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Insecticide usage pattern on chilli crop ecosystem in three selected districts of Southern Karnataka: A survey

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Abstract

In this study selected farmers from three different Talukas were surveyed regarding the pesticide use pattern in South Karnataka. The mean survey data of chilli growers from the three districts of Chikkaballapur, Bengaluru and Chitradurga revealed that 40% of the farmers had education level of higher secondary. 81 per cent of the farmers preferred to grow improved chilli varieties. The plant protection information of chilli farmers indicated that the primary source of information (62%) for these farmers was through agrochemical shops. Most of the farmers (77%) sprayed insecticides in the morning hours and majority (83%) invariably mixed different pesticide chemicals at each application. 56 per cent of the farmers used same chemical repeatedly and applied chemicals at 15 days interval (51%). 48 per cent farmers applied more than three sprays and 21 per cent applied two sprays in a cropping season. Only 10 per cent farmers used Power sprayer for application, while 90 per cent of them used high volume sprayers like, knapsack and gator sprayers. 62 per cent of the farmers prepared the spray solution carefully and took up spray with at least the mask covering the face partially. About 40 per cent farmers resorted to harvest chilli fruits 7-10 days after pesticide application. A variety of pesticide formulations were used in chilli crop the frequently used Insecticides included (Acephate, Dimethoate, Fipronil, Imidacloprid, Thiamethoxam, Chlorfenapyr and diafenthiuron) highly and moderately hazardous pesticides.

Keywords: Insecticide, chilli, plant protection practice

Introduction

Chikkaballapur, Kolar, Bengaluru and Chitradurga are major agricultural districts in South Karnataka, where majority of the farmers rely on synthetic pesticide for insect pest control in vegetable cultivation. Pesticides have been the chief weapons in farmers' struggle to combat pests and diseases of cultivated crops. Wide spread indiscriminate use of pesticides is also known to leave toxic residues in various environmental components or commodities (Kumari *et al.*, 2002 ^[1]; Srivastava *et al.*, 2011 ^[8] and Wang *et al.*, 2011) ^[11]. Frequent or continuous exposure to chemical pesticides results in number of serious and chronic health related problems such as birth defects, nerve damage, cancer, skin diseases and many others which might occur over period of time (EPA, 2012) ^[5]. Due to monoculturing of chillies in the recent past, buildup of thrips has been so enormous that farmers would resort to a minimum of 5 to 6 chemical sprays (George and Giraddi, 2007) ^[6]. A literature search revealed that there is a serious lacuna of studies relating to pesticide use pattern including knowledge and awareness of farmers on risks and hazards of pesticides' use in the farming profession in Southern Karnataka. With this backdrop, the present study to unravel the pattern of pesticide use among chilli farmers in Chikkaballapur, Bengaluru and Chitradurga districts of Karnataka was attempted to identify the shortfall in their knowledge, if any, as well as awareness of risks and hazards of pesticide usage.

Material and Methods

Insecticide usage pattern by farmers for managing *S. dorsalis* on chilli

Using roving survey method, information on pesticide usage pattern among the farmers in selected villages of Chikkaballapur, Bengaluru and Chitradurga districts was collected. The information on pesticide use by chilli growers was obtained through farmer's personal interaction using a schedule/questionnaire. Information on the pesticides applied on chilli crop in the previous season or year was collected from a representative sample of farmers.

The main objective of the study was to investigate on the insecticide usage pattern among the

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farmers with regard to management of thrips in a chilli cropping system, using a detailed questionnaire covering various aspects of pesticide usage. Personal interview with the respondent farmers enabled collection of information on alternative use of chemicals, dosages, number and frequency of application, safety measures observed, safe harvesting interval followed and grower's preference for consumption/use of treated chilli grown on their farm *etc.* Farmer's personal information about education level, agricultural land holding, knowledge level of farmer pertaining to farm practices, chilli varieties/hybrids, incidence of pests & diseases and management options which influenced the use of pesticides at the farm level were also obtained. The data were pooled for various information categories and studied to understand the pesticide usage pattern in the chilli cropping system across three Southern districts of Karnataka state.

