Plant Archives Vol. 16 No. 1, 2016 pp. 390-394 *ISSN 0972-5210*

FARMERS PERCEPTION OF PESTICIDE RESIDUE MANAGEMENT IN BRINJAL

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Abstract

Insect pest infestation is one of the most limiting factors for accelerating yield potential of brinjal. It is most prone to damage by various insects and pests, of which, shoot and fruit borer are considered to be most prominent ones. The use of pesticides is one of the essential measures of modern agricultural practices in protecting the crops from different pests. On the other hand, the residues resulting from the misuses of pesticides on vegetables and fruits is a major concern in many countries as well as India. However, health hazards emanating from indiscriminate use of pesticides can be minimized to a great extent, if these residues are kept below their prescribed safe level (maximum residue limit). To assess the use of pesticides a field survey was conducted with 110 farmers in the major brinjal growing areas of Dharwad and Belagavi districts of Karnataka.

Study revealed that farmers use 20-50 pesticides belonging to different chemical groups mainly to control shoot and fruit borer. However, most frequently used pesticides were found to be Indoxacarb, Rynaxypyre, followed by flubendamide, emamectin benzoate, acetimaprid, monocrotophos, imadicloprid , thiodicarb, spinosad, profenophos etc. It was also reavealed that most farmers used higher quantity of pesticides than the recommended dose. The farmers take up 28-30 sprays during crop growth period (180 days) which amounts to average frequency of six days between the sprays. The pattern of usage of pesticides varied greatly between the farmers and locations. The source of information for using the pesticides was found to be predominantly the pesticides dealers compared to agriculture experts and government officials. It is inferred from the present study that farmers need to be educated about right dosage, proper timing and frequency of using pesticides to monitor residual levels below the maximum residual limit set by Food Safety and Standards Regulation (FSSAI).

Key words : Brinjal, pesticide residue management, insect pest, *L. orbonalis*.

Introduction

Insect pests infestation is one of the most limiting factors for accelerating yield potential in brinjal. The crop is prone to damage by various insects, although there is wide variability in their degree of infestation. Brinjal is attacked by a number of insect pests at various stages of crop growth. Among the insect pests infesting brinjal, the major ones are shoot and fruit borer, (*Leucinodes orbonalis* (Guen.)), which is considered the main constraint as it damages the crop throughout the year. The extent of losses caused by these pests depends on season, variety, soil and environmental factors. Indiscriminate use of pesticides has posed a great threat not only to human beings and cattle, but also to the environment. The situation of indiscriminate use of spurious chemicals is quite often being quoted and leading to loss of several lives of farmers. The increase in the quantity of pesticides to different crops has made it necessary to monitor residues in consumable parts of plant *viz.*, seeds, fruits, vegetables and any other plant portion. In addition, several agricultural commodities are being exported to other countries and the stringent measures are being imposed by the regulatory bodies importing such of these commodities.

In view of this, it has almost become mandatory that the agricultural commodities need to be supplemented with pesticide residues analysis data. There are numerous pesticides available in market and are being applied to different crops at various stages. The metabolism of these pesticides is dependent upon the crop/variety, type of the chemical, environmental conditions and season. It is necessary to understand the metabolism of pesticides, so that précise quantities of pesticides can be applied, for which we need to have the detailed information on the physiology of crops. Since many vegetable are consumed

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raw without subjecting these for cooking, there is more danger of persistence of pesticides, since some pesticides are thermolabile and get disintegrated during the process of cooking. At this juncture it is necessary to know the level of pesticides at different time intervals after application and at different growth stages during crop phenology. Hence, the present investigation would help in assessing precise doses and right stage of application of pesticides to avoid pesticide residues in vegetables. Keeping this in view the present study was undertaken to find out the frequency and the type of pesticides being used by the farmers in Belgavi, Dharwad and Gadag districts of north Karnataka.

Materials and Methods

The survey was undertaken in Dharwad, Belgavi and Gadag districts of north Karnataka. The farmers were selected based on their experience of cultivating brinjal and only such farmers were considered for the study. A total 110 farmers were considered for the study. A total 110 farmers covering 22 villages in this three districts were interviwed and were asked to furnish the details as per the questionnaires indicated below. Apart from collecting the information from the farmers, 10 pesticides dealers were interviewed only to know about their business experience, source of any training and application of pesticides.

Results

The information collected on the dosage and the frequency of the pesticide used by the farmers indicated in table 1 revealed that farmers used 18 different types of pesticides. It was observed that the dosage used by the farmers is much higher than the recommended dose for all the chemicals except oberon 240 S. C. and Solomon. Among different chemicals/pesticides, maximum dosage of acetimaprid 20 SP is administered followed by monocrotophos, profenophos, emamectin benzoate and triazophos. However, the least dosage was found to be with oberon, solomon and flubendamide. It is clear from the information collected that the farmers used several times higher dosage than the recommended concentrations. When any chemical recommended, it is based on the experimental results on the proper control of specific insect pest which comes out of several years of research on research stations and the farm trials. It is necessary that the farmers have to stick to the recommended dose pesticide from the point of economy, health and environment.

