DETERMINATION OF PRE-HARVEST INTERVAL OF SYNTHETIC PYRETHROID INSECTICIDE IN EGGPLANT THROUGH THE STUDY OF CHEMODYNAMICS IN BANGLADESH

Md. Abdur Razzak Choudhury[1*], Md. Mahbubar Rahman[2], Md. Zinnatul Alam[2], M. Mofazzal Hossain[3] and Qazi Abdul Khaliq[4]

[1]Department of Entomology, Sylhet Agricultural University, Sylhet 3100, Bangladesh. [2]Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh. [3]Department of Horticulture, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh. [4]Department of Agronomy, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh

ABSTRACT

A chemodynamics study was undertaken to determine the pre-harvest interval (PHI) of the selected synthetic pyrethroid insecticide (cypermethrin 10EC) in eggplant. The study was conducted in the experimental farm and Pesticide Toxicology Laboratory of the Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur during summer (February-June 2016). The fate of cypermethrin after application, consisted of receiving insecticide by eggplant plant and disseminating it to air and soil was evaluated. Cypermethrin residue was determined from eggplant and soil sample sprayed @ 1ml l^{-1} of water in the field and it was 0.022 mg/kg up to 7 days after spraying (DAS) and 0.107ppm up to 5 DAS individually. The quantities were above the CODEX maximum residue limit (MRL) up to 3 DAS (0.408 ppm & 0.461 ppm) both in eggplant and soil samples. When cypermethrin 10EC sprayed @ 2ml l^{-1} of water, the residue of cypermethrin was detected in soil and eggplant samples up to 0.028ppm at 7 DAS and 0.030ppm at 10 DAS, separately, where MRL exceeds at 5 DAS (0.421ppm) for soil sample and at 3 DAS (0.452ppm) for eggplant sample, respectively. The residue degradation observed at early period was lower (42.18% in eggplant and 27.95% in soil at 1 DAS, when cypermethrin was applied @ 1ml l^{-1} of water and conversely 40.83% in eggplant and 56.02% in soil at 1 DAS, when cypermethrin was applied @ 2ml l^{-1}), however, at the later period it was higher (97.80%in eggplant and 89.13%in soil when cypermethrin was applied @ 1ml l^{-1} of water, these were 97.03% in eggplant and 98.67% in soil when cypermethrin was applied @ 2ml l^{-1} of water). The Pre-Harvest Interval (PHI) was found 04 days for cypermethrin in eggplant.

Keywords: Cypermethrin, chemodynamics, eggplant plant, pesticide residue.

*Corresponding author : choudhurymar.entom@sau.ac.bd

INTRODUCTION

Eggplant (*Solanum melongena* L.) is the plant of Solanacae family and commonly cultivated as fruit vegetables crop (Kantharajah and Golegaonkar 2004). It's globally cultivated more than 1,600,000 ha lands and production quantity more than 50 million tons per annum (FAO 2012). Choudhury *et al.* (2016) reported 8 insect pests, El-Shafie (2001) found 28 species of insect pests and Nayer *et al.* (1995) described 53 species of insect pests of eggplant. Eggplant shoot and fruit borer (*Leucinodes orbonalis* Guenee) is the key destructive pest of eggplant. To overcome the loss of eggplant production the use of pyrethroid insecticides viz., cypermethrin is regularly used by the growers of Bangladesh and they apply extensively even at fruiting stage (Zafar *et al.* 2011). The least 4.28-8.57% of shoot infestation found in Cypermethrin 10EC treated eggplant field (Choudhury *et al.* 2018). Choudhury *et al.* (2019) reported that cypermethrin 10 EC increased the healthy fruits and reduced the infested fruit over control (79.24% and 51.66%, respectively). Until now, pesticides play a vigorous role for the control of insect pests and diseases, but pesticides have lots of detrimental effects on agro ecosystem, human health and the environment resulting from indiscriminate and overuse of pesticides (Maclntyre *et al.* 1989).

Chemodynamics refers the study of the transportation, adaptation, and fate of chemical materials in air, water, or soil, including their movement from one medium to another after its application (Thibodeaux 1996). The environment and human health are adversely affected by higher irrational use of insecticides (Wilson and Tisdell 2001). Insecticides when applied on crops get transported to various environmental components (FAO 2012) like soil, plant, and water, while only a small part of the chemical stays in the area where it is applied. Indiscriminate and haphazard use of these chemicals, particularly at fruiting stage, leads to its accumulation in the vegetables, fruits which consequently cause hazards to human health through food chain (Nafees 2009). It is necessary to use pesticides following good agricultural practice (GAP). Monitoring of pesticide residues is the essential tool to prove GAP. It is also very important to know about how much pesticide is lost during application and help to measure the residual status. The use of pesticides on any crop or commodity may lead to its residues remaining till the time of harvest and onwards (Mandal *et al.* 2010). Before any pesticide is recommended to be used in the field it is mandatory to study its residues on the crop (Kar *et al.* 2013).

The monitoring of pesticides residues particularly in vegetable and fruits is being done in regular basis in many developed countries. However, in Bangladesh, the monitoring of pesticide residues in fruits and vegetables are very limited (Aktar *et al.* 2017, Tasnim *et al.* 2022, Alam *et al.* 2022, Prodhan *et al.* 2022, Parven *et al.* 2021, Parvin *et al.* 2021, Hasan *et al.* 2021, Prodhan *et al.* 2021, Habib *et al.* 2021, Islam *et al.* 2021, Islam *et al.* 2019, Islam *et al.* 2019a, Nahar *et al.* 2020, Hasan *et al.* 2017, Islam *et al.* 2014). On the other hand, there is very scanty information are found on cypermethrin drifting loss, residues and its degradation pattern in eggplant and soils in Bangladesh. Therefore, considering the above background, the present research was undertaken to study the degradation pattern of cypermetrin in eggplant and soil samples and to determine the pre-harvest interval (PHI) of cypermetrin in eggplant.

