Vol.2 No. 1, 111-117 (2013)
Received: June 2012; Accepted: Feb.2013

Endosulfan use Pattern in the Districts of Uttarakhand and Uttar Pradesh States of India

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Abstract

The present study was undertaken with the objectives of determining Endosulfan use pattern using a pre- tested structured questionnaire. The study was carried out in 8 centres of Uttarakhand and Uttar Pradesh. The results indicated that Endosulfan was most commonly sprayed insecticide on many crops especially vegetables. Among them tomato, ladyfinger, brinjal, cauliflower and cabbage were identified as the vegetable where Endosulfan dose was higher than the recommended. Also the numbers of application were more than recommended and waiting period was found to be least. Excessive use of this insecticide may leave residue on the crops sprayed as well as cause acute to chronic toxicity to the farmers.

Key words: Pesticides, insecticide, Endosulfan, dose, waiting period

Introduction

Some of the pesticides like Endosulfan that have been banned or restricted in their use in many countries have been liberally used in India. In India, it is widely used against a variety of agricultural pests [1]. During 1999- 2000, about 81,000 metric tons of Endosulfan was manufactured in India [6]. Endosulfan is an organochlorine compound of cyclodiene group [3] . Because of its low cost and low persistence with favourable toxicological parameters, it is registered for use in the management of insect pests .

In the package of practices towards achieving higher production of crops, now the farmers are addicted for using Endosulfan insecticide indiscriminately and excessively. It is therefore essential to study the general profile of Endosulfan use in crops for the safety of farmers and consumers. Keeping the above point in view, the present study was undertaken with the objective of determining Endosulfan use regarding brand names, dose sprayed, waiting period, and number of applications, techniques and equipment used for spraying.

Materials and Methods

The survey of 240 farmers was done in 8 centres of Uttarakhand and Uttar Pradesh districts of India to achieve the

above stated objectives using a pre-tested structured questionnaire. The method was used for filling the questionnaire. These centres were selected on the basis of use of Endosulfan insecticide in various agricultural operations.

Results and Discussion

Almost all the crops were sprayed with Endosulfan (Table 1). It can be seen that Endosulfan was the choice of farmers for most of the vegetables. Most commonly used Endosulfan brands in the study area were Endocid-40, Endoin, Arjun, Endocel, Thiodan, Mentor, Sri Ram Endo 35, Endosri and Endoveer.

The approximate reported dose, number of application and waiting period of Endosulfan insecticide sprayed on various crops is given in Table 2, 3 and 4 respectively. Maximum dose of this insecticide was reported for tomato, ladyfinger, brinjal, cauliflower and cabbage crops. Least dose was reported for onion, chilies and garlic. All these farmers sprayed Endosulfan through foliar technique.

. Maximum per cent deviation from standard dose was seen for 5 crops namely tomato, ladyfinger, cauliflower, brinjal and cabbage. Negative per cent deviation of Endosulfan dose was found for onion, chilies and garlic.

Number of applications of pesticide spray varies depending upon the interview

mergence of pests. However, on tomato and brinjal, this insecticide was applied 5-9 times during the crop season. Ladyfinger, cauliflower and cabbage were sprayed between 4-7 times by the respondent farmers. For garlic, paddy and wheat, the rounds of this insecticide application was reported to be minimum (2-3 rounds).

Maximum waiting period of 20 days was seen for wheat crop followed by sugarcane, paddy, black gram, green gram, maize, pea, soybean, mustard, gram, garlic, chilies and onion. Least waiting period of 8.97, 8.96, 8.66, 8.21 and 8.06 days were seen for tomato, cauliflower, cabbage, brinjal and ladyfinger crops, respectively. Every pesticide has some safety or waiting period. If vegetables are harvested before completion of the waiting period, it is likely to have higher level of residues, which are hazardous to health [5].The present study however revealed that the waiting period followed by the farmers was not greater than recommended for most vegetables.

A total of 179 farmers used specific measures for diluting the pesticide. Most of the farmers used the lid of pesticide container for diluting the pesticide. Some of the farmers diluted it depending upon area to be sprayed. The household utensils were

Table 1: Endosulfan insecticide sprayed on various crops by the farmers of Uttranchal and Uttar Pradesh states of India

Crop	No. of Farmers spraying Endosulfan pesticide
Vegetable:	
Spinach	1(0.42)
Tomato	78 (32.50)
Pea	12 (5.00)
Beans	-
Potato	-
Ladyfinger	78 (32.50)
Onion	9 (3.75)
Cabbage	32 (13.33)
Brinjal	71 (29.58)
Cauliflower	23 (9.58)
Chillies	19 (7.92)
Garlic	5 (2.08)
Oil seed crop:	
Mustard	38 (15.83)
Cereals:	
Maize	53 (22.08)
Paddy	20 (8.33)
Wheat	1 (0.42)
Pulses:	
Green gram	20 (8.33)
Gram	12 (5.00)
Soybean	9 (3.75)
Blackgram	13 (5.42)
Cash crop:	
Sugarcane	24 (10.00)

* The figures in parenthesis indicate percentage.

