TRIAZOPHOS INSECTICIDE RESIDUES ON AND IN MOLOUKHIA LEAVES AND OKRA FRUITS

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(Manuscript received 20 June . 1996)

Abstract

These studies were carried out to determine the residual behaviour of triazophos organophosphorous insecticide on moloukhia leaves and okra fruits. The residue half life values determined on moloukhia and okra were 1.55 and 3.3 days, respectively. The removal effect of some processing steps (including washing, freezing, drying and storage) were also studied. It could be concluded that processing reduce triazophos residue to a safe level for consumption.

Another part of this study includes a survey carried out for detecting the contamination of moloukhia and okra with organophosphorous insecticides in samples collected from El-Qalubia, El-Dakahlia and El-Gharbia governorates markets. It was found that all detected organophosphorous residues were below the Maximum Residue Limits (MRLs) of the Codex Committee on Pesticide residues (CCPR), compared with vegetable crops similar to moloukhia and okra.

INTRODUCTION

The aim of these studies was to evaluate the persistence of triazophos organophosphorous insecticide on two of the major summer vegetables in Egypt i.e. moloukhia and okra. Although triazophos insecticide is not recommended for use on these vegetables it may reach the plant surface as a contaminant when these vegetables are planted beside the cotton fields.

Further studies were also done on the removal effect of some processing steps normally carried out with moloukhia and okra, on triazophos residues.

A survey study was also carried out for organophosphorous insecticide residues that might contaminate both vegetable crops in some local markets in three of the Egyptian governorates i.e. EL-Qalubia, El-Dakahlia and El-Gharbia.

MATERIALS AND METHODS

1. Field treatments and sampling

Each crop was planted in two plots of 1/100 per feddan area at El-Ramlah Village Qalubia Governorate in the summer of 1992. Triazophos (Hostathion E. C. 40 %) was sprayed on mature plants of each crop. A Knapsack sprayer was used for application which was done at the the rate of 1.25 L/feddan diluted to 200 L. water / feddan. Moloukhia was sprayed on June 25 th (35 days after planting), but okra was planted on April 20th and sprayed on August 2nd. Representative samples were taken two hours after spraying and then after 1,3,7,10 and 15 days, respectively.

II- Processing

1- Freezing

a) Moloukhia was washed, then the leaves were taken and minced into small pieces then blanched by exposure to steam for 2-3 min rapidly packed and immediately placed in the freezer at -18^{o}C for 6 months .

b) Okra fruits were trimmed, washed, blanched in boiling water for 2-3 min, cooled quickly by water, packed and immediately placed in the freezer at - 18^{o}C for 6 months .

2- Drying

a) Whole parts of moloukhia were spread after washing on clean papers and exposed to the sun for 4 days with several turnings to complete drying. The leaves were then ground by hand, packed and stored for 2 months.

b) Okra fruits were trimmed, washed and distributed on clean paper and exposed to the sun for 10 days until drying.

III- Survey of organophosphorous insecticide residues in different local markets

This survey was carried out in three Governorates: El-Qalubia (Benha and

Kaha), El Dakahlia (El-Mansoura and Belkas) and El Gharbia (El-Mahalla) in 1992 summer. The samples of both moloukhia and okra were picked from different markets and immediately analyzed for monitoring any organophosphorous residues.

For organophosphorous pesticide residues determination the multi-residue method mentioned in the manual of Analytical Methods for Pesticides Residues (AMPR, 1985) was carried out for extraction of samples then GC determination was followed as for triazophos residues. Rates of recovery for detected organophosphorous ranged between 84 and 94 %.

IV- Triazophos residue analysis

Extraction and clean up

Moloukhia leaves or okra fruits were cut into small pieces and transferred into a blender. Redistilled benzene was used for extraction of triazophos residues at the rate of 2 ml. per gram of sample. Five grams of anhydrous soduim sulphate were added and the sample was blended for 5 minutes. Extracts were then filtered through a pad of cotton into 250 ml graduated cylinder. A known volume was taken for cleaning up and evaporated to dryness. The extracted samples were cleaned up using the method described by Jonhson (1963) and adapted by Hegazy *et al.* (1991) using coagulating solution.

