photo's author: Aleksandra Izdebska

Better effect of a lower dose of plant substances in deterring storage pests.

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STORAGE PESTS

Storage pests occur on stored products of plant or animal origin, including cereals. It is specialized group adapted to living in closed rooms in temperate climate. They cause great damage to stored products.

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THE AIM AND OBJECTS OF THE STUDY

The aim of the study was to compare the effect of two concentrations (0.1 and 1%) of different plant substances on dettering *Rhyzopertha dominica* F. and *Sitophilus granarius* L.

Both species were treated with the essential oils of *Foeniculum vulgare* Mill. and *Carum carv*i L. as well as L-carvone and anethole.

Sitophilus granarius L.

https://upload.wikimedia.org/wikipedia/commons/thumb/0/0e/Sitophilus.granarius.jpg/171px-Sitophilus.granarius.jpg

KINGDOM:
Animalia

PHYLUM:
Arthropoda

CLASS:
Insecta

ORDER:
Coleoptera

FAMILY:
Dryophthoridae

GENUS:
Sitophilus

SPECIES:
Sitophilus granarius

Rhyzopertha dominica F.

https://upload.wikimedia.org/wikipedia/commons/5/57/Rhyzopertha_dominica_Fabricius%2C_1792.jpg

KINGDOM:
Animalia

PHYLUM:
Arthropoda

CLASS:
Insecta

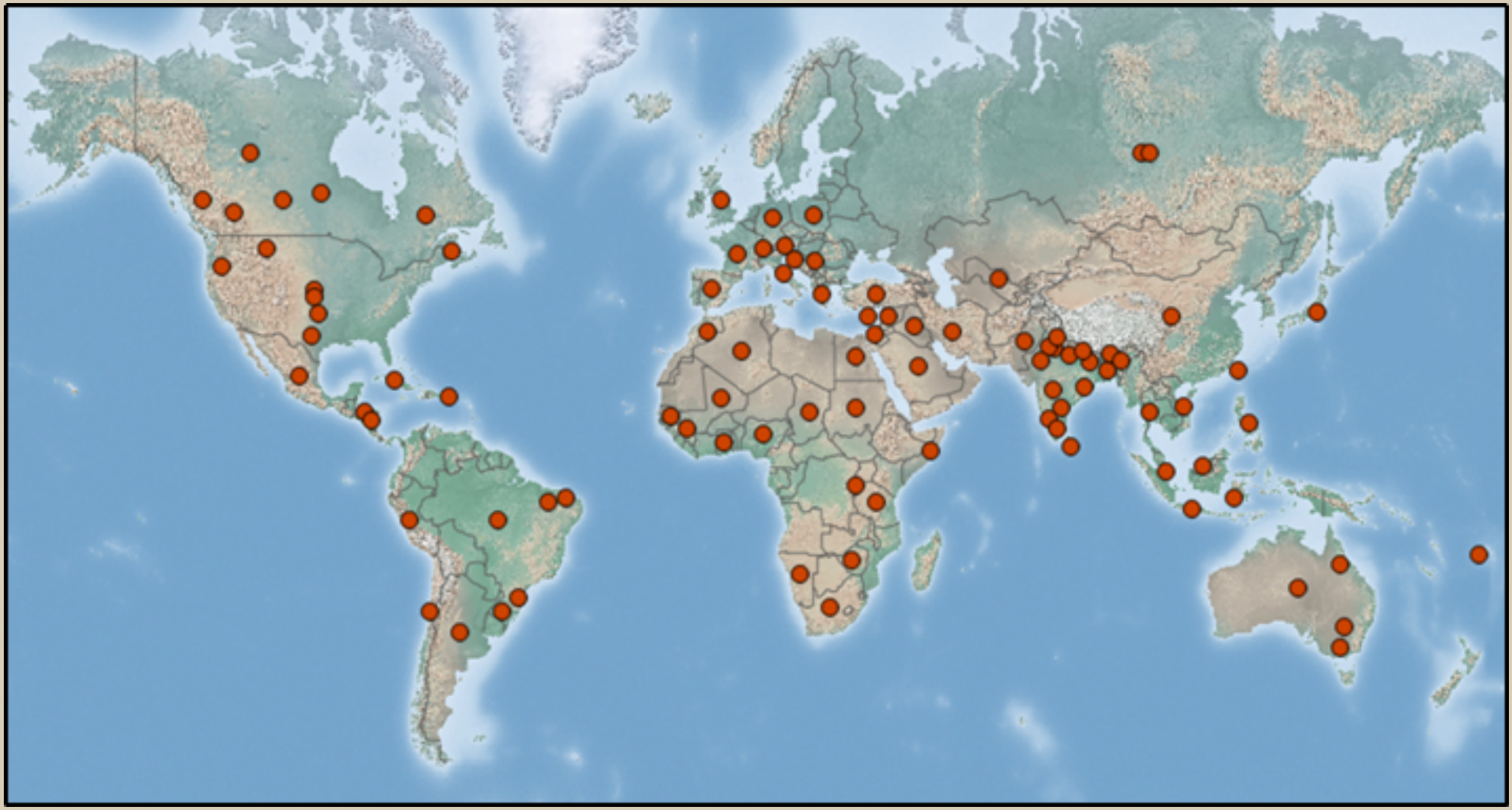
ORDER:
Coleoptera

FAMILY:
Bostrichidae

GENUS:
Rhyzopertha

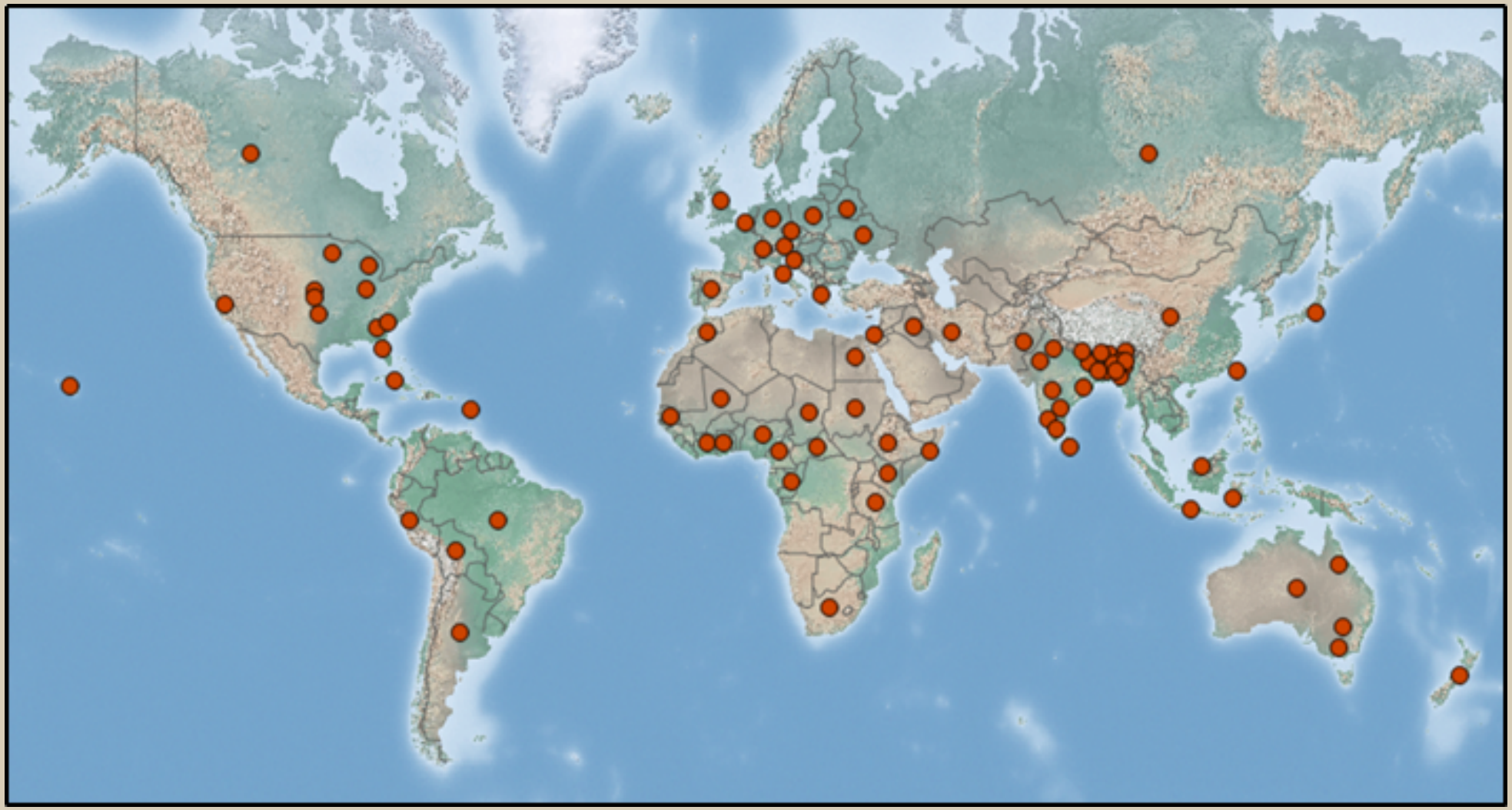
SPECIES:
Rhyzopertha dominica

The extent of the occurrence of *Rhyzopertha dominica* F.



https://www.cabi.org/

The extent of the occurrence of *Sitophilus granarius* L.



https://www.cabi.org/

The experimantal vessels

The experimental vessels consist of two plastic containers - a smaller and a larger one. Both containers are tightly closed with perforated lids. The inner container had 30 holes in the bottom and side walls up to a grain. The inner vessel had 4 screws.

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The experiments

The insects were placed in the inner container along with the paper disc. It was soaked with the essential oils of fennel and cumin, carvone and anethole in concentrations of 0.1% and 1% by weight.

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The experiments

40 beetles were added to the inner container in each variant of the experiment and in each its replication. The substrate for the control culture was 40 g of pure wheat. The filter paper disc placed in a smaller vessel was not soaked with any substance. Forty beetles were released into the prepared containers.

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PLANT SUBSTANCES

We chose fennel and caraway essential oil and compounds isolated from them for our research, because they are widely used and have no negative impact on the environment and human health.

Emigration (deterrence) of insects was recorded after 1, 2, 3, 4, 5, 24 and 48 hours of exposure.

The ANOVA Kruskall-Wallis rank test was applied, followed by a multiple comparison test. The test probability level "p" and the significance level "**α**" were 0.05.