MATERIALS AND METHODS

The study was conducted in the experimental farm and Pesticide Toxicology Laboratory of the Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur, during summer (February to June 2016). The crop was grown following the recommended practices as described by Rashid (1999). Experiment was arranged in randomized complete block design (RCBD) with three replications. The whole field was divided into three blocks of equal size having 2m space between the blocks and 1.5 m between the plots. The unit plot size was 3 m × 3 m accommodating 15 pits per plot. The distance between rows was 1m and that between plants 60 cm. Every unit plot had 3 rows with 5 plants at each row. The total number of plants per plot was 15. The present study was composed of three treatments and these were T_1 = Rambo10 EC (Cypermethrin) @1ml l^{-1} of water T_2 = Rambo10EC (Cypermethrin) @ 2 ml/l of water and Untreated control.

Collection of soil and fruits: Representative fruit and soil samples were collected randomly at 0, 1, 3, 5, 7, 10, 12 and 15 days after spraying (DAS) for determining the residues remain in fruit and soil. The collected samples were kept in deep freeze at -22°C until homogenization.

Insecticide residue analysis: The residue analysis was done at Insecticide Toxicology Laboratory in the Department of Entomology, BSMRAU, Gazipur. Gas Chromatograph (GC)-17A was used to quantify the residue level in fruit and soil samples. Chemicals used in the insecticide residue analysis were n-Hexane (C_6H_{14}), Methanol, Sodium sulphate [anhydrous granular, (Na_2SO_4)] and Standard solution of Cypermethrin in hexane.

Extraction of fruit samples: The frozen samples were taken from deep freeze and kept in room temperature for 5-6 hours for thawing. The methodology prescribed by William and George (2005) with necessary modification was adopted for extraction, separation and clean-up of the sample. Around ³250 g eggplant fruit sample was grounded thoroughly with the meat grinder (Handmixer M-122 Bamix, Switzerland). From this, 20 g sub sample was taken into a wide mouth jar (250 ml). Then 100 ml of hexane was added to it. Sodium sulphate (Na_2SO_4) was also added with the sample until water was removed. The mixture was then macerated with mortar pestle. The homogenized material was then poured into 250 ml conical flask and placed on a shaker (Orbital Shaking Incubator) for 6 hrs continuous shaking. After shaking, the slurry was filtered through a Buchner funnel with suction. The flask and filter cakes were rinsed with 8-10 ml of hexane each. The filtrate was then transferred into 250 ml round bottom flask and was dried to 5-7 ml by evaporation using a rotary vacuum evaporator. The concentrated filtrate was then transferred into 500 ml separatory funnel making 10 ml volume with hexane. For colour removal, 20 ml methanol was added with 10 ml filtrate and shaked vigorously for 3-5 minutes in a shaker. After shaking, the separatory funnel was set on a stand and kept undisturbed for 3-5 minutes.

Then the clear part of the solution from the bottom of the separatory funnel was collected in vial which was then centrifuged at 12000 rpm for 5 minutes (Laboratory Centrifuges, SCR 18B, Japan). After centrifuge, the supernatant was cleaned up by SPE cartridge. Then the final volume was adjusted to 10 ml and this was used for injection.

Extraction of soil samples: One kg soil sample was collected from the eggplant plot from which 100 g representative sample was taken. From this representative sample 20 g of working sample was taken in a conical flask (250 ml). Then 100 ml of hexane was added to it. Sodium sulphate (Na_2SO_4) was also added with sample until water was removed from it. The conical flasks were capped by aluminum foil. The conical flasks were placed on the Orbital Shaking Incubator for 6-12 hours with RPM of 120-140 at a temperature of 20°C. The extracted solutions were then collected in the centrifuge tubes. The solutions were centrifuged for 10 minutes with RPM of 16500 at a temperature of 20°C. The solutions were filtered through Whatman paper and the super extract solutions were collected in the round bottom volumetric flask (250 ml). Then the solutions were dried by rotary vacuum evaporator until 5-7 ml super extracts existed. The super extracted solutions were collected in the centrifuge tubes and centrifuged for 10 minutes with RPM of 16500 and maintained at 20°C. After

centrifuge, the supernatant was cleaned up by SPE cartridge. Then the final volume was adjusted to 10 ml and this was used for injection.

Detection and quantification of cypermethrin residue in samples: The concentrated extracts were subjected to analysis by GC-17A (Shimadzu) with Electron Capture Detector (ECD). The capillary column used was AT-1, length 30 m, ID 0.32 mm and film thickness 0.50 µm. Nitrogen was used as carrier and make up gas in ECD.

Instrument parameters for GC-ECD to quantify the cypermethrin residue were as follows:

[Injection Port condition]

Injection Mode	: Split	Temperature	: 280^{0}C
Flow Control Mode	: Linear velocity	Split Ratio	: 1.0
Purge flow	: 3 ml min^{-1}		
Linear velocity	: 39.9 cm sec^{-1}		
Column flow	: 2.10 ml min^{-1}		

[Column information]

Length	**:** 30m		
Film thickness	: 0.50 µm	Initial Temperature	: 160^{0}C
Inner Diameter	: 0.32 mm	Max. Temperature	: 340^{0}C
Equilibration Time	: 0.5 min		

Column oven temperature program

Total Program Time: 20.00 min

Rate (^{0}C/min)	Temperature (^{0}C)	Hold Time (min)
---	160.0	1.00
10.0	290.0	8.0

[Detector Channel 1 ECD]

Temperature	: 300^{0}C	Stop Time	: 20 min
Current	: 0.50 nA	Make up pressure	: 75

