



**KNOWLEDGE AND PERCEPTION OF FARMERS REGARDING
AGROCHEMICAL USAGE AND TOXIC AFFECTED BY
RURAL FARMING VILLAGES OF KRISHNA DISTRICT,
ANDHRA PRADESH, INDIA**

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Abstract:

Agriculture is an important economic sector in India. Over 60 per cent of the rural households depend on agriculture practices as their principal means of livelihood. Agriculture Farmers are extensively using agrochemical for pest and diseases control in agriculture crop fields. Their precarious handling practices may lead to higher exposure resulting in adverse health and environments effects. Current study was aimed to evaluate the knowledge and Perception and agriculture practices regarding pesticide usage and its toxic effects by rural farmers and environments. A cross sectional study was conducted in the rural villages of Krishna District, Andhra Pradesh, India. Hard data were collected through face-to-face interviews, using a questionnaire contained three main sections questionnaire, its included personal profile of farmers, awareness of pesticides and pesticides handling practices. It was designed in English and translated into Telugu, the local language Telugu that is understood by majority of the farmers. A total of 100 rural agriculture farmers participated in this study with majority of age of 40-60 years about 55% out of 100 farmers, about 40% of the farmers knew the harmful effects of agrochemical. However, 20% of them were mixing the pesticides using their bare hands and 60% were not wearing any protective clothing during spraying agrochemical. Around 50% were carelessly disposing the leftover pesticides in the open fields. Exposure of farmers to pesticides is immense especially in rural areas. So understanding farmer's level of knowledge and levels of awareness of agrochemical safety is essential. Eye, Skin problems and neurological system disturbances were the most common pesticide related health symptoms. These findings showed that knowledge level is adequate among farmers but this did not reflect in their practice. There is a need for continuous pesticide safety education along with training to the farmers regarding use of personal protective devices, personal hygiene and sanitation practices during and after application of pesticides through the student's community services programs and chemical based pesticides awareness programs.

Key Words: Agrochemical, Environment Pollution, Perception, Toxicity and Rural Farmers.

Introduction:

The Indian population growing very fast and this leads to food scarcity. For the survival enormous quantity of food is required. To fulfil the daily requirements of the population huge amount of food is required. Most of the world's population depends on agricultural practices for yielding food, for this purpose, various agrochemicals apply to the agriculture crops and horticulture crops. These agrochemicals are plants growth promoters and growth regulators, herbicides, insecticides, weedicides, nematicides, viricides and rodenticides. These agrochemicals protect against the plant's predators and enhance crop production. But excessive use of agrochemical on crops leads to soil contamination, air contamination, and water contamination.

Many of the agrochemical can have harmful effects on human beings either as acute or chronic toxicity¹. Acute exposure to pesticides and fungicides can lead to death or serious illnesses². About 3,55,000 people die globally each year due to unintentional acute poisonings³. Two-thirds of these deaths occur in developing countries where such poisonings are associated with excessive exposure and or inappropriate use of toxic fungicides, nematicides and pesticides present in occupational and domestic environments^{4,5}. The cumulative health impacts of human exposures to various agrochemical can be a factor in a range of chronic health conditions and diseases like cancer, reproductive, endocrine, immunological, congenital and developmental disorders⁶⁻⁹.

Groundwater is the major source of drinking water in India¹⁰. Besides, it is an important source of water for the agricultural and the industrial sector. The continued use of chemical-based compounds in agriculture crop fields has revealed its potential to percolate and reach the groundwater^{11,12}.

This study was done in selected villages of Krishna district in Andhra Pradesh to understanding farmer's knowledge of agrochemical and safety practices is vital to provide valuable information aimed at preventing or reducing the health and environmental hazards associated with agrochemical.

Materials and Methods:

A cross sectional study was conducted in the village of Agiripalli and Totapalli, Krishna District, Andhra Pradesh, India. Data were collected through face-to-face oral interviews, using a questionnaire. It was

designed in English and translated into Telegu, the local language that is understood by majority of the farmers and was administered in mother tongue Telegu language. The questionnaire included closed ended questions. These were in a multiple-choice format so that respondents had to select only the appropriate answers that they thought best described their opinion or attitude on a particular issue. The questionnaire contained three main sections. The first section was designed to collect information on personal characteristics of the farmers including age, gender, education level, years of farming experience and farming practices (soil type, crop types and yields). The second section focused on farmers' level of awareness on ill-effects of agrochemical. The third section included questions regarding agrochemical handling practices and use of personal protective equipment (PPE) during foliar spray of fungicides and pesticide. Farmers were chosen randomly for the interview and their participation was entirely optional.

