

Knowledge, Attitude and Behaviour of Paddy Growers towards Use and Handling of Pesticides in Krishna Western Delta area of Guntur District of Andhra Pradesh, India

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ABSTRACT

Use of pesticides have become inevitable for crop pest management leading to increased cost of cultivation, pesticides residues in food and also making the farmers vulnerable to risks of pesticide application. Thus, study on paddy farmers' knowledge and practices in handling pesticides was conducted among 90 farmers in Krishna Western Delta area of Guntur district, Andhra Pradesh, India. A great majority of the farmers were unaware about recommended pesticides (70.65%) as per Insecticide Act, 1968 and got the advisories on pesticide recommendation from retail pesticide shop dealers (66.30%). About 67.39% measured pesticide using bottle cap and majority of the farmers (63.04%) didn't follow any safety measure during pesticide application and 69.57% were unaware of the first aid practices to be followed in case of accidental poisoning. None of the farmers were aware of proper disposal methods and 80% throw the used pesticide containers into open fields or in the farm.

Key words : Awareness, Disposal, Farmers, Pesticide handling, Safety measures

Introduction

Agriculture is the mainstay of Indian economy where 58 per cent (Sai *et al.*, 2019) of the rural households were dependent on agriculture as their principal means of livelihood (Yadav and Dutta, 2019) which contributes major share to national economy (Valluri *et al.*, 2022a). With the introduction of green revolution, the scenario of Indian agriculture has changed drastically involving the higher usage of

agrochemicals. Among agrochemicals, pesticides have played an important role in achieving food security over the years, with new molecules being introduced in response to changing times, pest scenarios, and environmental and food safety requirements (Cherukuri, 2016). The use of chemical pesticides is also associated with risk and health hazards if not handled properly (Bag, 2000; Singh and Gupta, 2009 and Sai *et al.*, 2019). WHO estimated that on an average 20,000 deaths (Gupta, 2010) and

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0.5 to 1 M people suffer from health effects due to pesticide poisoning every year all over the world. GOI (Govt. of India) realized this hazard for a long time and passed stringent regulations through Insecticide Act, 1968. Hence it is vital to provide valuable information at preventing or reducing the problems associated with pesticides (Sai *et al.*, 2019) and rice is the most important cereal food crop and is the staple food in India, especially South India (Valluri *et al.*, 2022b) the present investigation was designed accordingly.

Materials and Methods

Study area/Location of the work

This study was carried out among 90 farmers in 10 mandals *i.e.*, Tenali, Duggirala, Vemuru, Amruthaluru, Tsundur, Repalle, Nagaram, Ponnur, Bapatla and Kakumanu, with three villages from each mandal and three farmers from each village in paddy growing region of Krishna Western Delta (KW Delta) area, Guntur district, Andhra Pradesh, India during *kharif* 2021-22.

Data collection

Data were collected through direct face-to-face interviews, using a questionnaire which was designed in English and translated into Telugu, the local language that can be easily understood by majority of the farmers. The questionnaire contained two sections where one section included general information about the farmer *viz.*, name, address, age, education and farming experience where the other section included closed ended questions and were in a multiple-choice format so that respondents can select only the appropriate answers that they thought best described their opinion or attitude on a particular issue. The questionnaire focused on farmers knowledge and behaviour towards pesticide usage and handling pattern *viz.*, awareness on pesticide recommendation, classification, residues; contact person for pesticide recommendation, pesticide handling (measuring and mixing of pesticides; disposal of empty pesticide containers); safety measures practiced; effect of pesticides on health of spray men and awareness on first aid practices in case of accidental poisoning.

Data analysis

The raw data collected on pesticide use and han-

dling was coded and entered in MS Excel. This data was subjected to simple statistical tools such as frequencies and percentages using SPSS version 20.0 (IBM Corp., Armonk, NY). Also, chi-square analysis was done to measure the association between educational qualification and pesticide handling practices of farmers with 95% and 99% confidence interval.

Results and Discussion

Farmers profile

General information of the farmers under study was presented in Table 1. Majority of the farmers who were cultivating paddy were under the age group of 30-50 years (82.61%) and more than half of the farmers were found to be literates with secondary school education (54.35%). Around 70.65% of the farmers were semi-medium farmers and majority of the farmers were highly experienced (46.74%) with

Table 1. General information of farmers in KW Delta in Guntur district of Andhra Pradesh during *kharif* 2021-22.

