ISSN: 0975-833X

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

Vol.6, Issue 09, September - 2014

Impact Factor: SJIF : 3.845
Indexing: Thomson Reuters: ENDNOTE

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 6, Issue, 09, pp.8626-8629, September, 2014

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

DISSIPATION PATTERN OF PROFENOPHOS ON CABBAGE *(BRASSICA OLERACEA VAR.CAPITATA)*

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ARTICLE INFO

Article History:
Received 18th June, 2014
Received in revised form
26th July, 2014
Accepted 15th August, 2014
Published online 30th September, 2014

Key words:
Insecticides, *Plutella xylostella*,
Initial deposit, Efficacy,
Dissipation and Half-life.

ABSTRACT

An experiment was conducted during *kharif,* 2012 to evaluate the efficacy of seven insecticides *viz.*, emamectin benzoate 5 SG at 11 g a.i.ha^{-1}, emamectin benzoate 5 SG at 22 g a.i.ha^{-1}, profenophos 50 EC at 500 g a.i.ha^{-1}, profenophos 50 EC at 1000 g a.i.ha^{-1}, spinosad 45 SC at 100 g a.i.ha^{-1}, bifenthrin 10 EC at 100 g a.i.ha^{-1} and *Bacillus thuringiensis* at 5 WP at 25 g a.i.ha^{-1} against DBM (*Plutella xylostella)* on cabbage of which profenophos 50 EC (1000 g a.i.ha^{-1}), applied twice as foliar spray was found to be most effective in controlling the *P. xylostella* for which the dissipation studies were conducted. The dissipation pattern of profenophos 50 EC (1000 g a.i.ha^{-1}) was studied collecting samples at regular intervals *i.e.* 0, 1, 3, 5, 7, 10, 15 and 20 days after last spray and analyzed. The initial deposits of 0.99 mg kg^{-1} profenophos recorded at 2 hours after last spray dissipated to 0.85, 0.82, 0.16 and 0.07 mg kg^{-1} by 1, 3, 5 and 7 days after last spray, respectively and below determination level (BDL) by 10th day.

INTRODUCTION

Cabbage (*Brassica oleracea var. capitata L.) is* the second important cruciferous vegetable crop in the world. In India, it is cultivated in an area of 0.369 m ha with an average annual production of 7.949 m MT and productivity of 21.5 MT ha^{-1}. The major cabbage producing states are Maharashtra, Bihar, Karnataka, Orissa, West Bengal and Andhra Pradesh, whereas West Bengal ranks first both in area and production with 0.0753 m ha and 2.087 m MT, respectively (NHB 2011). It contains adequate quantities of vitamins A,B and C and minerals phosphorus, potassium, calcium, sodium and iron (Nath *et al.*, 1984). Though lack of quality seeds, improved cultivars, F_1 hybrids and suitable production technology contribute partly to the lower yields, various other factors are responsible for low productivity among which damage by various insect pests starting from transplanting till harvest is most significant.

A host of insect pests *viz.*, diamond back moth, (*Plutella xylostella (L.)*), cabbage leaf webber, (*Crociodolomia rinotalis (Zell.)),* tobacco caterpillar, (*Spodoptera litura (Fab.))* and mustard aphid, (*Brevecornyae brassicae (L.))* etc., attack the crop. Among these diamond back moth, (*Plutella xylostella (L.)*) is the most notorious and pernicious pest on cruciferous vegetables causing 52 percent loss in marketable produce (Krishna kumar *et al.*, 1986), farmers apply pesticides 8 to 10 times to effectively control this pest. Indiscriminate use of pesticides leads to undesirable load of pesticide residues in marketable vegetables (Kumari *et al.,* 2005) and cause severe ecological consequences like destruction of natural enemy fauna, effect on non target organisms and directly effect in the form of residues. Hence studies were conducted for the efficacy of different insecticides used commonly and also to establish the dissipation pattern of relatively safer insecticides to fit in pest management strategy.

