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## Package of practices with respect to usage of pesticides in selected food grains grown in central Telangana zone of Andhra Pradesh

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### Abstract

The use of pesticides has become inevitable in agriculture due to diverse reasons. Presence of harmful pesticide residues in the foods consumed had a negative impact on an individual's health. Pesticide residues in foods are currently a major public health concern in developed countries as well as in developing countries due to increased demand of food grains and needs of growing population. Hence, less priority is given for the qualitative aspects as concentrating more on the quantitative aspects of the farmers. This certainly affects the economy of farmer and the nation as a whole. Consequently, there is excessive use of pesticides to combat the issues. Pesticide usage is an age old practice and over the decades, there have been various alterations in the pattern of usage owing to surged awareness. Therefore, the current investigation was undertaken to know the usage of pesticides and pros and cons of their application, the recommended package of practices and the existing package of practices with regard to the usage of pesticides and crops selected for the present study were jowar, maize, blackgram and bengalgram. The recommended package of practices of pesticide usage by the farmers was studied using structured questionnaire specifically developed for the study. The information of the questionnaire was statistically analyzed by frequency distribution. The number of farmers interviewed was 90 at Warangal, Medak and Khammam districts of Central Telangana Zone of Andhra Pradesh. The results revealed that most of the farmers (40.0%) were illiterates, besides that agriculture farmers were exploring ancillary occupation such as horticulture (10.0%), poultry (14.0%) and dairy (69.0%). Most of the farmers applying pesticides greater than the recommended dosage/acre and few of the farmers were getting recommended yield followed by less recommended yield and very less member of the farmers getting more than recommended yield. So, finally concluded that the Farmers in the zone experienced many health implications as a consequence of unsafe handling and application of pesticides, due to lack of knowledge. There is a need to educate the farmers about ill health effects of not taking proper precautions during the application of pesticides and to avoid the minor and major health ailments.

**Keywords:** pesticides, food grains grown, jowar, maize, blackgram

### Introduction

Andhra Pradesh is an agriculture state in India. It is renowned as the "Granary of the South". It is the leading and primary supplier of food grains throughout the country. The Central Telangana Zone consists of Warangal, Khammam and Medak. The major food crops grown in this zone are jowar, maize, blackgram and bengalgram. Now a days, there is more focus on quantity of food grains due to the increased demand, to meet the needs of the growing population. In this process less priority is given for the qualitative aspects as they concentrate more on the quantitative aspects.

Man is exposed to pesticides occupationally, during the handling and application of the products or through the consumption of treated food that contains their residues so it leads to adverse effects can be observed. The risks from chronic dietary exposure to pesticides can be assessed by comparing the daily intake with a toxicologically acceptable level, the acceptable daily intake (ADI). Risks might exist when the intake exceeds the acceptable daily intake (ADI) (Caldas *et al.*, 2004)<sup>[1]</sup>. According to Tarola *et al.*, (2008)<sup>[4]</sup> reported that different types of pesticides were used in agriculture, pesticides were chemical substances and it was potentially harmful to the environment and subsequently to human beings through the consumption of pesticide contaminated food. The consequences of exposure to the chemicals such as insecticides may lead to intellectual impairments, behavioral problems, spontaneous abortions and premature births in the pregnant women.

Pesticides may be present in food, either as residues from the treatment of crops or at higher levels, as a result of contamination. Potatoes, apples, citrus fruits, corn, soybeans and wheat have been found to be particularly contaminated. Residues in food from agricultural handling may cause many possible sources of exposure in the environment of children and a potential risk for cumulative exposure (Joanna *et al.*, 2006)<sup>[6]</sup>.

A part from this, Farmers were compelled to administer pesticides owing to the affluence of pests, eventually affecting the yield and quality of crops grown. This certainly affects the economy of farmer and the nation as a whole. Consequently, there is excessive use of pesticides to combat the issues. Pesticide usage is age old and over the decades, there have been various alterations in the pattern of usage owing to surged awareness.

### Materials, methods and data sources

The Central Telangana zone included Warangal, Medak and Khammam districts. In each district one mandal was selected randomly. The mandals selected were Maddur, Kondapak and Chintakani. From each of the above mandals one village was randomly selected. The selected villages were Gagillapur, Dhampally and Chinnamandava.

Information on pesticide usage practices of farmers on major grain crops of Central Telangana Zone of A.P. was collected from 30 farmers in each village namely Gagillapur, Dhampally and Chinnamandava.

### Development of schedule

A questionnaire was developed exclusively to obtain the information about pesticide usage practices of farmers on

major grain crops of Central Telangana Zone of A.P. It included general information about the farmers, the practices followed with regard to usage of pesticides, changes in use of pesticides over a period of time, crops grown during current the year, source of procurement of pesticides and seeds, dosage of pesticides and expenditure on pesticides etc. The farmer's practices like yield and dosage of pesticides applied/acre was compared with the recommended package of practices given by Regional Agriculture Research Station (RARS) Warangal.

