

Knowledge and Practices of Herbicide Use Among Farmers in Edo State, Nigeria

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ABSTRACT

This study was designed to investigate the knowledge and practices of herbicides use among farmers in Edo State, Nigeria. Multistage sampling technique was used to select one hundred and twenty (120) respondents. The instrument for data collection was interview schedule designed by the researchers. The data obtained were analysed using mean statistic and standard deviation and presentation in percentage. The findings of this study showed that the knowledge of the respondents on herbicide use was high as 95.8% of farmers' stored herbicides away from food and admitted that herbicide could harm the environment as well as the consumers (95.8%). The theoretical practices of respondents were encouraging as opposed to the actual practices where farmers fell short of the ideal. Best practice used by respondents were washing of hands after using herbicides or their containers ($\bar{x} = 2.91$), storage of herbicides in locked cabinets ($\bar{x} = 2.82$) and cleaning and rinsing sprayers after use ($\bar{x} = 2.69$), Glyphosate (85.8%) was the most used herbicide for weed control and cassava (90.0%) cultivated crop in the study area. Conclusions and recommendations were made.

Keywords: Knowledge, Practices, Herbicide Use, Nigeria.

1. INTRODUCTION

Chemical herbicides have contributed to the protection of crop, human, and animal health for over a half century. However, management of herbicides in developing countries is often inadequate due to lack of available resources. This is particularly true for countries where regulations are not strictly implemented and farmers'

knowledge of safe handling is often inadequate [1]. Many African and other developing countries suffer from weak import controls, lack of training on appropriate herbicide use, inappropriate donations and aggressive sales practices, poor storage and stock management, pressure to stockpile for unforeseen emergencies, and a lack of safe destruction technologies [2]. Though a good number of farmers are disposed to the use of herbicides, many are unaware of herbicide types, level of poisoning, safety precautions and potential hazards on health and environment [3].

Over the past ten years, the amount and number of different herbicides have increased significantly. This have led to growing concern about the possible adverse effect on human health such as cancer, birth defects, reproductive problems, tumours, and damage of liver, kidney and neural organs [4]. Also, the environment is affected as abuse of herbicides could lead to contamination of soil, water, and air thereby damaging the surrounding ecosystem and other living organisms necessary for maintaining ecological balance, for example insects, birds, worms, fish, etc. [5][6][7][8].

Most farmers are aware that herbicides are hazardous; however, there is lack in awareness of exposure risk. This exposure is further enhanced by farmers' practice of washing their sprayers near or in the irrigation canal. They also use this water source for washing of hands and feet, clothes, and to some extent taking a bath. Most herbicides handlers use backyards or open fields for disposal purposes while some sell the used herbicides container or throw them into nearby water [9].

In spite of these known harms associated with the use of herbicides, many farmers in Edo State use herbicides to check weeds. In most rural areas, farmers can be seen carrying knapsack sprayers and spraying their farms. The extent of their knowledge and practice of the use of herbicides can pose danger to their lives and environment. There is therefore need to investigate farmers level of knowledge and practice in herbicide use in Edo State, Nigeria.

2. PURPOSE OF THE STUDY

The purpose of the study was to determine the knowledge and practices of herbicides use among farmers in Edo State, Nigeria. Specifically, the study sought to:

1. determine knowledge of farmers on the use of herbicides; and
2. determine farmers' practices in the use of herbicides; and
3. ascertain the crops grown in the area and the herbicide used

3. METHODOLOGY

The population for the study comprised all farmers that use herbicide in Edo State, Nigeria. Multistage sampling technique was used in selecting respondents for this study. Three (3) agricultural zones which make up the state were selected in the first stage. In the second stage, two (2) blocks were purposively selected from each zone based on the presence of farmers using herbicides. In the third stage, two (2) circles were selected from each block giving a total of four (4) circles per zone and a total of twelve (12) circles. In the fourth stage, a list of farmers who use herbicides was compiled. From the list, ten (10) farmers were randomly selected from each circle. Thus the total sample size for the study was one hundred and twenty (120) respondents.