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MATERIALS AND METHODS

The experiment was laid out in a Randomized Block Design (RBD) with 8 treatments including untreated control replicated thrice with individual plot size of 20 m^2 (5mx4 m) and the insecticides *viz.*, emamectin benzoate 5 SG at 11 g a.i.ha^{-1}, emamectin benzoate 5 SG at 22 g a.i.ha^{-1}, profenophos 50 EC at 500 g a.i.ha^{-1}, profenophos 50 EC at 1000 g a.i.ha^{-1}, spinosad 45 SC at 100 g a.i.ha^{-1}, bifenthrin 10 EC at 100 g a.i.ha^{-1} and *Bacillus thuringiensis* at 5 WP at 25 g a.i.ha^{-1} on cabbage first at head initiation and the second spray ten days later to evaluate the efficacy against *P. xylostella* of which profenophos 50 EC at 1000 g a.i.ha^{-1} was the most effective and the dissipation studies were conducted for the same by collecting cabbage samples at regular intervals *i.e.* 0, 1, 3, 5, 7, 10, 15 and 20 days after last spray in polythene bags and brought to the laboratory immediately for further sample processing in the laboratory as detailed here under.

Extraction and clean –up

Cabbage heads (5kg) were homogenized with robot coupe blixer and homogenized

↓

15±0.1g sample was taken in 50 ml centrifuge tube

↓

Required quantity of standard (CRM) added to get desired fortification level

↓

30±0.1 ml acetonitrile was added to the tube

↓

The sample was homogenized at 14000-15000 rpm for 2-3 min using Heidolph silent crusher

↓

3±0.1g sodium chloride was added to tube and mixed by shaking gently

↓

Centrifuged for 3 min at 2500-3000 rpm to separate the organic layer

↓

The top organic layer of about 16 ml was taken into the 50 ml centrifuge tube

↓

9±0.1 g anhydrous sodium sulphate was added to remove the moisture content

↓

8 ml of extract was taken in to 15 ml tube containing 0.4±0.01g PSA sorbent (for dispersive solid phase d-SPE cleanup) and 1.2±0.01 gr anhydrous magnesium sulphate

↓

The sample tube was vertexed for 30 sec followed by centrifugation for 5 min at 2500-3000 rpm

↓

The extract of about 2ml was transferred into test tubes and evaporated to dryness using turbovap with nitrogen gas and reconstituted with 1ml n-Hexane: Acetone (9:1) for GC analysis with ECD and TSD for profenophos analysis.

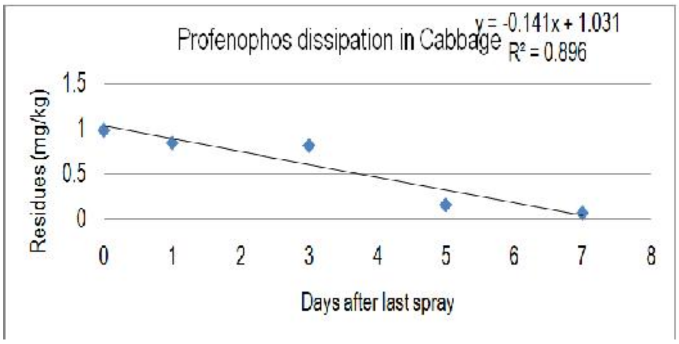
RESULTS AND DISCUSSION

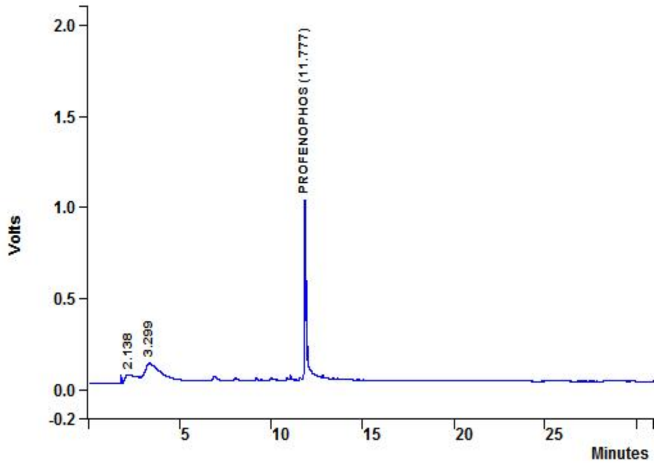
Initial deposits of 0.99 mg kg^{-1}, profenophos were detected at 2 hours after last spray, which dissipated to Below Determination Level (BDL) of 0.05 mg kg^{-1}, by 10th day after last spraying on cabbage. The initial deposits were dissipated to 0.85, 0.82, 0.16 and 0.07 mg kg^{-1}, by 1, 3, 5 and 7 days after last spray, respectively. The dissipation pattern showed constant decrease of residues from first day to 7th day. The residues dissipated by 14.14, 17.17, 83.84 and 92.93 % on 1, 3, 5and 7th day, respectively. The regression equation is Y = 1.031 + (-0.141) X with R^2 of 0.896. Maximum Residue Limit for profenophos in cabbage as per European Union (EU) is 0.01 mg kg^{-1}, and the calculated 14.27 days based on dissipation pattern data. Hence, a safe waiting period is 15 days is recommended. Maximum Residue Limit for profenophos in cabbage as per Codex Alimentarius Commission (CAC) has not been set. The half life of profenophos on cabbage was 4.91 days.

