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Perception of paddy growers towards pesticide usage pattern in Nagarjuna Sagar Jawahar canal area of Guntur district of Andhra Pradesh

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Abstract

The present study was designed among 45 paddy growers to study their knowledge and practices related to pesticide use in five Mandals of Nagarjuna Sagar Jawahar Canal area in Guntur district of Andhra Pradesh during *rabi* 2020-21 where data was collected through fortnightly field visits and personal interactions on pesticide use and handling. The study revealed that a great majority of the farmers were unaware about several aspects *viz.*, recommended pesticides against pests (93.33%), classification of insecticides based on toxicity (95.56%), pesticide residues in food (88.89%) and rejection of food materials for export due to presence of pesticide residues (100%). Most of the farmers got the advisories on pesticide recommendation from retail pesticide shop dealers (82.22%) where only 6.67 per cent contacted government agricultural personnel. Majority of the farmers used pesticides and their mixtures (95.56%) for higher yields and cost effectiveness respectively. With regard to handling of pesticides, about 71.11 per cent used bottle cap for measurement and about 37.78 per cent of the farmers were found to use stick for mixing the pesticidal spray solution, whereas, 33.33 per cent were found mixing with bare hand. During spraying operation none of the farmers had the practice of smoking and most of them didn't eat or drink (95.56%). About 75.56 per cent of farmers didn't follow any safety measure during pesticide application, whereas, only 24.44% used mask to cover face while spraying. The common symptoms like skin rash (41.18%), difficulty in breathing (29.41%) and dizziness (11.76%) were being observed by the spray men. Many of the farmers were unaware of the first aid practices to be followed in case of accidental poisoning (91.11%).

Keywords: Awareness, pesticides, handling and safety

Introduction

In India, agriculture is the predominant occupation which contributes major share to the national economy. The exponential rise in demand for food production with growing population requires a sustainable approach that puts significant increase in productivity against the circumstances of reduction in farm sizes and lower yields. Agricultural industrialization resulted in usage of agrochemicals *viz.*, fertilizers, pesticides, micro nutrients and plant growth regulators in agricultural fields. Among the agrochemicals pesticides plays a major role in current agriculture scenario, in order to prevent the crop damage from insects, mites, pathogens, weeds, rodents *etc.*

Rice is the most important cereal crop and staple food in India. The crop is prone to many pests and diseases, about 37% of yield losses were noticed by the farmers and it may range between 24 to 41 per cent depending on the situation (Sparks *et al.*, 2012) [1]. In order to control the pests and diseases and to reduce the yield losses pesticides were used in rice ecosystem. Pesticides are the chemical or biological components used for crop protection in the field, food protection during storage, and pest control in the home and have become key tool for plant protection. These 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) [2].

Though production increased exponentially with the introduction of green revolution, the hazards of pesticides have been gradually seeding. WHO estimated that on an average 20,000 deaths (Gupta, 2010) [3] and 0.5 to 1 M people suffer from health effects due to pesticide poisoning every year all over the world. GOI realized this hazard for a long time and passed stringent regulations through Insecticide Act, 1968. Despite of the fact that pesticides are the most effective, short-term control method for pests and diseases yet their hazardous effects on

human, animal and environmental health had also been well established as they may enter into the environment through various modes which include percolation through soil particles and groundwater, as a part of run-off water thus entering into surface water bodies, as aerosols when applied as sprays, as residues in various plant parts as well as soil and water organisms. These chemical pesticides tend to persist in soil, surface water bodies and groundwater for longer periods causing major threat for humans and animals health (Prashar *et al.*, 2015) [4]. Several reports of pesticide misuse, including over application in paddy cultivation was reported by Aravinna *et al.*, (2017) [5] and Horgan (2017) [6]. Thus, the present study mainly aims on the farmer's knowledge on pesticides and safety practices while handling these chemical pesticides in agricultural fields.

