Electrophysiological and behavioural responses of the Grapevine Moth *Lobesia botrana* to odours of the non-host plant *Perilla frutescens*

**Background**

*Lobesia botrana* is a major pest of grape worldwide. To find novel compounds with potential application in biological control, we screened the biological activity of metabolites isolated from the Asian food plant *Perilla frutescens* on the olfactory system of the insect. Compounds from this plant have previously been shown to activate *in vitro* a novel class of mammalian receptors, TRPs (Bassoli et al 2009), which are also found in insect antennae (Chouquet et al. 2009).

**Goals**

- Identifying active compounds in *P. frutescens* varieties with different chemical makeup (chemotypes)
- Testing behavioral activity of identified compounds

**Experimental Procedure**

- Extraction of *P. frutescens* essential oils
- GC-EAD identification of active compounds
- Confirming identity of compounds by GC-MS
- Bioassays (oviposition trials)

**Results**

GC-EAD experiments revealed *Isoegomaketone (IK)* as a strong activator of both mated and unmated *L. botrana* male antennae (left figure, red tracks) and *Perillaaldehyde (PA)* as a strong activator of mated female antennae (right figure, light-blue track). In a dual choice oviposition assay (Table below), the combination of an odour bouquet of a host plant with either the Perillaaldehyde essential oil (*e.O*) or a synthetic lure of the PA compound (*PA*) elicited a higher degree of female oviposition than the host plant odours alone (Host).

<table>
<thead>
<tr>
<th>Eggs laid % (p&lt;0.0001)</th>
<th>Host</th>
<th>Host + <em>Perilla</em></th>
<th>Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.60%</td>
<td>90.40%</td>
<td><em>e.O</em></td>
<td></td>
</tr>
<tr>
<td>19.90%</td>
<td>80.10%</td>
<td>PA</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusions**

- We identified compounds showing sex-specific activity, both in the antenna, and in behavior
- These could form the basis for biological control efforts

**Perspectives**

- Molecular, physiological and behavioural studies of the activity of single and blended *Perilla* compounds
- Study of the role of TRP receptors in *Lobesia* in the perception of these compounds

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