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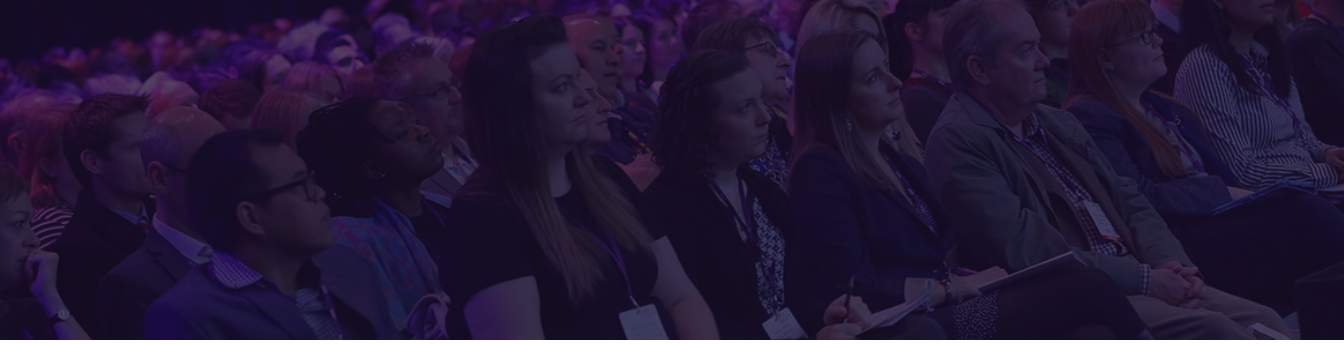
How can odours help to control vector-borne diseases?

Vector-borne diseases are infectious diseases that can be transmitted between humans or from animals to humans by living organisms. Diptera insects are certainly the most studied vectors, especially mosquitoes, as they are worldwide spread and also considered the deadliest animals in the world, for its competence on transmitting etiologic agents of many serious diseases, as malaria, dengue and yellow fever. Indeed, more than 3.9 billion people in over 128 countries are at risk of contracting dengue virus, with an estimative of 96 million cases per year. Malaria is caused by some Plasmodium protozoa species and causes more than 400 thousand deaths every year. Not transmitted by mosquito, but by phlebotomine sand flies, leishmaniasis represents a group of worldwide spread diseases caused by Leishmania protozoa species and includes a serious clinical form that can lead to death: The Visceral Leishmaniasis (VL). It is estimated that VL causes 26.000 to 65.000 deaths per year. Vector-borne diseases control depends on an association of a diversity of actions that must include vector control, which can be performed by different interventions as the use of traps to capture and monitor insect vectors population. It is known that olfaction is the best developed sense on insects and it is crucial for its orientation, including for food source seek. Carbonic gas (CO2) is a generalist cue that helps insects to find vertebrate hosts. Other volatiles cues helps on the refinement of the host choice and seems to be specific to each insect species. Human skin odours have been investigated to search for Volatile Organic Compounds (VOCs) to help the development or improvement of efficient insect vectors traps (or that can be used as repellents). Light traps have been used for such purpose and its efficiency seems to be improved when adapted with a CO2 delivery system and odours blends. BG-sentinels is a commercial trap that uses a odour lure, the BG-lure, that mimics human skin emanations and seems to be mostly specific vectors of dengue (Aedes aegypti), yellow fever (Aedes albopictus) and to house mosquitoes (Culex quinquefasciatus). A synthetic odour blend, referred as “Mbita” blend showed to be more attractive to mosquitoes than human subjects and its efficiency on malaria vectors capture was improved when 1-dodecanone or butan-1-amine was added. Octenol is VOCs present in human skin breath and in skin emanations and even though it seems to not significantly attract to mosquitoes, it has been shown to be attractive to some phlebotomine sand flies species in field captures and in laboratory assays. Phenylacetaldehyde, 6-methylhepten-5-en-2-one and icosane are present in human skin odours and were significantly attractive to females of Lutozmyia intermedia phlebotomine sandflies in laboratory assays. Thus these VOCs are considered candidates for field traps improvement. Besides, some studies have reported that volatiles present in odours produced by human skin microbiota (mostly bacteria) represents a key role on blood feed mosquitoes attraction and these compounds have been tested for such purpose. These are only some few examples of how odours can help to control vector-borne diseases.



Biography: Yan Li is an Associate Professor and works Diva Tavares is a Professor at the Medical School of the Christus University Center (UNICHRISTUS). She is biologist (graduated from the Federal University of Ceara – UFC), studied mangrove ecology during the graduation and also during the master course, where she obtained a master degree on ecology and Natural Resources (UFC). Her Ph.D. is in experimental pathology and it was obtained at the Goncalo Moniz Research Institute – IGM, from the Oswaldo Cruz Foundation – FIOCRUZ. She has experience in chemical ecology of phlebotomine sandflies, vectors of leishmaniasis, with emphasis on Tegumentary American Leishamaniasis.

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