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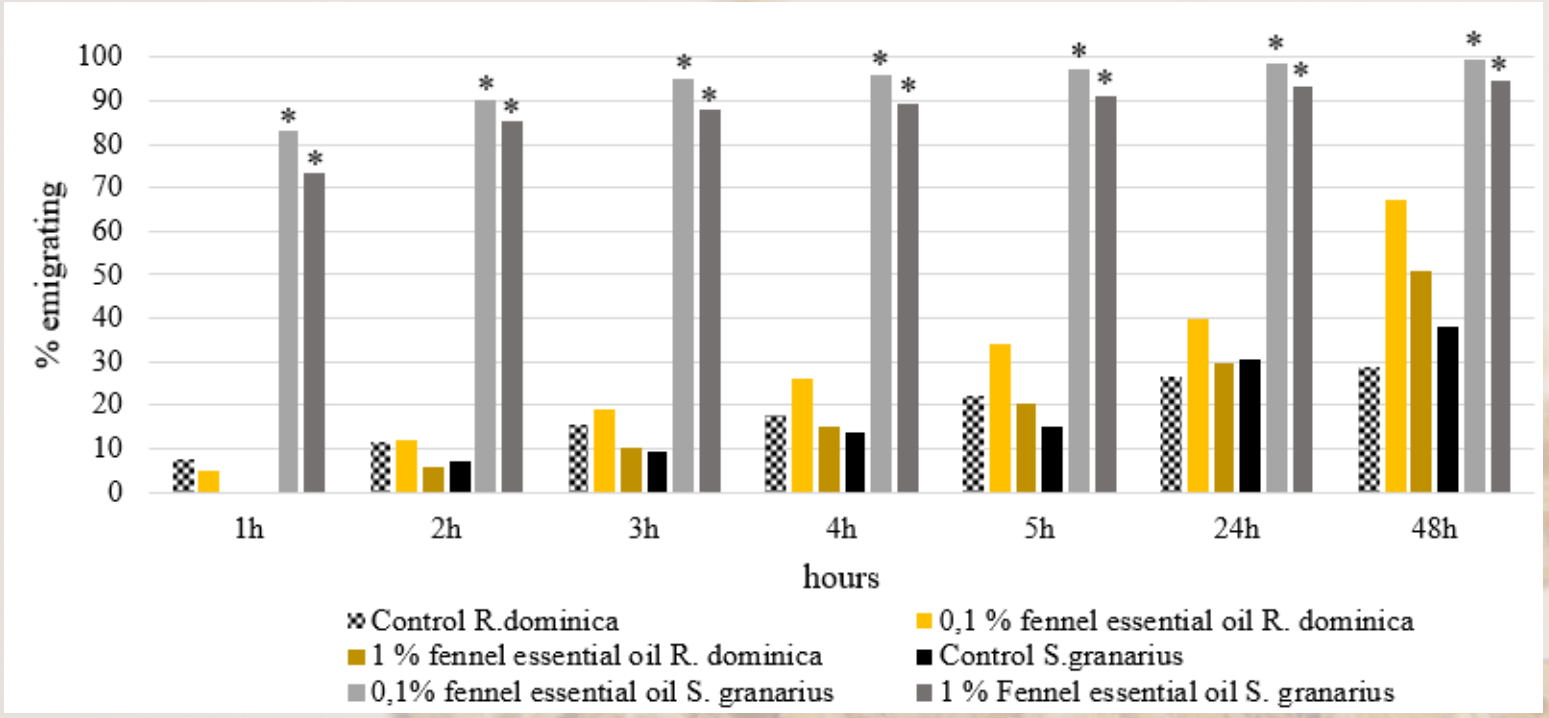
Results

