

ASSESSMENT OF PRECAUTIONARY MEASURES IN AGROCHEMICALS USAGE AMONG URBAN ARABLE CROP FARMERS IN OYO STATE, NIGERIA

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Abstract

The paper identified the various agrochemicals used by urban farmers and analysed their level of precautionary measures taken to avert hazards associated with the use of the identified agrochemicals. A sample of 120 urban farmers were used for the study. The findings revealed that majority (86.7%) of the respondents were married with relatively high household size. The average annual income from their farming activities was ₦347,649.38. The common agrochemicals used by the farmers with their trade names were paraquat, diazinon, weed-off, round-up and premextra.. It was observed that that frequency of use of herbicides ($b = -0.249$) and fungicides ($b = 0.361$) had significant relationship with the level of precautionary measures observed by the farmers. Correlation analysis revealed that level of precautionary measures observed by farmers had a positive relationship with the perceived health effects ($r = 0.209$; $P \leq 0.022$) of agro-chemicals. It was also revealed that farmers' knowledge of health hazards in relation to agrochemical usages was low. The study recommends rigorous campaign on the hazards associated with the use of agro-chemicals among urban farmers by extension agents and social workers with a view to reducing the health hazards that may result from improper precautionary measures.

Key Words: Precautionary measures, Agrochemicals, Urban farmers, Arable crops

Introduction

Involvement of Nigerians in urban agriculture cannot be underestimated. This may be unconnected with the problem of food insecurity that has engulfed the nation for the past two decades owing to her over dependence on crude oil as the major source of revenue (Manyong *et al.*, 2005). Urban agriculture which involves

the cultivation, processing, and distribution food in or around a town, or city (Yassin *et al.*, 2002) has been used as one of the strategies to reduce the incidence of food scarcity and discourage food importation from neighbouring countries in Nigeria. It also involves animal husbandry, aquaculture, agro-forestry and horticulture (Naido *et al.*,

2010). This type of agriculture is usually practiced on a small and medium scale level. Adeola (2012) described urban agriculture as type of agriculture generally practiced for income-earning as well as household food-production especially, among lower income earners. Although, in some communities it is mainly done for recreation and relaxation (Salau and Attah, 2012). In the view of Yassin *et al.* (2002) urban agriculture involves the cultivation of crops and rearing of animals for human or household consumption and commercial purposes within the urban centres. It takes place on private, leased or rented land in peri-urban areas, in backyards, on roof tops, on vacant public lands such as industrial parks, school grounds, roadsides and other institutions as well as ponds, lakes, and rivers (Damas *et al.*, 2006).

According to the 2002 American Community Survey, the population of the United States is 280,540,303 (US Census). Over 80 percent of this figure live in metropolitan areas, thus, urban agriculture accounts for about 78 percent of the total food consumed in such region (Community Food Security Coalition CFSC, 2003). In Nigeria, the case is different as over 75 percent of the food consumed in urban areas are produced in rural areas (Okolo, 2006). UNDP report (2003) revealed the population of farmers practising urban farming across some selected African countries. The report showed that about 35 percent in Yaoundé (Cameroon), 36 percent in Ouagadougou (Burkina Faso), 37 percent in Maputo (Mozambique), 45 percent in Lusaka (Zambia), 68 percent of urban dwellers in six Tanzanian cities, 80 percent of families in Libreville (Congo) and less

than 25 percent in Nigeria are involved in urban agriculture.

Interestingly, the importance of urban agriculture cannot be overlooked especially in fighting the menace of food insecurity in developing countries (Ishaya *et al.*, 2007). It plays an important role as part of an environmental sustainability program. Physically, it increases green space, which reduces the urban heat generated as a result of the industrial activities, stops water run-off, and improves air quality. Urban agriculture also reduces energy consumption and pollution associated with transportation. It provides social benefits by providing inexpensive access to locally-grown produce. The increasing population growth of recent years has brought the issue of sustainability to the forefront. Urban agriculture is one way to significantly impact not only people's lives, but also environmental sustainability. Furthermore, urban agriculture is potentially a source of income i.e. lucrative (Chickoye *et al.*, 2007). Urban agriculture contributes to food security and food safety in two ways: first, it increases the amount of food available to people living in cities, and second, it allows fresh vegetables, fruits, and meat products to be made available to urban consumers.

