A study on pesticides usage pattern in red chilli in Palnadu district of Andhra Pradesh

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ABSTRACT

The study was conducted in the year 2023 on pesticides usage pattern of chilli farmers in Palnadu district of Andhra Pradesh. Three mandals viz Sattenapalli, Dachepalli and Bollepalli were selected based on maximum acerage of chilli crop, from which 120 chilli farmers were selected. Among the herbicides, 72 per cent of the respondents used pendimethalin 38.7 CS. The top three insecticides fipronil 40 WG + imidacloprid 40 WG, fipronil 80 WG and diafenthiuron 50 WP were used by 95, 80 and 55 per cent of the chilli farmers respectively. Among fungicides, mainly azoxystrobin 23 SC was being used by 30 per cent of the farmers. Farmers used only streptomycin sulphate against bacterial diseases as it was broad-spectrum antibiotic in nature. The deviation in use of herbicides by the farmers ranged from 33.33 to 52.00 per cent, of insecticides from 0 to 81.82 per cent and of fungicides from 16.66 to 60.00 per cent. The deviation in the use of bactericide was noted 52.00 per cent. The farmers mainly trusted dealers' recommendation for selection of particular pesticide.

Keywords: Growers; usage pattern; pesticides; chilli

INTRODUCTION

Agriculture is the backbone and dominant sector of the Indian economy. India is among the leading producers and consumers of pesticides in Asia and the world. In the last decade from 2012-13 to 2021-22, India's consumption of chemical pesticides has been an average of 58,429.7 MT (Pavithra 2023). Consumption of pesticides in India in 2022-23 was 52,466 MT (technical grade), whereas, in the state of Andhra Pradesh it was 2001 MT (technical grade) (Anon 2023).

Between 20 to 40 per cent of global crop production is lost to pests annually (Gula 2023). Globally, 2 million tonnes of pesticides are used, out of which herbicides account for 47.5 per cent of usage, insecticides for 29.5 per cent, fungicides for 17.5 per cent and other pesticides for 5.5 per cent. India accounts for 76 per cent of the overall pesticide consumption in comparison to worldwide usage of 44 per cent (Aktar et al 2009).

Despite their benefits, pesticides can be hazardous to both humans and the environment (Fenik et al 2011). To avoid crop losses, farmers must use pesticides at the optimum rate and at the appropriate time. To achieve good yields with minimal crop losses, farmers must be knowledgeable about the product's usage, including the right pesticide to use, when to apply it, how to spray etc. The present study was conducted to understand the pesticide usage pattern of chilli growers of Palnadu district of Andhra Pradesh and the factors influencing pesticide application in chilli crop.

MATERIAL and METHODS

The study was conducted in the Palnadu district of Andhra Pradesh. The Palnadu district is the main producer and exporter of most varieties of chillies and chilli powder from India to regions such as Sri Lanka, Bangladesh, Middle East, South Korea, the UK, the US, and Latin America (https://palnadu.ap.gov.in/district-produce/chillies/). Out of 28 Mandals in the district, three Mandals viz Sattenapalli, Dachepalli and Bollepalli were chosen based on maximum crop acreage under chillies. From each Mandal, 2 villages were chosen and from each village 20 chilli growers were selected randomly thus constituting a total sample size of 120 farmers. The necessary information was gathered from the farmers using a pre-tested interview schedule. The statistical techniques like frequency, percentage, mean and Garett's mean score were used.

RESULTS and DISCUSSION

Demographic profile of respondents: The data pertaining to source of credit, mobile phone usage, farm size and main occupation of farmers were collected and are presented in Table 1.

Majority of the chilli farmers (41.5%) were dependent on money lenders for credit as the process of availing credit from money lenders was easy and quick and they were nearest and available to them all the time. More than half (58.0%) of the chilli farmers had smart phones for getting the information about production technologies, marketing and post-harvest technology as the smart phones facilitated the use of internet and 42 per cent were using basic cell phones. It was also found that half (50.0%) of the respondents had small farm size of >2.5-5 acres followed by 32.5 per cent marginal farmers having up to 2.5 acres landholding. For majority of the chilli farmers (79.0%), agriculture was the main occupation and 21 per cent of the farmers, along with agriculture, were also doing animal husbandry.

