GAVIN CONFERENCES

2nd International Conference on
Advances in Biotechnology
July 23-25, 2018 at Kuala Lumpur, Malaysia

Development and viladiation of the headspace-SPME method to analyse volatile organic compounds (VOCs) from red flour beetle Tribolium castaneum (Herbst) (Coleoptera: Tenebrionidae)

Ihab Alnajima, b, Manjree Agarwala, Tao Liuc*, YongLin Rena*
a. School of Veterinary and Life Sciences, Murdoch University Perth, Australia.
b. Date Palm Research Centre, University of Basrah, Basra, Iraq.
c. Chinese Academy of Inspection and Quarantine, No. 241, Huixinxijie, Chaoyang District, Beijing 100029, China.

Background: We assume that selection pressure can act on both the biochemical and the physiological regulation of the chemical signal which released from metabolic process, such as a body odour bouquet to the environment not as a (intentional) signal but as an unavoidable consequence of metabolic activity or tissue damage. Breath, sweat, urine, faeces, their aquatic equivalents, and their bacterial and other symbiotic embellishments all can serve as identifiers for chemoreceptive insects interested in finding food or hosts. Understanding the biological and chemical bases for these signals – Volatile Organic Compounts (VOCs) could lead to new approaches to the diagnosis and bio-treatment of insect pests.

Results: A robust headspace solid phase microextraction (HS-SPME) technique was developed and validated. The specific volatile organic compounds or chemical signals from *T. castaneum* were extracted and identified. The analytical conditions and procedures were optimised and validated for T. castaneum.

Results showed that 50/30 µm DVB/CAR/PDMS was the optimum fibre for both qualitative and quantitative analysis. Among the five tested insect densities (1, 5, 10, 20 and 30), ten insects gave the more VOCs. Extraction for four hours at 35±1°C had achieved optimal efficacy. Total of 23 volatile organic compounds were extracted from T. castaneum and seperated with GC-MS. The majority of the compounds identified were quinones and their derivatives and isomers.

Conclusion: This study had shown that HS-SPME GC is a robust and cost-effective system for the diagnosis of T. castaneum based on the production of specific VOCs, and studies are in progress to characterize and identify the VOCs released from T. castaneum. Moreover, the efficiency of extraction of VOCs from *T. castaneum* was significantly affected by the extraction time and temperature, insect intensity and type of SPME fibre.

Keywords: Stored grain insect; Tribolium castaneum; red flour beetle; VOCs; headspace-SPME; GCMS

Biography:

Ihab alnajim a lecturer and researcher at Date Palm Research Centre, University of Basrah, Iraq. He got his master's degree in plant protection. He published 11 research papers in journals. He has a scholarship to complete his PhD at Murdoch University, Perth, WA, Australia. His project is about the biochemical differences between phosphine susceptible and resistant insect strains of two main stored pests (Tribolium castaneum and Rhyzopertha dominica). The project focuses on the differences between the susceptible and resistant strains regarding three main aspects which are respiration, volatile organic compounds (VOCs) and metabolism products.

I.Alnajim@murdoch.edu.au