A standard calibration curve was obtained by injecting different concentration of standard of cypermethrin. The injected volume of supernatant was 1 µl. Each peak was characterized by its retention time. Sample results were quantified in ppm

automatically by the GC software, which represented the concentration of the final volume injected and from this, the actual amount of pesticide residue present in the sample was determined by using the following formula:

$$\text{Residue in sample (ppm)} = \frac{\text{Concentration obtained in injected volume (ppm)} \times \text{Quantity of final volume (l)}}{\text{Amount of sample taken (kg)}}$$

Rate of Degradation

The rate of degradation expressed in percent was calculated by using the following formula:

$$\% \text{ Degradation} = \frac{\text{Residue at 0 DAS - Residue at DAS}}{\text{Residue at 0 DAS}} \times 100$$

RESULTS AND DISCUSSION

Determination of residue from eggplant and soil sample: The concentrated extracts of eggplant and soil samples of different days after spraying (DAS) were subjected to analysis by GC-17A, with the pre-set parameters. Some chromatograms of the injected extracts of eggplant and soil samples containing cypermethrin at different days after spraying (DAS) are shown in figs. 1, 2 & 3.

Residue in eggplant samples (when cypermethrin sprayed @1ml l^{-1} of water): The results of the analyses of cypermethrin residue in eggplant samples when applied @ 1ml l^{-1} of water are summarized in the Table 1. It was revealed that cypermethrin residue was detected in the eggplant sample up to 7 DAS and the quantities were above MRL up to 3 DAS. At 0 DAS the residue in the sample was 0.998 ppm which degraded to 0.577 ppm at 1 DAS, 0.408 ppm at 3 DAS, 0.139 ppm at 5 DAS and 0.022 ppm at 7 DAS. At 3 DAS it was 0.408 ppm which was above MRL and at 5 DAS the residue was found 0.139 which was below the MRL set by FAO/WHO (2004). Hossen (2008) detected cypermethrin residue in tomato sample up to 5 DAS and the quantities were over MRL up to 3 DAS and his finding is comparable to the present study. Whereas Prodhan *et al.* (2018) observed cypermethrin residue in yard-long bean was above the MRL up to 5 DAS. Rahman (2013) detected cypermethrin residue in the sample up to 5 DAS and the quantities were above MRL up to 3 DAS.

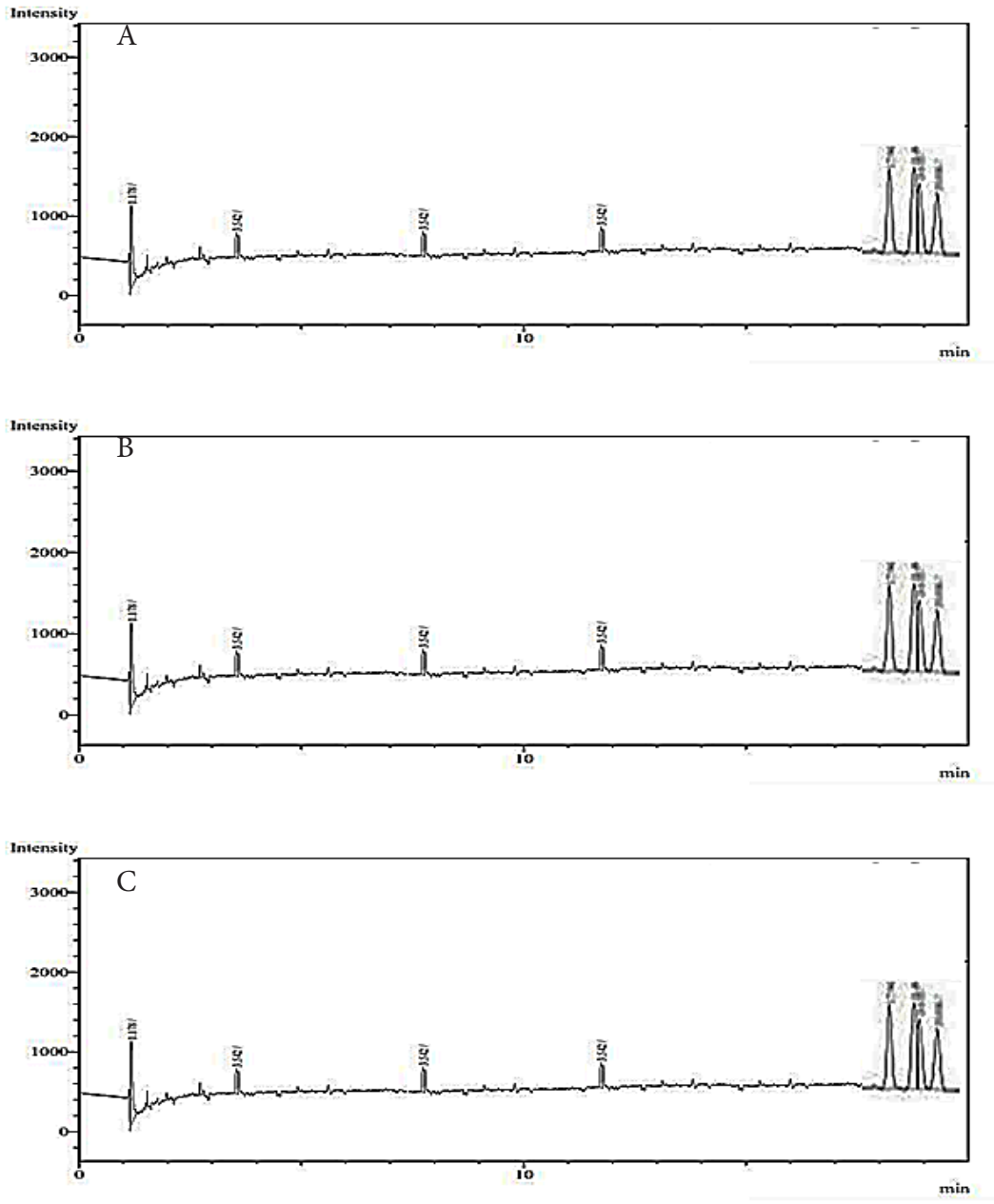


Fig. 1. Chromatogram of cypermethrin 10EC obtained from the extract of eggplant collected from eggplant field at (a) 0.0 DAS, (b) 01 DAS and (c) 03 DAS.

