
Use of Herbicides among Rural Women Farmers in Abia State, Nigeria

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Abstract

The study examined the use of herbicides among rural women farmers in Abia State, Nigeria. Using a multistage sampling technique, 70 farmers were selected. Data were collected using structured interview schedule and were analysed using descriptive statistics. Some of the herbicides used by the respondents were Primextra (22.9%), Force up (21.5%), Raze down (18.6%) and Tackle (18.6%). The majority (64.3%) applied herbicide twice in one growing season. The mean quantity applied was 8.5 litres. On the farmers' knowledge level of use of herbicides, the majority (51.8%) of the women had moderate knowledge on herbicide technology. The respondents practised cleaning and rinsing of sprayers after use ($\bar{x}=1.31$), using separate utensil for mixing herbicides ($\bar{x}=1.39$) and washing of clothes used or spraying separately from other clothes ($\bar{x}=1.14$). The perceived major constraints to the use of herbicides were inadequate training ($\bar{x}=1.12$), inadequate awareness ($\bar{x}=1.10$), and high cost of herbicides ($\bar{x}=1.07$). The study concluded that most of the farmers had moderate level of knowledge and poor practises on herbicide use and this will likely have negative impact on the crop and health of farmers and hence recommended increase in extension contact for awareness and training of farmers on right use of herbicides.

Keywords: *Herbicides use, rural women and knowledge level*

Introduction

Women play vital roles in agricultural production in all parts of the world (Nuhu, Donye and Bawa, 2014). In Nigeria, the role and position of women in meeting the challenges of agricultural production and development are quite dominant and prominent. Amparo, Luc and Talip (2017) revealed that women are commonly considered to perform the bulk of work in African agriculture. Depending on the region, and they are engaged in production of food crops such as beans, cassava, cocoa, beans, groundnuts, kola nut, maize, rice, rubber, etc. They are also mainly involved in weeding and processing of agricultural produce. They employ manual labour in places where they cannot handle by themselves such as tilling a very tough soil, harvesting tuber crop, making large mounds and ridges.

Many rural women did not choose agricultural production as an occupation of choice; rather they grew up into it as the only and natural role (Adenugba and Raji-Mustapha, 2013). Hence, their work as mothers, wives and citizens have always been combined with essential economic roles as food producers, income earners and managers of personal and household budgets. Therefore, the training of rural women is very important, especially with the adoption of modern agricultural practices like the use of agrochemicals with a view to increasing rural women's production levels. Agrochemicals such as herbicides when available help in the control of weeds which pose major issues to rural women farmers and farmers in general

Weeds are generally known as plants that grow where they are not wanted. They shelter pests and diseases that attack the crop and reduce crop yields and farmers' income. Weeds are vigorous growers and their nutrient requirements are often greater than the crops (Food and Agricultural Organization (FAO), 2017). Conventionally, in the rural areas, weeds are controlled mechanically through the use of hoes and cutlasses and some even do hand picking.

Herbicides are known as weed killers. They are chemicals that inhibit or interrupt normal plant growth and development. According to Kughur (2012), herbicides use is not limited to crop production alone, its use in animal production include antibiotics administered either by injection or combined with feed; to control infectious diseases and parasites that often arise when animals are raised under extremely crowded conditions. They generally provide cost effective weed control with a minimum use of labour (Peter, 2012).

Herbicides have contributed to the protection of crop, human, and animal health for over a half century (Uddin, Igbokwe and Enwelu, 2015). This had led to an increase in land areas under cultivation by farmers, saving high cost of manual weed control thus reducing farming work load. In Nigeria, herbicides have since been effectively used to control weeds in agricultural systems. Thus, chemical weed control has become an increasingly necessary operation in the economic production of crops. This becomes very pertinent in tropical regions like Nigeria where weed problems are more severe. Weeds compete with crop for water, nutrients and light and have been a matter of great concern to farmers as they reduce farm and forest productivity, displace crops and contribute significantly to land and water degradation (Rana and Rana, 2016).