Data for the study were collected using interview schedule. Relevant knowledge questions were drawn. Respondents were asked to tick True or False to assess their knowledge level by responding to thirty (30) open and closed (structured) questions. Each correct answer had one point. The highest score was 30 points and the lowest was zero (0). The respondents were thereafter categorized into three (3) groups based on their knowledge level namely:

- a. Low knowledge (for those respondents with 1 – 10 score)
- b. Moderate knowledge (for those respondents with 11 – 20 score)
- c. High knowledge (for those respondents with 21 – 30 score)

Practices of farmers regarding herbicide use were assessed. Respondents were required to respond to statements under the following subject matter: I clean and rinse the sprayer after use, I use a separate utensil for mixing herbicide, I leave the sprayer just anywhere, when spraying, I wear mask. The frequency of use of each item was measured using a three point Likert-type scale of always (3), sometimes (2), and never (1). The values were summed up to get 6, which was divided by 3 to obtain a mean score of 2. Positive practice statements with mean ≥ 2 were regarded as best practices frequently used by respondents while those with a mean < 2 were regarded as practice not used by respondents. Further, negative practice statements with mean ≥ 2 were regarded as best practices seldom used by respondents while those with a mean < 2 were regarded as practice used by respondents. Mean statistic and standard deviation were used in the analysis and result presented in percentage.

4. RESULTS AND DISCUSSIONS

4.1 Knowledge score of farmers on herbicide use

Results of the study showed that 46.7% of the respondents had information that herbicides can be kept together with fertilizers and 95.8% of farmers already knew that herbicides should be stored away from feeds. Based on this finding, it can be surmised that farmers were well aware that herbicides must not be lump together with feeds much so foods because of the risks it carries.

Furthermore, 94.2% had information that herbicide bottles should not be kept hanging under the trees while 76.7% of respondents knew that herbicides should be stored in locked cabinets, and 65.8% knew that there must be separate utensils for mixing herbicides. A total of 75.8% admitted that herbicide could harm the environment as well as the consumers (95.8%). About 93.3% knew that it is never okay to remove and throw herbicide labels

away while 88.3% knew that clothes must always be changed if herbicide is spilled on it.

It was also gathered that 84.2% of farmers knew that nausea, headache and vomiting are signs of herbicide poisoning, and about 99.2% of the total respondents knew that in cases of herbicide poisoning victims should immediately be brought to the hospital. This implies that respondents are aware and already know the different signs and symptoms of herbicide poisoning as well as the appropriate response in case it happens.

Farmers were not alien to the importance of protecting themselves using facemasks and long sleeves and this fact is reflected on the results seen on Table 1 where 82.5% of farmers knew of the protective role of facemask while 87.5% had knowledge of the protective effect of long sleeves during application. However, personal observation and interaction with farmers in the field showed that even though they were aware of the different protective effects of the gears in theory, they are not totally sold to the idea of actually using or wearing them due to factors like financial constraints and inability to let go of old-fashioned farming where gear like facemask is not used.

Farmers who knew that herbicide could enter the body through the skin were 69.2%, through the nose 92.5% and through the eyes 65.8%. Also, 87.5% of farmers in the study knew that it was necessary to regularly wash their hands after using herbicide, while 95.8% knew that it was not advisable to wear clothing contaminated with herbicide. Among the respondents, 83.3% knew that spraying during windy weather was dangerous. By implication this is impressive considering the harm herbicides could cause to the environment and nearby residents when sprayed during windy weather.

Farmers who believed that rubbing of eyes should be avoided during herbicide application were 98.3%, and those who knew that smoking while applying herbicide was a problem accounted for 89.2%. Also, 56.7% and 50.8% had information that goggles were the right protective gear to use when spraying herbicide and that herbicide container should be properly disposed respectively. This result exemplifies the need to educate farmers in the area on the importance of using goggles and proper disposal of used herbicide containers.