Urban agriculture is commonly regarded by some people as an activity that is marginal, temporary and old. Some also perceived it as a practice that is harmful to farmers' health, consumers' health and our environment due to the use of agrochemicals. The use of pesticides in urban agriculture has been identified to have adverse health effects such as impotency and infertility on farmers in Ghana (Mancini *et al.*, 2005).

Despite the importance of urban agriculture as a key factor in sustainable food security to urban population. Some of the practices carried out by farmers have been discovered to pose some health risks and the farmers are thereby susceptible to occupational and other health related problems from the use of agrochemicals. For instance, the exposure of farmers without protective wears to pesticides which have long-term health problems such as dizziness and memory disorders, impotency in men and infertility in women. Naido *et al.* (2010) identified schistosomiasis, cholera, bacterial diseases, nematode infections, malaria, headaches, dermatological, visual, cardiac and respiratory problems as the health problems associated with the use of agrochemicals in Ghana. Ogunjimi and Farinde (2012) identified redness of eyes, cough, difficulty in breathing, excessive sweating, headache, baby itching, lack of muscle coordination and yellowing of skin were associated with the use of agrochemicals in Edo State. In addition, Ajayi and Akinnifesi (2008) identified respiratory infections, dermatosis, allergies, cancer as the major diseases occurring in agricultural works. World Health Organisation estimated that over 3 million farmers in the developing countries experience severe poisoning from pesticide exposure where about 18,000, representing 6.0 percent die annually due to the inappropriate precautionary measures. This situation, therefore, calls for a careful study of the precautionary measures among urban farmers in the use of agrochemicals in Oyo State, Nigeria. Specifically, the study described the socio-economic and personal characteristics of the farmers involved in urban agriculture, identified

the types of agrochemicals used and sources and determined the level of precautionary measures taken by farmers using agrochemicals in the study areas

Materials and Methods

Study Area

The study was carried out in Oyo State, Nigeria. The state covers an area of approximately 28,454 square kilometers with a population of 5,591,589 according to 2006 National Population Census figure. It is ranked 14th by size and the state is made up of Thirty Three (33) Local Government areas. Oyo State is located between latitude 7° and 9° North of the Equator and longitude 2° and 4° East of the Greenwich Meridian. The State is broadly occupied by Yoruba speaking people. The major occupation of the people is farming, which employs over 60 percent of the entire population. The climate is equatorial, notably with dry and wet seasons with relatively high humidity. Average daily temperature ranges between 25°C and 35°C almost throughout the year round. The climate in the state favours the cultivation of both arable and tree crops.

Sampling Technique and Sample Size

Multi-stage sampling technique was used to select the sample for the study. About 50 percent of the four Agricultural Development Programme (ADP) zones (Ibadan and Ogbomoso) were purposively selected based on their degree of food production in the State. At the second stage, 3 communities were randomly selected from each of the ADP zones based on their high level of urbanisation, making a total of six communities. At the third stage, 20 urban farmers were randomly selected in each of the six communities. A total of 120

farmers were with the use of questionnaire and interview schedule. Data collected were described with frequency counts, percentages, mean and charts while correlation and regression analyses were used to make inferences from the data.

