

**THE USE OF SAFETY DEVICES IN ADOPTION OF AGRO-CHEMICALS  
BY RICE FARMERS IN OBAFEMI-OWODE LOCAL GOVERNMENT AREA  
OF OGUN STATE**

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## ABSTRACT

This study was carried out to assess knowledge and use of rice agrochemicals and also the knowledge and use of safety devices and methods attached to the proper application of the chemicals. The study was carried out among the rice farmers of Obafemi-Owode Local Government Area (LGA) of Ogun State, Nigeria. Multi-stage random sampling technique was used to select the respondents for this study. The list of rice farmers in the study area who were registered with the Agricultural Development Zonal office was procured and the functioning ones among them determined by preliminary field tour. One hundred and twenty seven functioning farmers were finally randomly selected and data procured from them through the administration of validated structured interview schedule. About two-thirds of the farmers were not more than 50 years old, 87% married while 66% were literate. About 86% were full-time small-scale rice farmers (69% growing less than 2.6ha) while only 48.8% of these had fortnightly contact with agricultural extension agents. Most of the farmers (72.4%) were land secure while about half relied solely on hired labour. The knowledge level of agrochemicals and their level of use were found to be moderately high. About 41% of them depended on extension agents as major source of information about rice agro-chemicals. Other major sources were salesmen of agrochemicals, rice merchants, radio and television. However, the knowledge level and actual use of safety devices and methods were low. Age ( $\chi^2 = .266$ ,  $p=.018$ ) and educational level ( $\chi^2 = 72.003$ ,  $p=0.051$ ) were found to be significantly related to the knowledge of safety devices and methods used in the application of rice agrochemicals. The literacy level of farmers need to be raised while extension agents need to intensify their visit and campaign on the use of rice agrochemicals, particularly the safety devices and methods attached to the application of the chemicals.

**Key words:** Agrochemicals, rice farmer, knowledge, safety

## INTRODUCTION

Rice is one of the oldest foods known to man, and it is taken as part of the three daily meals in certain areas of the world [1]. About three decades ago, except in areas where rice was grown as traditional crop, many households took rice only on Sundays or during important festivities. Today, all households have incorporated rice into their regular menu, some taking it on daily basis. Rice has therefore shifted from being a “ceremonial” or “weekend” food in Nigeria to part of the normal diet [2].

Since the early development of agricultural practices, people have always sought different ways to increase their crop yield. Notable are the use of organic and inorganic fertilizers, insecticides, fungicides, herbicides, thuricides (for soil worms) and improved cultivars. The early use of pesticides included a variety of substances such as urine, lime-soap suds, vinegar, tobacco, and similar simple compounds [3].

Agrochemicals are used extensively in modern farming, hence it is almost impossible to avoid daily exposure to low levels of different ones. There is now a great concern about the possible adverse effects on human health arising from continuous long term exposure [4]. According to Sarnar [5], agricultural workers run at least twice the risk of dying on the job than workers in other sectors. In a global overview prepared for a recent conference on farm safety and health, International Labor Organization (ILO) reported that tens of thousands of agricultural workers die each year, and millions suffer injuries or poisoning from agrochemicals. Most of the time, exposure to agrochemicals also constitute another risk of farm workers accounting in some countries for as much as 14% of all occupational injuries in the agricultural sector and 10% of all fatalities.

Rice farmers are exposed to agrochemicals when chemicals are used during rice cultivation as insecticides, herbicides and fungicides. After harvesting, during storage, most cereals are doused again with several chemicals to protect them from pests and diseases. It has been estimated that cereal crops receive approximately 5 – 8 pesticide applications per growing season [3].

The general public is becoming increasingly aware about agrochemical use. This is because the effects of such use are not always confined to the area of land treated. Nitrates and fertilizers may seep into sources of drinking water, and pesticides may contaminate river water or be carried as spray drift onto public land. Unfortunately, the public is more aware about the benefits of agrochemical application than about the harm that misuse can cause [6]. The pertinent question to ask now is that “are rice farmers aware of the high risk due to inadequate education, training and safety devices in adoption of agrochemicals?” [5].

To minimize the hazards caused by wrong use or poor handling of agrochemicals, Udoh [7] advocates that banned chemicals not be imported, recommended ones be available all year round at affordable prices, while consistent educational campaign should be directed at the rice farmers. The problem of poor handling and wrong use of

agrochemicals is still rampant among rice farmers, making them victims of frequently occurring chemical accidents. Much of the educational campaign effort to mitigate this problem still lies with the field extension agents. To this extent, this study was designed to investigate the use of safety devices adopted in the use of agrochemicals by rice farmers in Obafemi-Owode Local Government Area of Ogun State.