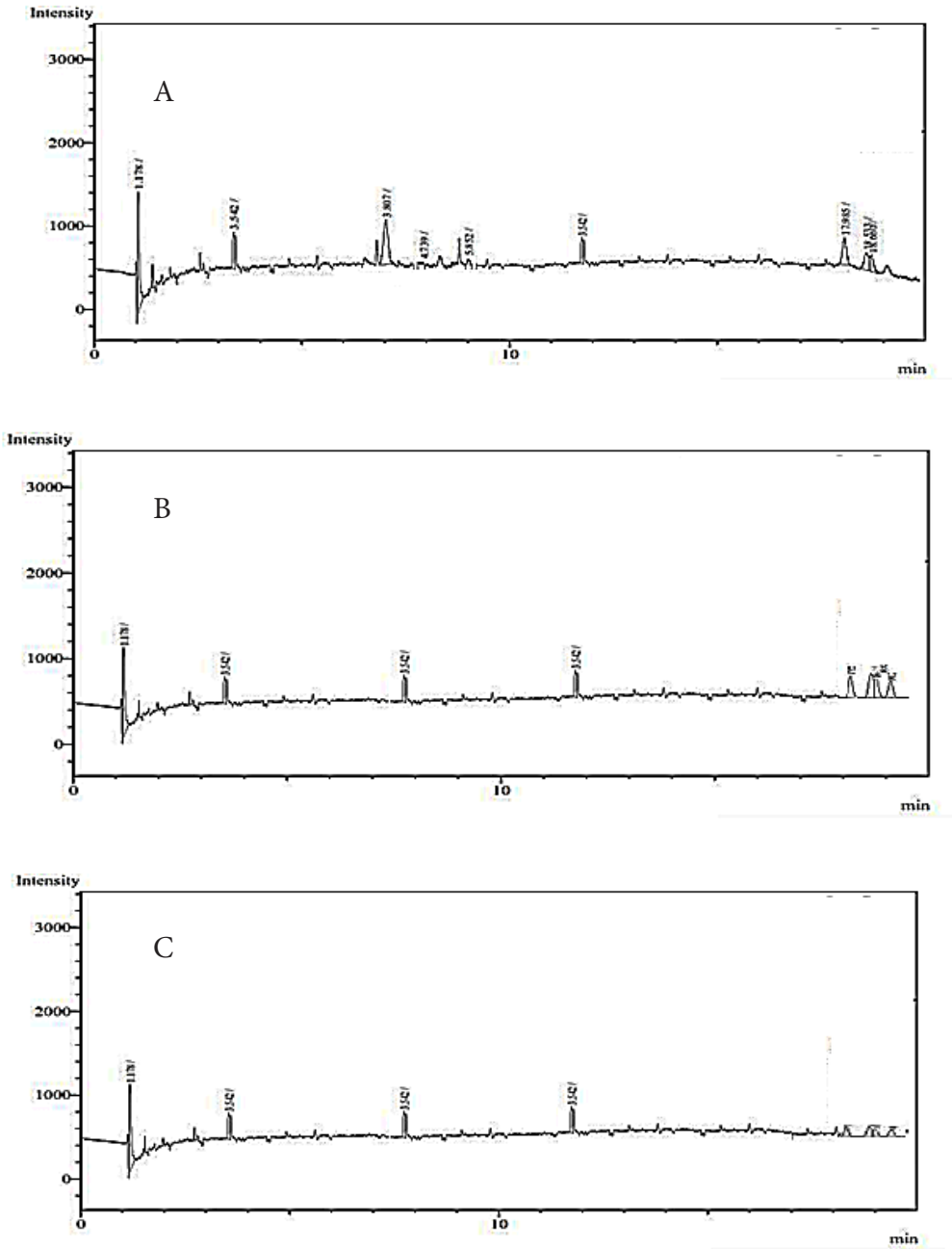


Fig. 2. Chromatogram of cypermethrin 10EC obtained from the extract of eggplant collected from eggplant field at (a) 05 DAS, (b) 07 DAS and (c) 10 DAS.