Results and Discussion

Socio-economic Characteristics

Results in Table 1 showed that 7.5 percent of the respondents were less than 30 years of age, 81.7 percent were between ages of 30 and 59 years while 10.8 percent had their ages ranging between 60 years and above. This implies that majority of the respondents were between the ages of 30-59 years. The mean age was found to be 44.05 ± 10.76 years. This implies that the farmers were still active and as such they will still be able to withstand the tedious nature of farming. The finding coincides with the findings of Adeogun and Agbongiarhuoyi (2009); Babatunde *et al.* (2007) which asserts that the mean of farmers in Nigeria is 46.5 years. The findings also showed that only 10.0 percent of the respondents are reported to be single, 86.7 percent married, while 1.5 percent of the respondents were divorced. This result corroborates the earlier report of Okolo (2006) which stated that the highest numbers of people that are engaged in rural farming in Nigeria are married. In addition, about 79.2 per cent of respondents were male and 20.8 per cent were female. The findings revealed that majority (79.2%) of the respondents were male. This implies that there were more male farmers in the study areas than female. These results agree with the

findings of Oguntola (1998) who concluded that farming is a male-dominated profession. The mean household size was 5.68 ± 1.76 persons per household. This implies that farmers in the study area had relatively high household size compared to the United Nations household standard of 4 persons per household. Results in Table 1 further showed that only 3.3 percent of the respondents attended primary school education, 63.3 percent had secondary education while 33.3 percent of them passed through various tertiary institutions. This implies that majority (63.3%) of the farmers in the study area had a minimum of secondary education. This corroborates with the findings of Olowogbon *et al.* (2013) that majority of the farmers in Oyo state are literates. However, the findings contradict the report of Oladele (2001) that over 60% of livestock farmers in Oyo State had no formal education. The mean years of farming experience was 15.02 ± 11.37 years. This implies that respondents' farming experience was relatively low compared to the findings of Ogunjimi and Farinde (2012) and Tijani and Sofoluwe (2012) who reported that farmers in Edo and Ondo States of Nigeria had above 20 years of farming experience. Farmers make on average ~~₦347,649.38~~ ₦132,689.35 per season from farming.

Results in Figure 1 showed that 57.5 per cent of the respondents were Christians while 42.5 per cent were Muslims. The results revealed that Christianity and Islam are the major religions practiced in the study area.

Table 1: Distribution of respondents selected socio-economic characteristics

Variable	Frequency	Percentage	Mean	Std.Dev
Age				
<30 years	9	7.5		
30-60 years	98	81.7	44.05	10.76
60 years and above	13	10.8		
Marital status				
Single	12	10.0		
Married	104	86.7		
Divorced	4	3.3		
Sex				
Male	95	97.2		
Femal	25	20.8		
Household size				
<4	8	6.7		
4-7	95	79.2	5.68	1.76
8 and above	17	14.2		
Formal Education				
Primary	4	3.3		
Secondary	76	63.3	11.23	3.65
Tertiary	40	33.3		
Farming experience			15.02	11.37
Annual income			₴347,649.38	₴132,689.35

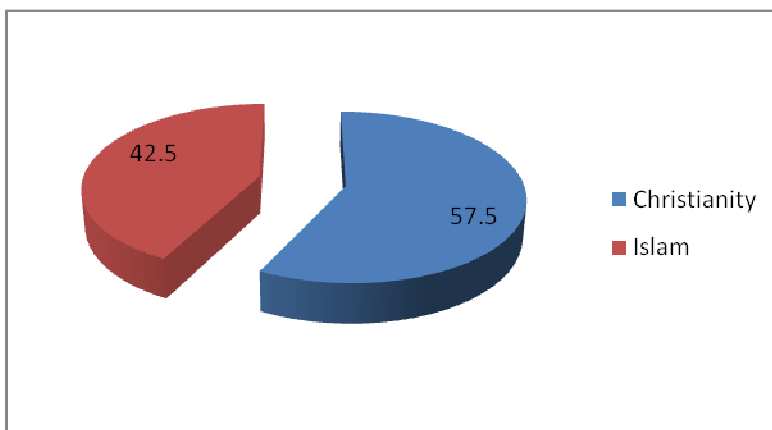


Figure 1: Distribution of respondents by religion

Types of Agrochemical Used

Results in Table 2 showed that 70.8 percent of the farmers used Primextra, 37.5 percent used rodeo, 84.2 percent used Weed-off and 59.2 percent used force-up while about 85.0 percent used Paraquat. In addition, 60.0 percent of the