The specific objectives of the study are to: (1) identify the socio-economic characteristics of the respondents, (2) identify the commonly used agrochemicals in rice production in the study area. (3) find out the respondents' knowledge of safety devices employed in the application of agrochemicals and (4) determine the extent of use of such safety devices by the respondents.

The hypotheses of the study, stated in the null form, are: (I) There is no significant relationship between selected personal characteristics (age, cosmopolitanism, level of education, primary occupation, farm size, labour, extension contact) of the respondents and adoption of rice agrochemicals. (II) There is no significant relationship between selected personal characteristics (age, cosmopolitanism, level of education, primary occupation, farm size, labour, extension contact) of the respondents and their knowledge of safety measures used in the application of rice agrochemicals.

## METHODOLOGY

This study was carried out among the rice farmers in Obafemi-Owode LGA of Ogun State, Nigeria. The list of registered rice farmers in the local government area obtained from the Agricultural Development Programme Zonal office at Ikenne indicated that 426 of them were still functioning. They were registered on 'cell' basis and there were 7 cells. 'Cells' are geographical units of a local government area delineated for easy administration by village extension agents (VEAs). One hundred and thirty, representing one-third of the registered farmers, were randomly selected, pro-rata per cell. These 130 constituted the sample respondents on which validated and structured interview schedule was administered to procure data. One hundred and twenty seven interview schedules were found well administered and therefore, processed. The data were then subjected to descriptive and inferential analyses.

## RESULTS

**Sex:** Data collected indicated that 93.7% of the respondents were male while 6.3% were female.

**Age, Marital status, Level of education :** Data in Table 1a indicates that almost two-thirds (63.4%) of the respondents were not more than 50 years old while only 12.2% were above 60 years. About 87% were married while only 5% were single. About 66% of the farmers were literate out of which a majority of 38.6% attended only primary school. However, 4% acquired post secondary education.

**Primary and Secondary occupations** – Table 1a further indicates that about 86% of the respondents were engaged in farming as their primary occupation while 21.3%

adopted it as secondary occupation. From the data on secondary occupation most of the farmers were engaged in other non-farm income generating activities such as Trading – 15%, Artisans – 14.2%, Civil service – 11.2%. Only 21.3% of the respondents had no secondary occupation.

**Membership of formal social groups** – Majority (63%) of the respondents were members of cooperative societies while 37% did not belong to any formal organization (Table 1b). About 41% and 21.3% belonged to religious and socio-cultural groups, respectively, while 17% were members of trade/professional associations.

**Cosmopolitanism:** This is the exposure to more developed areas beyond the respondent's abode. It is measured by the frequency of visits to major towns and/or cities by the respondents. About 45% (weekly – 26%, fortnightly – 18.9%) had a high level of cosmopolitanism, while 35.4% rarely traveled out of their farming communities.

**Extension contact:** Data in Table 1b revealed that only 48.8% had fortnightly contact with extension services while 27.6% did not enjoy extension services at all.

**Farm size, Land ownership, Labour source** – Table 1b indicates that majority (68.5%) of the farmers were small-scale rice producers because 68.9% were growing less than 2.6 hectares. Only 31.5% had farms larger than 2.6 hectares. About 72.4% were land secure - 66.9% were operating on inherited land while 5.5% purchased theirs. Only 17.3% of the respondents depended solely on family labour while 49.6% relied solely on hired labour. About 25% augmented hired labour with family labour.

### **Knowledge and Use of Agrochemicals**

Data in Table 2 contains data about knowledge and use of rice agrochemicals. About 54% had the knowledge of herbicides but only 41.4 actually used them. For seed dressing chemicals, 51.2% knew about them but only 30% used them while 78.7% knew pesticides but only 50.4% used them. About 7.1% did not have the knowledge of agrochemicals at all while 12.6% were not using them at all.

### **Main source of knowledge about agrochemicals**

Table 3 contains data that reveal the major sources of information which the farmers patronized about rice agrochemicals. Most of them (40.9%) relied on agricultural extension agents while 10% depended on salesmen of agrochemicals. Rice merchants who sometimes pay in advance for the farmers' products were the sources of knowledge about the chemicals to 16.5% while 24.4% depended on Radio and Television. However, those who depended solely on radio and television may only be aware and not convinced enough to adopt the chemicals.

### **Knowledge and Use of safety devices**

Data in Tables 4 and 5 show the percentage of farmers that had the knowledge of safety devices used during application of agrochemicals and the percentage of those that were actually using the devices. Forty percent of the farmers knew that they

should use overalls when applying herbicides but only 11.8% were actually using them. About 12.6% of the farmers knew they should bathe after applying pesticides but only 7.1% were actually doing so. About 47.1% of the farmers knew about the use of nose guards when dressing seeds with chemicals but only 10.2% were actually using it.

