USE OF APIS MELLIFERA AS A BIOINDICATOR FOR THE EVALUATION OF ENVIRONMENTAL AND AGRO-ALIMENTARY BIO-SECURITY.

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INTRODUCTION

Apis mellifera is an excellent environmental bioindicador of pesticides and other pollutants according to scientific reporters. In fact it is necessary tests of toxicity on bees to be able to classify and commercialize pesticides.

OBJECTIVE

The aim has been to study the possible use of *Apis mellifera* as a method of evaluation of the environmental and food-processing biosecurity in fruit and vegetable fields.

METHOLOGY

Methodology has three phases.

Firstly, two stations of monitoring (with two colonies of *Apis mellifera* each) were located in plums, peaches and tomatoes fields from a cooperative with integrated production in the province of Badajoz (Spain) and controlled according to a protocol previously stablished (a).

In the second phase, the dead bees were gathered every 7 days during 5 months and those that overcame the threshold of mortality surrendered to chemical (b) and palinologic (c) analysis.

Finally, results gave place to the elaboration of a biosecurity map by means of Geographical Information Systems, indicating type and origin of pollution.

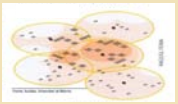
1

Stations of Biomonitoring

2

Chemicals and Palinological Analysis

3



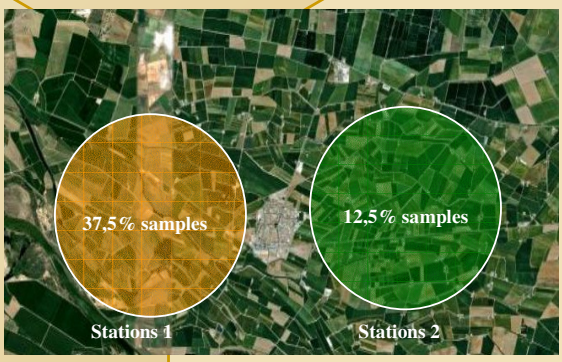
Biosecurity Maps

RESULTS

40% of the samples overcame the threshold of mortality (250 bees died by station and week). In 100% of the above mentioned samples it was demonstrated the presence of different group of pesticides, such as Neonicotinoids (thiamethoxam, clotianidin and imidacloprid) and Organophosphates (fenitrotion, fosmet and clospirifos etile).

Sampling	Date	Hive 1.A	Hive 1.B	Stations 1	Hive 2.A	Hive 2.B	Stations 2
1	11-may	197	69	***266***	152	468	***620***
2	18-may	11	34	***45***	72	152	***224***
3	25-may	16	58	***74***	102	104	***206***
4	01-jun	26	37	***63***	102	128	***230***
5	08-jun	57	12	***69***	43	100	***143***
6	15-jun	60	12	***72***	159	246	***405***
7	22-jun	40	34	***74***	55	129	***184***
8	29-jun	59	116	***175***	40	73	***113***
9	06-jul	59	40	***99***	102	158	***260***
10	13-jul	221	197	***418***	79	209	***288***
11	20-jul	260	140	***400***	275	555	***830***
12	27-jul	45	40	***85***	34	110	***144***
13	03-ago	118	459	***577***	63	135	***198***
14	10-ago	148	157	***305***	51	79	***130***
15	17-ago	254	192	***446***	129	88	***217***
16	24-ago	47	123	***170***	154	61	***215***
17	31-ago	57	84	***141***	419	476	***895***
18	07-sep	754	172	***926***	247	239	***486***
19	14-sep	249	235	***484***	75	104	***179***
20	21-sep	36	66	***102***	202	158	***360***

SAMPLES	NEONICOTINOIDS (µg/kg)			ORGANOPHOSPHATES (mg/kg)		
	Imidacloprid	*Thiamethoxam*	*Clothianidin*	*Fenitrotion*	*Fosmet*	*Clorpirifos etile*
1.1	nr	***12,9***	***1,62***	***0,018***	***0,052***	nr
1.2	nr	nr	nr	***0,022***	nr	nr
1.3	nr	nr	nr	***0,021***	nr	nr
1.4	nr	nr	nr	***0,612***	nr	nr
1.5	nr	nr	***172***	***0,142***	nr	nr
1.6	nr	nr	nr	***0,096***	nr	nr
1.7	nr	nr	nr	***0,456***	nr	nr
1.8	***32,7***	nr	***102***	***0,105***	nr	nr
2.1	nr	nr	nr	***0,016***	nr	nr
2.2	nr	nr	nr	nr	nr	nr
2.3	nr	nr	nr	nr	***0,938***	nr
2.4	nr	nr	nr	***0,025***	***0,013***	nr
2.5	nr	nr	nr	nr	nr	***0,164***
2.6	***19,9***	nr	nr	nr	nr	***3,628***
2.7	nr	nr	nr	***0,016***	nr	***0,092***
2.8	nr	nr	nr	***0,111***	nr	***0,092***



Presence of neonicotinoids in samples overcame the threshold of mortality .

CONCLUSIONS

In conclusions, bees biomonitoring can be considered an useful and very effective method of evaluation and self-control to be used by farmers and a tool of certification for the future.

This way, farmers might be allied and not enemies of bee-keepers.

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