respondents used Round-up, 77.5 percent used Glyphosate, 55.8 percent used Sorosate, 20.0 percent used touch-down, 35.0 percent used Lindane while only 6.7 percent of them used Endosulfan. Furthermore, 26.7 percent of the respondents used Dursban, 48.3 percent

used Actara, 7.5 percent used Malathion, 13.3 percent used Diazinon, 85.0 used Gammalin 20 and about 15.8 percent used Ridomil gold 66WP. Moreso, 25.8 of the farmers used Funguran, 20.0 percent used Nordox, 10.8 percent Kocidel 101, 22.5 percent used Manzate, 9.2 percent used Diathane, while only 1.7 percent of them used thiolux. The implications of this findings was that majority of the respondents in the study area used Primextra, Weed off, Force up, Paraquat, Round up, Glyphosate, Sorosate and Gammalin 20 and markets and Non-Governmental organisations

were the major sources of these agrochemicals to the farmers. The findings revealed that Gammalin 20 (85.0%), Paraquat (85.0%), Weed off (84.2%), glyphosate (77.5%), Primextra (70.8%) and Round-up (60.0%) were the major agro-chemicals used in the study area. The findings corroborate Ogunjimi and Farinde (2012) and Adeola (2012) assertions that most farmers in Edo and Southwestern states in Nigeria used Gammalin -20 and Primextra as the major agrochemicals in their farming operations.

Table 2: Types of agro-chemicals used and sources

**Types of agro-chemicals used	Frequency	Percentage	Sources
Herbicides			
Primextra	85	70.8	Mkt, NGO
Rodeo	45	37.5	Mkt, NGO
Weed off	101	84.2	Gvt, Mkt, NGO
Force up	71	59.2	Gvt, Mkt, NGO
Paraquat	102	85.0	Gvt, Mkt, NGO
Round up	72	60.0	Mkt, NGO
Glyphosate	93	77.5	Mkt, NGO
Sorosate	67	55.8	Mkt,NGO
Touch down	24	20.0	Gvt, Mkt, NGO
Insecticides			
Lindane	42	35.0	Mkt, NGO
Endosulfan	8	6.7	Gvt, Mkt
Dursban	32	26.7	Mkt, NGO
Actara	58	48.3	Gvt, Mkt, NGO
Malathion	9	7.5	Gvt, Mkt, NGO
Diazinon	16	13.3	Mkt, NGO
Gammalin 20	102	85.0	Mkt, NGO
Fungicides			
Ridomil gold 66WP	19	15.8	Gvt, Mkt, NGO
Funguran	31	25.8	Gvt, Mkt, NGO
Nordox	24	20.0	Mkt, NGO
Kocidel 101	13	10.8	Mkt, NGO
Manzate	27	22.5	Gvt, Mkt, NGO
Diathane	11	9.2	Mkt, NGO
Thiolux	2	1.7	Mkt, NGO

** Multiple responses.

Govt= government, Mkt= market. NGO= non-governmental organisation

Level of Precautionary Measures Among Farmers in the Use of Agrochemicals

Results in Table 3 showed that overall/outer garments ($\bar{X}=2.92 = 3.4$), hand gloves ($\bar{X}=2.92 = 3.3$) and the use of boot ($\bar{X}=3.1$) while spraying agrochemicals were occasionally used while respirator/nose cover ($\bar{X}=2.92 = 2.0$) was rarely used. However, eye protection lens and other means of taking precautions were never used. The grandmean score of 3.0 used as a benchmark indicates that farmers only takes high level of precautionary measures in the use agro-chemicals by using overall/outer garments, hand gloves and boots. The inability of the farmers to use the full precautionary measures that include nose and eyes protectors may be due to the fact that they do not have adequate knowledge of the health problems that could be contacted by