Results and Discussion

Agricultural information and Socio - economic status

The mean survey data of chilli growers from the three districts of Chikkaballapur, Bengaluru and Chitradurga revealed that 40% of the farmers had education level of higher secondary, whereas 35% and 19% of the farmers had beyond secondary and no formal education respectively (Fig. 1). Majority of the farmers (62%) cultivated chilli in one-acre area and chilli cultivation by 92 per cent of the farmers was one crop every year. 81 per cent of the farmers preferred to grow improved chilli varieties (Table 1)

Farmers' opinion about plant protection practices in chilli cropping system

The overall plant protection information of chilli farmers across three districts of Chikkaballapur, Bengaluru and Chitradurga (Table 2) indicated that the primary source of information (62%) for these farmers was through agrochemical shops followed by 27 per cent farmer's information from Agri. Univ. experts (Fig. 2). Most of the farmers (77%) sprayed insecticides in the morning hours and majority (83%) invariably mixed different pesticide chemicals at each application. 56 per cent of the farmers used same chemical repeatedly and applied chemicals at 15 days interval (51%). 48 per cent farmers applied more than three sprays and 21 per cent applied two sprays in a cropping season (Fig. 3). Only 10 per cent farmers used Power sprayer for application, while 90 per cent of them used high volume sprayers like,

knapsack and gator sprayers. 62 per cent of the farmers prepared the spray solution carefully and took up spray with at least the mask covering the face partially (Fig. 4). About 40 per cent farmers resorted to harvest chilli fruits 7-10 days after pesticide application (Fig. 5) (Table 2)

In the present study the respondents are of the view that chemical method of pest control was very effective in combating severe pest infestation. This revealed tremendous scope for agricultural extension activity in such pesticide-use predominant regions. The pesticides were easily available and hence used widely in crop cultivation. The main use of pesticides was to control insect pests and diseases on the field crops. The level of education and illiteracy of farmers contributed to knowledge and use of pesticides is comparable with the results of Deviprasad *et al.* (2015) [4] in Belgaum, Chamarajanagar, Gulbarga and Mandya districts of Karnataka.

More than 60% of the farmers were collected the primary plant protection information through agrochemical shops. Shetty *et al.* (2010) [7] in all the states of India, Vemuri *et al.* (2016) [10] & Kumar *et al.*, 2017 [2] in Karimnagar region of Telangana and Meenambigai *et al.* (2017) [3] in Tamil Nadu region also reported the primary plant protection information was collected from agrochemical shops, as recorded in the present study. 62 per cent of the farmers prepared the spray solution carefully and took up spray with at least the mask covering the face partially in the present investigation but it is not comparable the results of Tyagi *et al.* (2015) [9]. About 40 per cent farmers resorted to harvest chilli fruits 7-10 days after pesticide application this is corroborated with the results of Kumar *et al.* (2017) [2] in Karim nagar of Telangana and Meenambigai *et al.* (2017) [3] in Tamil Nadu.

Insecticide use pattern in three selected districts of Karnataka

The farmers' personal survey data revealed up to 7 spray applications on chilli crop across the three selected districts of southern Karnataka, a variety of pesticide formulations were used in chilli crop ecosystem in these study areas. The frequently used Insecticides included (Acephate, Dimethoate, Fipronil, Imidacloprid, Thiamethoxam, Chlorfenapyr and diafenthiuron) highly and moderately hazardous pesticides and minimum of 4 different types of insecticides were used on chilli crop in all three selected districts of Southern Karnataka (Table 3).

Table 1: Agricultural information and Socio-economic status of chilli growers in three selected districts of Karnataka

Farmers' profile	Respondent farmers (%)			
	Chikkaballapur*	Bengaluru*	Chitradurga*	Over all
Education level				
No formal education	14	10	34	19
Primary education	06	08	04	06
Middle/secondary	34	42	42	40
College (PUC)	30	30	18	26
Degree	16	10	02	9
Area cultivated under chilli				
0.5 acre	20	10	08	13
1 acre	62	70	54	62
2 acres	18	20	38	25
Chilli cultivation frequency (no. of crops/year)				
1 crop	92	88	96	92
2 crops	08	12	04	08
Chilli varieties used				
Local	20	16	22	19
Improved	80	84	78	81