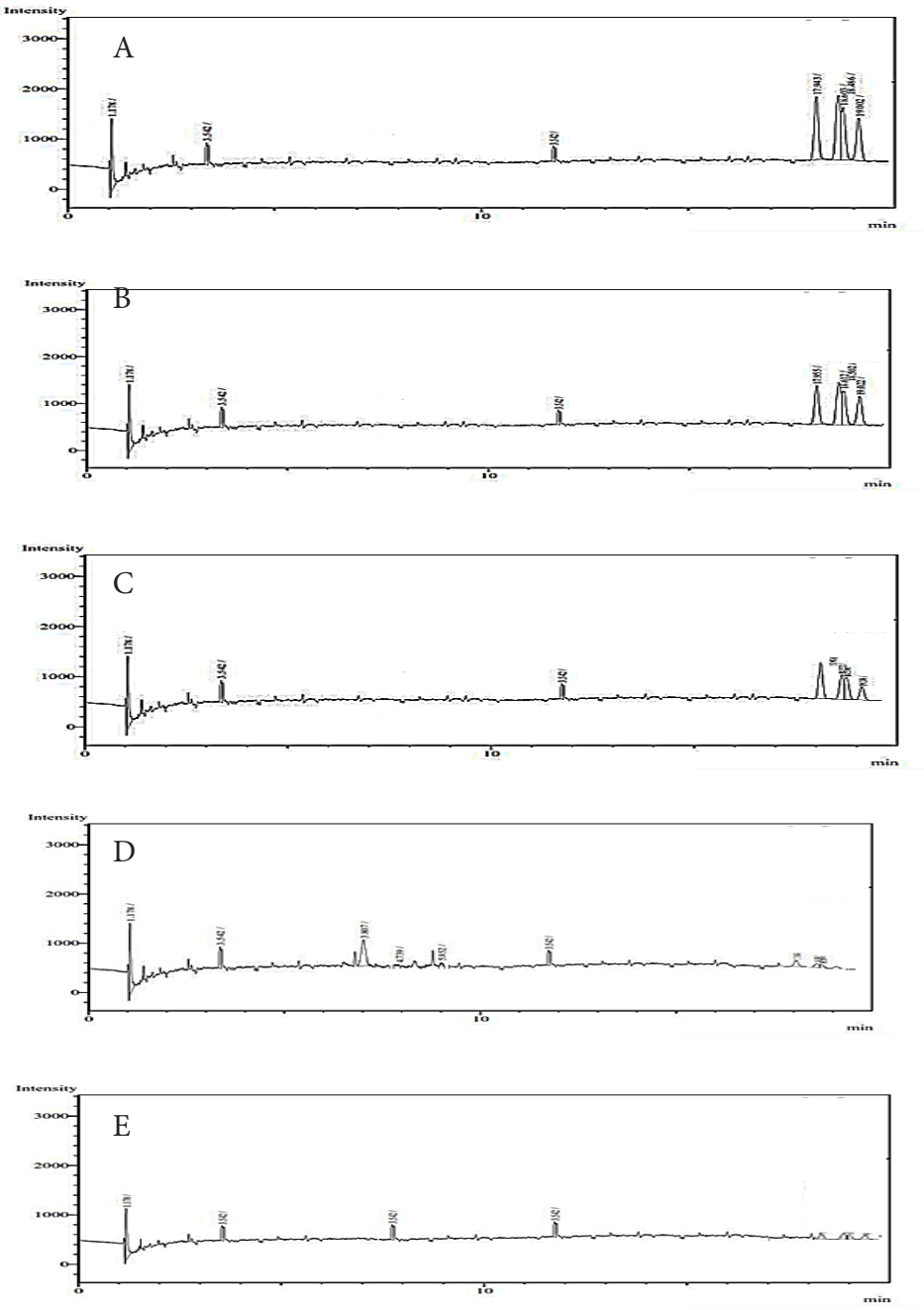


Fig. 3. Chromatogram of cypermethrin 10EC obtained from the extract of soil collected from eggplant field at (a) 0.0 DAS, (b) 01DAS and (c) 03 DAS (d) 05 DAS and (e) 07 DAS

At 0 DAS the residue in the sample was 2.575 ppm which degraded to 1.961 ppm at 1 DAS and 0.762 ppm at 3 DAS. At 5 DAS it was 0.031 ppm which was below the MRL set by FAO/WHO (1996). The present findings are in a good agreement with the findings observed by Hossain *et al.* (2014)

Residue in soil samples (when cypermethrin sprayed @ 1ml l^{-1} of water): The results of the analyses of cypermethrin residue in soil samples when applied @ 1ml l^{-1} of water are furnished in the Table 2. The cypermethrin residue was detected in the soil sample up to 5 DAS. At 0 DAS the residue in the sample was 0.984 ppm which degraded to 0.709 ppm at 1 DAS and 0.461ppm at 3 DAS and 0.107 ppm at 5 DAS. It was revealed that all the values were above the MRL except at 5 DAS.

Rahman (2013) showed that cypermethrin residue was detected in the soil sample up to 5 DAS. At 0 DAS the residue in the sample was 2.007 ppm which degraded to 1.539 ppm at 1 DAS and 1.140 ppm at 3 DAS. At 5 DAS it was 0.608 ppm and all the value was above the MRL.

Walker (1992) reported that the cypermethrin has a moderate persistence in soils. He also opined that microbes play a significant role in the degradation of cypermethrin. It has been reported that cypermethrin degrades more slowly under anaerobic and waterlogged conditions. Increased cypermethrin persistence was observed in soil with high organic matter, high clay content, reduced microbial activity and anaerobic conditions (Chapman 2011).

Table 1. Quantity of cypermethrin residue in eggplant samples when applied @ 1 ml l^{-1} of water.

Sample collection (DAS)	Sample weight (g)	Injected volume (µl)	Level of insecticide residue (ppm)	FAO/WHO recommended MRL (ppm)
0	20	1	0.998	0.20
1	20	1	0.577	
3	20	1	0.408	
5	20	1	0.139	
7	20	1	0.022	
10	20	1	ND	
12	20	1	ND	
15	20	1	ND	

FAO/WHO Codex Alimentarius Commission Recommended MRL, 2004.

DAS= Days after spraying, MRL=Maximum Residue Limit, ND = Not Detected

Table 2. Quantity of cypermethrin residue in soil samples when applied @ 1ml l^{-1} of water.

