New ultra-rapid detection of pesticides in honeybee

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Introduction

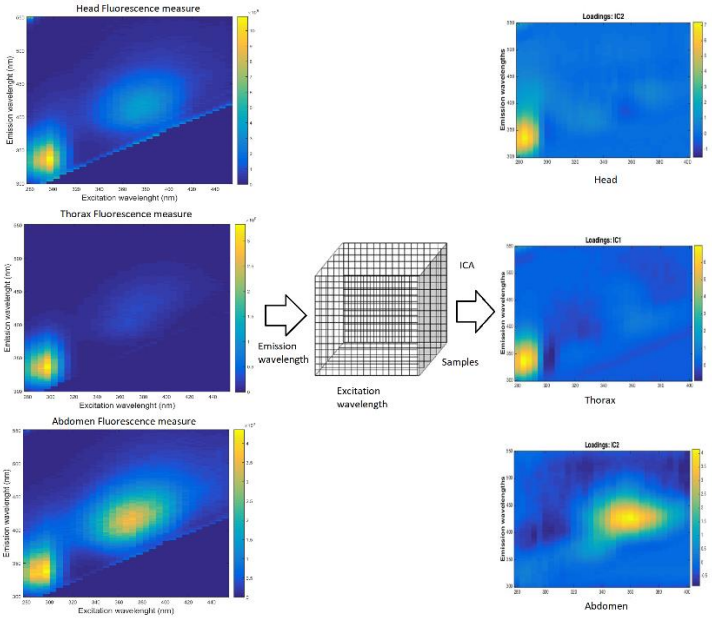
The development of 3D-Fluorescence Spectroscopy to follow biological fluorophores into honeybees allows for detecting variations in honeybees' metabolism linked to pesticide exposure, in combination with the Independent Component Analysis, which used as a means of source signals extraction from raw spectra.

Materials and Methods

6 boxes of 40 honeybees/box with pesticide and 6 others without pesticide. Fluoromax-4 Spectrofluorimeter (Spex-Jobin Yvon, Longjumeau, France) for fluorescence analysis and Matlab environment to perform the ICA and ANOVA analyses onto the ICA scores.

Results and Discussion

Figure and Table 1: Description of the Independent Component Analysis and ANOVA results of some of the fluorophores detected, with their identification.



Body Part	IC	Ex/Em Pair (nm)	df	F	Probability	Fluorophore
Head	IC2	280/340	17	9,62	0,0069*	Trp-Protein[1]
Thorax	IC2	280/340	17	5,66	0,0302*	Trp-Protein[1]
Abdomen	IC3	330/440	17	16,53	0,0009*	NADH[3]

The variation in ICA signals' proportions of these fluorophores shows the presence of pesticide, the response to stress and detoxification process in the honeybee[2].

Conclusion

The variation between main fluorophores of the honeybee metabolism shows that the presence of pesticide can be detected with the Front-Face Fluorescence Spectroscopy. The stress response modelling makes it possible to have a more general idea of the detoxication response to stress in a very fast way.

Bibliography

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