Among different insecticide groups, it was observed that organophosphates and nitrogenous groups are being used to the maximum extent followed by pyrethroids (fig. 1). While diamide and antibiotic or microbial are also being used and the extent of use of these two insecticides is almost half compared to organophosphate and nitrogenous. Farmers are also in the practice of handpicking the fruits and shoot borer and the extent of handpicking is just 2% as against the use of insecticide. Although handpicking is more effective as well as environmental friendly as it does not involve any chemical contamination, but is time consuming and laborious. In the recent times, labour shortage or non-availability of farm labours, it is higher impracticable to advise hand picking.

With respect to the frequency of the application of the pesticides, it was observed that 83.63 per cent of farmers used the pesticide suggested by the dealers. It is also clear from table 2 that the farmers are in the habit of collecting the information about the method of application, dose, timing and frequency from the pesticide dealers (69.00 per cent). Although the information is disseminated to the farmers through agricultural experts, government officials and their own response, merely 8 to 10 per cent of the farmers follow the suggestions given by these agencies. With respect to the timing of pesticide application, the study revealed that 86.36 per cent of farmers going for weekly application of pesticide while 8.18 per cent follow 15 days interval application. At this juncture, it is pertinent to mention that considering the type of insecticide, weather conditions and the extent of infestation, the farmers need to follow right frequency of the application of pesticide. It was further revealed that only 10.9 per cent of the farmers have received training about the usage of pesticides. Farmers further feel that by enhancing the dose and the frequency, they can control the pest effectively without knowing the metabolism of the pesticide and it is persistent in the plant. It is perceived by the farmers (38.18 per cent) that there is more pest incidence and the dealers (43.63 per cent) also feel that they need to use higher doses than the recommended.

Farmers perception on the pesticide residue clearly indicated that, they not bother about the pesticide residue, waiting period of pesticide. In this survey, only 36.33 per cent of farmers know about pesticide residue, 10.90 per cent farmers follow the practices for residue management (Integrated pest management) and they also don't know about waiting period of pesticides results that more residue

The study clearly shows that the farmers are using excessive pesticides which not only is deleterious to the human health but also pollutes the environment and it is necessary that farmers have to be thoroughly educated about the use of pesticides.

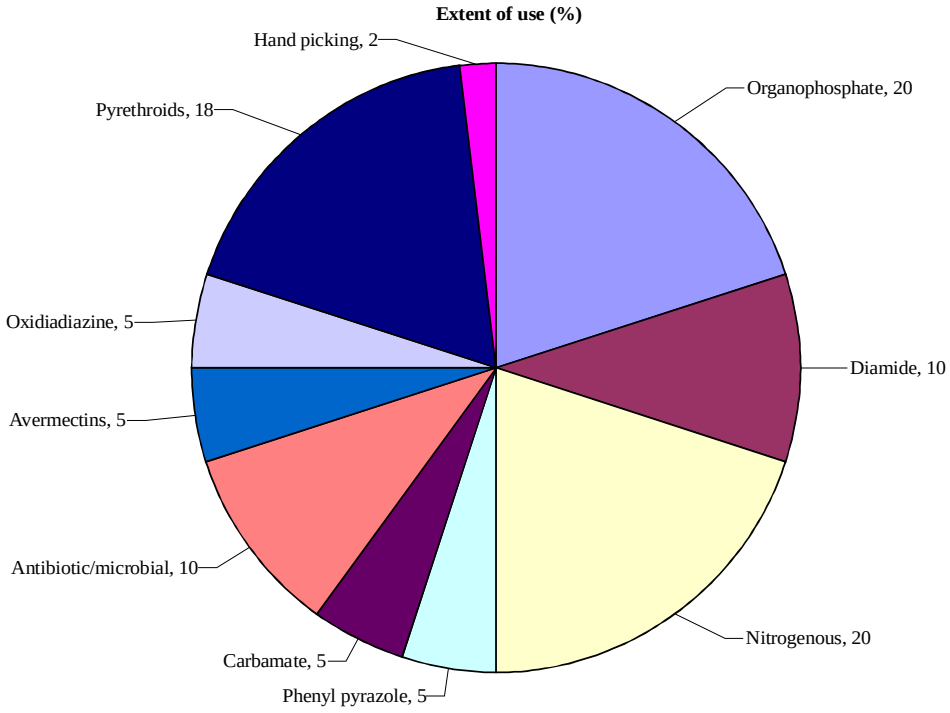

Fig. 1 : Pesticides group being used by the farmers.

Plate 1: Farmer's field survey.

Table 1 : Frequently used pesticides and their dosage by farmers.

