

Summary

The aim of the study was to investigate the effectiveness of various essential oils, as well as the chemical compounds extracted from them on the mortality and emigration of the grain weevil *Sitophilus granarius* L. - a dangerous pest of stored cereal grain. The researchers used substances derived from the following plants: fennel *Foeniculum vulgare* Mill., caraway *Carum carvi* L., black cumin *Nigella sativa* L. and *Mentha pulegium* L.

Finding an effective repellent or insecticide can help protect cereal grain from pests. The researchers focused on plant-based substances that are commonly used in various industries. Particular attention was paid to the selection of plants and chemical compounds so that the preparations used did not pose a threat to the environment and/or human health.

The studies assessed the emigration activity and mortality of *S. granarius* beetles. Experiments were conducted based on unidirectional emigration without the possibility of insects returning to the parent population. Dead grain weevil individuals were also counted. The studies used caraway essential oil and L-carvone and R-(+)-limonene, fennel essential oil and anethole, black cumin oil and thymoquinone, pennyroyal essential oil and pulegone in concentrations of 0.025%; 0.05%; 0.1%; 0.5%, 1%. Piperitone isolated from pennyroyal essential oil was also tested in concentrations of 0.01%; 0.025%; 0.1%; 0.05%. The experiments were checked after 1, 2, 3, 4, 5, 24 and 48 hours. Live and dead beetles were counted in both the smaller and larger vessels. Control cultures were also conducted in which the substrate was wheat without any added substance. The natural tendency of the beetles to emigrate was assessed.

The influence of plant substances – essential oils and compounds isolated from them – on the emigration (repellence) and mortality of grain weevils was compared. The best repellent properties against grain weevils were demonstrated by fennel essential oil and caraway essential oil. The strongest insecticidal properties against grain weevils were demonstrated by: 1% and 0.5% spearmint essential oil, and 0.5% pulegone. It was found that the lower the concentration of the tested substances the stronger the repellent effect, and the higher the concentration of the tested substances the stronger the insecticidal effect. The use of a plant compound isolated from an essential oil does not guarantee its stronger insecticidal or repellent effect. Fennel and caraway essential oil could be used as repellents, and peppermint oil and pulegone as insecticides and find application in the protection of stored cereal grain.