*N=50

Table 2: Plant protection practices of chilli growers in three selected districts of Karnataka

Plant protection practices	Respondent farmers (%)			
	Chikkaballapur*	Bengaluru*	Chitradurga*	Over all
Source of plant protection advice				
University scientists	24	36	20	27
Line department personnel	10	10	08	9
Pesticide outlets	66	50	70	62
Fellow farmers	-	04	02	2
Time of application of insecticides				
Forenoon	80	86	64	77
Afternoon	20	14	36	23
Mixing of chemicals				
Yes	78	86	84	83
No	22	14	16	17
Repeated use of same chemicals				
Yes	56	52	60	56
No	44	48	40	44
Interval between two spray applns.				
10 days	26	22	02	17
15 days	46	54	52	51
20 days	28	24	46	32
Preparation of solution				
With wooden sticks	74	76	68	73
With locally available gloves	06	16	16	12
Both wooden sticks and gloves	20	08	16	15
Total number of spray appl./crop				
No spray	-	-	06	2
1 spray	02	04	04	4
2 sprays	08	12	44	21
3 sprays	26	28	22	25
3 sprays	64	56	24	48

Plant protection practices	Respondent farmers (%)			
	Chikkaballapur*	Bengaluru*	Chitradurga*	Over all
Sprayer type				
Back pack sprayer	48	44	48	47
Power sprayer	10	12	08	10
Gator sprayer	42	44	44	43
Waiting period between last spray application and harvest				
Three days	-	-	-	
7 days	50	52	24	42
10 days	42	40	32	38
15 days	08	08	36	17
Not specific	-	-	08	3
Storage of the chemical				
Dwelling house	18	12	20	17
Farm shed	82	88	80	83
Protective clothes used (while spraying)				
Apron	-	-	-	
Mask	66	50	68	62
Gloves	08	10	04	7
All the above	26	40	28	31
None	-	-	-	
Preference for consumption of chilli grown in the own farm				
Yes	90	80	94	88
No	10	20	06	12

*N=50

Table 3: Insecticide use pattern in three selected districts of Karnataka

Location	No. of types of insecticide used & proportion of farmers	Number of applications/ crop	Repeatedly used insecticide (repeat application)
Chikkaballapur	1 (12%) 2 (22%) 3 (62%) 4 (4%)	1 to 7 applications	Acephate Dimethoate Fipronil Imidacloprid Thiamethoxam Chlorfenafyr Diafenthiuron
Bengaluru	1 (2%) 2 (24%) 3 (62%) 4 (12%)	1 to 6 applications	Acephate Fipronil Imidacloprid Thiamethoxam Chlorfenafyr Diafenthiuron
Chitradurga	0 (10%) 1 (18%) 2 (48%) 3 (24%)	1 to 4 applications	Acephate Fipronil Imidacloprid

Conclusion

The results of this survey indicated that a variety of pesticide formulations were used in chilli crop in these study areas. The use included highly and moderately hazardous pesticides. Insecticides were frequently used. Significant lack of knowledge among the farmers about preventive & proper

pesticide application and personal protection were observed. This survey points the need for a comprehensive intervention and awareness amongst farmers on environmental issues including health impacts due to usage of pesticides in the above study areas.

