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Structure—Activity Relationships of Benzoic Acid Derivatives as Antifeedants for the Pine Weevil, *Hylobius abietis*

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Abstract Aromatic organic compounds found in the feces of the pine weevil, *Hylobius abietis (L.)* (Coleoptera: Curculionidae), have been shown to deter feeding behavior in this species, which is a serious pest of planted conifer seedlings in Europe. We evaluated 55 benzoic acid derivatives and a few homologs as antifeedants for IL *abietis.* Structure–activity relationships were identified by bioassaying related compounds obtained by rational syntheses of functional group analogs and structural isomers. We identified five main criteria of efficiency as antifeedants among the benzoic acid derivatives. By predicting optimal structures for *II. abietis* antifeedants, we attempted to find a commercial antifeedant to protect conifer seedlings against damage by *H. abietis* in regenerating forests. New, highly effective antifeedants are methyl 2,4-dimethoxybenzoate, isopropyl 2,4-dimethoxybenzoate, methyl 2-hydroxy-3-methoxybenzoate, methyl (3,5-dimethoxyphenyl) acetate, and methyl (2,5-dimethoxyphenyl)acetate. Of these, methyl 2,4-dimethoxybenzoate and isopropyl 2,4-dimethoxybenzoate have the highest antifeedant indices of all substances tested and are the best candidates for practical applications in order to protect planted seedlings in the field.

Keywords Benzoate • Bioassay • Curculionidae • Deterrent • Feces • Feeding • Isopropyl 2,4-dimethoxybenzoate • Methyl 2,4-dimethoxybenzoate • Phenylacetate • Reforestation • Seedling protection

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