Sample collection (DAS)	Sample weight (g)	Injected volume (µl)	Level of insecticide residue (ppm)	FAO/WHO recommended MRL (ppm)
0	20	1	0.984	0.20
1	20	1	0.709	
3	20	1	0.461	
5	20	1	0.107	
7	20	1	ND	
10	20	1	ND	
12	20	1	ND	
15	20	1	ND	

FAO/WHO Codex Alimentarius Commission Recommended MRL, 2004.
DAS= Days after spraying, MRL= Maximum Residue Limit

Residue in eggplant samples (when cypermethrin sprayed @ 2ml l^{-1} of water): The results of the analysis of cypermethrin residue in eggplant sample when sprayed @ 2ml l^{-1} of water are presented in Table 3. The cypermethrin residue was detected in the eggplant sample up to 10 DAS. At 0 DAS the residue in the sample was 1.009 ppm which degraded to 0.597 ppm at 1 DAS, 0.452 ppm at 3 DAS, 0.184 ppm at 5 DAS, 0.090 ppm at 7 DAS and 0.030 ppm at 10 DAS. It was shown that up to 3 DAS it was above the MRL level set by FAO-WHO (2004). According to Rahman (2013), cypermethrin residue was detected in the eggplant plant fruit sample up to 10 DAS. At 0 DAS the residue in the sample was 3.157 ppm which degraded to 2.611 ppm at 1 DAS and 2.030 ppm at 3 DAS. At 5 DAS it was 1.331 ppm and 0.768 ppm at 7 DAS which was still above the MRL. In 10 DAS the residue was 0.196 ppm which was below MRL level set by FAO-WHO (2004). According to Prodhan *et al.* (2009), Fenitrothion in eggplant plant sprayed @ 2ml l^{-1} of water in field condition and the insecticide residue was found up to 7 DAS.

Residue in soil samples (when cypermethrin sprayed @ 2ml l^{-1} of water): The results of the analysis of cypermethrin residue in soil sample when sprayed @ 2ml l^{-1} of water are shown in the Table 4. Here the cypermethrin residue was detected in the soil sample up to 7 DAS. At 0 DAS, the residue in the sample was 1.108 ppm which degraded to 0.927 ppm at 1 DAS and 0.628 ppm at 3 DAS. At 5 DAS and at 7 DAS, residue in the sample was 0.421 ppm and 0.028 ppm, respectively. But after 7 DAS no residue was detected. It was noticed that all the values were above the MRL except at 7 DAS.

Table 3. Quantity of cypermethrin residue in eggplant samples when applied @ 2ml l^{-1} of water.

Sample collection (DAS)	Sample weight (g)	Injected volume (µl)	Level of insecticide residue (ppm)	FAO/WHO recommended MRL (ppm)
0	20	1	1.009	0.20
1	20	1	0.597	
3	20	1	0.452	
5	20	1	0.184	
7	20	1	0.090	
10	20	1	0.030	
12	20	1	ND	
15	20	1	ND	

FAO/WHO Codex Alimentarius Commission Recommended MRL, 2004.
DAS- Days after spraying, MRL- Maximum Residue Limit

Table 4. Quantity of cypermethrin residue in soil samples when applied @ 2ml l^{-1} of water

Sample collection (DAS)	Sample weight (g)	Injected volume (µl)	Level of insecticide residue (ppm)	FAO/WHO recommended MRL (ppm)
0	20	1	1.108	0.20
1	20	1	0.927	
3	20	1	0.628	
5	20	1	0.421	
7	20	1	0.028	
10	20	1	ND	
12	20	1	ND	
15	20	1	ND	

FAO/WHO Codex Alimentarius Commission Recommended MRL, 2004.
DAS- Days after spraying, MRL- Maximum Residue Limit

Trend of Residue Degradation: Trend of degradation of cypermethrin residue in eggplant and soil samples with 1ml and 2 ml l^{-1} of water are shown in Figs. 4 – 7.

Rate of degradation when dose 1ml l^{-1}: Fig. 4 showed that cypermethrin residue degradation in eggplant sprayed @ 1ml l^{-1} of water. It can be established that 42.18%

cypermethrin residue degraded at 1 DAS which increased up to 59.12% at 3 DAS, 86.07% at 5 DAS and 97.80% at 7 DAS. At 10 DAS no residue was detected.

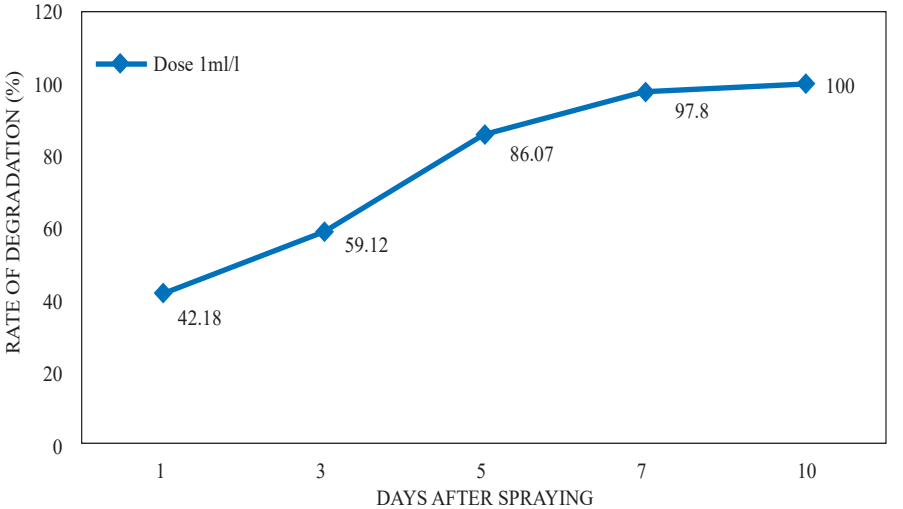


Fig. 4. Trend of cypermethrin residue degradation in eggplant sprayed @ 1ml l^{-1} of water at different days after spraying (DAS).