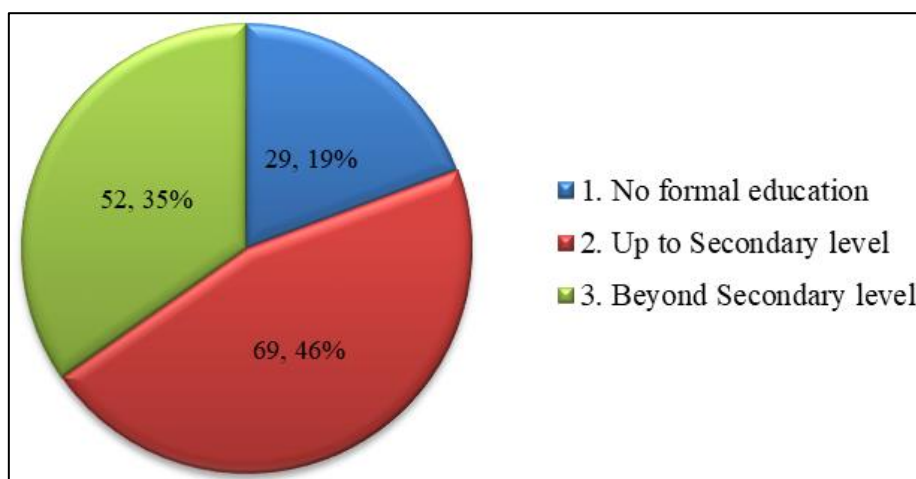


Fig 1: Education level of chilli growers in three selected districts of Karnataka (n=150)

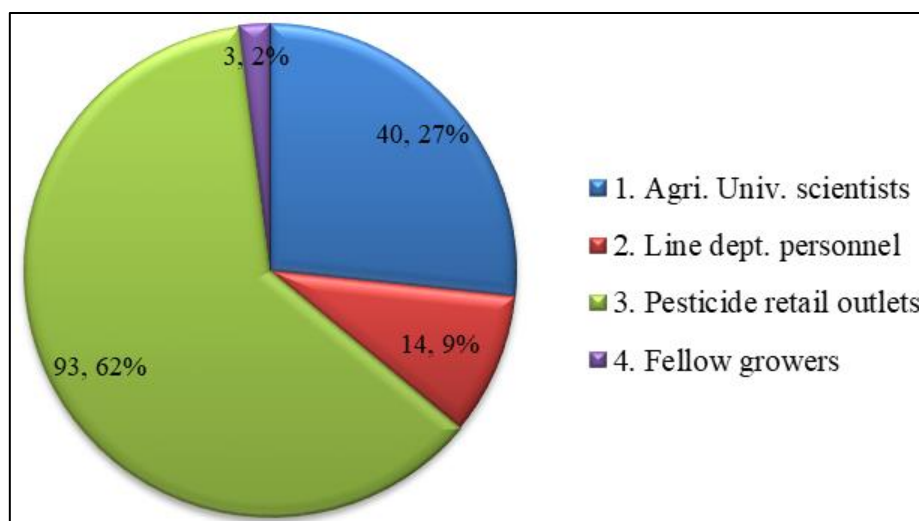


Fig 2: Plant protection advice perceived by chilli growers in three selected districts of Karnataka (n=150)

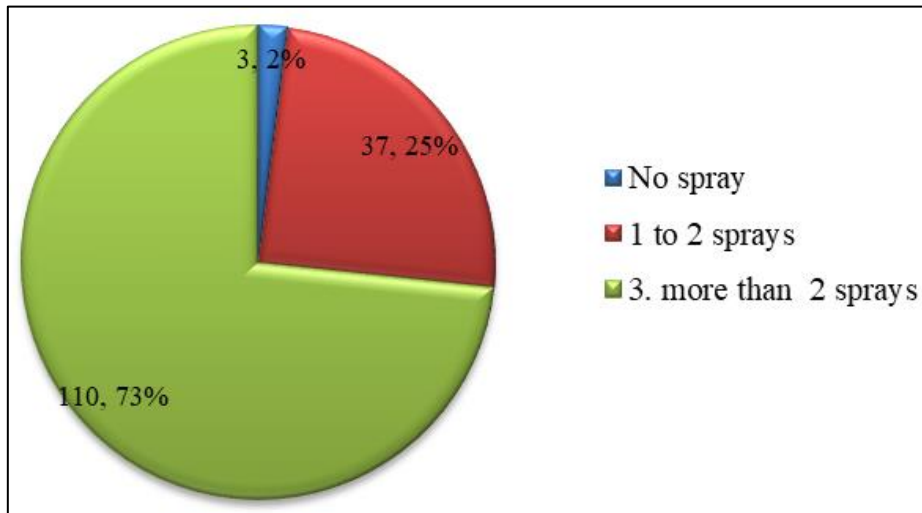


Fig 3: No. of spray applications on a chilli crop in three selected districts of Karnataka (n=150)