Table 4.1: Percentage distribution of respondents' knowledge score

Knowledge Items	Right Answer (%)
Herbicides can be kept together with fertilizers.	46.7
Herbicides should be stored away from feeds.	95.8
Herbicide bottles can be kept hanging under the trees.	94.2
Herbicides should be stored in locked cabinets.	76.7
A separate utensil for mixing Herbicide is not always necessary.	65.8
Herbicide can also harm the environment.	75.8
Herbicide can harm the consumers.	95.8
It is ok to remove and throw Herbicide labels away.	93.3
Clothes should always be changed immediately if Herbicide was spilled in the clothing.	88.3
Nausea, headache and vomiting are signs of Herbicide poisoning.	84.2
In cases of Herbicide poisoning, victim should always be brought to hospital.	99.2
Face mask cannot protect farmers from the effects of Herbicide.	82.5
Long sleeves can protect farmers from the effects of Herbicide.	87.5
Herbicide can enter the body through our skin.	69.2
It can also enter the body through our nose.	92.5
Herbicide can enter the body through our eyes.	65.8
Washing of hands after using Herbicide or their containers is not always necessary.	87.5
It is not advisable to wear clothing that is contaminated with Herbicide.	95.8
Spraying during windy weather is not dangerous.	83.3
During Herbicide application, rubbing of eyes should be avoided.	98.3

After Herbicide application, clothing should be removed immediately.	89.2
After Herbicide application, personal equipment such as face mask should be removed immediately.	21.7
If Herbicide was sprayed in the eyes, washing of eyes quickly with water is always needed.	94.2
Smoking while applying Herbicide is not a problem.	95.0
Herbicide containers should always be sealed tightly.	97.5
Protective gear is used for the eye when spraying herbicide	56.7
Weed control decision aside herbicide	95.0
What to be done to left over herbicide	62.5
Disposal of herbicide containers	50.8
First thing to be done after purchasing herbicide for use	82.5

Source: Field survey, 2013

4.2 Practices of farmers on herbicide use

Entries on Table 2 show that respondents practiced cleaning and rinsing their sprayers after use ($\bar{x} = 2.69$), washed their working clothes separately from other clothes ($\bar{x} = 2.64$), wore long sleeves while spraying herbicides ($\bar{x} = 2.60$), had separate utensil for mixing herbicide ($\bar{x} = 2.59$) and wore a mask ($\bar{x} = 2.33$). Also, respondents seldom practiced keeping their sprayers anywhere ($\bar{x} = 1.19$), keeping contaminated clothing anywhere ($\bar{x} = 1.18$) and did not spray herbicide living their body bare ($\bar{x} = 1.13$).

These may be because most farmers know that they should wear protective gear. They may just be giving socially acceptable answers. This study agrees with [10] who did a study on International Rice Research Institute (IRRI) workers. He stated that most farmers were aware of what equipment to use to protect them from exposure. But looking at practice realities, few used recommended gear. The possible reason for not using protective gear was that farmers do not have enough money to buy protective gear. This agrees with the study conducted by [11] who found out that protective equipment was rarely used because aside from being expensive it is too cumbersome to user in a hot climate. The results of this study are also supported by the study conducted by [12] in Cambodia. Majority of the respondents (82%) said they wore protective clothing while spraying which was limited to a long sleeved shirt and long pants.

Furthermore, findings show that respondents washed their hands after using herbicides or their containers ($\bar{x} = 2.91$), washed hands immediately after spraying herbicides ($\bar{x} = 2.88$) and changed their clothes ($\bar{x} = 2.77$). Smoking was rarely practiced while spraying herbicide ($\bar{x} = 1.03$). This is an indication that farmers in the study practiced personal hygiene both during and after herbicide use. This aligned with [13] who in his study found that regular hand

washing was practiced by all his respondents; as well as [4] who found out that 95% of farmers washed hands after application of pesticide and 95% of farmers as well changed clothing before and after herbicide exposure.

Entries on Table 2 further reveal that farmers stored herbicides in places that were always locked ($\bar{x} = 2.82$), didn't hang herbicide bottles under the tree ($\bar{x} = 1.45$) and never kept herbicides or their containers in the kitchen ($\bar{x} = 1.08$). This implies that farmers in the study area are safety conscious as such stored herbicides in places that are always locked at home, farm store, farm house, hamlets and shops. This practice is important because herbicides are chemicals that can cause severe damage to children and livestock if ingested.

However, findings show that they always disposed their herbicide containers by wrapping and burying them ($\bar{x} = 2.16$), containers of used herbicides were not used by the farmers to store consumable products like water, palm oil and vegetable oil ($\bar{x} = 1.56$). Farmers in the study area never disposed herbicide into nearby ponds ($\bar{x} = 1.02$).