Table 1. Demographic profile of the respondents

Component	Respondents (n = 120)	
	Frequency	Percentage
Source of credit		
No requirement of credit	21	17.5
Money lenders	50	41.5
Neighbours/friends/relatives	12	10.0
Banks	37	31.0
Mobile phone used		
Smart phone	70	58.0
Basic mobile	50	42.0
Farm size (acres)		
Marginal (up to 2.5)	39	32.5
Small (>2.5-5)	60	50.0
Medium (>5-10)	14	11.5
Large (>10)	7	6.0
Major occupation		
Agriculture	95	79.0
Agriculture + animal husbandry	25	21.0

Pesticides usage pattern of the farmers in chilli crop: The information regarding usage of pesticides by the farmers, against various weeds, pests and diseases in the field, was collected and analyzed and is presented in Table 2.

Among the herbicides, 72 per cent of the respondents used pendimethalin 38.7 CS followed by 41 per cent who used paraquate dichloride 24 SL. It might be due to the fact that pendimethalin is effective against broad-leaved as well as grassy weeds and paraquate dichloride is a non-selective herbicide.

The top three insecticides fipronil 40 WG + imidacloprid 40 WG, fipronil 80 WG and diafenthiuron 50 WP which were used by 95, 80 and 55 per cent of the chilli farmers respectively. This might be due to the fact that the occurrence of thrips and white flies is high in chilli crop and the effectiveness of these chemicals against these pests is high. Fipronil 40 WG + imidacloprid 40 WG being wide spectrum in nature, can be used against wide range of insect pests.

Among fungicides, mainly azoxystrobin 23 SC was being used by 30 per cent of the farmers followed by hexaconazole 5 SC (24%) and the combi-product, carbendazim 12 WP + mancozeb 63 WP (21%). Farmers used only streptomycin sulphate against bacterial diseases as it was broad-spectrum antibiotic in nature.

Yeshwanth et al (2019) reported that 97.5 per cent farmers in Kurnool district of Andhra Pradesh used pendimethalin 30 EC in chilli as it controlled annual grasses and broad-leaved weeds. In a survey conducted by Nagulananthan et al (2021) in four districts of Southern Tamil Nadu, revealed that 14 insecticides belonging to organophosphate, synthetic pyrethroids, neonicotinoids and diamide groups were