2. Material and Methods

2.1 Study area/Location of the work

The study was carried out among 45 farmers in 5 mandals *i.e.*, Vinukonda, Savalyapuram, Ipuru, Bollapalle and Nuzendla, with three villages from each mandal and 3 farmers from each village in paddy growing region of Nagarjuna Sagar Jawahar Canal (NSJ Canal) area, Guntur district, Andhra Pradesh, India during *rabi* 2020-21.

2.2 Data collection

Data was 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 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 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.

3. Results and Discussion:

Awareness on recommended pesticides and pesticide classification

The results displayed in table 1 showed that almost all the farmers (93.33%) (Fig 1) were unaware of recommended pesticides and 95.56% (Fig 2) of them were unaware of the pesticide classification based on toxicity. The result obtained was in line with the results reported by Anil *et al.*, (2017) [7] 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) [8] also reported similar results where 86.70% of the farmers were unaware of recommended pesticides.

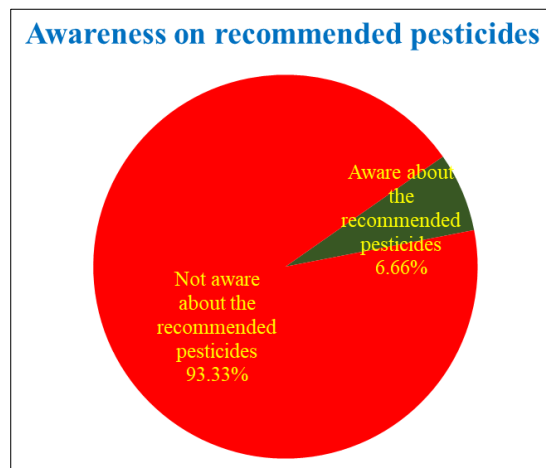


Fig 1: Awareness on recommended pesticides

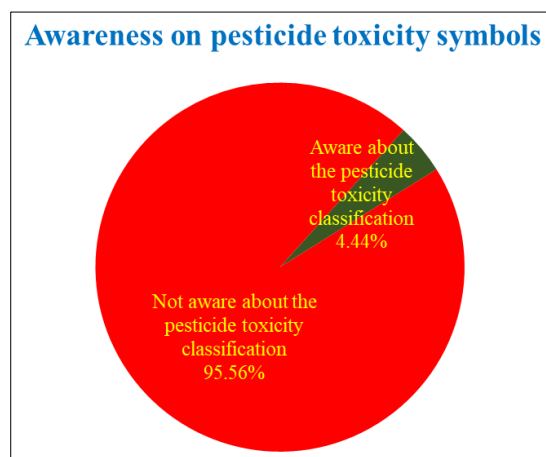


Fig 2: Awareness on pesticide toxicity symbols

Pesticide measuring and mixing

The present study revealed that, about 71.11% of the farmers measured the pesticides using bottle cap and 28.89% measured approximately for spraying (Fig 3). Anil *et al.*, 2017 [7] also reported majority of the farmers used bottle cap to measure the pesticide formulation. Majority of the farmers (37.78%) mix pesticides using a stick whereas, 33.33% farmers use bare hands while 28.89% used both hand and stick based on availability (Fig 4). The result on mixing pesticides was in accordance with the results of Yadav and Dutta (2019) [9] and Lari *et al.*, (2020) [10].

Pesticide advisories

Most of the farmers (82.22%) communicate with the pesticide retailers while 11.11% of them interact with fellow farmers and only 6.67% contacts government agricultural personnel for information on pesticide recommendation (Table 1 and Fig 5). Similar results were reported by Rashid *et al.*, (2008) [11], Mahantesh & Singh (2009) [12], Sai *et al.*, (2019) [13] and Anand Kumar *et al.*, (2020) [14] with respect to source of information on recommendations.