Although manual weeding is an age-long practise in Nigeria, it is no longer sustainable because of its tediousness and the ageing of the farming population especially in the rural areas of Abia State where women are mostly farmers (Alpha, 2013), hence the need for herbicides use. Although herbicides could be beneficial to farmers in weed control, they could also be harmful to the users and the environment (Iyagba, 2013), especially when the user is ignorant or lacks knowledge of safety parameters. Misuse of agro chemicals and ignorance of the possible dangers could be blamed on low levels of education, poor packaging with inadequate warnings and a lack of information for to the farmers. It is therefore necessary to ascertain the users' practices and knowledge of the herbicide technology. This study sought to provide answers to the following questions; what are the methods of herbicide use? What are the knowledge levels of the women on herbicides technology? What are the practices on the use of herbicides among the rural women? What constraints do women farmers face in the use of herbicides?

Purpose of the Study

The purpose of this study was to examine the use of herbicides among rural women farmers in Abia State, Nigeria. Specifically, the study was designed to;

- ascertain the methods of herbicides use among the rural women farmers;
- assess the knowledge level of the rural women farmers on the use of herbicides;
- ascertain the rural women farmers' practices in the use of herbicides use; and
- identify constraints to the use of herbicides among the women.

Methodology

The study was carried out in Abia State. Abia State comprises 17 Local Government Areas (L.G.A's) that was divided into three agricultural zones namely, Aba, Ohafia and Umuahia (Okezie, Sulaiman and Nwosu, 2012). The state lies between longitudes 7° 00'and 8° 00'East and latitudes 4°45'and 6° 17'North. All the rural women farmers in Abia State comprised the population of the study. A multistage sampling procedure was used to select the respondents. In the first stage, two agricultural zones (Umuahia and Aba) were selected out the three agricultural zones in the state using a simple random sampling technique. Each agricultural zone is divided into 8 blocks. In each block, there are eight (8) cells or circles (Obasi, Ijioma, Ogwo and Okoroigwe, 2014).

At the second stage, two blocks were selected using random sampling technique from each of the two selected zones making a total of four blocks. Stage three involved selection of two circles (out of eight) from each block using simple random sampling technique making a total of eight circles. Then, 10 women farmers were proportionately selected from six circles and five from the seventh and eight circle making a total sample size of 70 respondents. Data for the study was collected using interview schedule.

To assess their knowledge level, respondents were asked to tick 'true' or 'false' on 15 relevant knowledge items. Each correct answer scored one (1). The highest score was 15 while the lowest was 0. The respondents were later categorized into 3 groups based on

their levels as follows: low knowledge (respondents with 1-5 scores), moderate knowledge (respondents with 6-10 scores) high knowledge (respondents with 11-15 scores). To ascertain the practices of farmers regarding herbicide use, the respondents were required to indicate the extent to which they carry out some practices using a three point Likert-type scale of never, sometimes, and always. Values of 0, 1 and 2 were assigned respectively and were summed up to get 3 which was later divided by 3 to obtain a mean score of 1. Variables with mean values of 1 and above were regarded as a major practice. To determine the constraints to the use of herbicides among the rural women, a three-point Likert-type scale of not serious, serious, very serious was also used. Values of 0, 1 and 2 were assigned respectively and was added up to get 3 which was later divided to obtain a mean score of 1. Practices with mean score of 1 and above were regarded as major constraints.

Results and Discussions

Types of herbicides used by the respondents

The herbicides used by the respondents were Primextra (24.3%), force up (22.9%), Raze down (20.0%), attack (17.1%), Delsate (7.1%), Paraquat instant splash (5.8%) and Paraforce (2.9%), (Table 1). This implies that there are various herbicides that are available for use in the market. These herbicides are also found to be suitable for weed control in the location. However, a farmer's preference for a particular type of herbicide is dependent on his/her exposure and awareness of the herbicide (Udensi, Tarawali, Ilona, Okoye and Dixon, 2012)

Quantity of Herbicides Used in One Season

About 41% of the respondents used a range of 6-10 litres of herbicides in one growing season, 34.3% used less than 5 litres, 18.6% used between 11-15 litres, 5.7% used 16 litres and above. The mean quantity used in a growing season was 8.5 litres. Compared to the farm sizes of the respondents, it can be inferred that some respondents applied adequately and generously while others did not. This can be attributed to some factors as identified by Oyinbo, Saleh and Rekwot (2013) who indicated that farmers' level of education, household income, extension contact, membership of social organization and farming experience positively influenced the quantity of herbicide applied. This shows a positive relationship between the variables and the quantity of herbicides applied. Similarly according to the authors, age, marital status and household size were found to negatively influence herbicide application and this implies that as these variables increase, the quantity of herbicides applied decreases.