S.No.	Parameters	Details	Percentage
1	Age	< 30 years	11.96
		30-50 years	82.61
		> 50 years	5.43
2	Education	Illiterate	22.83
		Primary school	5.43
		Secondary School	54.35
		Graduate	17.39
3	Farmer type size of land holding under cultivation	Marginal	5.43
		Small	11.96
		Semi medium	70.65
		Medium	6.52
4	Farming Experience	Large	5.43
		< 10 years	11.96
		10-20 years	41.30
		> 20 years	46.74

more than 20 years in farming.

Awareness on recommended pesticides and pesticide classification

Majority of the farmers in the study area were unaware about the recommended pesticides (70.65%). The results of chi square analysis indicated no significant association was found between educational qualification and awareness of recommended pesticides among farmers (Table 2). Almost all the farmers *i.e.*, 80.44% were unaware about pesticide classi-

fication based on toxicity and toxicity symbols in labels which might be due to insufficient extension activities and educational qualification of the farmers. The results of chi-square analysis revealed that there exists a significant association between educational qualification and awareness on pesticide classification (Table 2). The result obtained was in line with the results reported by Anil *et al.*, (2017) who reported that 66.66 % and 88.66 % of farmers were unaware of recommended pesticides and pesticide classification based on toxicity. Sai *et al.*, (2021) also reported similar results where 86.70 % of the farmers were unaware of recommended pesticides.

Pesticide measuring and mixing

Majority of the farmers used bottle cap (67.39%) for measuring the pesticide formulation as they were habituated to its usage, and it was found that there was no significant association between educational qualification and practice of measuring pesticides (Table 2). Anil *et al.*, (2017) also reported majority of the farmers used bottle cap to measure the pesticide formulation. About 43.48% of farmers mixed pesticides in tank either using a stick or bare hands which indicates that 43.48% were concerned about pesticide ingestion from hands along with the food they eat. It was recorded that there was no significant relation between educational qualification and

practice of mixing pesticides (Table 2). The result on mixing pesticides was in accordance with the results of Yadav and Dutta (2019) and Lari *et al.*, (2020).

Pesticide advisories

Most of the farmers (66.30 %) communicate with the pesticide retailers while 11.96 % of them interact with fellow farmers and only 21.74 % contacts government agricultural personnel for information on pesticide recommendation because of easy and convenient accessibility of the dealers (Table 2). Similar results were reported by Sai *et al.*, (2019) and Anand Kumar *et al.*, (2020) with respect to source of information on recommendations.

Disposal and Re-Use of pesticide containers

Disposal of the empty pesticide containers was not carried out in a satisfactory way as majority (80%) of the farmers were throwing the empty pesticide containers in the field. When contacted about re-use of pesticide containers, 23.91 per cent of the farmers responded that they were re-using the empty containers after thorough cleaning with sand and soap water as they were unaware of bad effects of reuse of pesticide containers (Table 2). Yadav and Dutta (2019) also noticed that 72.8 % of the farmers had thrown the pesticide containers on the field and 15.2 % of them were found to reuse the empty pesticide

Table 2. General awareness/knowledge and practices followed by farmers on various aspects of pesticides during *kharif* 2021-22 in KW Delta of Guntur District of Andhra Pradesh.

S. No.	Particulars	Response / practice followed	Percentage	Chi square value
1	Awareness on recommended pesticide	Yes	29.35	5.83
		No	70.65	
2	Awareness on pesticide classification and toxicity symbols on packing	Yes	19.56	11.06**
		No	80.44	
3	General practice for measuring of pesticide	Bottle cap	67.39	3.50
		Approximately	32.61	
4	Mixing of pesticides	Stick	43.48	2.65
		Bare hands	43.48	
		Both	13.04	
5	Advisories / Source of information on pesticide recommendation	Pesticide dealers	66.30	3.31
		Neighbour farmers	11.96	
		Govt officers	21.74	
6	Disposal of empty containers	In field	80.00	4.33
		Selling	20.00	
		Buried in soil	0.00	
7	Re-use of empty containers	Yes	23.91	16.05**
		No	76.09	

** Chi-square is significant at 0.01 level (2-tailed)

* Chi-square is significant at 0.05 level (2-tailed)

containers. There were several reports (Anil *et al.*, 2017; Sai *et al.*, 2019; Yadav and Dutta, 2019; Lari *et al.*, 2020 and Sai *et al.*, 2021) which states that most of the farmers disposed the pesticide containers by throwing them away in the fields. The results of chi-square analysis revealed that there was a significant relationship between educational qualification and practice of reusing the pesticide containers.

