Variations of cuticular hydrocarbons in the invasive hornet *Vespa velutina* nigrithorax in France

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The research project "FRELON", supported by the local government (region Centre, France, 2011-2014), (1) analyzes the biology and the ecology of the invasive hornet *Vespa velutina* nigrithorax in Europe, and (2) develops a selective trap against this species. This hornet was accidentally introduced in France from China in 2004. This hornet is a pest in France, because it preys upon domestic honeybees, *Apis mellifera*. Beekeeping operations are affected by this predation, with some beekeepers reporting colony losses. Among different subjects analyzed in the project, we wanted to identify the cuticular hydrocarbons (CHCs) which constitute the chemical signature of this species. These compounds could be used as a tool to identify the colony origin of workers predating in front of bee hives, and could be used to increase the selectivity of a specific trap.

**MATERIALS AND METHODS**
- 10 hornets from each caste (gyn, worker and male) were isolated in 15 colonies.
- Cuticular hydrocarbons (CHCs) were extracted with pentane.
- CHCs were analyzed by GC-FID.
- Compounds were identified by GC-MS for each caste (pools of CHCs from 9 hornets).
- Statistical tests: MANOVA and Principal Component Analysis (PCA)

**RESULT 1: CHEMICAL SIGNATURE OF CASTES**

CHCs profiles of the three castes (gyn, workers and males). Only the main peaks were selected for more readability.

- Among the 95 peaks detected in the chemical signature, only 71 were selected for this study.
- The relative quantity of these 71 CHCs varies according to the castes. Each caste presents a specific chemical signature.

Each caste presents a specific chemical signature in *Vespa velutina*.

**RESULT 2: COLONIAL CHEMICAL SIGNATURE**

- CHCs comparisons have been performed between colonies for each caste (10 individuals by caste, colonies comparisons side-by-side).
- For males, 55 comparisons were performed showing a significant difference for chemical signature.
- In both workers and gynes, for 28 respective comparisons, 93% show a significant difference for chemical signature.

*Vespa velutina* presents a colonial signature for each caste in its invasive area.

**CONCLUSIONS**
- The chemical signature (CHCs) of *V. velutina* was analyzed in this study.
- Hornets present a specific chemical signature which is linked to their sex, caste and colonial origin.
- The identification of these CHCs could allow us for further studies, for example: How these compounds are perceived by individuals? Could they have an attractive or repulsive effect? Could they be used for the elaboration of a selective trap?