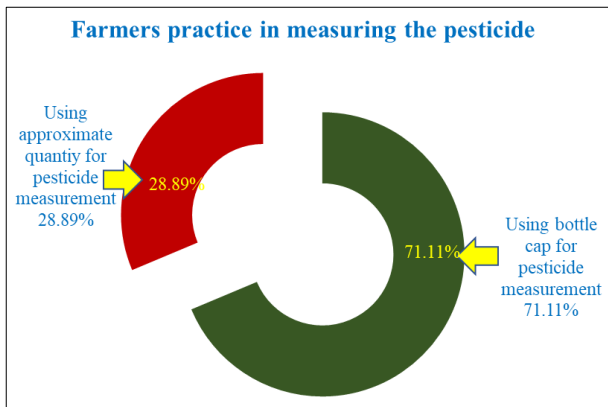


Fig 3: Farmers practice on measuring of pesticides

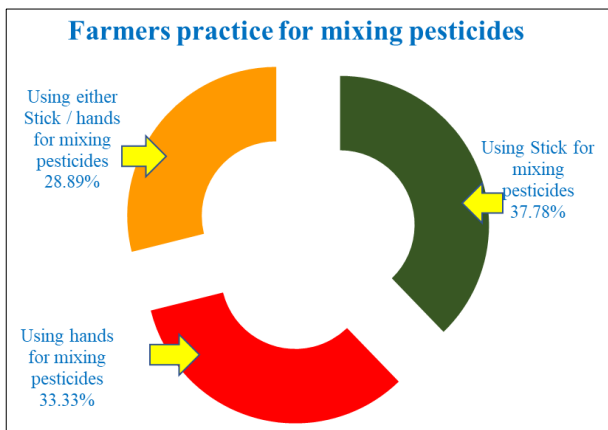


Fig 4: Farmers practice on mixing of pesticides

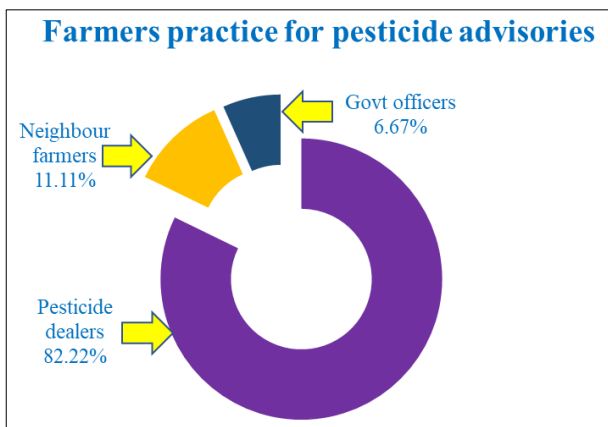


Fig 5: Farmers practice for taking advisories on use of pesticides

several reports (Anil *et al.*, 2017 ^[7]., Sai *et al.*, 2019 ^[13]., Yadav and Dutta, 2019 ^[9], Lari *et al.*, 2020 ^[10] and Sai *et al.*, 2021^[8]) which states that most of the farmers disposed the pesticide containers by throwing them away in the fields.

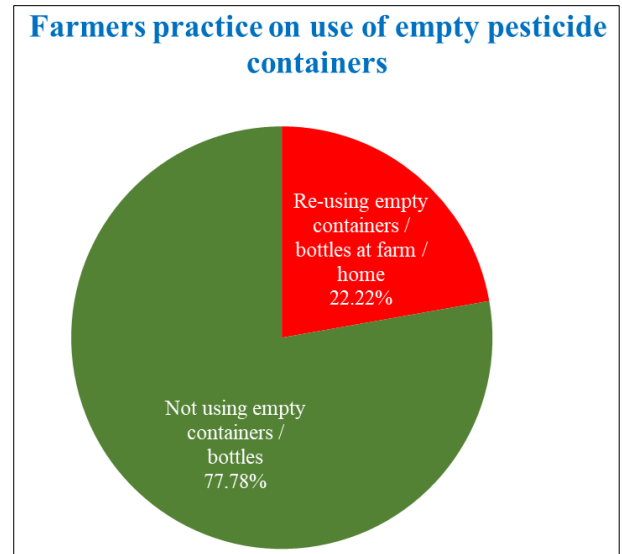


Fig 6: Farmers practice on re-use of empty containers.