inhaling the chemicals. The findings show that farmers do not take full precautionary measures as respirator/nose covering and eye protection lens are not wore. This may be hazardous to their health if adequate measures are not taking while using agro-chemicals as it is be very easy to inhale the dangerous active ingredients in these agrochemicals by the farmers. This means that farmers in the study area were not using full precautionary measures as expected. This corroborates the findings of Oluwafemi and Robert (2009) report that majority of farmers in Ekiti State never used any form of protective equipment except their normal clothes with only 11.1% using boots as protective measures against agro-chemicals. Also, the result agreed with Muhammad (2009) who claimed that very few farmers took precautionary measures during the application of agrochemicals in Pakistan.

Table 3: Level of Precautionary Measures among Urban Farmers Using Agro-chemicals

Variable	Not at all (1)	Rarely (2)	Occasionally (3)	Regular (4)	Very regular (5)	Mean
Respirator/nose cover	16 (13.3)	9 (7.5)	28 (23.3)	46 (38.3)	21 (17.5)	2.0
Boot	11 (9.2)	17 (14.2)	20 (16.7)	49 (40.8)	23 (19.2)	3.1*
Overalls/outer garments	10 (8.3)	8 (6.7)	31 (25.8)	39 (32.5)	32 (26.7)	3.4*
Eye protection lens	52 (43.3)	20 (16.7)	28 (23.3)	16 (13.3)	4 (3.3)	0.8
Hand gloves	21 (17.5)	7 (5.8)	11 (9.2)	53 (44.2)	28 (23.3)	3.3*
Others	118 (98.3)	1 (0.8)	1 (0.8)	0	0	0.2

Figures in parentheses represent percentage.

Grandmean score= 3.0

* $X \geq 3.0$ = High level of precautionary measure observed

An in-depth analysis was conducted to determine level of precautionary measures taken by farmers in using these agrochemicals. ‘Mean plus and minus standard deviation was used for this categorization. Results revealed that 31.7 percent of the farmers were rated low in their level of

precautionary measures taken, about 51.7 percent had moderate while only 16.7 percent took high level of precaution as presented in Figure 2. The finding revealed that slightly above average (51.7%) of the farmers moderately practiced the identified precautionary measures.

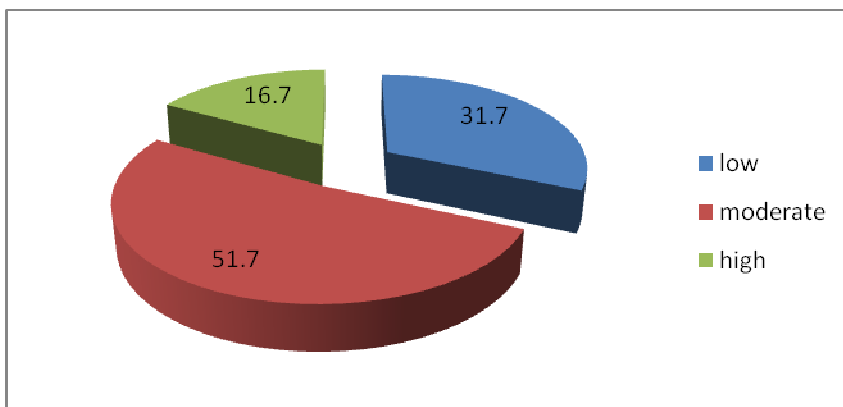


Figure 2: Farmers Level of Precautionary Measures in the Use of Agro-chemicals

Relationship Between Level of Precautionary Measures in the Use of Agro-chemicals and their Frequency of Use