Dissipation of Profenophos (1000 g a.i.ha^{-1}) in cabbage

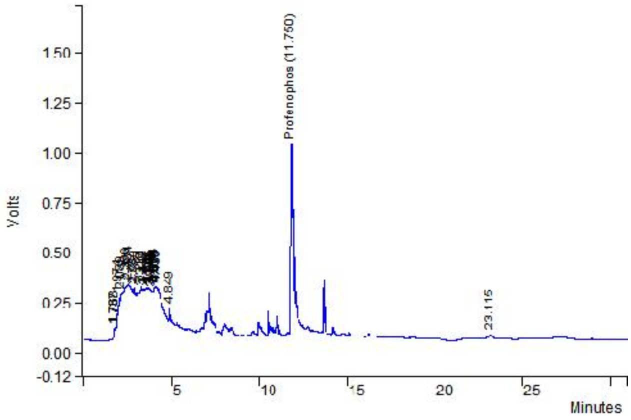
Days after last spray	Residues of profenophos (mg kg^{-1})				Dissipation %
	R1	R2	R3	Average	
0	1.05	0.95	0.97	0.99	0
1	0.87	0.82	0.85	0.85	14.14
3	0.80	0.72	0.96	0.82	17.17
5	0.17	0.14	0.15	0.16	83.84
7	0.08	0.07	0.06	0.07	92.93
10	BDL	BDL	BDL	BDL	100
15	BDL	BDL	BDL	BDL	100
20	BDL	BDL	BDL	BDL	100
Regression equation	Y = 1.031 + (-0.141) X				
R^2	0.896				
Half-life	4.91 days				
Safe waiting period (As per EU MRL = 0.01 mg kg^{-1})	15 days				

BDL: Below Determination Level (0.05 mg kg^{-1})