A sample size analysis of 100 was calculated using margin of error of 2% with 98% confidence interval. The raw data from the questionnaire was coded and entered in excel. SPSS version 20.0 (IBM Corp., Armomk, NY) was used to analyse the data. Chi-square test was used to measure the association between agrochemical toxic effects and agrochemical handling practices, with 95% CI.

Results:

The respondents of Agiripalli and Thotapalli villages of Krishna district farmers profile included 100 farmers from 2 villages. Majority of them were males (85%), while females were 15% and majority of age between 46-60 years of the farmer's agriculture practices about 55%. Among them 2% of the farmers illiterate (Table 1). Around 80% of the farmers were farming since more than 20% of farmers 1 years, indicating the farmer's years of experience in cultivating paddy (75%) and vegetables (25%). The study showed that insecticides (60%), fungicides (15%), chemical-based fertilizers (25%), growth promoters and growth regulators (5%) and herbicides (5%) were the different pesticide and fungicide formulations used seasonally. Dichlorvos, an Acetylcholinesterase (AChE) inhibitor that kills mushroom flies, aphids, spider mites, caterpillars, thrips, and whiteflies was recorded as the most commonly used insecticide (Table 2).

Table 1: Characteristics of the study population from Two villages (N=100)

Characteristics	Categories	Number (%)
Age groups	<30 years	2(2%)
	30-40 years	30(30%)
	40-60 years	55(55%)
	>60 years	13(13%)
Educational status	Not attended school	15(15%)
	1-5 th standard	45(45%)
	5 th -10 th standard	30(30%)
	>10 th standard	10(10%)
Experience	2-5 years	5(5%)
	>10 years	10(10%)
	>20 Years	40(40%)
	>30 Years	35(35%)
Type of cultivation	Paddy	75(75%)
	Vegetables	25(25%)

Table 2: Classification of commonly used agrochemicals in the study villages

Type	Trade Name	Chemical	Number (%)
Insecticide/Pesticide	Corogen	Choloranthraniliprole	60%
	Cymbush	Cypermethrin	
	Dursban	Chlropyrfos	
	Rogar	Dimethoate	
Fungicides	Bavistin	Carbendaziem	15%
	Benofit	Beomyl	
	Beam	Tricyclazole	
Herbicides	Stomp	Pendimethalin	5%
	Round-up	Glyphosate	
Fertilizers	DAP	Diammonium phosphate	15%
	20-20-20	Nitrogen-Phosphorus-Pottasium	
Plant growth hormones Chemicals based	NAA	Quassinoid and Alkaloid	5%
	IBA	Polyphenolic and Alkaloid	

Farmers knowledge (50%) learnt regarding agrochemical by communicating with retailers while 20% knew about it by interacting with co-farmers 30% used consultancies to make themselves aware. It was seen that 90% of the people retained the pesticides and fungicides in original container while 10% transferred it into their own containers. Protective measures during and after agrochemical application are considered effective means of reducing the risks of farmer's health. In this study it was found that 80% of them used sticks to mix pesticides

while 20% used bare hands for mixing. Almost all the farmers (93.57%) claimed to wash their hands with detergent soap after using agrochemicals. It was found that 70% growers were aware that protective equipment had to be used while using agrochemicals. Face mask (30%) and hand gloves (10%) were the most commonly used safety ware. 77% of the farmers used hand pump to spray pesticides and fungicides while the rest used hand. For storage 50% used storage room, 30% stored outside the houses while 20% stored it inside the houses. The used containers were thrown into open fields about 50%, 40% threw them into dustbin or burring in soil, 10% returned them to company. It was observed that most of the farmers (80%) washed the equipment outside the house which drains the pesticide remains into the soil while 20% washed it near lake or river (Table 3).

Table 3: Framers' knowledge practices regarding use of agrochemicals in both villages

Questions	Categories / Variables	Number (%)
How do you know about? Pesticides, Fungicides, Herbicides, Fertilizers and Plant growth hormones	Retailers	50(50%)
	Co-Farmers	20(20%)
	Consultance	30(30%)
What Kind protection you use while using agrochemicals?	Mask	50(50%)
	No protection	40(40%)
	Gloves	10(10%)
Where do you store agrochemicals?	Store room	50(50%)
	Outside house	30(30%)
	Inside house	20(20%)
How do you dispose container of agrochemicals?	Throw in open field	50(50%)
	Throw in dustbin	40(40%)
	Return to company	10(10%)
Cleaning immediately after applying agrochemicals	Detergent soap water	80(80%)
	Won't do any thing	20(20%)

Farmers awareness on agrochemicals poisoning was reported that 80% of the farmers knew the ill effects of pesticides completely and 20% were not aware. During the use of agrochemicals like pesticides and fungicides farmers reported problems such as eye irritation (25%), headache (25%), dizziness (15%), breathing difficulty (5%), skin rashes (5%) and 25% claimed to have experienced all of these symptoms at least once during their exposure to pesticides (Table 4). When such symptoms are seen 70% responded that they would consult a doctor, 20% ignored and 10% used home remedies.