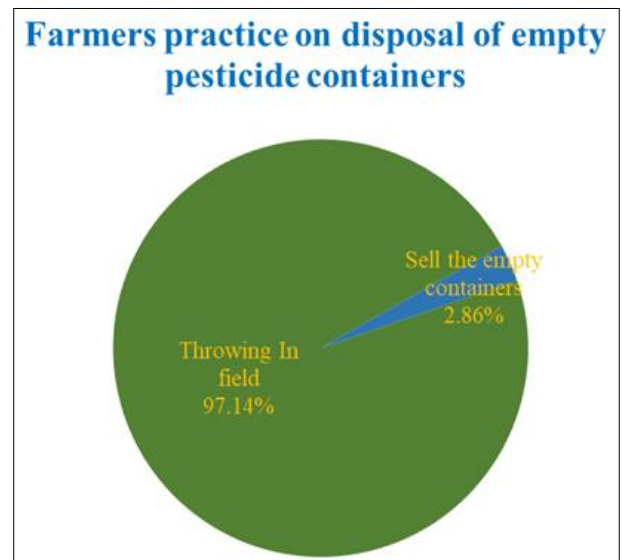


Fig 7: Farmers practice on disposal of empty containers

Disposal and Re-Use of pesticide containers

Majority of the farmers were conscious about ill-effects of reuse of empty pesticide containers and only 22.22% found to reuse them at home / farm (Table 1 and Fig 6) and most the farmers were found to throw away the used pesticide containers into open fields or in the farm (97.14%) rather than disposing them by burying or following any safe practice to dispose (Table 1 and Fig 7). Sucheta and Subroto (2019) ^[15] 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 containers. There were

Practices followed before, during and after spraying

Most of the farmers didn't follow any personal protection equipment while spraying, where only 24.44% were found to cover their face with a mask (Table 2 and Fig 8). The results obtained were in accordance with Mohanty *et al.*, (2013) ^[17], Kautilya *et al.*, (2017) ^[17] and Prabhavathi *et al.*, (2020) ^[18] where most of the farmers didn't used any protection measure. The study also found that 95.56% of the farmers didn't consume food or water and none of the farmer had the habit of smoking or chewing tobacco or drinking alcohol while spraying (Table 2 and Fig 9). Devi (2009) ^[19] and Singh and Gupta (2009) ^[20] also reported that majority of the farmers didn't consume food/water or bad the habit of smoking.

Table 1: General awareness / knowledge and practices followed by farmers on various aspects of pesticides

S No.	Particulars	Response / practice followed	Percentage
1	Awareness on recommended pesticide	Yes	6.67
		No	93.33
2	Awareness on pesticide classification and toxicity symbols on packing	Yes	4.44
		No	95.56
3	General practice for measuring of pesticide	Bottle cap	71.11
		Approximately	28.89
4	Mixing of pesticides	Stick	37.78
		Bare hands	33.33
		Both	28.89
5	Advisories / Source of information on pesticide recommendation	Pesticide dealers	82.22
		Neighbour farmers	11.11
		Govt officers	6.67
6	Disposal of empty containers	In field	97.14
		Selling	2.86
		Buried in soil	0.00
7	Re-use of empty containers	Yes	22.22
		No	77.78

Table 2: Spray men practice on before, during and after spraying pesticides

S No.	Particulars	Details	Percentage
1	Usage of PPE during spraying	Wearing Mask	24.44
		Eye shield	0.00
		Not using any kind of PPE	75.56
2	Other practices during the spraying	Eating food	4.44
		Smoking or chewing tobacco	0.00
		Drinking (alcohol)	0.00
		None	95.56