### Objective

The present research was conducted with the specific objective of studying the package of practices with respect to usage of pesticides in maize, bengalgram, blackgram and jowar in the Central Telangana Zone of Andhra Pradesh and to compare with the recommended practices.

### Results and discussions

#### 1. General information of the farmers

The general information of the farmer included age, educational qualification and occupation of the farmers is given in Table 1.

The age groups of the sample farmers surveyed was found to be 20-30 yrs (15.0 %), 30 to 40 yrs (55.0 %), 40 to 50 yrs (20.0 %) and above 50yrs (10.0 %). Among the farmers 40.0 % were illiterates, 28.0 % studied up to 1<sup>st</sup> to 5<sup>th</sup> class, 20.0 % studied up to 6<sup>th</sup> and 10<sup>th</sup> class, 9.0 % studied up to intermediate and only 3.3 % were with degree qualification.

Besides agriculture (100.0 %) farmers were exploring ancillary occupation such as horticulture (10.0 %), poultry (14.0 %) and dairy (69.0 %).

**Table 1:** General information of the farmers, (n = 90)

General information of farmers	Details	Percentage of farmers (%)
Age	20 - 30 yrs	15.0 (13.0)
	31 - 40 yrs	55.0 (50.0)
	41 - 50 yrs	20.0 (18.0)
	>50 yrs	10.0 (9.0)
Educational status	Illiterates	40.0 (36.0)
	1 <sup>st</sup> - 5 <sup>th</sup> class	28.0 (25.0)
	6 <sup>th</sup> - 10 <sup>th</sup> class	20.0 (18.0)
	Intermediate	9.0 (8.0)
	Degree	3.0 (3.0)
Occupation	Agriculture	100.0 (90.0)
	Horticulture	10.0 (9.0)
	Poultry	14.0 (12.0)
	Dairy	69.0 (62.0)

\*Figures in parenthesis indicates frequency distribution of the farmers.

### Information on agriculture and allied activities

The percentage distribution of farmers based on agriculture allied activities is given in Table 2

Among the subjects 66.0 % were marginal farmers comprising of 1 to 5 acres of land for cultivation, 24.0 % were small farmers comprising a land of 6 to 10 acres and 10.0 %

were large farmers comprising of more than 10 acres of land for cultivation. With regard to irrigation of the land, it was observed that 82.0 % of the farmers were following rain water irrigation, 64.0 % of the farmers were following well mode of irrigation and 51.0 % of farmers prefer bore irrigation for cultivation.

**Table 2:** A Percentage distribution of farmers based on agriculture allied activities, (n = 90)

Agriculture allied activities	Details	Percentage of farmers (%)
Land cultivated	1-5 acres (Marginal farmers)	66.0 (59.0)
	6-10 acres (Small farmers)	24.0 (22.0)
	> 10 acres (Large farmers)	10.0 (9.0)
Irrigation facility	Rain fed	82.0 (74.0)
	Well water	64.0 (58.0)
	Bore water	51.0 (46.0)
Crops grown in kharif season	Jowar	32.0 (29.0)

Crops grown in Rabi season	Maize	60.0 (54.0)
	Blackgram	16.0 (14.0)
	Bengalgram	10.0 (9.0)
	Jowar	36.0 (32.0)
	Maize	34.0 (32.0)
	Blackgram	29.0 (26.0)
	Bengalgram	10.0 (9.0)

\*Figures in parenthesis indicates frequency distribution of the farmers.

The major crops grown in the Central Telangana Zone of Andhra Pradesh were maize and jowar. Maize was the major cereal crop grown in both the seasons. Cent percent of the farmers were cultivating maize as a major crop in kharif and rabi seasons. Jowar was the other major cereal crop grown in both kharif (32.0 %) and rabi seasons (36.0 %). The major pulse crops grown by the farmers in both the seasons were blackgram and green gram in the study area. Regarding

blackgram, 16.0 % of the farmers cultivated blackgram during kharif season and 29.0 % grown in rabi season. Very less percent (i.e 10.0 %) of the farmers were cultivating bengalgram as a major crop in kharif and rabi seasons.

## 2. Yield of the crop

The percentage distribution of farmers based on the yield per acre during 2010-2011 is given in Table 3.