Table 4: Toxic symptoms associated with agrochemicals exposed in both villages

Symptoms	Number (%)
Irritation	25(25%)
Headache	25(25%)
Dizziness	15(15%)
Breathing difficulty	5(5%)
Skin rash	5(5%)

Discussion:

Knowledge of farmers to agrochemical is immense especially in rural areas of Krishna districts. Understanding farmer's level of knowledge, their education and levels of awareness of agrochemical safety is essential. This helps in providing sound educational and policy strategies for avoiding the dangers of agrochemicals and for reducing potential pollution to agricultural systems. Hence the present study aimed to understand the knowledge and practices of farmers of Agiripalli and Totapalli villages of Krishna Districts, Andhra Pradesh India. Oral communication with the farmers helped us to obtain information about the use of agrochemicals and the safety measures they follow while handling those pesticides, growth regulators, growth promoters and fungicides.

Out of 100 study participant's majority of them were male farmers, who were directly involved with agrochemicals, either during preparation and/or its application in the crop fields. Similar results were found in the studies conducted in India by Satya Sai mv et.al and brazil by Juliana Oliveira Pasiani et al.¹³ Experience of the farmworker in agrochemicals handling has been taken into account to know its contribution on knowledge and practice of safe use of chemicals like pesticides and fungicides. Most of the study respondents were involved in the farming for more than 10-20 years which shows that they would have been well versed with the farming techniques and usage of agrochemicals¹⁴.

Most of the study participants of farmer behaviour were aware of agrochemicals they use and the harmful effects related to it. Participants said that the information was provided by retailers and co-farmers were more reliable than the information provided by media advertisements. Some of the authors said this could be because applying the information provided in advertisements to real scenarios is difficult¹⁵. For people working with hazardous substances, it is compulsory to use personal protective equipment. Some of the researchers said a proper protection can enhance not only the safety of the workers but also work productivity¹⁶. In our study many growers were aware that protective equipment had to be used while applying agrochemicals. Face mask

and hand gloves were most commonly used safety ware. In this connection our study few percentages of the farmers did not use any agrochemical applicator which indicates a high risk of exposure leading to health hazards. Agrochemical storage in unguarded sites is more common practice in many developing countries^{17,18}. In our study results showed that 50% of farmers stored in room, 30% of farmers stored outside the house and 20% stored inside the house. Majority of the farmers of our study respondents reported that containers were thrown into open fields. This unsafe practice has an impact on environment by contaminating soil, surface and ground water and also poses risk to non-target organisms^{19,20}. Similar results were found in a study conducted by Maria Celina et al.,²¹. Proper safety procedures need to be undertaken while cleaning pesticide containing equipment's²². In our study we observed that even though most of the farmers washed the equipment outside the house with the detergent soaps or surfs, the washing area was in proximity of the house and few of the farmers washed near the lakes or rivers. These indiscreet agriculture practices possess severe risk to the inhabitants of environments.

In our study the knowledge and awareness on the dangers of agrochemicals use to human health and the environment provided interesting results. About 50% of the farmers knew the ill effects of agrochemicals. Similar studies conducted in Kuwait by Mustapha et al.,²³ also reported that majority of the farmers strongly agree that agrochemicals like pesticides causes ill-effects to human health. The study conducted by Mohanty et al. also shows that the farmers were aware that the pesticides are toxic to both environment and human body¹⁶. With regard to self-reported toxicity symptoms associated with pesticide use, our study results showed that 90% of the farmers reported problems. The most common symptoms among the farm workers were eye irritation, headache, dizziness, breathing difficulty and skin rashes. Symptoms associated with agrochemicals of pesticides use in a study conducted by Karunamoorthi et al., were headache (58.8%), salivation and vomiting (38.2%), nausea (36.5%), and sneezing (12.5%) [10]. The reason for toxic effects of the agrochemicals used in the study area may be exposure to carcinogens and suspected endocrine disruptors²⁴.

Conclusion:

The findings of the study indicate that knowledge level is adequate among farmers but this did not reflect in their practice. The practice of storing, mixing and applying agrochemical without personal protection and unsafe disposal of pesticide containers appears to be widely prevalent in the study villages of Krishna districts. There is a need for continuous pesticide safety education along with training to the farmers regarding use of personal protective devices, personal hygiene and sanitation practices during and after application of agrochemical. In addition, a comprehensive program for creating awareness for safe management, handling and disposal of pesticides among both users and shop keepers is required to address this important health and environmental problem. This would reduce the dependency of agrochemical by the promotion of alternative pest control strategies such as application of bio pesticides can be introduced.

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