GLC determination

Pye Unicam 4500 gas chromatograph equipped with FPD operated in the phosphorous mode and a pyrex glass column (1.5 m x 4 mm i.d.) packed with 4% SE-30 ± 6% OV-210 on gas chromosorb Q 80-100 mesh was used under the following conditions: Injector temperature : 242°C Column temperature 240°C Detector temperature : 245. Carrier gas (N_2) flow rate 30 ml/min., Hydrogen and air flow rate : 30 ml/min. Triazophos retention time under these conditions was 8.6 /min. The rate of recovery of trizophos was 94 % in case of Moloukhia leaves and 84 % for okra fruits.

RESULTS AND DISCUSSION

1- Persistence of triazophos in moloukhia and okra

Residues of triazophos on moloukhia leaves and okra fruits are shown in Tables (1) and (2). The residues detected on moloukhia leaves were higher than that

Table 1. Triazophos residues on and in moloukhia leaves before and after washing (at 1.25 L/f) .

Days after treatment	Unwashed		Washed	
	Residues (ppm)	% loss	Residues (ppm)	% loss
0	46.01	0.00	31.56	31.41
1	32.88	28.54	14.76	55.11
3	15.27	66.81	10.11	33.71
7	4.43	90.37	4.10	4.45
10	2.57	94.41	0.59	77.04
15	UND	100.00	UND	100.00

UND = Undetectable

Table 2. Triazophos residues on and in okra fruits before and after washing (at 1.25 L/f) .

Days after treatment	Unwashed		Washed	
	Residues (ppm)	% loss	Residues (ppm)	% loss
0	10.74	0.00	6.30	41.34
1	9.06	15.64	5.75	36.53
3	5.76	46.37	4.14	28.13
7	4.40	59.03	2.59	41.14
10	1.58	85.29	UND	100.00
15	UND	100.00		

UND = Undetectable

found on okra fruits. The intial deposits of triazophos were 46.01 ppm on moloukhia leaves and 10.74 ppm on okra fruits. After one day the pesticide residues decreased to 32.88 ppm and 9.06 ppm on the two crops, respectively showing a higher rate of decrease in case of moloukhia leaves than in case of okra fruits. This may be due to the difference in the nature of the plant treated and the part sampled. The half life values of triazophos were 1.55 and 3.3 days on moloukhia leaves and okra fruits, respectively.

Horbwicz *et al* (1984) found that triazophos residues decreased to very low levels within few days of treatment when applied at a rate of 0.1 - 0.2% on onions, cabbage, carrots, pear and brussels sprouts.

Kashyap and Walia (1986) found that about 61% and 33.37 % of malathion and fenitrothion residues on okra fruits were degraded within the first 3 days, respectively.

Quinalphos residues degraded to the maximum residue limit on okra after 0.73 and 1.50 days with half life values of 0.95 and 1.1 days for 250 and 500 g a.i. /ha treatments, respectively (Gupta *et al* (1988).

Biswas *et al* (1991) reported that dissipation of both monocrotophos and fenvalerate on okra followed the first-order kinetics with half life values ranged from 1.1 to 3 days.

El-Sayed *et al* (1975) found that the residue half life for Azodrin, Nuvacron, Dursban E.C., Dursban W.P. and Gardona on moloukhia leaves were 93.6, 98.4, 20.4 and 24 hours, respectively.

The study also included the effect of washing on the pesticide residues on both moloukhia and okra. It could be noticed from Tables (1) and (2) that washing process significantly reduced the residues of triazophos pesticide to a clear extent. For instance the initial deposits of triazophos on moloukhia leaves reduced from 46.01 to 31.56 ppm after washing revealing a rate of removing of 31.41%. In case of okra fruits the rate of removing due to washing of the initial deposits was higher than moloukhia leaves (41.34 %).

Concerning the hazards, the results clearly shown that the residues of triazophos were undetected and this means that the leavel of residues was below the MRL of Codex (0.1 ppm) in the samples of moloukhia leaves (washed or unwashed) 15

days after treatment.

Washed okra fruits contained undetectable amounts of triazophos residues, 10 days after treatment but unwashed fruits contained 1.58 ppm which are above the MRL of Codex (0.1 ppm) 10 days after treatment.

El-Sayed *et al* (1975) reported that unwashed moloukhia leaves could be marketed safely after 9 days of application of Gardona insecticide, while washed leaves could be safely marketed one hour after application.