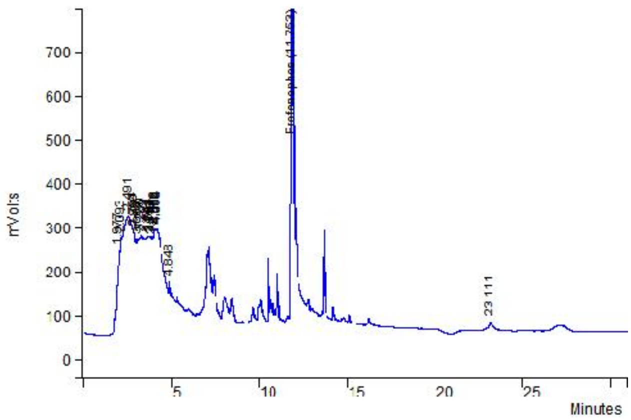




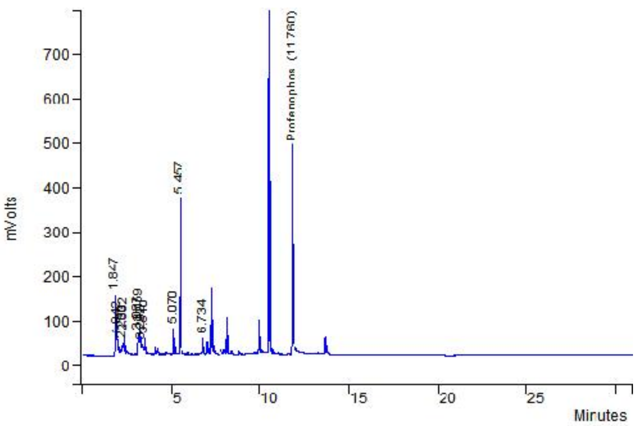
Standard sample



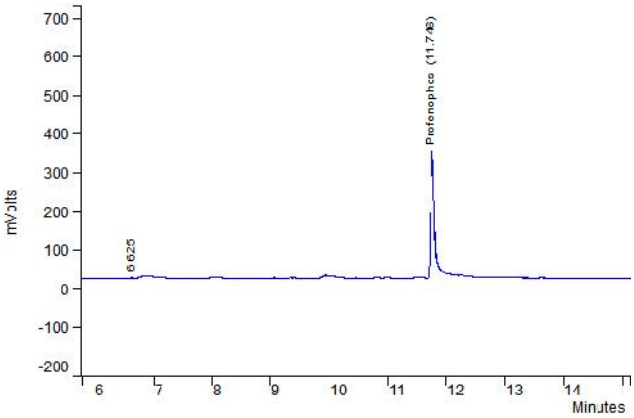
Zero day sample



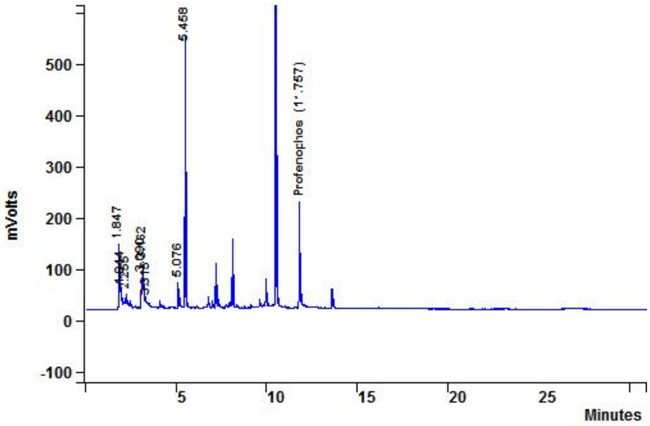
one day sample



3 day sample



5 day sample



7 day sample

The present results are in agreement with the findings of Barba *et al.* (1987) who reported degradation of profenophos residues from 0.60 to 0.04 ppm by 7 days on globe artichokes.

The results are in the agreement with the findings of Malla Reddy (2003) who reported that, profenophos at 0.05% sprayed on cabbage heads, had very low initial deposits of 0.91 mg kg^{-1}, i.e., less than the MRL value of 1.00 mg kg^{-1} with a waiting period of one day. The residues of profenophos (0.05%) dissipated from cabbage heads to an extent of 93.40% in ten days after spraying. The removal of upper most layer on cabbage heads and subsequent water washings reduced the initial deposit of profenophos to an extent of 91.20%. The results of the present studies are in agreement with the findings of Reddy *et al.* (2007) who studied the dissipation of profenofos (0.1% a.i.ha^{-1}) on chillies sprayed at 15 days interval, starting from 45 days after transplanting and recorded initial deposits of profenophos 0.36 mg kg^{-1} after last spray which dissipated to 0.02 mg kg^{-1} by 30 days amounting to loss of 92.4%.

Experimental results of Radwan *et al.* (2004) also showed a waiting period of 10 and 14 days after application of profenophos at 400 g a.i.ha^{-1} on green pepper and eggplant, respectively. Similarly, Sahoo *et al.* (2004) reported an initial deposit of 1.37 mg kg^{-1} following application of profenophos at 500 g a.i.ha^{-1} on tomato. These levels were reduced to below determination level (BDL) after 15 days of application.

REFERENCES

Barba, A., Camara, M.A., Galindo, L and Lopez del – Hicron, N. 1987. Persistence of profenophos in artichokes. *Revista-de-Agron-Technologia –de-Alimendos* 27 (3): 457-461.

Krishna Kumar, N.K. Srinivas, K. Suman, C.L and Ramachander, P.R.1986. Optimum control strategy of cabbage pests from a chemical control, *Prog.Hort*.18:104-110.

Malla Reddy, K. 2003. Bio-efficacy and dissipation of certain insecticides on pests of cabbage. *M.Sc (Ag.) Thesis.* Acharya N G Ranga Agricultural University, Hyderabad, India.

National Horticultural Board. *Annual report 2011*.P 184-187.

Radwan, M.A., Shiboob, M.H., Abu-Elamayem, M.M and Abdel-Aal, A. 2004. Residues of pirimiphos-methyl and profenofos on green pepper and eggplant fruit and their effects on some quality properties. *Emirates Journal of Agriculture Sciences.*16 (1): 32-42.

Reddy, K. D. Reddy, K. N. Mahalingappa, P. B. 2007. Dissipation of fipronil and profenofos residues in chillies (*Capsicum annum L.*). *Pesticide Research Journal*. 19: 1, 106-107.

Sahoo, S.K., Kapoor, S.K and Singh, B. 2004. Estimation of flubendiamide residues of profenofos in/on tomato, *Lycopersicon esculentum* Mill. *Bulletin of Environmental Contamination and Toxicology*. 72: 970-974.

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