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## Development of analytical methodologies for the chemical investigation of insect attractants or repellents.

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This study focuses on the design, development and testing of a portable olfactometer for the chemical investigation of volatile organic compounds (VOCs) with insect attractant and repellent activity. The olfactometer has a Y-shape design and comprises of four chambers: a) for hosting the under-investigation insect population, b) for hosting the chemical analytes of interest, c) a control chamber and d) a decision chamber. A compact portable membrane inlet quadrupole mass spectrometer (MI-QMS) has been integrated within the developed olfactometer and employed for the first time to detect and monitor continually, both qualitatively and quantitatively, VOCs with mosquito repellent activity. On-line monitoring of such compounds in field conditions (i.e. out of the laboratory) is of great importance and allows the chemical comprehension of the olfactory behaviour of insects with potential negative impact on public health. MI-QMS is a powerful, simple analytical technique ideal for *in-situ* applications that offers high sensitivity (low limits of detection), selectivity, fast and accurate analysis (within seconds), with no sample preparation requirements. Representative compounds examined include: (-)- $\alpha$ -pinene,  $\gamma$ -terpinene, (+/-)-linalool, (-)- $\beta$ -pinene, p-cymene, R-(+)-limonene, b-Myrcene, (-)-linalool, butyl hexanoate, ethyl butyrate, o-xylene. Gas phase experiments were performed at concentration levels from low ppb to low ppm using two techniques for gaseous standards generation: a) static dilution bottles and b) a built-in-house vapour generator. Results obtained showed very good linearity within the examined concentration range, ppb limits of detection and fast response times (within sec). Preliminary lab evaluation experiments with mosquitoes will also be presented.

**Keywords:** olfactometer, mosquitoes, repellent activity, mass spectrometry, *in-situ*