Repellency of *R. dominica and S. granarius* and caused by fennel essential oil



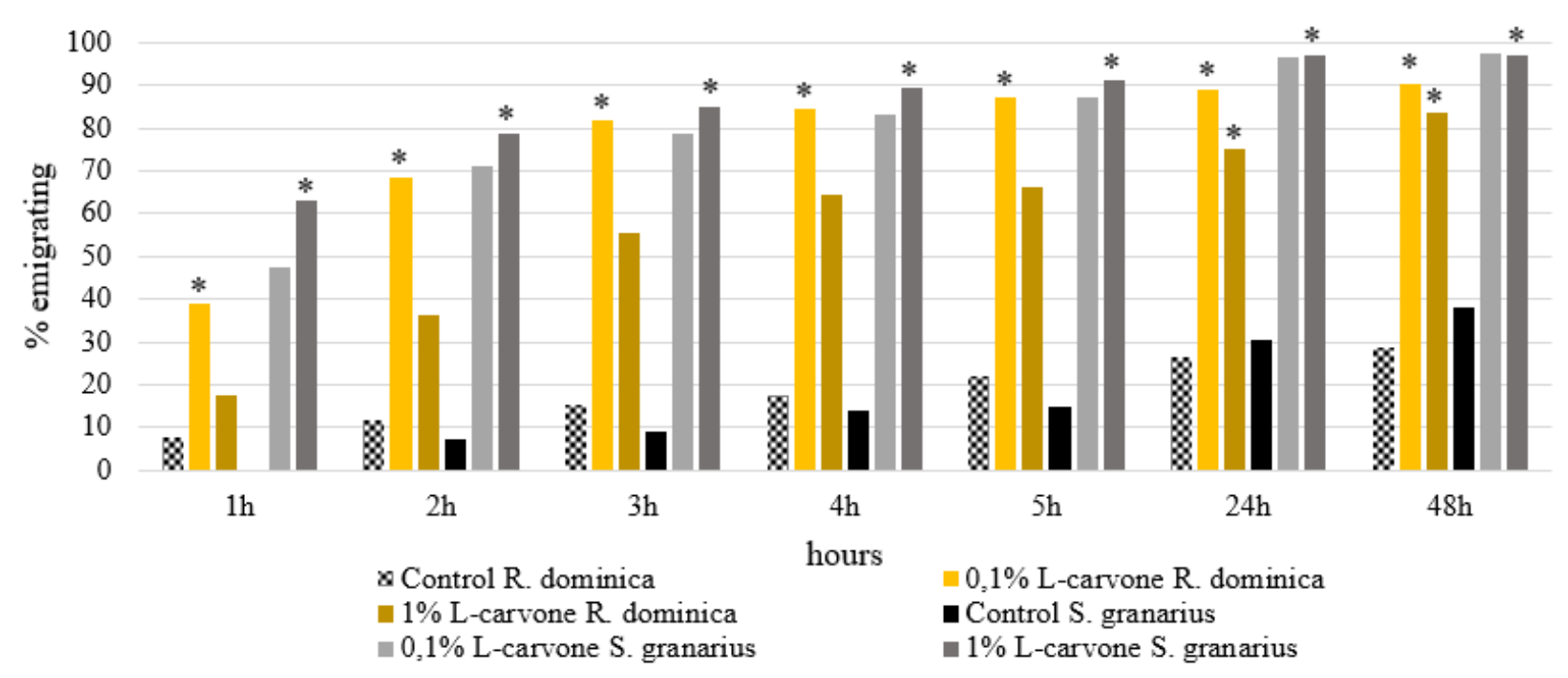
Statistically significant differences are marked with an asterisk

- **Fennel essential oil 1% on *R. dominica* caused a higher repellency compared to the control culture after 24 and 48h of the research. Fennel essential oil 0.1% on *R. dominica* caused a higher repellency in comparison to the control culture from 3h to 48h of the study. The lower dose resulted in a higher repellency.**

- **Fennel essential oil 0.1% and 1% on *S. granarius* caused a higher repellency compared to the control culture. The lower dose resulted in a higher repellency from 1h of testing to the end of the test that was conducted for 48 hours.**