**Table 3:** Percentage distribution of farmers based on the yield per acre, (n = 90)

Crop	Recommended* yield (R.Y)/acre (Quintals)	Percentage of the farmers (%)		
		< R.Y / acre	R.Y/ acre	> R.Y / acre
Jowar	5 to 7	29 (26)	63 (57)	8.0 (7.0)
Maize	30- 40	18 (16)	72 (65)	10.0 (9.0)
Blackgram	2-3	48 (43)	52 (47)	0.00
Bengalgram	2-3	38 (34)	51 (46)	12.0 (11.0)

\*Figures in parenthesis indicates frequency distribution of the farmers.

\*\* Source - Proceedings of ZREAC, Central Telangana zone of A.P, (2007).

The recommended yield as given by the Regional Agriculture Research Station (RARS), Warangal for jowar was 5 to 7 quintals / acre, for maize it was 30 – 40 quintals / acre and that of blackgram and bengalgram was 2 to 3 quintals / acre each.

The Table 4.1.2.B clearly depicted that 29.0 % of the jowar farmers were getting less than the recommended yield /acre, 63.0 % of the farmers were getting the yield as recommended by the RARS Warangal and 55.0 % of the farmers were gaining more than the recommended yield / acre.

Seventy two percent of the maize farmers gained the recommended yield /acre, 10.0 % of the farmers were getting more than the recommended yield /acre, whereas 18.0 % of the farmers were getting apparently less recommended yield than the recommended yield/acre.

Forty eight percent of the blackgram farmers were getting as per the recommended yield/acre and 52.0 % of the farmers gained more than the recommended yield/acre where as none of the farmers were getting more than recommended yield/acre.

With regard to it was observed that yield of the bengalgram, 51.0 % of the farmers were getting as per the recommendation of RARS Warangal followed by 38.0 % of the farmers getting less than recommended yield /acre and 12.0 % of the farmers gained more than the recommended yield. Most of the farmers getting recommended yield/acre as per given by Central Telangana Zone, Warangal.

Information on package of practices of pesticide usage by the farmers

**Table 4:** A. Percentage distribution of the farmers based on the package of practices of usage of pesticides, (n = 90)

Package of practices of usage of pesticides by the farmers	Details	Percentage of farmers (%)
Reasons for application of pesticides	Increase in yield	79.0 (71.0)
	To kill insects and pests	100.0 (90.0)
Advices taken by the farmers about the application of pesticides	Agriculture scientists	68.0 (61.0)
	A.E.O /A.O	17.0 (15.0)
	Books/Vyavasaya panchangam	39.0 (35.0)
	Shopkeeper	26.0 (21.0)
	Labels on pesticides	10.0 (9.0)
	Head of the family	31.0 (28.0)
Mode of usage of pesticides	Neighbours	50.0 (45.0)
	Spraying	100.0 (90.0)
Precautions to be taken during the application of pesticides	Granular Sprinkling	100.0 (90.0)
	No precautions	50.0 (45.0)
	Wearing mask	16.0 (14.0)
	Wearing gloves	18.0 (20.0)
Health effects	Wearing both mask and gloves	16.0 (14.0)
	Headache	56.0 (50.0)
	Nausea	8.0 (7.0)
	Vomiting	18.0 (16.0)
	Diarrhoea	5.0 (4.0)
	Fever	6.0 (5.0)

	Burning eyes	5.0 (4.0)
	Itchy skin	8.0 (7.0)
	Skin rashes	29.0 (26.0)
Holding period of pesticides application before harvesting of the crop	< 15 days	30.0 (27.0)
	15 to 30 days	57.0 (51.0)
	1-2 month	69.0 (62.0)
Changes in usage of pesticides over the years i) Quantity of pesticides used over the years	Increased	73.0 (66.0)
	No change	27.0 (24.0)
	Decreased	0.00
ii) Frequency of application of pesticides over the years	Increased	66.0 (59.0)
	No change	34.0 (31.0)
	Decreased	0.00
Annual expenditure on pesticides	Rs.2000-3000	40.0 (36.0)
	Rs.3001-4000	10.0 (9.0)
	Rs.4001 -5000	50.0 (45.0)
Awareness of health problems caused by the consumption of foods cultivated using pesticides	Yes	26.0 (23.0)
	No	74.0 (67.0)

\*Figures in parenthesis indicate frequency distribution of the farmers.

The reasons given by farmers for application of pesticides were to increase the yield of the crop and to kill the insects and pests. Seventy nine percent of farmers used pesticides to increase the yield of the crop, whereas 100 % of the farmers used pesticides to kill the insects and pests. The definition of pesticides itself supports the reasons of the usage of the pesticides. The farmers seek information from various sources for the usage of the pesticides such as, Agriculture scientists (68.0%), A.O/ A.E.O (17.0 %), books or vyavasya panchangam (38.0 %), shopkeeper (26.0 %), head of the family (31.0 %), labels on pesticides (10.0 %) and neighbours (50.0 %).