S. no.	Insecticides		Dosage (ml or g lit^{-1})		
			Recommended	Actually used	
	Chemical name	Trade name		Range	Mean
1	Rynaxypyre 20 SC	Chlorantraniliprole	0.50	0.5-1.0	0.75
2	Indoxacarb 14.5 SC	Avaunt	0.50	0.5-1.0	0.75
3	Emamectin benzoate 5 SG	Proclaim	0.25	1-5.0	3.0
4	Monocrotophos	Nuvacron	1.0	3.45-4.0	3.70
5	Flubendamide	Fame	0.10	1.0	1.0
6	Acetimaprid 20 SP	Pride	0.20	6.56-7.0	6.80
7	Deltamethrin	Decies	0.5-10	1-2.0	0.50
8	Fipronil 5 SC	Regent	1.0	2.0	2.0
9	Methomyl 40 S P	Dunet/Lanet	1.50	2 -2.5.	2.25
10	Imidachloprid 17.8 SL	Confidor	0.20	0.25-1.0	0.41
11	Thiodicarb 75 WP	Larvin	1.0	3.0-5.0	2.66
12	Profenophos 50 EC	Curacron	2.0	2.0-5.0	3.55
13	Spinosad 45 EC	Tracer	0.10	1.0-3.0	2.0
14	Imidacloprid 200 SL	Super confidor	0.25	1.0-3.0	2.0
15	Spinosad 48 EC	Tracer	0.20	1.0-2.0	1.50
16	Triazophos 60 L.C.	Cherrish	2.0	2.50-3.0	2.75
17	Oberon240 S.C.	Spiromesifen	1.0	1.0	1.0
18	Betacyfluthrin+imidachloprid	Solomon	1.0	1.0	1.0

Discussion

Nyakundi *et al*. (2010) conducted the survey to determine the current pesticide use patterns and applications among farmers in Rift Valley and Central provinces of Kenya. The most frequently mentioned source of information on pesticides usage was from commercial media (37.6 per cent), government agricultural extension officers (26.4 per cent), village leaders (25 per cent) and finally the opinions of other community leaders. In this survey, insecticides were the most frequently mentioned chemical utilized, followed by herbicides and fungicides. Evidence from this survey pointed toward the need for a comprehensive intervention to change farmers' pesticide use patterns. Diazol 60EC, a pesticide in the organophosphate family, was the most frequently used by farmers, followed by methomex 90sp, which is in the carbamate family. Glyphogan 48 SL was the most popular herbicide, whereas the combination of linurex and touchdown was the most frequently mentioned fungicidal agent.

Khan (2005) studied the residue of commonly used insecticides on fruits and vegetable grown Peshawar region of Pakistan and a field survey was conducted in major growing areas of fruit and vegetables regarding the use of insecticids by local farmers on these crops. On the basis of questionnaires, 105 farmers were interviwed concerning the types of insecticides used, frequency and doses of application prior to harvest. Found that fifteen insecticides belonging to different groups were to be commonly used on fruis and vegetables by farmers and the most frequently used insecticide was cypermethrin followed by methamidophos and chlorpyriphos. The mismanagement or non-availability of proper information about the pesticide application can lead to contamination of food crops with pesticide residue (Batora *et al*., 1981). Masud and Hassan (1992) conducted survey in Karachi, Pakistan market and reported that the residue of organochlorine, organophosphorus and pyrethroid insecticides in fruits and vegetables collected from wholesale market of Karachi.

Conclusion

Farmers are using higher dose of pesticide compared to recommended dose results in presence of pesticide

Table 2 : Frequency of pesticide usage by the farmers (Number of samples 110).

S. no.	Statements	Frequency	Percentage
1	Do you use pesticide suggested by dealers?	92	83.63
2	From where you collected information about application, dosage, timing, frequency of pesticide application?		
	a) Agriculture expert	12	10.91
	b) Pesticide dealers	76	69.01
	c) Government officials	9	8.19
	d) own experience	12	10.9
3	Timing of pesticide application		
	a) Weakly	95	86.36
	b) 15 Days interval	9	8.18
	c) Monthly	6	5.45
4	Have you received any training on applying pesticides?	12	10.90
5	Why did you increase the dosage of pesticide?		
	a) Everybody else increased	2	1.81
	b) Insect do not die anymore at low dosage	18	16.36
	c) Just to make sure that it works	0	0
	d) More pest incidence	42	38.18
	e) Supplier say so	48	43.63
	f) others	0	0
6	Do you know about pesticide residues?	40	36.33
7	Any practices you follow for residue management?	12	10.90
8	Do you know about waiting period of pesticides?	0	0

residues is a concern for consumers because pesticides are known to have potential harmful effects to other non-targeted organisms than pests and diseases. Some of the pesticides are persistent and remain in the body causing long term exposure. The concern has led to governments setting up monitoring systems in order to assess the safety situation and make information system for farmers concerning about effective use of pesticide. Findings of this study clearly suggest that it is necessary to reduce possible health and environmental risks associated with pesticide residues by documenting risk perceptions and developing ways to address them.

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