### **Result of hypotheses**

Chi square analyses revealed that none of the selected socio-economic characteristics was significantly related to adoption of rice agrochemicals. However, age ( $\chi^2 = .266$ ,  $p=.018$ ) and educational level ( $\chi^2 = 72.003$ ,  $p=0.051$ ) were significantly related to knowledge of safety devices used in the application of rice agrochemicals.

## **DISCUSSION OF RESULTS**

**Sex, Age, Marital status** - Rice cultivation is known to be time and energy sapping [6]. Except where reliable labour is available, women could hardly combine their other non-farm activities with rice cultivation, hence the few women recorded. The large proportion (63.4%) of respondents found to be less than 50 years old indicates that majority could still be actively and productively engaged in farming. The resource-scarce farming still being practised in this area requires a substantial input of family labour, hence majority of the farmers were married.

**Level of education** – Findings here are consistent with [1] who reported in his study of rice farmers in Ogun State that 40.4% of the respondents had no formal education. In Nigerian extension studies, innovativeness has been found to be positively related to high levels of education [8]. The relatively high level of education found among the respondents would help them in adopting chemicals and safety measures.

**Occupation** - Engagement in non-farm occupations by many of the farmers is a poverty alleviation strategy. Income realized from these is used to augment the farm earnings in order to meet the numerous financial demands of the households.

**Membership of formal organizations** - Sixty-three percent of the respondents belonged to cooperative societies which happened to be veritable sources of loans to members. Some cooperative organizations even procure material inputs for members and help them market their produce. About 17% were members of trade/professional groups. Such groups protect the interest of members and often formulate marketing strategies for members.

**Cosmopolitanism** - High level of cosmopolitanism may sometimes affect farming activities adversely [9] while sometimes it enhances innovativeness because of exchange of ideas with more enlightened colleagues met in the course of traveling [10].

**Extension contact** - Because most of the farmers were operating under the auspices of Agricultural Development Programme (ADP) village extension agents were supposed to contact them fortnightly. It is however surprising that only 48.8% enjoyed this

fortnightly contact, contrary to expectation. Extension agents were not even visiting about 27.6% of the farmers and they too were not visiting the extension agents. This would definitely affect adoption of innovations adversely.

Farm size, Land ownership, Labour source – Finding on land ownership status conforms with the previous finding among rice farmers in a State-wide study that 62.8% of the rice farmers were operating on inherited land [1]. The World Bank also discovered that majority of farmers in Nigeria got their farmland through inheritance. Those who inherited farmland and those who purchased theirs are at liberty to use the land as they wish, putting as much of it as they like under rice cultivation. Since land ownership has been found to be positively correlated with adoption, these categories of land owners could adopt rice innovations as desired [11]. While security of land sometimes favours innovativeness, farm- size may discourage it among small-holder farmers. The small percentage of farmers (17.3%) who depended on family labour indicates that despite being married, farmers could no longer rely on family labour. This is because the children had to go to school, sometimes away from the parents' abode, and wives had to face other non-farm income-generating activities to supplement the family earnings.

**Knowledge and use of Agrochemicals** - The data obtained here about the percentage of farmers who had knowledge of agrochemicals and the very low percentage who actually used them indicate that a sizeable number of farmers were at the mercy of pests and diseases which may ravage their crops and lower their production. The knowledge level is moderately high while the level of use is low except in the case of fertilizer and pesticide. Reasons adduced included unavailability of reliable extension agents who could educate the farmers properly and prohibitive cost of chemicals.

**Knowledge and Use of safety devices** – Data from this study indicate that knowledge level and actual use of these safety devices were very low among the rice farmers. This will make a large number of farmers to be prone to inconveniences arising from application of chemicals without the use of safety devices. This may lead to diseases and disabilities which may affect the farmers' productivity adversely.

## CONCLUSION

Empirical evidence from this survey reveals that even though the knowledge of rice agrochemicals was moderately high, the actual adoption of the chemicals in rice production was just average. This was likely due to inadequate education and inability to afford the chemicals due to high prices. The knowledge level and actual use of safety devices was found to be low among the rice farmers. This indicates that the farmers were at risk of experiencing the hazards of inappropriate use of rice agrochemicals.

## RECOMMENDATION

In order to ensure effective and safe use of agrochemicals, agricultural extension agents should intensify their contact with the rice farmers and specifically educate them more on the importance of agrochemicals, their use and the safety measures attached to their use. Also, relevant recommended rice agrochemicals and the safety devices should be made available at affordable prices to the farmers. This may be sold to the farmers through their various formal organizations, which may even extend credit to the farmers and undertake the extensions services involved.

The educational level of the rice farmers should be improved through operation of adult literacy classes. This will improve their knowledge and adoption of rice agrochemicals and safety measures during application of such chemicals.