Awareness of spray men on use of PPE

The detailed studies were conducted on practices / safety precautions followed during pesticide application / spraying, and it was recorded that 19.57 % spray men were found to cover their face with a mask while spraying, whereas 63.04 per cent of them had not used any personal protection equip-

ment. There is no significant relation between educational qualification of farmers and safety measures followed except in case of eating or drinking while spraying (Table 3).

Awareness about symptoms of poisoning and first aid

It was recorded 78.26 per cent of the farmers had not observed any negative effects of pesticides on the health of spray men, while 21.74 per cent had observed symptoms like skin irritation (35.00 %), dizziness (30.00 %), cough (20.00%) and difficulty in breathing (15.00 %). Study conducted by Sai *et al.*, (2019) showed symptoms *viz.*, headache (58.8 %), difficulty in breathing (2.34 %) and skin rashes (2.34 %) were associated with the use of pesticides (Table

Table 3. Spray men practice on before, during and after spraying pesticides during *kharif* 2021-22 in KW Delta of Guntur District of Andhra Pradesh.

S. No.	Particulars	Details	Percentage	Chi square value
1	Usage of PPE during spraying	Wearing Mask	19.57	7.61
		Eye shield	17.39	
		Not using any kind of PPE	63.04	
2	Eating or drinking practices during the spraying	Eating food	0.00	22.90**
		Drinking water	8.70	
		None	91.30	
3	Other practices during the spraying	Smoking or chewing tobacco	7.61	6.76
		Drinking (alcohol)	0.00	
		None	92.39	

** Chi-square is significant at 0.01 level (2-tailed)

* Chi-square is significant at 0.05 level (2-tailed)

Table 4. Spray men experience on health ailments due to spraying and knowledge on first aid methods during *kharif* 2021-22 in KW Delta of Guntur District of Andhra Pradesh.

S. No.	Particulars	Details	Percentage	Chi square value
1	Observation of ill-effects of pesticides on spray men	Observed	21.74	5.24
		Not observed	78.26	
2	Common health-ailments / issues observed during spraying	Cough	20.00	9.50
		Skin irritation	35.00	
		Breathlessness	15.00	
		Headache	0.00	
		Eye irritation	0.00	
		Dizziness	30.00	
3	Awareness on first aid practices	Yes	30.43	9.41**
		No	69.57	
4	Firstaid methods followed	Inducing vomiting if swallowed	18.52	15.60
		Cleaning the affected area with water	51.85	
		Moving the person to fresh air	29.63	

** Chi-square is significant at 0.01 level (2-tailed)

* Chi-square is significant at 0.05 level (2-tailed)

Table 5. Awareness on pesticide residues during *kharif* 2021-22 in KW Delta area of Guntur district of Andhra Pradesh.

S No.	Particulars	Details	Percentage	P value
1	Awareness on pesticide residues	Aware	29.34	12.08**
		Not Aware	70.66	
2	Awareness on exportrejections due to pesticideresidues	Aware	0	a
		Not Aware	100	

** Chi-square is significant at 0.01 level (2-tailed)

* Chi-square is significant at 0.05 level (2-tailed)

a No statistics are computed because unawareness is a constant.

4). Anil *et al.*, (2017) also conducted similar studies and obtained similar results.

Majority of the farmers (69.57%) were not aware of first aid practices to be followed in case of accidental poisoning and only 30.43 per cent of the farmers were aware of practices to be followed in case of accidental poisoning such as induce vomiting (18.52%), moving the person to fresh air (29.63%), and clean the pesticide exposed area with water (51.85%). The educational qualification of farmers has significant association with awareness on first aid practices (Table 4).