Results

Repellency of *R. dominica* and *S. granarius* and caused by L-carvone



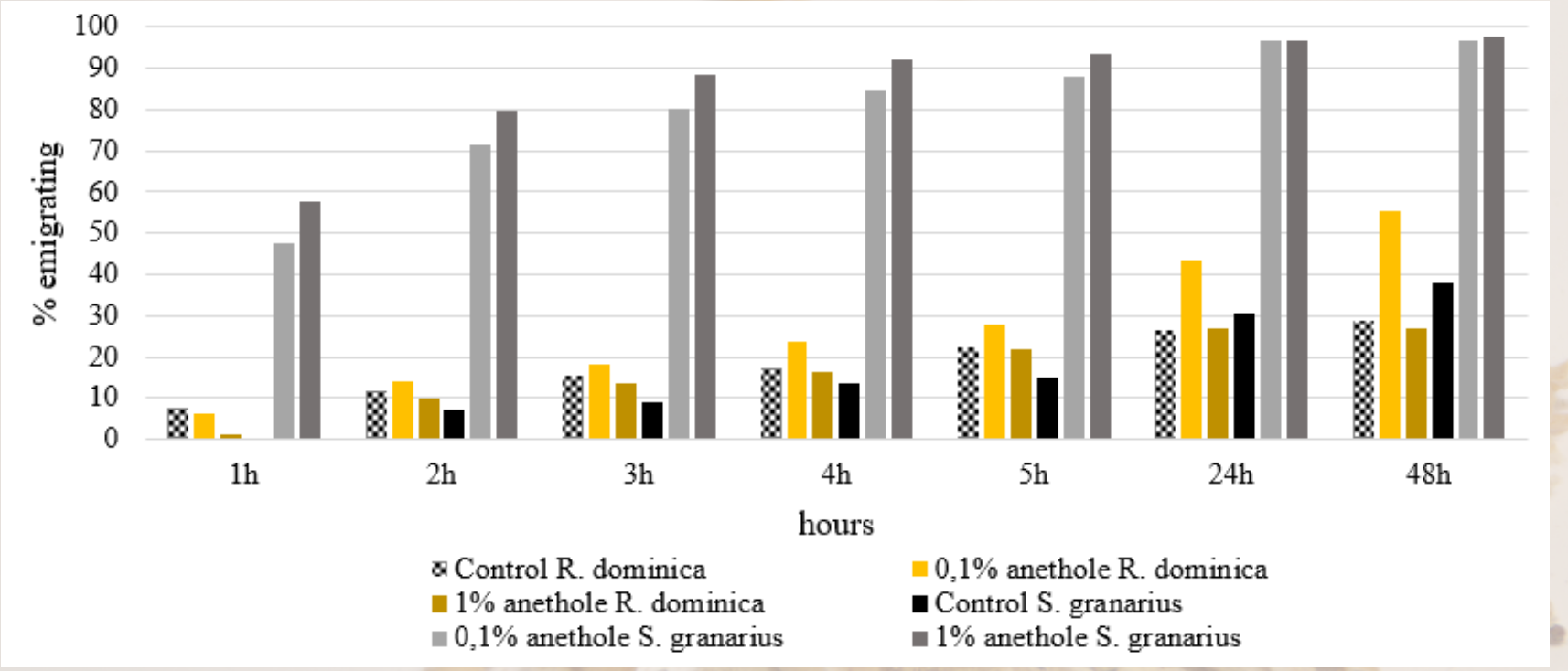
Statistically significant differences are marked with an asterisk

- **L- carvone 0.1% and 1% on *R. dominica* caused a higher repellency compared to the control culture from 1h of testing to the end of the test that was conducted for 48 hours. The lower dose resulted in a higher repellency from 1h of testing to the end of the test that was conducted for 48 hours.**

- **L- carvone 0.1% and 1% on *S. granarius* caused a higher repellency compared to the control culture from 1h of testing to the end of the test that was conducted for 48 hours. The lower dose resulted in a higher repellency from 1h of testing.**

Results

Repellency of *R. dominica* ans *S. granarius* caused by anethole.