Most of the farmers explore almost all the possible ways of advice for the usage of the pesticides as they were keen in pursuing a healthy yield.

There were two types of application of pesticides in the farm i.e. spraying and granular sprinkling. Cent percent of the farmers were following both the types. While applying pesticides 50.0 % of the farmers did not take any precautions, 16.0 % of farmers used to wearing mask, 18.0 % of the farmers were wearing gloves and 16.0 % of the farmers were wearing both masks and gloves. Half of the farmers were neglecting the precautions to be taken while applying pesticides due to lack of knowledge on the ill health effects such as headache (56.0 %), nausea (8.0 %), vomiting (18.0 %), diarrhoea (5.0 %), fever (6.0 %), burning eyes (5.0 %), itchy skin (8.0 %) and skin rashes (29.0 %). Hence, there is a need to educate the farmers about health effects of pesticide usage if proper precaution were not taken during the application of pesticides and to avoid the minor and major health effects to the farmers.

Majority of the farmers (30.0 %) were holding pesticides the application of pesticides for < 15 days before the harvest of the crop. Fifty seven percent of the farmers holding pesticides it between 15 to30 days and 69.0 % of the farmers holding pesticides between 1-2 month before the harvest of the crop.

Seventy three percent of the farmers stated that the quantity of pesticides used over the years was increased. Twenty seven percent of the farmers reported that they were no change in the quantity of pesticide usage over the years and none of the farmers decreased the quantity of pesticides used over the years. The frequency of the application of the pesticides over the years was increased among 66.0 % of the farmers and there was no change in 34 % of farmers were no change while applying of pesticides over the years. These results reflected the fact that the usage of pesticides increased over the years which might be due to the increase in the knowledge of the pesticides advantages of usage of pesticides etc. Forty percent of the farmers spent Rs. 2,000 – 3,000, 10.0 % Rs. 3001 – 4,000 and 50.0 % of the farmers spent Rs. 4,001 – 5,000 on pesticides annually. The farmers invest large amounts on the pesticides because they were very particular about getting healthy and more yield of the crop. Twenty six percent of the farmers aware of health problems caused by the consumption of foods cultivated by spraying of pesticides and remaining (74.0 %) were not aware of health problems due to consumption of foods cultivated using pesticides.

### 3. Dosage of pesticides

The percent distribution of farmers based on dosage of pesticides in comparison with recommended dosage /acre is given in Table 5.

**Table 5:** Percentage distribution of the farmers based on the package of practices of dosage of pesticides used. (n=90)

Pesticides	Recommended* dosage (R.D) / acre	Percentage of farmers (%)		
		< R.D/ acre	R.D / acre	> R.D/ acre
Monocrotophos	320 ml	0	40.0 (36.0)	60.0 (54.0)
Endosulphan	400 ml	0	45.0 (40.0)	55.0 (50.0)
Chloropyrifos	300 ml	0	43.0 (39.0)	57.0 (51.0)
Quinolphos	500 ml	0	45.0 (40.0)	55.0 (50.0)
Acephate	300 g	0	40.0 (36.0)	60.0 (54.0)
Carbofuran	4 – 5 kg	0	40.0 (36.0)	60.0 (54.0)

\*Figures in parenthesis indicates frequency distribution of the farmers.

\*\* Source: Proceedings of ZREAC, Central Telangana zone of A.P., 2007.

The most commonly used pesticides were monocrotophos, endosulfan, chlorpyrifos, quinalphos, acephate and carbofuran. The recommended dosage of pesticides per acre

were 320 ml for monocrotophos,400ml for endosulfan, 300 ml for chlorpyrifos, 500 ml for quinalphos, 300 g for acephate and 4 to 5 kg for carbofuran.

More than half of the farmers (60.0 %) were using monocrotophos, acephate and carbofuran which were greater than the recommended dosage / acre, whereas 40.0 % of the farmers were applying as per the recommended dosage / acre. Forty five percent of farmers were applying endosulfan and quinalphos, which was the recommended dosages/ acre, whereas 55.0 % of the farmers were applying greater than recommended dosages/ acre. Chlorpyrifos was used by 43.0 % of the farmers which was as for the recommended dosage/ acre and 57.0 % of the farmers were applying greater than the recommended dosage/ acre. Most of the farmers were applying more than recommended dosage. No farmer was used less than the recommended dosage.

### **Conclusions, recommendations and implications**

#### **Future strategies-integrated pesticide management**

This study reported that organic agriculture is the process of producing food naturally. This method avoids the use of synthetic chemical fertilizers and genetically modified organisms to influence the growth of crops. The main idea behind organic agriculture is zero impact on the environment. The motto of the organic farmer is to protect the earth resources and produce safe and healthy food (Jeya kumar 2011).

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