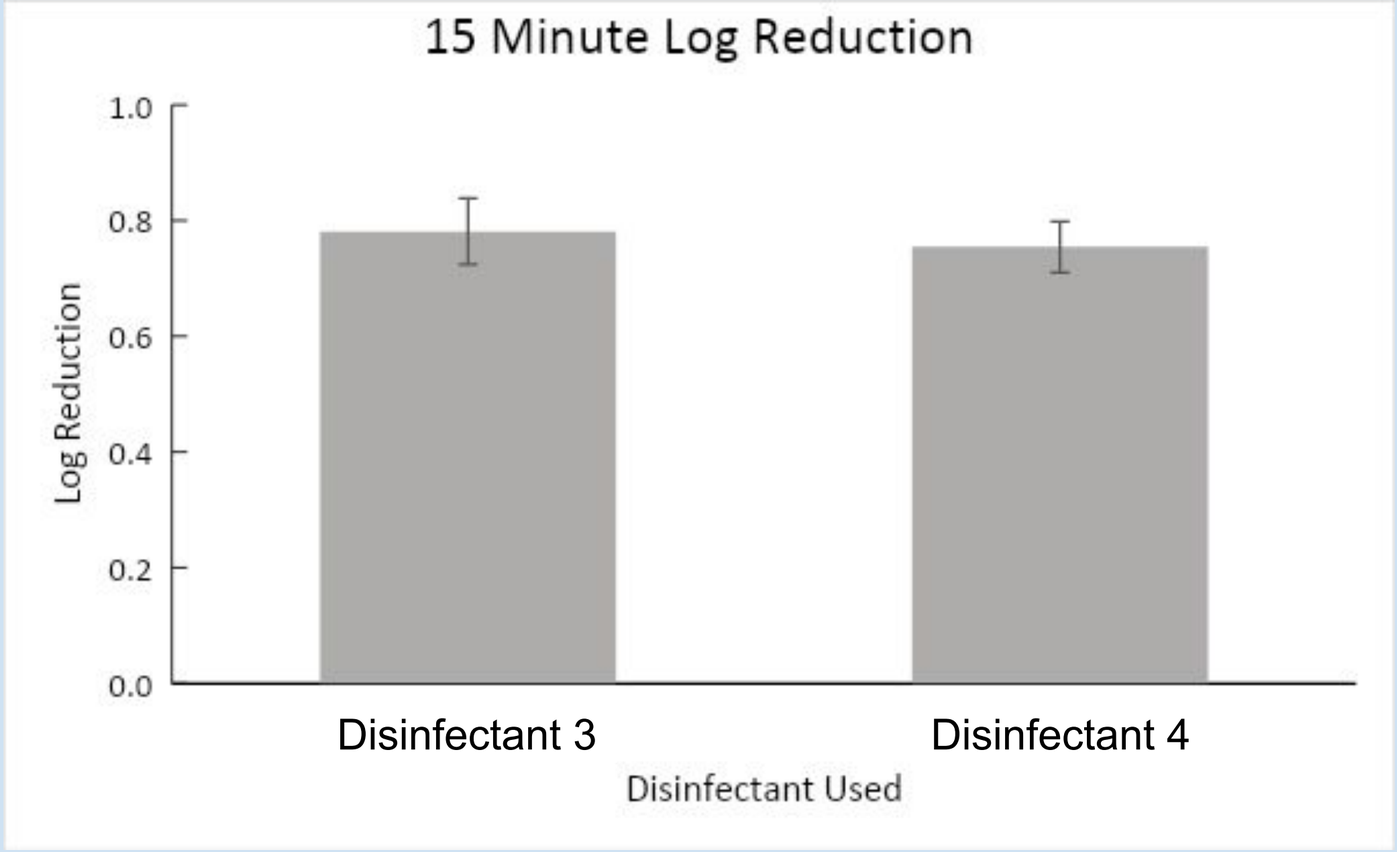


Predicted time to 4-log reduction or 99.99% kill is 117.95 seconds

Disinfectant 2



Predicted time to 4-log reduction or 99.99% kill is 8.64 minutes



Disinfectants 3 and 4

04.

Conclusions

Conclusions

1. Disinfectant 1 could be used as an effective disinfectant against SARS CoV-2 with a contact time of 117.95 seconds.

2. Disinfectant 2 could be used as a effective disinfectant against SARS CoV-2 with a contact time of 8.64 minutes

3. The results for Disinfectants 3 and 4 do not indicate that they are effective disinfectants against SARS CoV-2 as tested.

4. We do not have enough information to know if the viral reduction in Disinfectants 1 and 2 is caused by essential oils or the other ingredients.

Ideas for future steps

1

Identify reactive chemicals in the essential oils and compare their antiviral effects to those of the oil.

2

Compare the effects of the other active ingredients in Disinfectants 1 and 2 to the effects of the oils

3

Investigate other essential oils and blends to identify other potential oil disinfectants.

Acknowledgements

This project received funding and products from © Young Living Essential Oils, LC. Products used were Thieves Spray® (Disinfectant 1), Thieves® Household Cleaner (Disinfectant 2), Thieves® essential oil blend (Disinfectant 3), and Purification® essential oil blend (Disinfectant 4).

References

E Silva, R. C., da Costa, J. S., de Figueiredo, R. O., Setzer, W. N., da Silva, J. K. R., Maia, J. G. S., & Figueiredo, P. L. B. (2021). Monoterpenes and sesquiterpenes of essential oils from Psidium species and their biological properties. *Molecules*, *26*(4). https://doi.org/10.3390/molecules26040965

Reichling, J. (2021). Antiviral and Virucidal Properties of Essential Oils and Isolated Compounds - A Scientific Approach. In *Planta Medica*. Georg Thieme Verlag. https://doi.org/10.1055/a-1382-2898

Romeo, A., Iacovelli, F., Scagnolari, C., Scordio, M., Frasca, F., Condò, R., Ammendola, S., Gaziano, R., Anselmi, M., Divizia, M., & Falconi, M. (2022). Potential Use of Tea Tree Oil as a Disinfectant Agent against Coronaviruses: A Combined Experimental and Simulation Study. *Molecules*, *27*(12). https://doi.org/10.3390/molecules27123786

Şakalar, Ç., & Ertürk, M. (2023). Inactivation of airborne SARS-CoV-2 by thyme volatile oil vapor phase. *Journal of Virological Methods*, *312*. https://doi.org/10.1016/j.jviromet.2022.114660

thank you!

Questions?