**Table 1a: Socio-Economic Characteristics of the Respondents. n=127**

<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age (years)</b>		
<31	11	9.8
31 -40	31	21.4
41 – 50	38	29.2
51 – 60	31	24.4
➤ 60	16	12.2
<b>Marital status</b>		
Married	111	87.4
Single	6	4.7
Widowed	4.	3.2
Divorced	6	4.7
<b>Level of education</b>		
No formal education	47	37.0
Primary school	49	38.6
Secondary school	26	20.4
Post secondary	5	4.0
<b>Primary occupation</b>		
Farming	109	85.8
Trading (agricultural products)	4	3.2
Trading (consumer items)	4	3.2
Artisans	5	3.9
Civil service	5	3.9
<b>Secondary occupation</b>		
Not applicable	27	21.3
Farming	18	14.2
Trading	19	15.0
Artisan	18	14.2
Civil service	13	10.2
Others	32	25.1

*Source: Field survey, 2005*

**Table 1b: Socio-economic Characteristics of the Respondents**

<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Membership of formal groups</b>		
Cooperatives	80	63.0
Socio-cultural	27	21.3
Religious	52	40.9
Trade/professional	22	17.3
None	47	37.0
<b>Cosmopolitanism</b>		
Rarely	45	35.4
Monthly	25	19.7
Fortnightly	24	18.9
Weekly	33	26.0
<b>Extension contact</b>		
Weekly	4	3.2
Fortnightly	62	48.8
Monthly	20	15.7
Rarely	6	4.7
Never		27.6
<b>Farm-size (hectares)</b>		
0.1 – 0.5	24	18.9
0.6 – 1.5	35	27.6
1.6 – 2.5	28	22.0
2.6 – 3.5	22	17.3
> 3.5	18	14.2
<b>Land ownership</b>		
Inherited	85	66.9
Lease/Rent	35	27.6
Purchase	7	5.5
<b>Main source of labour</b>		
Family	22	17.3
Hired	63	49.6
Family + Hired	32	25.2
Communal	10	7.9

*Source: Field survey, 2005*

**Table 2: Distribution of Respondents by Knowledge and Use of Agrochemicals**

Agrochemical *	Knowledge		Use	
	Frequency	Percentage	Frequency	Percentage
Herbicide	69	54.3	53	41.7
Fertilizer	98	77.2	93	73.2
Pesticide	100	78.7	64	50.4
Seed dressing chemical	65	51.2	38	29.9
None	9	7.1	16	12.6

Source: Field survey, 2005

\* Multiple responses

**Table 3: Distribution of Respondents by Main source of knowledge about Agro-chemicals**

Source of Knowledge	Frequency	Percentage
Extension agents	52	40.9
Salesmen of Agro-chemicals	13	10.1
Rice merchants	21	16.5
Radio/TV	31	24.4
Friends & Neighbours	10	7.9
<b>Total</b>	<b>127</b>	<b>100.0</b>

Source: Field survey, 2005

**Table 4: Distribution of Respondents by Knowledge of Safety Devices**

Chemicals	Overall		Bath after		Hat/cap		Boots		Goggles		Nose guards		Hand gloves		Wash hands	
	F	%	F	%	f	%	f	%	F	%	f	%	f	%	f	%
<b>Herbicide</b>	51	40.2	-	-	33	26.0	58	45.7	16	12.6	34	26.8	-	-	-	-
<b>Fertilizer</b>	-	-	-	-	-	-	-	-	-	-	-	-	53	41.7	45	35.4
<b>Pesticide</b>	-	-	16	12.6	-	-	-	-	-	-	55	43.3	49	38.6	-	-
<b>Seed-dressing</b>	-	-	-	-	-	-	-	-	-	-	60	47.2	55	43.3	-	-

Source: Field survey, 2005

\*Multiple responses

**Table 5: Distribution of Respondents by Use of Safety Devices for Agrochemicals application**

Chemicals	Overall		Bath after		Hat/cap		Boots		Goggles		Nose guards		Hand gloves		Wash hands	
	f	%	F	%	f	%	f	%	f	%	f	%	F	%	F	%
<b>Herbicide</b>	15	11.8	-	-	25	19.7	11	8.7	4	3.2	22	17.3	-	-	-	-
<b>Fertilizer</b>	-	-	-	-	-	-	-	-	-	-	-	-	9	7.1	45	35.4
<b>Pesticide</b>	-	-	9	7.1	-	-	-	-	-	-	40	31.5	6	4.7	-	-
<b>Seed-dressing</b>	-	-	-	-	-	-	-	-	-	-	13	10.2	11	8.7	-	-

Source: Field survey, 2005

\* Multiple responses

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