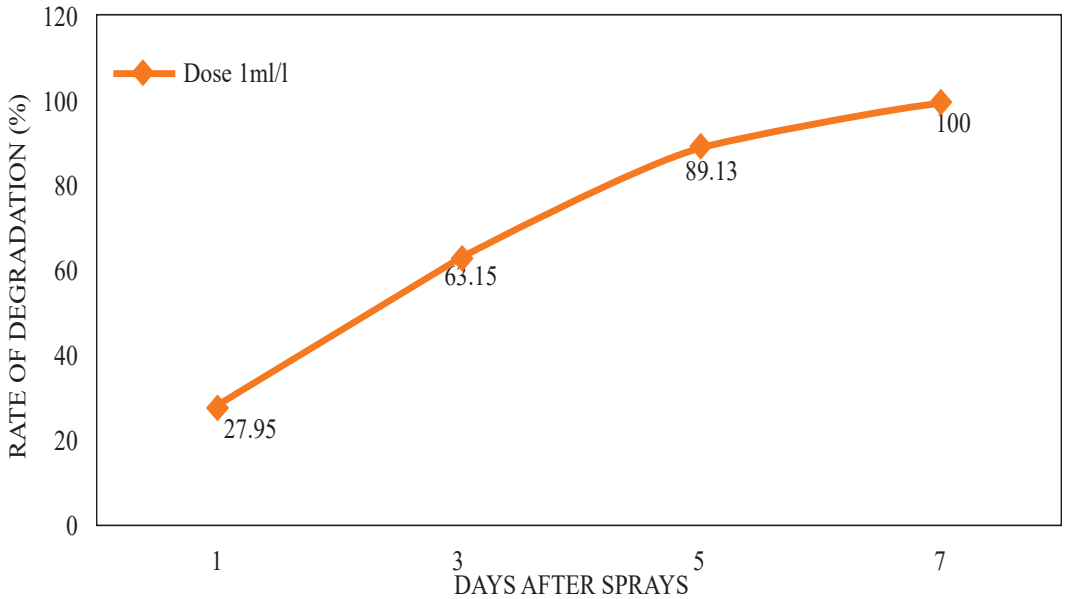


Fig. 5. Trend of cypermethrin residue degradation in soil sprayed @ 1ml l^{-1} of water at different days after spraying (DAS).

Cypermethrin residue degradation in soil of the eggplant field sprayed @ 1ml l^{-1} of water was shown in Fig. 5. It is clear that 27.95% cypermethrin residue degraded at 1 DAS which gradually increased to 63.15% at 3 DAS and 89.13% at 5 DAS. At 7 DAS no residue was found.

Rate of degradation when dose 2ml l^{-1}: Fig. 6 showed the trend of cypermethrin residue degradation in eggplant that was sprayed @ 2ml l^{-1} of water. Cypermethrin residue degraded up to 40.83% at 1 DAS which increased gradually to 55.2% at 3 DAS, 81.76% at 5 DAS and 91.08% at 7 DAS. At 10 DAS 97.03% residue was degraded and at 12 DAS no residue was obtained. Fig. 7 showed the trend of cypermethrin residue degradation in soil of the eggplant field that was sprayed @ 2ml l^{-1} of water. Cypermethrin residue degraded up to 56.02% at 1 DAS, which increased up to 70.21% at 3 DAS, 80.03% at 5 DAS and 98.67% at 7 DAS. No residue was detected at 10 DAS.

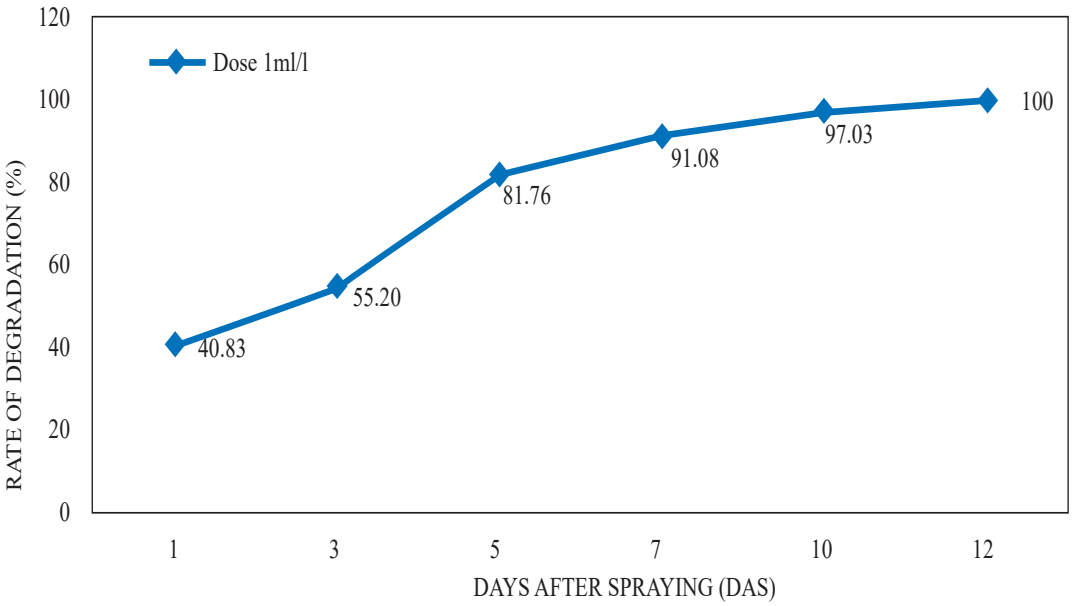


Fig. 6. Trend of cypermethrin residue degradation in eggplant sprayed @ 2ml l^{-1} of water at different days after spraying (DAS).