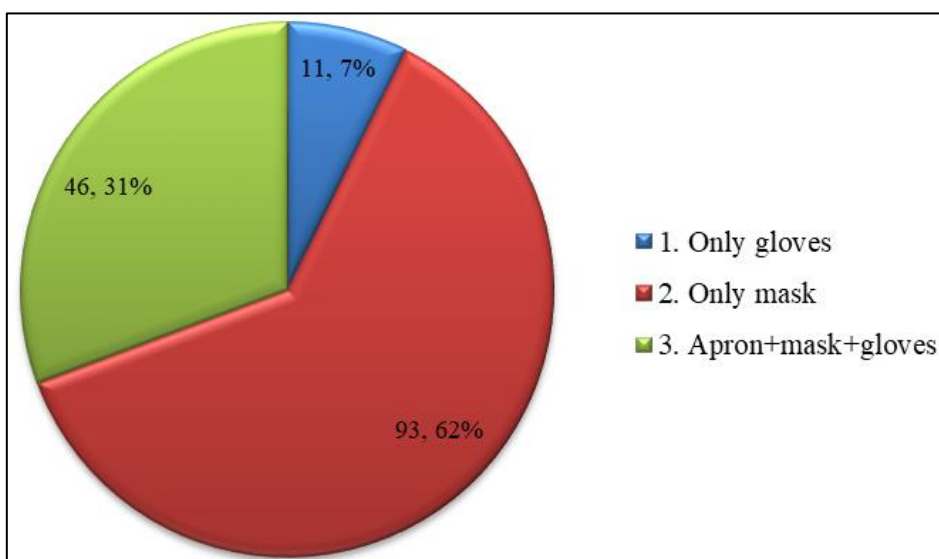


Fig 4: Health concern (Self) of chilli growers in 3 selected districts of Karnataka (n=150)

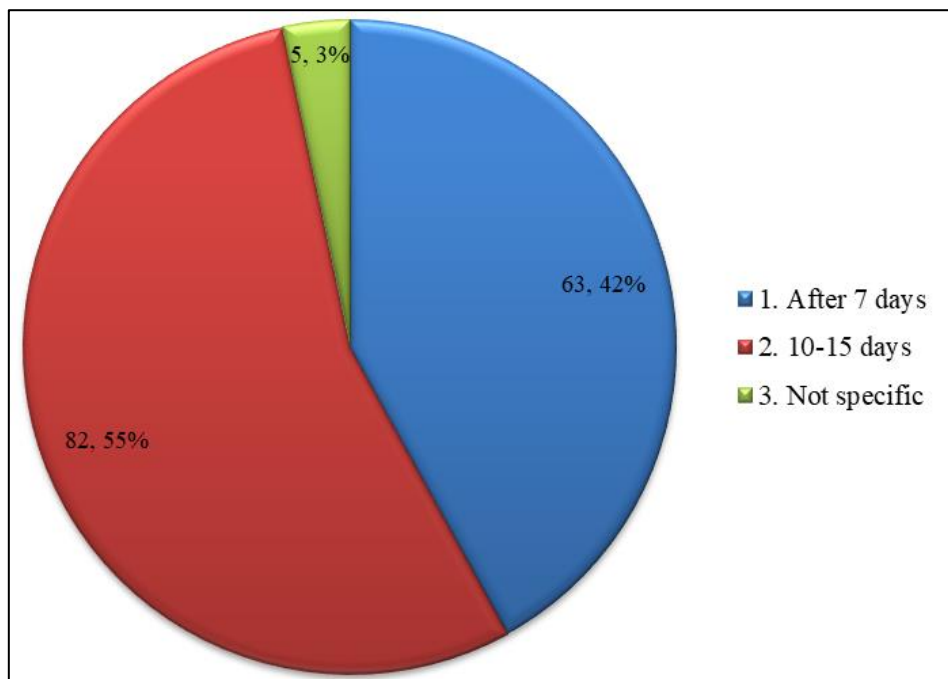


Fig 5: Waiting period followed by chilli farmers in three selected districts of Karnataka (n=150)

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