2- Effect of processing on triazophos residues

Table (3) demonstrates the triazophos initial deposits determined on either moloukhia and okra crops and the effect of different processing steps that were carried out on another part of the same sample. Freezing process caused complet removal of triazophos residues on both moloukhia and okra. Drying process resulted in removal of 91.28 % of triazophos on moloukhia and 76.44% on okra. Storage process resulted in 99.89% and 99.81% loss of triazophos residues from moloukhia and okra, respectively. The results agree with that of Jacob and Verma (1985) and with Anderson (1987).

Table 3. Effect of processing on triazophos residues on and in moloukhia leaves and okra fruits.

Treatment	Moloukhia leaves		Okra fruits	
	Residues (ppm)	% loss	Residues (ppm)	% loss
Initial deposits	46.01	00.00	10.74	00.00
1- Washing	31.56	31.41	6.30	41.43
2- Blanching	0.02	99.96	UND	100.00
3- Freezing (for 6 months)	UND	100	UND	100.00
4- Drying (by sun)	4.01	91.28	2.53	76.44
5- Storage (for 2 months)	0.05	99.89	0.02	99.81

UND = Undetectable

The sun dried moloukhia contained 4.01 ppm of triazophos residues but this amount reduced to 0.05 ppm, after storage for 2 months, which is below the MRL of CCPR. Also when dried okra was stored for 2 months the triazophos residues (2.53 ppm) were reduced to 0.02 ppm level which is below the MRL of CCPR (1993). Farrow *et al* (1986) reported that hot water blanching increased pesticide removal .

3- Survey of organophosphorous insecticides in moloukhia and okra in some local markets

The results obtained on moloukhia and okra are shown in Table (4). Malathion, fenitrothion and pirimphos-methyl were detected either in moloukhia or okra in some samples. It could be noticed that the organophosphorous residues in moloukhia and okre collected from local markets were below the MRLs of CCPR for the detected insecticides. These results are in agreement with those obtained by Kawamura *et al.* (1986) in Japanese market.

Table 4. Organophosphorous residues (ppm) detected on and in moloukhia and okra samples collected from local markets .

Insecticide	Area of sampling					Codex MRLs (mg/kg)
	Benha	Kaha	El-Mansoura	Balkas	El-Mansoura	
Moloukhia (2-6 / 7/1992)						
Fenitrothion	UND	UND	UND	UND	UND	0.2
Methamidophos	UND	0.002	UND	UND	UND	1
Profenofos	UND	0.006	UND	UND	UND	0.1
Pirimiphos-methyl	0.017	0.008	UND	UND	UND	5
Malathion	0.121	0.002	0.001	0.012	0.111	8
Moloukhia (2-6 / 7/1992)						
Fenitrothion	0.016	UND	UND	UND	UND	0.5
Methamidophos	UND	0.001	UND	UND	UND	1
Profenofos	UND	UND	UND	UND	UND	0.5
Pirimiphos-methyl	UND	UND	0.303	0.124	0.020	1
Malathion	UND	0.006	UND	UND	UND	1

UND = Undetectable

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متبقيات مبيد الترای أزوفوس على أوراق الملوخية وثمار البامية

محمد السعيد على حجازى ١ ، مصطفى محمد أبو زهو ١ ، عبد الرحمن بيومى ٢ ، سليمان عباس سليمان ٢ ، محمد نجيب سعد حجاج ١

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أجريت هذه الدراسات لتقدير سلوك متبقيات مبيد الترای أزوفوس الفوسفورى العضوى على أوراق نبات الملوخية وثمار نبات البامية . وكانت قيمة نصف العمر المقدرة هى ١,٥٥ يوما على أوراق الملوخية و ٣,٣ ايام على ثمار البامية كما درس تأثير خطوات عمليات التجهيز متضمنة الغسيل ، التجميد ، التجفيف ، التخزين فى ازالة متبقيات المبيد من على أوراق الملوخية وثمار البامية . وقد ظهر أن عمليات التجهيز تقلل متبقيات المبيد الى مستوى آمن للمستهلك.

وفى جزء آخر من الدراسة تم عمل حصر لمتبقيات المبيدات الفوسفورية على أوراق الملوخية وثمار البامية فى بعض الاسواق المحلية بمحافظة القلوبية والدقهلية والغربية. وقد وجد أن كل متبقيات المبيدات الفوسفورية التى آمكن الكشف عنها فى هذه الخضر كانت دون الحدود القصوى المسموح بها من الكودكس.