Farmers practice on use of PPE during spraying

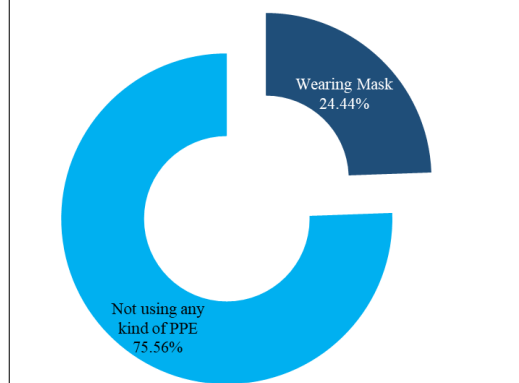


Fig 8: Farmers practice on use of PPE during spraying

Habits of spray men during pesticide application

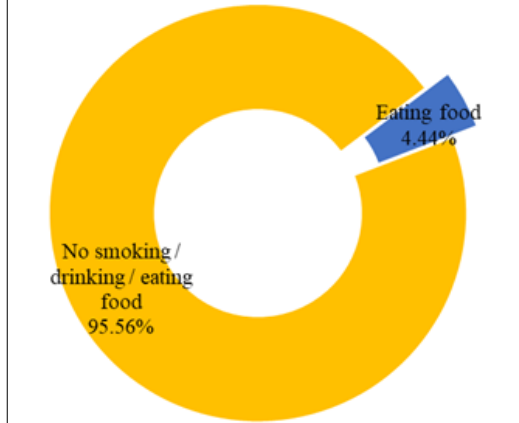


Fig 9: Spray men habits during pesticide application.

Awareness about symptoms of poisoning and first aid

It was found that 62.22% (Table 3) of the farmers did not observe any ill effects on the spraymen, few of them (37.78%) noticed toxicity symptoms viz., skin rashes (41.18%), difficulty in breathing (29.41%), cough, dizziness and other symptoms (5.88%) of them observed (Table 3 and Fig. 10). Study conducted by Sai *et al.*, (2019) [13] showed symptoms viz., headache (58.8%), difficulty in breathing (2.34%) and skin rashes (2.34%) were associated with the use of pesticides. Anil *et al.*, (2017) [7] also conducted similar studies and obtained similar results. A large proportion of the farmers 91.11% were not aware of first aid practices to be followed in case of accidental poisoning (Table 3). Only 8.89% were aware of practices on accidental poisoning like moving the person to fresh air and induce vomiting (25%) and clean the pesticide exposed area with water (50%) (Table 3 and Fig 11).

Table 3: Spray men experience on health ailments due to spraying and knowledge on first aid methods

S No.	Particulars	Details	Percentage
1	Observation of ill-effects of pesticides on spray men	Observed	37.78
		Not Observed	62.22
2	Common health ailments / issues observed during spraying	Cough	5.88
		Skin irritation	41.18
		Breathlessness	29.41
		Headache	5.88
		Eye irritation	5.88
3	Awareness on first aid practices	Dizziness	11.76
		Yes	8.89
4	First aid methods followed	No	91.11
		Inducing vomiting if swallowed	25.00
		Cleaning the affected area with water	50.00
		Moving the person to fresh air	25.00