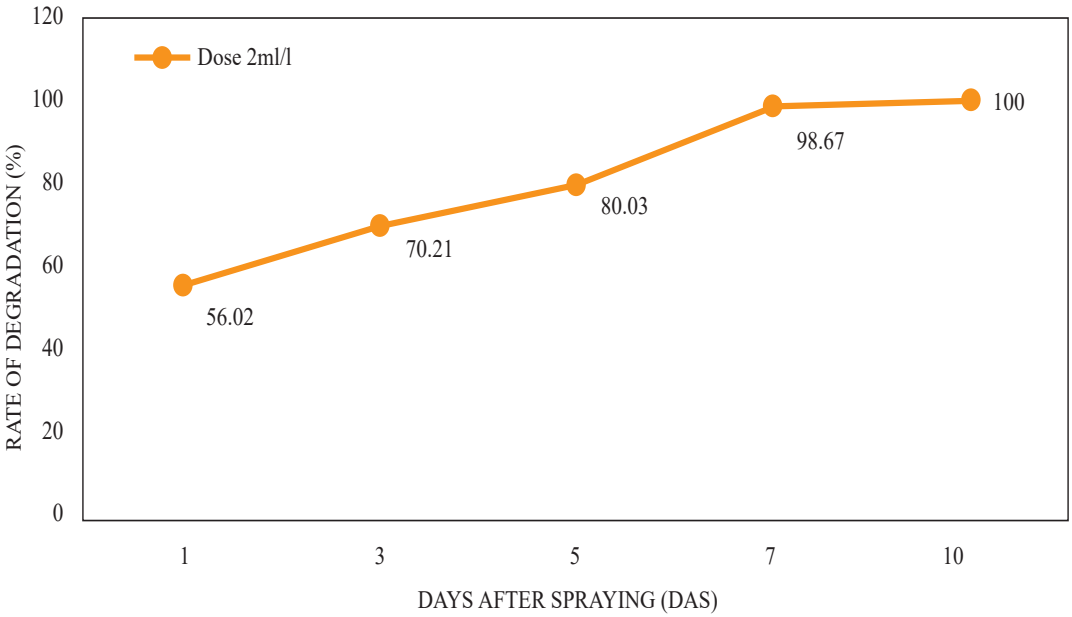


Fig. 7. Trend of cypermethrin residue degradation in soil sprayed @ 2ml l^{-1} of water at different days after spraying (DAS)

Cypermethrin is relatively non-persistent in soils. In sandy soils it persists for 2-4 weeks (Jones 2013). He found increased cypermethrin persistence was observed in soil with high organic matter, high clay content, reduced microbial activity and anaerobic conditions.

In this present study it was observed that at early DAS residues degradation rate was low and with increased DAS the degradation rate increased positively.

The present study is in agreement with Rahman (2013), who found that cypermethrin residue degradation in eggplant sprayed @ 1ml l^{-1} of water. He found 23.88% cypermethrin residue degraded at 1 DAS which increased up to 70.40 % at 3 DAS and 98.79 % at 5 DAS. At 7 DAS no residue was detected. Residues degradation in soil of the eggplant field was 23.76 % degradation of cypermethrin residue at 1 DAS which gradually increased to 43.19 % at 3 DAS and 69.70 % at 5 DAS. At 7 DAS no residue was found. Conversely the trend of cypermethrin residue degradation in eggplant that was sprayed @ 2ml l^{-1} of water showed that cypermethrin residue degraded up to 17.29 % at 1 DAS which increased gradually to 35.68 % at 3 DAS, 57.83 % at 5 DAS and 75.67 % at 7 DAS. At 10 DAS 93.79 %

residue was degraded and at 12 DAS no residue was detected. Cypermethrin residue of soil samples, degraded up to 23.01% at 1 DAS, which increased up to 64.13 % at 3 DAS, 73.78 % at 5 DAS and 87.78 % at 7 DAS. No residue was detected at 10 DAS.

On the other hand, Paul *et al.* (2016) reported that the residues level of cypermethrin in country bean sprayed @ 1ml l^{-1} of water. They found that 27.36% cypermethrin residue degraded at 1 DAS which increased up to 67.66% at 3 DAS, 82.15% at 5 DAS and 94.29% at 7 DAS. At 10 DAS no residue was detected. Conversely cypermethrin residue degradation in soil of the country bean field plot was 32.27% cypermethrin at 1 DAS which gradually increased to 43.35% at 3 DAS and 74.66% at 5 DAS. At 7 DAS no residue was found.

Determination of Pre-Harvest Interval (PHI): The Pre-Harvest Interval (PHI) is the period of time after the application of a pesticide to a crop during which harvest of that crop is prohibited. This interval is necessary to ensure that the crop will meet the established pesticide residue tolerances (Calvin *et al.* 2000). The PHI of cypermethrin for eggplant is shown in Table 5.

Table 5. Determination of Pre-Harvest Interval (PHI) of Cypermethrin in eggplant

Name of Insecticide	Name of Vegetable	Residue detected up to (DAS)		Residue above MRL values (DAS)	MRL Standard value (mg/kg)	Recommended Pre- Harvest Interval (Day)
		1ml l^{-1}	2ml l^{-1}			
Cypermethrin	Eggplant	7	10	3	0.2	4

From Table 5, it was revealed that cypermethrin residue was detected in the eggplant sample (sprayed @ 1ml l^{-1} of water) up to 7 DAS and the quantities were above MRL up to 3 DAS. Conversely residue in eggplant sample when sprayed @ 2ml l^{-1} of water, the residue was detected in the eggplant sample up to at 10 DAS and the quantities of above MRL was recorded up to at 3 DAS set by FAO-WHO (2004). Therefore, it might be recommended that Pre-Harvest Interval (PHI) of Cypermethrin is four (04) for eggplant cultivation. The present study was supported by Ahmed *et al.* (2013) who reported that Pre-Harvest Interval (PHI) for safe and healthy harvest of eggplant is four (04) days.

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