Number of times herbicides is applied in one growing season

The majority (64.3%) of respondents applied herbicide twice in one growing season while 18.6% and 17.1% applied once and three times, respectively (Table 1). The number of times of herbicide application could be dependent on factors like type of crop cultivated, type of weed and weather condition. However, applying right amount of herbicide is important in mitigating the problem of environmental build up of herbicide residues and herbicide resistant weeds (Imalome and Moral, 2017).

Table 1: Pattern of herbicide use among respondents

Types of herbicides used	Percentage	Mean
Primextra	24.3	
Force up	22.9	
Razedown	20.0	
Attack	17.1	
Delsate	7.1	
Paraquat instant splash	5.7	
Paraforce	2.9	
Quantity of herbicides used		
Less than 5	34.3	
6-10	41.4	
11-15	18.6	8.5
16 and above	5.7	
Number of times herbicide was applied per growing season		
Once	18.6	
Twice	64.3	
Thrice	17.1	

Source: Field survey, 2017

Farmers Knowledge of Herbicide

Table 2 shows that 85.7% of the respondents were aware that herbicides containers should be sealed tightly and 64.3% knew that herbicides points of entry into the body can be through ears, eye, nose and skin. Exposure to herbicide can possibly occur both in the process and after application of herbicide and the persons who are involved in the mixing, loading, and application of herbicides are at the greatest risk of exposure. Iyagba (2013) who noted that the three major entry routes for herbicides into the body are dermal (exposure through the skin or eyes), respiratory (inhalation into the lungs) and oral (ingestion by mouth). Furthermore, 65.7% had information that nausea, headache and vomiting were signs of herbicide poisoning and 54.3% knew that herbicides should be kept with fertilizer.

It is surprising to note that only about 14.0% of the respondents sampled knew that herbicides should be stored away from food and that a separate utensil should be used for mixing herbicides. Based on this finding, it can be inferred that the farmers did not know that herbicides must not be lumped together with foods. This implies inadequate knowledge among women farmers on the risks involved in exposing herbicides with edibles. According to Babarinsa, Ayoola, Fayinminnu and Adedapo (2018), there is increase in the risk of chemical toxicity in food and in our environment, with associated negative effects on human and animal health; the increase in productivity as a result of

usage of agrochemical chemicals in modern agriculture notwithstanding. Issa, Atala, Akpoko and Sanni (2015) asserted that the effects of acute poisoning due to exposure to dangerous levels of agrochemicals in food are apparently more severe in developing countries (like Nigeria) than in industrialized countries.

Among the respondents, only 38.6% knew that spraying during windy weather is dangerous and only 14.3% admitted herbicides can harm the environment. The findings show that the women farmers need more information on herbicide use and the implications of abuse or misuse. This has become imperative following the ignorance of consequences of spray drift that can emanate from spraying during windy weather. According to United States for International Development (USAID) (2016), spray drift is the airborne movement of agricultural chemicals away from the target area during, or shortly after, its application and this can be in the form of droplets, particles (fine dust) or vapour. The consequences of spray drift include injury/damage to plants, animals, the environment or property, and if can even affect human health.

Table 2: Knowledge of herbicide use

Knowledge items	Correct answer (%)
Herbicides should be kept with fertilizers	54.3
Herbicides should be stored away from food	14.3
Herbicides can harm the environment	14.3
A separate utensil for mixing herbicides is not always necessary	14.3
Herbicides can enter the body through our eyes, nose, ear, or skin	64.3
During herbicides application, rubbing of eyes and mouth should be avoided	34.3
Spraying during windy weather is not dangerous	38.6
Washing of hands after using herbicide or the containers is not always necessary	35.7
Nausea, headache, and vomiting are signs of herbicides poisoning	65.7
In cases of herbicide poisoning, victim should always be brought to the hospital	34.3
Face masks cannot protect the farmers from the effects of herbicides	47.1
It is not advisable to wear clothing that is contaminated with herbicides	62.9
Smoking while applying herbicides is not a problem	51.4
Herbicide containers should be sealed tightly	85.7
Herbicides are faster than manual weed control	77.1