By implication, farmers' practice of disposing empty containers by wrapping and burying should be discouraged. According to [14], burning empty pesticide containers in open fires or burying empty containers should not be used as a method of management and disposal of empty herbicide containers. Distributors and suppliers and even local authorities often recommend these practices, but they are potentially hazardous to human health and the environment and should be discouraged and appropriate management encouraged. Safe burning procedures require a good understanding of herbicide chemistry, while safe burial requires adequate knowledge of local hydrology as well as of the environmental behaviour of herbicides. Many users do not have such knowledge or cannot apply it properly to their particular circumstances.

Farmers interviewed are not in the habit of reusing herbicide containers to store consumable products like water, palm oil and vegetable oil as opposed to 70% who did so in Oyo State as contained in a study by [15] in 2007. This finding is remarkable because in many developing countries, empty herbicide containers are

highly valued and used or exchanged as storage containers for other materials such as fuel, other chemicals, and sometimes even drinks or food, as was the case in the study by [14] in West Bank. Such practices are dangerous and should be prevented; for example, by puncturing any empty herbicide containers that cannot be returned to the supplier, in accordance with WHO recommendations [16].

Table 4.2: Distribution of farmers' practices in the use of herbicides

Practices	Mean (M)	Std. Deviation
I clean and rinse the sprayer after use.	2.69	0.48
I use a separate utensil for mixing herbicide.	2.59	0.59
I leave the sprayer just anywhere.	1.19	0.47
I wash my working clothes separately from other clothes.	2.64	0.58
During spraying, I wear long sleeves.	2.60	0.56
When spraying, I wear mask.	2.33	0.67
I don't keep contaminated clothing anywhere.	1.18	0.46
During herbicide application, I don't take my shirts off.	1.13	0.48
I wash hands after using herbicide or their container.	2.91	0.34
I wash hands immediately after spraying.	2.88	0.32
I change clothes immediately after spraying	2.77	0.43
I don't smoke while spraying.	1.03	0.22
I store herbicide in places that are always locked.	2.82	0.38
I don't hang herbicide bottles under the tree.	1.45	0.78
I don't keep herbicide containers in the kitchen.	1.08	0.32
I wrap and bury empty bottles of herbicides.	2.16	0.85
I don't reuse empty herbicide containers.	1.56	0.77
I don't dispose unused herbicide in the pond.	1.02	0.13

Source: Field survey, 2013

4.3 Crops grown in the study area

Data on Table 4 show that cassava is widely cultivated in the study area as 90.0% of respondents cultivated the crop followed by yam and maize with 76.7% and 56.7% respectively. This may not be unconnected with the fact

that cassava is a rural food staple and main source of calories [17] in the diets of rural consumers. Therefore, its production and utilization must be given prime attention in food policy in Edo State, Nigeria.

Table 4.3: Percentage distribution of crops grown in the study area

Crop Name	Percentage
Cassava	90.0
Yam	76.7
Pineapple	36.7
Oil palm	8.3
Groundnut	8.3
Vegetables	24.2
Plantain	35.8
Maize	56.7
Melon	7.5
Cocoyam	10.8
Potatoes	1.7
Rice	5.0

Pawpaw	2.5
Rubber	1.7

*multiple response

4.4 Herbicide used in the study area

Entries on Table 3 show that Glyphosate (85.8%) was the most used herbicide for weed control in the study area.

This is an indication that farmers in the area majorly used herbicide for general weed control before land preparation and killing troublesome weeds that are already growing.

Table 4.4: Percentage distribution of herbicides used in the study area

Herbicide Name	Percentage
Glyphosate	85.8
Paraquat	61.7
Atrazine	33.3
Alachlor	1.7

*multiple response

5. CONCLUSION AND RECOMMENDATION

This study is all enriching for the effectiveness of farmers' use of herbicide use in Edo State, Nigeria. There were observed high knowledge of the use of herbicides in the state and frequent use of some best practices in herbicide use. However, these have not translated to real situations in actual practices probably because of limited resources especially capital.

Therefore, it is strongly recommended that the state government and NGOs initiate special educational programs and the implementation of personal protective measures; such approaches are necessary to decrease the harmful effect of herbicide use on farmers.

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