Table 2. Pesticide usage pattern of chilli farmers

Pesticide	Recommended dose/ha	Average quantity used/ha	Variation in pesticide usage	Deviation (%)	Target	Used by farmers (%)
Herbicide						
Pendimethalin 38.7 CS	1,200 ml	2,500 ml	1,300 ml	52.00	Broad-leaved /grassy weeds	72
Paraquate dichloride 24 SL	1,250 ml	2,000 ml	750 ml	37.50	Non- selective herbicide	41
Oxyfluorfen 23.5 EC	100 ml	150 ml	50 ml	33.33	Broad- spectrum selective herbicide	26
Insecticide						
Fipronil 40 WG and imidacloprid 40 WG	100 g	200 g	100 g	50.00	Sucking pests	95
Fipronil 80 WG	80 g	160 g	80 g	50.00	Thrips	80
Diafenthiuron 50 WP	600 g	875 g	275 g	31.42	Sucking pests	55
Imidacloprid 30.5 SC	210 ml	250 ml	40 ml	16.00	Sucking pests	49
Fipronil 5 SC	1,000 ml	1,500 ml	500 ml	33.33	Sucking pests	44
Monocrotophos 36 SL	430 ml	1,250 ml	820 ml	65.60	Sucking pests	41
Acephate 75 SP	800 g	1,625 g	805 g	50.76	Sucking pests	40
Broflanilide 300 G	34 ml	34 ml	0	0	Sucking pests	27
Cyantraniliprole 10.26% w/w OD	1,800 ml	2,400 ml	600 ml	25.00	Sucking pests	26
Emamectin benzoate 5 SG	220 g	375 g	155 g	41.33	Lepidopterans	25
Dimethoate 30 EC	700 ml	1,250 ml	550 ml	44.00	Sucking pests	24
Tolfenpyrad 15 EC	1,000 ml	1,500 ml	500 ml	33.33	Sucking pests	23
Spinosad 45 SC	50 ml	150 ml	100 ml	66.66	Sucking insects, lepidopterans, coleopterans	22
Spirotetramat150 OD	400 ml	900 ml	500 ml	55.55	Sucking pests	20
Indoxacarb 15.8 EC	500 ml	600 ml	100 ml	16.66	Lepidopterans	20
Novaluron 5.25 SC + indoxycarb 4.5 SC	500 ml	1,000 ml	500 ml	50.00	Lepidopterans	19
Imidacloprid 70 WG	80 ml	150 ml	70 ml	46.66	Sucking pests	19
Thiamethoxam 25 WG	130 g	375 g	245 g	65.33	Sucking pests	18
Ethion 50 EC	1,500 ml	2,000 ml	500 ml	25.00	Sucking pests	17
Imidacloprid 17.8 SL	100 ml	550 ml	450 ml	81.82	Sucking pests	16
Spiromesifen 22.90 SC	400 ml	600 ml	200 ml	33.33	Sucking pests	15
Spinetoram 11.7 SC	188 ml	500 ml	312 ml	62.40	Thrips, lepidopterans	15
Diafenthiuron 47 SC + bifenthrin 9.4 SC	500 ml	750 ml	250 ml	33.33	Sucking pests	15
Chlorantraniliprole 18.5 SC	150 ml	225 ml	75 ml	33.33	Lepidopterans	14
Novaluron 10 EC	800 ml	925 ml	125 ml	13.51	Lepidopterans	13
Profenofos 50 EC	500 ml	1,250 ml	750 ml	60.00	Lepidopterans	12
Chlorfluazuron 5.4 EC	1,250 ml	1,500 ml	250 ml	16.66	Lepidopterans	12
Chlorfenapyr 10 SC	500 ml	700 ml	200 ml	28.57	Lepidopterans	10
Fipronil 15 WDG + flonicamid 15 WDG	400 g	500 g	100 g	20.00	Sucking pests	10
Lamda-cyhalothrin 2.5 EC	500 ml	875 ml	375 ml	42.85	Lepidopterans	9
Fungicide						
Azoxystrobin 23 SC	500 ml	600 ml	100 ml	16.66	Broad-spectrum fungicide	30
Hexaconazole 5 SC	750 ml	1,000 ml	250 ml	25.00	Leaf spot	24

Pesticide	Recommended dose/ha	Average quantity used/ha	Variation in pesticide usage	Deviation (%)	Target	Used by farmers (%)
Carbendazim 12 WP + mancozeb 63 WP	300 g	600 g	300 g	50.00	Leaf spot	21
Mancozeb 75 WP	1,000 g	1,250 g	250 g	20.00	Leaf spot	18
Carbendazim 50 WP	500 g	1,250 g	750 g	60.00	Leaf spot, wilt	16
Metalaxy l35 WS	350 g/100 kg seed	500 g/100 kg seed	150 g	30.00	Seed borne diseases	14
Fluxapyroxad 250 G/L + pyraclostrobin 250 G/LSC	200 ml	300 ml	100 ml	33.33	Broad spectrum fungicides	14
Copper oxychloride 50 WP	1,000 g	1,875 g	875 g	46.66	Root rot, wilt	13
Pyraclostrobin 20 WG	500 g	800 g	300 g	37.50	Leaf spot	11
Bactericide						
Streptomycin sulphate 90% (w/w)	120 g	250 g	130 ml	52.00	Broad-spectrum antibiotic	15

Multiple responses

used either alone or as tank mix combination by the chilli farmers.

Data show that the deviation in use of herbicides by the farmers ranged from 33.33 (oxyfluorfen 23.5 EC) to 52.00 (pendimethalin 38.7 CS) per cent, of insecticides from 0 (broflanilide 300 G) to 81.82 (imidacloprid 17.8 SL) per cent and of fungicides from 16.66 (azoxystrobin 23 SC) to 60.00 (carbendazim 50 WP) per cent. The deviation in the use of bactericide (streptomycin sulphate 90% w/w) was noted 52.00 per cent.