Source: Field survey, 2017

Knowledge Level of Rural Women Farmers on Herbicides Use

Figure 1 indicates that 52.0% of the women had moderate knowledge on herbicide use. This implies that half of the farmers in the study area are not really knowledgeable about the use of herbicides. This may be as a result of lack of information or training on herbicide

use. The capacity of farmers can be significantly influenced by the level of knowledge they have on herbicide related issues.

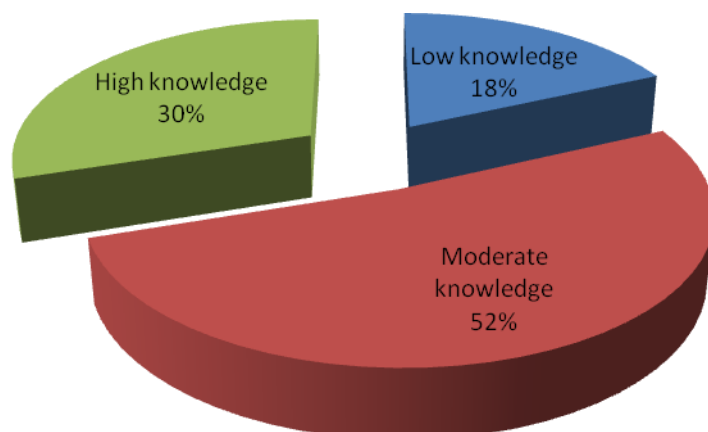


Figure 1: Knowledge level of women farmers on herbicide use.

Herbicide Practices among the Respondents

Table 3 shows that respondents wore a mask during spraying of herbicide ($\bar{x}=1.51$), had a separate utensil for mixing herbicides ($\bar{x}=1.39$), practiced cleaning and rinsing of sprayers after use ($\bar{x}=1.31$) and washed their working clothes separately from other clothes ($\bar{x}=1.14$) and wore long sleeves while spraying herbicides ($\bar{x}= 1.09$). The respondents hardly kept contaminated clothing anywhere ($\bar{x}=0.64$) and never sprayed herbicides leaving their body bare. These show that the respondents were knowledgeable on some of the herbicide practices and this could be helpful against risks that emanate from unhealthy herbicide practices. Okoffo, Mensah and Fosu-Mensah (2016) affirmed that lack of knowledge regarding safe and proper pesticide handling as well as disregard for the use of personal protective equipment (PPE) during pesticides use result to the increase in susceptibility of farmers to agrochemical related risks. On practices of farmers both during and after herbicides use, data on Table 3 show that respondents washed their hand after using or spraying herbicides or their containers ($\bar{x}=1.63$), seldom spray on windy days ($\bar{x}=0.50$), seldom spilled herbicides on skin or clothing ($\bar{x}=0.49$) and never ate and drank while spraying ($\bar{x}= 0.34$). This is an indication that farmers despite the increased amount of various herbicides usage were aware that herbicides are hazardous (Uddin and Igbokwe, 2015)

Entries in Table 3 show that farmers stored herbicides in places that were always locked ($\bar{x} =1.0$), did not hang herbicides under a tree ($\bar{x} =0.74$) and never kept herbicides or containers in the kitchen ($\bar{x}=0.41$). 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 practise is important because herbicides are chemicals that can cause severe damage to humans and livestock if ingested (Gupta, 2016)

Table 3 also shows that they disposed their unused herbicides in ponds ($\bar{x} = 0.50$), containers of used herbicides was disposed by wrapping and burning ($\bar{x}=1.57$). This is similar to the findings of Okafoagu, Oche and Lawal (2017) which shows that 55.8% of the respondents sampled stored empty pesticide containers in their homes and 42.1% used the empty cans to store water at home. Such practices are dangerous and should be prevented for herbicides though beneficial to farmers in weed control could also be harmful to the users and the environment (Iyagba, 2013) especially if the containers are not properly disposed.