Table 2: Reported mean dose of Endosulfan sprayed on various crops

Crop name		Reported mean dose (ml/acre)	Standard dose (ml/acre)	% deviation of the standard
Spinach (n=1)		150.00	140	7.14
Tomato (n=78)	Mean	388.46	160	142.79
	Range	250-600		
	± S.D.	78.92		
Pea (n=12)	Mean	260.83	220	18.56
	Range	150-300		
	± S.D.	55.18		
Ladyfinger (n=78)	Mean	453.33	220	106.06
	Range	300-600		
	± S.D.	90.09		
Onion (n=9)	Mean	211.11	240	- 12.04
	Range	200-250		
	± S.D.	22.05		
Cabbage (n=32)	Mean	323.44	220	47.02
	Range	200-400		
	± S.D.	69.54		
Brinjal (n=71)	Mean	687.32	400	71.83
	Range	400-800		
	± S.D.	96.26		
Cauliflower (n=23)	Mean	319.56	200	59.78
	Range	250-400		
	± S.D.	36.12		
Chillies (n=19)	Mean	206.32	220	-6.22
	Range	150-250		
	± S.D.	31.48		
Garlic (n=5)	Mean	230.00	240	-4.12
	Range	200-250		
	± S.D.	27.39		
Mustard (n=38)	Mean	265.53	250	6.21
	Range	200-330		
	± S.D.	35.35		
Maize	Mean	203.02	200	1.51

(n=53)	Range	175-250		
	± S.D.	29.44		
Paddy (n=20)	Mean	245.00	220	11.36
	Range	200-300		
	± S.D.	42.61		
Wheat (n=1)		250.00	220	13.64
Green gram (n=20)	Mean	285.00	200	42.50
	Range	200-350		
	± S.D.	36.63		
Gram (n=12)	Mean	283.33	220	28.79
	Range	250-350		
	± S.D.	38.93		
Soyabean (n=9)	Mean	455.56	400	13.89
	Range	300-450		
	± S.D.	172.19		
Blackgram (n=13)	Mean	288.46	200	44.23
	Range	200-350		
	± S.D.	65.04		
Sugarcane (n=24)	Mean	558.33	220	39.58
	Range	450-650		
	± S.D.	58.36		

* The figures in parenthesis indicate percentage.
** Method of application- Foliar (100 %)

also used for mixing and transferring the pesticides. On the whole, no farmer had any training in pesticide handling and use. Alam (1996) also reported that about 98 per cent farmers had no training in pesticide use. Dedek (1981) reported that the group of people applying pesticides in field have a higher level of exposure and are often less well trained in the safe handling of toxic materials. It is evident from the Table 5 that the equipment used for pesticide application in the study areas was knapsack and foot sprayers because they cultivated less than 5 acres area. Most of them used knapsack

Table 3: Reported number of application of Endosulfan used on various crops

Crop		**Reported number of applications of Endosulfan**
Spinach	Mean	3.00 (n=1)
	Range	-
	± S.D.	-
Tomato	Mean	6.58 (n=78)
	Range	5-9
	± S.D.	1.05
Pea	Mean	3.92 (n=12)
	Range	3-4
	± S.D.	0.29
Beans	Mean	-
	Range	-
	± S.D.	-
Potato	Mean	-
	Range	-
	± S.D.	-
Ladyfinger	Mean	6.01 (n=78)
	Range	5-7
	± S.D.	0.44
Onion	Mean	2.44 (n=9)
	Range	2-3
	± S.D.	0.53
Cabbage	Mean	4.97 (n=32)
	Range	4-6
	± S.D.	0.59
Brinjal	Mean	8.04 (n=71)