Awareness on pesticide residues

Most of farmers *i.e.*, 70.66 % were not aware about the detection of pesticide residues in the food and none of them were unaware about rejection of food exports due to presence of pesticide residues. Significant association was found between educational qualification of farmers and awareness on pesticide residues in food (Table 5). Anil *et al.*, (2017) reported that only 20% of the farmers were aware about the presence of pesticide residues in food which supports the results of present findings.

Conclusion

The present study revealed that majority of the farmers were unaware of many important issues that were happening and useful in their daily life *viz.*, recommended pesticides, toxicity labels, pesticide residues, ill-effects of pesticides, first aid in case of accidental poisoning *etc.*, Majority of the farmers believe that use of pesticides helps to improve yield and use of pesticide mixtures saves labour cost for extra application, but there was no proper usage pattern. Many of the farmers consult pesticide dealers to get the information on pesticide recommendation rather than government agricultural personnel. There is a need for pesticide safety education with

training to the farmers regarding safe handling practices, use of personal protective equipment, sanitation practices during and after spray and proper methods of disposing the empty pesticide containers.

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Declaration

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Anand Kumar, A.D.V.S.L.P., Rao, C.V.R., Rao, N.M., Raju, S.K. and Nafeez Umar, S.K. 2020. Insecticide usage pattern on rice crop in Godavari delta of Andhra Pradesh. *The Andhra Agricultural Journal*. 67(3): 170-176.
- Anil, B.K., Ragini, K., Padmasri, A., Jeevan Rao, K. and Shashibhushan, V. 2017. Survey on pesticide usage pattern in bhendi (*Abelmoschus esculentus* L.) *Bulletin of Environment, Pharmacology and Life Sciences*.6 (1): 182-188.
- Bag, D. 2000. Pesticides and Health Risks. *Economic and Political Weekly*. 6(16): 20-21.
- Cherukuri, S.R. 2016. Pesticide residues – Export implications. *Plant Health Newsletter*. 6 (10): 2-6.
- Gupta, M. 2010. Pesticide poisoning in India. Occupational health and safety. *Asian Labour Update*. 32-35.
- Lari, S., Srujana, M., Kasa, Y.D., Pandiyan, A. and

- Padmaja, J. 2020. Pesticide handling practices and self-reported morbidity symptoms among farmers. *Archives of Environmental and Occupational Health*. 1-11.
- Sai, M.V.S., Revathi, G.D., Ramya, R., Swaroop, A.M., Maheswari, E. and Kumar, M.M. 2019. Knowledge and perception of farmers regarding pesticide usage in rural farming village, Southern India. *Indian Journal of Occupational and Environmental Medicine*. 23(1): 32-36.
- Sai, A.D.V.P., Cherukuri, S.R., Kumar, D.V.S., Ramesh, D. and Tirumala Devi, Ch. 2021. Farmers awareness on responsible use of pesticides in cucurbit growing areas of Guntur district. *Journal of Research ANGRAU*. 49(3): 92-97.
- Singh, B. and Gupta, M.K. 2009. Pattern of use of personal protective equipments and measures during application of pesticides by agricultural workers in rural area of Ahmednagar district, India. *Indian Journal of Occupational and Environmental Medicine*. 13(3): 127-130.
- Valluri, J.H.V., Cherukuri, S.R., Chiranjeevi, Ch., Rao, V.S. and Varma, P.V. 2022a. Perception of paddy growers towards pesticide usage pattern in Nagarjuna Sagar Jawahar canal area of Guntur district of Andhra Pradesh. *The Pharma Innovation Journal*. SP-11(6): 1496-1501.
- Valluri, J.H.V., Cherukuri, S.R., Chiranjeevi, Ch., Rao, V.S. and Varma, P.V. 2022b. Seasonal occurrence of insect pests in rice ecosystem in Nagarjuna Sagar Jawahar Canal area of Guntur district, Andhra Pradesh. *Scientist*. 1(3): 4098-4106.
- Yadav, S. and Dutta, S. 2019. A study of pesticide consumption pattern and farmers perceptions towards pesticides: A case of Tijara Tehsil, Alwar (Rajasthan). *International Journal of Current Microbiology and Applied Sciences*. 8(4): 96-104.
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