Table 3: Distribution of respondents by herbicide practices

Herbicide practices	Mean	Standard Deviation
Clean and rinse sprayer after use	1.31*	0.578
Use separate utensil for mixing	1.39*	0.597
Wash working clothes separate from other dirty ones	1.14*	0.572
Wear long sleeves during spraying	1.09*	0.479
Wear masks when spraying	1.51*	0.576
I do not keep contaminated clothes anywhere	0.64	0.587
Wash hands immediately after using or their container	1.63*	0.543
Store herbicides in places where they are locked	1.0*	0.577
I do not keep herbicide in the kitchen	0.50	0.569
I do not dispose unused herbicide in ponds or carelessly	0.50	0.631
I do not spray herbicides during windy days	1.57*	0.579
Never eat and drink while spraying	0.34	0.697
I do not spill spray materials on skin or clothing	0.49	0.531
I do not hang herbicide bottle under the tree	0.74	0.728
Dispose herbicides by wrapping and burning them	1.57*	0.635

***practices always used by the respondents (mean ≥ 1.0)**

Source: Field survey, 2017

Constraints to the Use of Herbicides

Entries on Table 4 indicate the perceived constraints to farmer's use of herbicide. The major constraints include: inadequate training ($\bar{x}=1.12$), high cost ($\bar{x}=1.07$), inadequate extension contact ($\bar{x}=1.05$), inadequate technical knowledge ($\bar{x}=1.03$), scarcity of herbicides ($\bar{x}=1.02$), inadequate awareness ($\bar{x}=1.10$), and poor timing in application ($\bar{x}=1.0$). This finding is in line with Iyagba (2013) who found out that the major factors limiting herbicide use in River State, Nigeria, include limited knowledge of herbicide, cost of herbicides, unavailability of herbicides, lack of skill in spraying operations among others. Similarly, Kughur (2012) in a study on the effect of herbicide on crops production and environment in Markurdi Local Government Area of Benue State found out that 80.0% of the farmers had a problem of high cost of herbicides. High cost of farm inputs can lead farmers to seek illegal channels of acquiring farm inputs such as smuggling and the eventual use of banned herbicides which could be cheaper to buy but can constitute harm to the farmer and impact negatively on the environment, namely the soil, water, air and food chain. Limited access to information on the availability and use of herbicide can be a very big problem too in the case of the women that indicated that lack of awareness and training was a constraint to them. Owing to the fact that there are not many agro chemical vendors in the rural areas, it is not surprising that scarcity of herbicides is a constraint to some respondents.

The perfect time to apply herbicide is very important as wrong timing can affect the crops negatively and cause loss instead of the expected outcome, therefore, instead of applying the herbicides at the wrong time and damaging the crops, the farmers rather not use the herbicides. This is the perceived reason why the respondents indicated poor timing as a constraint.

Table 4: Constraints to use of herbicides

Constraints	Mean	Standard deviation
Toxicity to plants and animals	0.71	0.725
Labor intensive fatigue	0.67	0.631
Weed resistance	0.57	0.672
Inadequate technical knowledge	1.03*	0.564
High cost	1.07*	0.461
Scarcity of herbicides	1.02*	0.558
Inadequate extension contact	1.05*	0.598
Lack of government policies	0.71	0.617
Inadequate training	1.12*	0.603
Inadequate weather	0.71	0.568
Contamination of water resources	0.71	0.515
Poor storage and obsolete stocks	0.74	0.530
Inadequate awareness	1.1*	0.598
Poor timing in application	1.0*	0.460

***Major constraints (mean \geq)**

Source: Field survey, 2017

Conclusion and Recommendations

Most of the farmers had moderate level of knowledge and poor practises on herbicide use and this will likely have implications on the crop and health of farmers. Also, the relative high cost perceived as a major constraint to the use of herbicides can lead to poor/under application of herbicide. There should be an increase in the extension contact with the farmers so as to give them more information and training on the right use of herbicides. This will increase their knowledge level and practices on herbicides use for adequate weed control and improved crop productivity. There should also be assistance from government and non-governmental organisations in form of loans and subsidies to enable farmers apply the right quantity of herbicide for effective weed control.

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