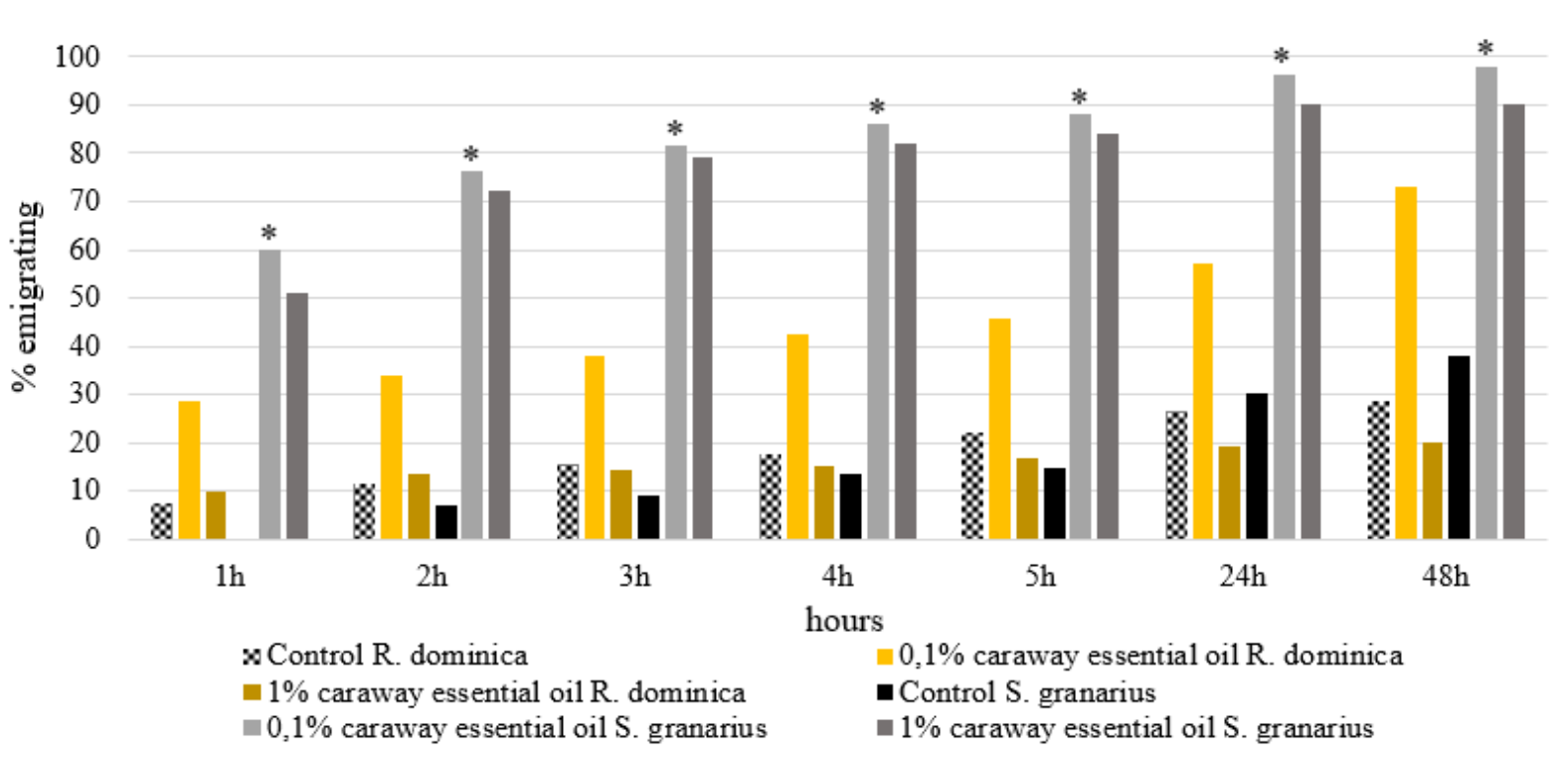


- **Anethole 0.1% on *R. dominica* caused a higher repellency compared to the control culture from 2h of testing to 48h of testing. Anethole in the concentration of 1% did not show higher repellent properties in comparison to the control culture in each time interval. The lower dose resulted in a higher repellency.**

- **Anethole 0.1% and 1% on *S. granarius* caused a higher repellency compared to the control culture from 1h of testing to the end of the test that was conducted for 48 hours. The lower dose resulted in a higher repellency to 24h of testing.**

Results

Repellency of *R. dominica* and *S. granarius* and caused by caraway essential oil



Statistically significant differences are marked with an asterisk

- **Caraway essential oil 0.1% on *R. dominica* caused a higher repellency compared to the control culture from 1h of testing to the end of the test that was conducted for 48 hours. The lower dose resulted in a higher repellency.**

- **Caraway essential oil 0.1% and 1% on *S. granarius* caused a higher repellency compared to the control culture from 1h of testing to the end of the test that was conducted for 48 hours. The lower dose resulted in a higher repellency to 24h of testing.**

Conclusion

The lower dose of *C. carvi* and *F. vulgare* essential oils, as well as carvone had the greatest deterrent effect on *S. granarius* and *R. dominica*. These results differ from the results obtained so far with regard to stored pests, the repellency increased with the increase in the concentration of the applied substances.

Thank you
for your
attention

Thank You

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