Table 4 shows the results of Pearson Product Moment Correlation showing relationship between frequency of use of agro-chemicals and level of precautionary measures observed by farmers. It was observed that significant relationship exists between frequency of use of fungicides ($r = -0.401$; $p \leq 0.01$) and insecticides ($r = 0.356$; $p \leq 0.05$) as well as herbicides ($r = 0.228$; $P \leq 0.05$). This shows that frequency of use of fungicides and insecticides positively correlated with the precautionary measures taking during their uses. The non-significant relationship of the use of herbicide and

precautionary measure observed may not be unconnected with the fact that herbicide is the most commonly used agro-chemical among farmers in the study area. Thus, farmers must have developed several ways of using them with little or not precautionary measures taken. However, fungicides and insecticides which are rarely used may be seen as more dangerous chemicals for the farmers. Hence, they take more precautionary measures in their uses. The findings support the Ishaya *et al.* (2007); Ogunjimi and Farinde (2012); Chikoye *et al.* (2007) and Dimas *et al.* (2006) reports that herbicides were the most common agro-chemicals used by farmers in Nigeria and Namibia.

Table 4: Results of Pearson’s Product Moment Correlation showing relationship between level of precautionary measures observed by farmers and frequency of use of agro-chemicals

Variable	Correlation Coefficient (r)	P-value	Decision
Frequency of use of herbicides	0.228	0.05	S
Frequency of fungicides	0.401**	0.01	S
Frequency of insecticides	0.356*	0.05	S

**Significant at 0.01 level; *Significant at 0.05 level

Level of Precautionary Measures and Perceived Health Effects Associated with the Use of Agro-chemicals

Results in Table 5 showed that level of precautionary measures observed by farmers had a significant relationship with the perceived health effects ($r = 0.209$; $P \leq 0.022$) associated with the use of agro-chemicals in the study area. This implies that farmers take precautionary measures when they perceived any health problem in the use of agro-chemicals among urban farmers in Oyo State due to the fear of having some of the health related issues that can be injurious to the farmers. However, it argues with the

findings of Ogunjimi and Farinde (2012) which identified that a non-significant relationship exists between knowledge level of precautionary measures and perceived health problems associated with the use of agro-chemicals among farmers in Edo and Osun States, Nigeria. However, Bhoopendra and Mudit (2009) concluded that farmers in India rarely protect themselves during application of agro-chemicals, hence various diseases such as skin irritation, redness of eyes and other diseases had been identified due to the poor use of protective wears among farmers.

Table 5: Results of correlation analysis showing relationship between level of precautionary measures observed by the farmers and perceived problems associated with the use of agro-chemicals.

Variable	Correlation coefficient (r)	Coefficient determination (r^2)	of Decision
Perceived problem scores	0.209*	0.0436	S

Conclusion

Agrochemical poisoning is a global health problem, and it is more prevalent in developing countries of the world. The harmful effects of these chemicals on human beings have been established by extant literature and this could be very fatal when adequate precautionary measures are not observed by the user. The incidence of pesticide poisoning is increasing according to the existing reports, and it is estimated that about 5 million people die every year as a result of intentional, accidental and occupational exposure worldwide to the various agrochemicals. Some of these chemicals find their ways into the streams and water bodies where either directly or indirectly we consume them, hence the need to investigate the level

of precautionary measures observed among urban farmers in Oyo State becomes the focus of the study. Based on the findings, majority of the urban farmers in Oyo state were married with relatively high household size. Christianity and Islam were the dominant religion among the farmers. The average annual income from their farming activities was ₦347,649.38. The common agrochemicals used by the farmers were paraquat, diazinon, weed-off, round-up and premextra. The major sources of these agro-chemicals are market and NGOs. The findings revealed that there was a moderate level of precautionary measures observed by the farmers in the use of agrochemicals. Frequencies of use of fungicides and insecticides and health hazards associated with agro-chemical

usage were the correlates of precautionary measures observed. The study concludes that if these farmers are made to understand the danger involved in the use of agro-chemical without appropriate measures, level of precautionary measures would be high. The study therefore recommends that stakeholders in the Federal Ministry of agriculture in conjunction with the Federal Ministry of health should embark on a campaign that will enlighten the farmers in the various hazards associated with the use of agro-chemicals with a view to reducing the health related issues associated with the use of agro-chemicals among urban farmers in Nigeria.

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