

# **(2*S*,8*Z*)-2-Butyrox-8-heptadecene: Major Component of the Sex Pheromone of Chrysanthemum Gall Midge, *Rhopalomyia longicauda***

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**Abstract** The sex pheromone of chrysanthemum gall midge, *Rhopalomyia longicauda* (Diptera: Cecidomyiidae), which is the most important insect pest in commercial plantations of chrysanthemum, *Dendranthema morifolium* (Ramat.) Tzvel., in China, was identified, synthesized and field-tested. Volatiles from virgin females and males were collected on Porapak in China and sent to UK for analysis. Coupled gas chromatographic–electroantennographic detection (GC-EAG) analysis of volatile collections from females revealed two components that elicited responses from antennae of males. These compounds were not present in volatiles collected from males. The major EAG-active component was identified as 2-butyrox-8-heptadecene from GC retention times, mass spectra in both EI and CI modes, hydrogenation, epoxidation and derivatization with dimethyldisulfide. The minor, weaker EAG-active component was the corresponding alcohol, and the ratio of butyrate to alcohol was 1:0.26. Racemic (*Z*)-8-heptadecen-2-ol and the corresponding butyrate ester were synthesized from (*Z*)-7-hexadecenyl acetate, and the synthetic compounds had identical GC retention times and mass spectra to those of the natural, female-specific components. The racemic material was resolved by enzymatic hydrolysis with lipase from *Candida arctica*. Analysis of the volatile collections on a chiral Cyclodextrin GC column showed the natural pheromone to contain (2*S*,8*Z*)-2-butyrox-8-heptadecene. Field tests showed that rubber septa lures containing racemic (*Z*)-2-butyrox-8-heptadecene were attractive to *R. longicauda* males. The naturally-occurring *S*-enantiomer was equally attractive and the *R*-enantiomer was neutral in its activity, neither attractive nor inhibiting the activity of the *S*-enantiomer. The attractiveness of the butyrate was significantly reduced by the presence of either enantiomer of the corresponding alcohol. The role of corresponding alcohol remains to be determined but traps baited with (2*S*,8*Z*)-2-butyrox-8-heptadecene or the racemic compound can be used for monitoring this pest.

**Keywords** Chrysanthemum gall midge · *Rhopalomyia longicauda* · Cecidomyiidae · Sex pheromone · (2*S*,8*Z*)-2-butyrox-8-heptadecene · (2*S*,8*Z*)-8-heptadecene-2-ol · Field trapping