

## SUMMARY

It is estimated that annual post-harvest commodities losses from storage pests in developed countries can reach up to 10%, and significantly more in developing countries. Insects can destroy food not only by feeding on it but also by contaminating it with eggs or feces, making it unsuitable for use in the food industry. Since the mid-20th century, many researchers put their efforts into the development of new insecticides as well as alternative methods for cheap and effective control of insect infestation in warehouses. However, recently, due to the detrimental impact of synthetic insecticides on the environment and their toxic effects on vertebrates, numerous studies have been carried out to develop new potential insecticides from compounds commonly found in nature. The essential oils (EOs) and volatile organic acids (VFAs) are examples of such substances.

The presented study aimed to assess the influence of the aforementioned substances on selected physiological and behavioral parameters of one of the most common stored product pest - *Callosobruchus maculatus* and to select and assess the most viable potential dilution medium for delivery of EOs and VFAs.

The studies have shown a high potential of rosemary EO (*Rosmarinus officinalis*) as an insecticidal agent against *C. maculatus*. Additionally, it was shown that the vapors of rosemary oil had a repellent effect and caused the loss of movement coordination in exposed individuals. The latter effect of the studied mixture is particularly crucial because it leads to the significant reduction of the oviposition and, therefore - minimalizes the destruction of stored products.

Similar analyses were conducted on volatile fatty acids (VFAs). However, VFAs showed a lower insecticidal potential in comparison to *R. officinalis* EO, although the propionic, and valeric acids exhibited very strong repellent effect and significantly inhibited insects' locomotor activity. These features can be beneficial in integrated pest management as well as in the design of the push-pull systems.

One of the critical aspects affecting the influence of EOs on insects are the dispersion media (the carrier substances in which the EOs are diluted and delivered during insecticidal/protective treatment). However, the scientific community studying the insecticidal action of EOs did not establish standardized practices on the usage of dispersion media. Many research groups use widely differing substances. In the course of the presented

study, the effects of the most popular dispersion media on observed insecticidal action of EOs were assessed. The results of the presented tests showed high variability of observed toxicity depending on the insect species and the solvent used, which indicates the need for the careful selection of the solvent and the optimization of procedures for testing on different insect species and types of substances. A high potential of diatomaceous earth as a dilution medium was also shown, wherein the case of a mixture of diatomite and rosemary EO, a synergistic effect was observed.

The results obtained in the conducted studies indicate the possibility of using the *R. officinalis* EO and propionic acid as potential insecticides against the *C. maculatus*.