Kiranmayi and Vijayabhinandana (2018) reported that 81.67 per cent chilli farmers of Guntur district of Andhra Pradesh adopted recommended doses of fertilizers, while the remaining 13.33 per cent fell in the category of partially adopted.

Kaur et al (2018) reported that in three agroeconomic zones, viz sub-mountainous, central plain and southwestern, of Punjab, about 48 per cent small, 25 per cent medium and 21 per cent large farmers were using recommended doses of pesticides. In all, 34 per cent of the total sampled farmers were using the recommended doses of pesticides. Eighty five per cent farmers in zone I responded that only need based application of pesticides was done by them. However, in zone II, only 18 per cent were found to be using recommended doses of pesticides while rest of the farmers were using higher levels of agro-chemicals. In zone III, 50 per cent of the respondents used the pesticides as per the recommended application. However, majority of the small farmers were using recommended doses (65%) followed by large farmers (43%) and medium farmers (18%) in zone III.

Factors influencing pesticide usage in chilli crop by the farmers: The factors that influenced the selection of brands and usage of pesticides are presented in Table 3. The data show that the farmers mainly trusted dealers' recommendation for selection of particular pesticide that ranked first with Garett's mean score of 75.26 followed by intensity of pests and disease, peer group recommendation, type of pest, cost of pesticides, crop income, stage of crop growth, departmental recommendation, size of landholding, advertisements and easy availability of product with mean scores of 72.99, 64.30, 62.36, 55.39, 49.49, 48.88, 46.47, 38.08, 33.76 and 28.73 respectively. Free samples with mean score of 20.90 received the last rank among the factors.

Kumar et al (2017) reported that majority of bhendi growers (70%) contacted pesticide dealers for recommendations and only few (16%) preferred to contact agricultural officers. Brar et al (2018) reported that in cauliflower and brinjal cultivating areas of Hamirpur, Bilaspur and Una districts of Himachal Pradesh, majority of the farmers (57.33%) were mainly dependent on the advice of pesticide dealers.

In Karnataka, Deviprasad et al (2015) reported that the major sources of information for use

Table 3. Factors influencing the pesticides application in chilli crop (n = 120)

Category	Total score	Garett's mean score	Rank
Dealers' recommendation	9,032	75.26	I
Intensity of pests and diseases	8,759	72.99	II
Peer group recommendation	7,717	64.30	III
Type of pest	7,484	62.36	IV
Cost of pesticides	6,647	55.39	V
Crop income	5,939	49.49	VI
Stage of crop growth	5,865	48.88	VII
Departmental recommendation	5,577	46.47	VIII
Size of landholding	4,569	38.08	IX
Advertisements	4,051	33.76	X
Easy availability of product	3,448	28.73	XI
Free samples	2,508	20.90	XII

Multiple responses

of pesticides by farmers were based on notifications by television, radio broadcasting, leaflets and pamphlets that were made available from agrochemical shops and also through agricultural officers and sales representatives from various agrochemical companies.

Vemuri et al (2016) found that, in general, all farmers contacted pesticide dealers for recommendations, polyhouse farmers preferred to contact scientists (35.71%) and open field farmers preferred to contact agricultural officers (33.33). Nagulananthan et al (2021) found that in four districts of southern Tamil Nadu, the majority of the farmers got technical guidance for their field pest problems from local dealers (66%) and 24 per cent of them consulted extension officials for pesticide prescription.

Valluri et al (2022) observed that in Guntur district of Andhra Pradesh, most of the farmers got the advisories on pesticide recommendation from retail pesticide shop dealers (82.22%) and only 6.67 per cent contacted government agricultural personnel.

CONCLUSION

It can be concluded from the study that the farmers had been using different herbicides, insecticides, fungicides and bactericides in chilli crop. However, there was great deviation in use of pesticides by the farmers. They mainly trusted pesticide dealers' recommendation for selection of a particular pesticide and its dose. Thus there is need to educate the farmers to use recommended dosages of pesticides. It is also needed that the farmers should take the advice of extension functionaries regarding plant protection and only use the recommended pesticides and their doses.

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