

The effect of (E,E)-2,4-decadienal, (E)-2-decenal, 2-undecanone and furfural on reproduction of *Tenebrio molitor*



Justyna Mirek, Karolina Walkowiak-Nowicka, Małgorzata Słocińska

Department of Animal Physiology and Development, Institute of Experimental Biology, Faculty of Biology, Adam Mickiewicz University in Poznań, Poznań, Poland

Introduction

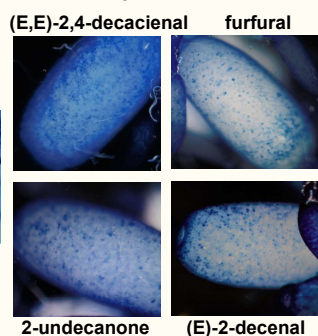
Natural origin compounds such as plant-derived substances containing plants secondary metabolites show great potential as bioinsecticides. They are safe for the environment, biodegradable and widely available. Moreover, they exhibit broad biological activity, and might be used as such as insecticides, nematocides, fungicides, nematocides and ovicides. They are also able to inhibit food intake or the growth and development of insects. Because insects can produce many eggs, oogenesis and oviposition could be the worthwhile aim of pest control.

Materials & methods

We used compounds in 2 concentrations: 10^{-5} and 10^{-7} M injected into an adult females *Tenebrio molitor*. In the research, we took ovarian development and reproduction parameters into account and assessed the volume of terminal oocytes, the number of eggs laid and larvae hatching.

Follicle epithelium

10^{-5} M



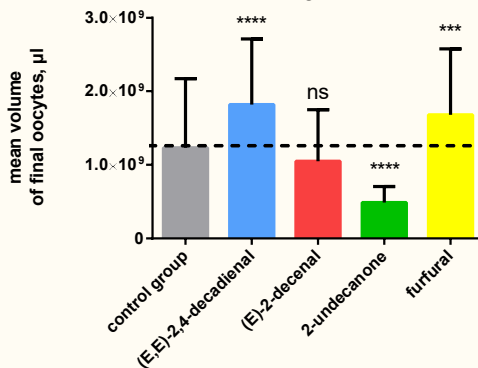
Control group

2-undecanone

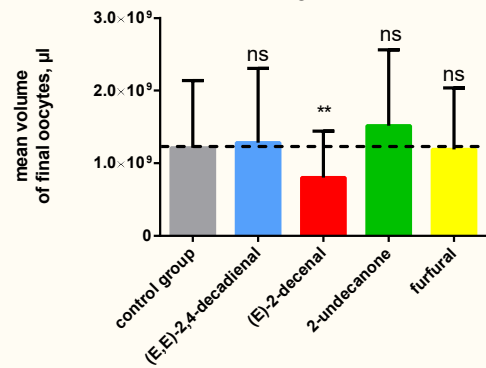
(E)-2-decenal

Changes in the volume of terminal oocytes

10^{-5} M

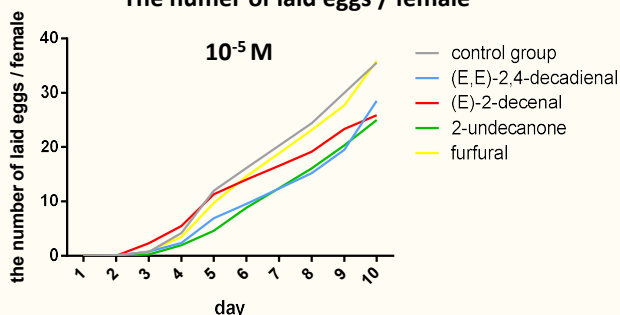


10^{-7} M

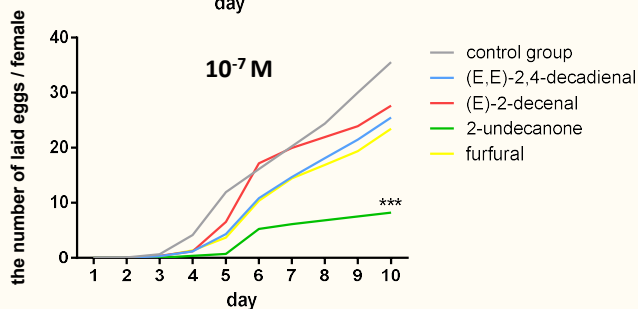


The number of laid eggs / female

10^{-5} M



10^{-7} M

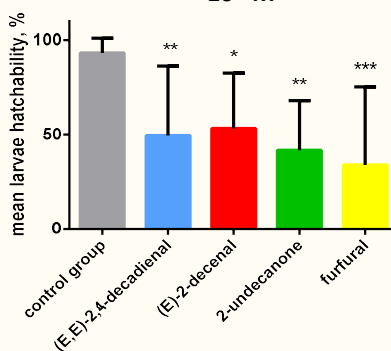


Results

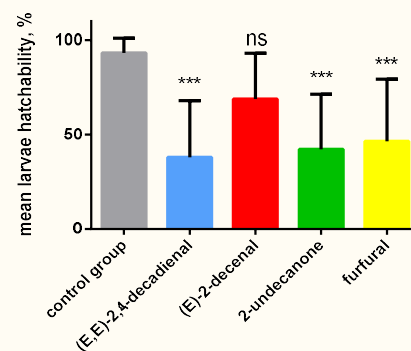
The application of (E)-2-decenal, furfural, 2-undecanone and (E,E)-2,4-decadienal caused changes in the volume of terminal oocytes. We showed a significant decrease in the volume of terminal oocytes after application of 2-undecanone at concentration 10^{-5} M and an increase for (E,E)-2,4-decadienal after furfural treatment. In the lower concentration of chemicals, we noted a gentle drop in the volume of terminal oocytes only after (E)-2-decenal. In each case, the follicle epithelium was well developed. We observed a gentle decrease in the number of laid eggs by females for each of the tested compounds. However, statistical analysis showed significant change only for 2-undecanone at the lower concentration of 10^{-7} M. Moreover, the application of tested compounds at both concentration caused a decrease in the number of hatched larvae. We show significant results in each case, except 10^{-7} M (E)-2-decenal.

Changes in larvae hatchability

10^{-5} M



10^{-7} M



Conclusions

Our results suggest that (E,E)-2,4-decadienal, 2-undecanone, furfural and (E)-2-decenal show ootoxic and embryotoxic properties.