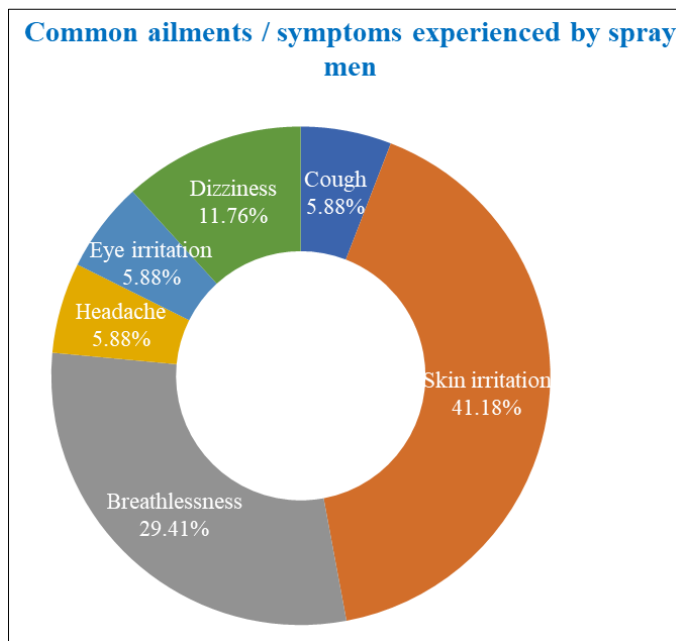


Fig 10: Common ailments / symptoms experienced by spray men during / after pesticide application

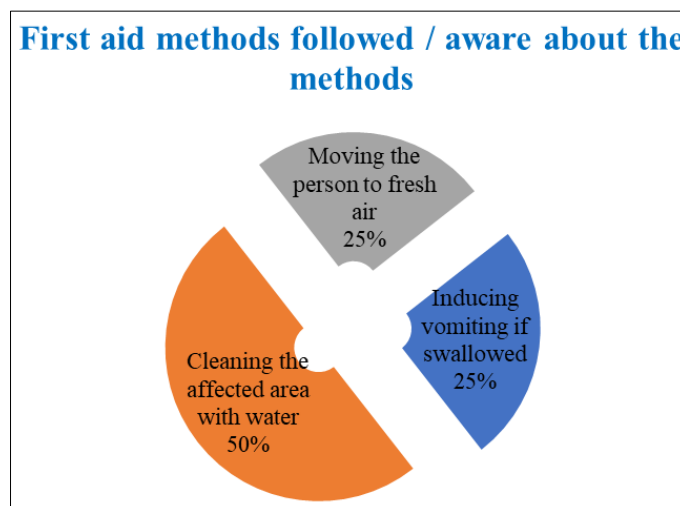


Fig 11: First aid methods followed / awareness about first aid methods

Awareness on pesticide residues

The study revealed that 88.89% of the farmers were not conscious about the presence of pesticide residues in the food

and 100% of them were incognizant on export of food material being rejected for the presence of pesticide residues (Table 4 and Fig 12).

Table 4: Awareness on pesticide residues and pre harvesting interval

S No.	Particulars	Details	Percentage
1	Awareness on pesticide residues	Aware	5.55
		Not Aware	44.49
2	Awareness on export rejections due to pesticide residues	Aware	0
		Not Aware	50

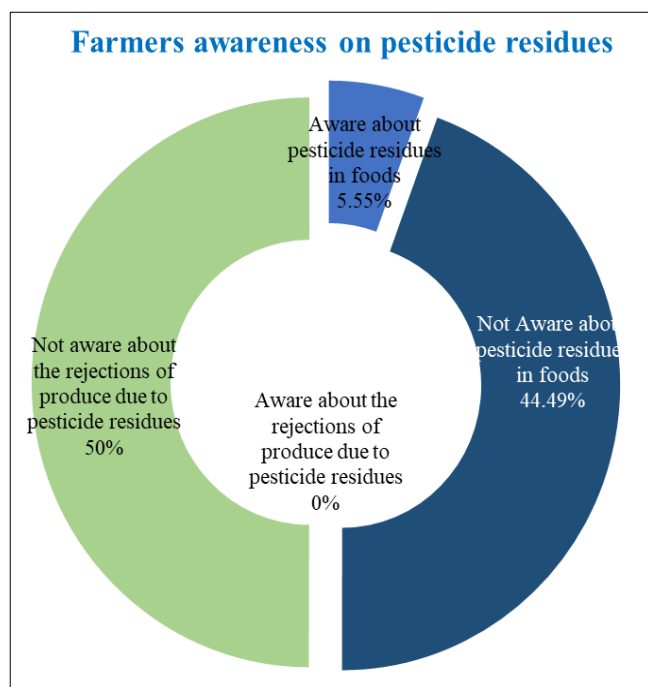


Fig 12: Farmers awareness on pesticide residues

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.

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