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DETERMINATION OF DIMETHOATE AND MALATHION RESIDUES IN HONEY

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ABSTRACT

The residues of dimethoate (o.o dimethyl S ((methylcarbomoyl methyl) phosphorothioate) and malathion (o.o- dimethyl dithiophosphate of diethyl mercapto succinate) were detected in honey samples obtained from different hives located in grapes and citrus orchards pretreated with the two insecticides to protect the two crops from insect infestation. Sampling took place on June 1st and continued up to August 15th, 1990 with fifteen days intervals. All samples were contaminated with dimethoate; residues ranged between 0.005 and 0.024 ppm. On the other hand, the first two samples of honey were free from malathion residues. The other samples contained higher amounts of malathion (0.24 - 0.489 ppm) as compared with dimethoate.

INTRODUCTION

Dimethoate and malathion are widely used to control some insect species infesting grapes and citrus. Honey hives are located nearby such orchards and the insecticides may be brought into the hive with nictar (Illarionov, 1977).

Honey samples were randomly taken on June 1st., 1990 and then every 15 days intervals from individual hives to

determine dimethoate and malation residues using El-Nabarawy and Carey method (1988 a). These residues were determined using gas chromatograph equipped with Flame ionization detector. The operating conditions were used as described by El-Nabarawy (1992).

MATERIALS AND METHODS

1- Sampling :

Honey samples were randomly taken from different hives which were found in grapes and citrus orchards at El-Katta village, Imbaba centre Giza Governorate during 1990 season, where dimethoate and malathion were used to control some insect species infesting such crops. These samples were analyzed as described by El-Nabarawy and Carey (1988a) to detect the possibility of presence any residues of the two used insecticides.

2- Method and analysis

a. Extraction of honey samples:

Honey samples (10g) were dissolved in 10 ml of water in a small beaker. It was found that diluting the honey with water resulted in avoiding the formation of emulsion as well as the poor recovery. The solution was quantitatively transferred into 250 ml separatory funnel using 100 ml of petroleum ether. The funnel was shaken and vented for 3 min, at this point the procedure of El-Nabarawy and Carey (1988 b) was then followed for extraction and clean- up of honey samples without using of methylating reagent or adjusting the pH.

b. Quantitation.

Each of dimethoate and malathion residues were determined using gas chromatograph (Hp-5890) equipped with flame ionization detector and capillary column (Hp-101). All the program and equipment conditions were used as described by El-Nabarawy and Abou-Donia, (1992).

c. Recovery rates.

Honey samples were fortified by the addition of each insecticide and processed throughout all the steps of the analytical method to validate the assay procedure. Results of recovery rates of both compounds are shown in Table (1).

RESULTS AND DISCUSSION

Data presented in Table (1) show the average of recovery rates of dimethoate and malathion. It is obvious that the recovery was above 90% which validate the used procedures. The recovery was found to be time independent.

Similar recovery rates were obtained by El-Nabarawy and Carey (1988 b) working on detection of parathion and some fungicide residues in honey.

Table (1) : Recovery percentages of dimethoate and malathion in honey.

Added ppm	Dimethoate	Malathion
1.0	93.0	97.0
0.5	91.0	93.0
0.1	86.0	85.0
average	90.0	91.5

Data obtained in Table (2) show that blank samples had not any residues of both compounds. It was found that all the samples contained dimethoate and only four samples contained malathion. Malathion residues were found in high concentrations ranged from 0.24 to 0.489 ppm, while dimethoate residues ranged from 0.005 to 0.024 ppm. The minimum detectable level was 0.001 ppm using this method of analysis.

The permissible limits of these two insecticides in honey are unknown (Federal Register, 1985). Exactly, honey should be free from any insecticide residues. It is known that therapeutic value of honey necessitates the non presence of any insecticide residues due to the bad effect on mankind and in turn decrease its economic value.

Pesticide residues may be brought to the hives with nectar. El-Nabarawy and Carey (1988 b) found that honey was contaminated with chlorothalonil and its metabolite (SDS-3701) and no parathion was found in honey with a minimum detectable level of 0.005 ppm.

Table (2) Residues (in ppm) of dimethoate and Malathion in Honey.

Date of sample	Dimethoate	Malathion
1/6/1990	0.024	0.000
15/6	0.015	0.000
30/6	0.008	0.240
15/7	0.005	0.420
30/7	0.005	0.489
15/8	0.005	0.290
Blank	0.000	0.000

Other studies (Pourtallier and Taliercio, 1967; Ogata and Bevenue, 1973; Sundaram, 1974; Grandi, 1975 and Bentler and Frese, 1981) indicated that honey collected worldwide is contaminated with low levels of pesticides including the organochlorine, organophosphorous and carbamate compounds, generally below 1 ppb and within limits of international honey standards (Tsverlkove et al., 1981).

On the other hand, E.Laurence Athins (The hive and the honey Bee, 1984) indicated that honey is not easily contaminated by pesticides because of the hive social structure.

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تقدير متبقيات الدايميثويت والمالاثيون فى عسل النحل

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تم تقدير متبقيات مبيدى الدايميثويت والمالاثيون فى عينات عسل النحل المأخوذة من الخلايا المتواجدة فى بساتين العنب والموالح السابق معاملتها بهذين المبيدين للوقاية من الإصابة الحشرية ٠

تم جمع ست عينات من العسل الأولى بتاريخ أول يونيو عام ١٩٩٠ ثم باقى العينات على فترات خمسة عشر يوما ووجد أن :

١- جميع العينات ملوثة بالدايميثويث وتراوحت قيم المتبقيات من ٠٠٥, إلى ٠٢٤, جزءا فى المليون ٠

٢- كانت العينات الأوليتان خاليتان تماما من المالاثيون بينما إحتوت بقية العينات على كميات عالية من هذا المبيد (٠,٢٤ - ٠,٤٨٩ ٠ - جزء فى المليون) بالمقارنة بالدايميثويت ٠