	Range	5-9
	± S.D.	1.01
Cauliflower	Mean	5.22 (n=23)
	Range	4-7
	± S.D.	0.74
Chillies	Mean	3.26 (n=19)
	Range	3-4
	± S.D.	0.45
Garlic	Mean	2.20 (n=5)
	Range	2-3
	± S.D.	0.45
Mustard	Mean	3.76 (n=38)
	Range	3-4
	± S.D.	0.43
Maize	Mean	3.06 (n=53)
	Range	3-5
	± S.D.	0.31
Paddy	Mean	2.30 (n=20)
	Range	2-3
	± S.D.	0.47
Wheat	Mean	2.00 (n=1)
	Range	-
	± S.D.	-
Green gram	Mean	3.80 (n=20)
	Range	3-4
	± S.D.	0.41
Gram	Mean	3.50 (n=12)
	Range	3-4
	± S.D.	0.52
Soybean	Mean	3.78 (n=9)
	Range	3-4
	± S.D.	0.44
Blackgram	Mean	3.69 (n=13)
	Range	3-4
	± S.D.	0.48
Sugarcane	Mean	3.50 (n=24)
	Range	3-4
	± S.D.	0.51

Table 4: Reported waiting period of Endosulfan used on various crops

Crop		**Reported waiting period of Endosulfan (days)**
Spinach	Mean	12.00 (n=1)
	Range	-
	± S.D.	-
Tomato	Mean	8.97(n=78)
	Range	7-11
	± S.D.	0.68
Pea	Mean	10.33 (n=12)
	Range	9-11
	± S.D.	0.65
Beans	Mean	-
	Range	-
	± S.D.	-
Potato	Mean	-
	Range	-
	± S.D.	-
Ladyfinger	Mean	8.06 (n=78)
	Range	7-10
	± S.D.	0.89
Onion	Mean	9.11(n=9)

	Range	8-11
	± S.D.	0.78
Cabbage	Mean	8.66 (n=32)
	Range	7-10
	± S.D.	0.83
Brinjal	Mean	8.21(n=71)
	Range	7-11
	± S.D.	1.05
Cauliflower	Mean	8.96(n=23)
	Range	8-11
	± S.D.	0.64
Chillies	Mean	9.11(n=19)
	Range	7-11
	± S.D.	0.88
Garlic	Mean	9.60 (n=5)
	Range	8-11
	± S.D.	1.34
Mustard	Mean	10.47 (n=38)
	Range	9-11
	± S.D.	0.56
Maize	Mean	10.74 (n=53)
	Range	10-11
	± S.D.	0.45
Paddy	Mean	11.05 (n=20)
	Range	9-15
	± S.D.	1.23
Wheat	Mean	20.00 (n=1)
	Range	-
	± S.D.	-
Green gram	Mean	10.75 (n=20)
	Range	10-11
	± S.D.	0.44
Gram	Mean	9.67 (n=12)
	Range	9-11
	± S.D.	0.89
Soybean	Mean	10.56 (n=9)
	Range	10-11
	± S.D.	0.53
Blackgram	Mean	10.92 (n=13)
	Range	10-13
	± S.D.	0.76
Sugarcane	Mean	14.29 (n=24)
	Range	12-15
	± S.D.	0.91

Table 5: Equipment used for spraying

Equipment	**No. of farmers (N= 240)**
Knapsack sprayer	201 (83.75)
Foot sprayer	0 (0)
Knapsack + Foot sprayer	39 (16.25)

* The figures in parenthesis indicate percentage.

sprayer. A small percentage (16.25%) used knapsack sprayer in combination with foot sprayer. None of them had only the foot sprayer.Hence, the present study revealed that the dose and frequency of application of Endosulfan on most vegetables was more. This practice can pose health hazards to both the farmers as well as the consumers. Such a faulty practice can be overcome by creating awareness in the farmers through education and training workshops

References

1. Aiyar, A.S. (2003). Pesticides in packaged drinking water- The shadow and the substance. Indian Food Industry. 22 (1): 11-18.
2. Alam, Z. (1996). Pesticide use and handling at farm level in Bangladesh. Grass roots. 5 (19): 14-22.
3. Cremylyn, R. (1978). Pesticides. Synthetic Pesticides II: Organophosphorus and carbamate compounds. In: Pesticides: Preparation and mode of action edited by R. Cremlyn. John Wiley and Sons Publication. Pp. 240.
4. Dedek, W. (1981). Routes of entry and hazards during exposure to pesticides. Education and safe handling in pesticide application. E.A.H. van Hemestra and W.F. Tordoir (eds.). Marce Dekker Inc. Pp. 187- 189, 194.
5. Nithya, D.J. and Padmini, T. (2005). Effect of processing on pesticide residues in foods. Beverage and Food World. 32 (10): 22- 24.
6. Saiyad, H.; Dewan, A.; Bhatnagar, V.; Shenoy, U.; Shenoy, R.; Rajmohan, H.; Patel, K.; Kashyap, R.; Kulkarni, P.; Rajan, B. and Lakkad, B. (2003). Effect of Endosulfan on male reproductive development. Environmental Health Perspective. 111(16): 1958- 1962.
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