

Farmers' Knowledge and Perception Towards Herbicides and Pesticides Usage in Fadama Area of Okun-Owa, Ogun State of Nigeria

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Abstract: Farmers in Oko-Mayon fadama area of Okun-Owa in Odogbolu Local Government Area of Ogun state, Nigeria, grow crops like Okro, tomatoes, pumpkin, maize etc. and use pesticides and herbicides to control pests and weeds that attack these crops. Based on the use of questionnaires and interviews that were conducted in the study area, farmers' knowledge and attitude towards the usage of herbicides and pesticides to crops was investigated. The pesticides used by the farmers include Nequvon with Trichlorfon as active ingredient, Warrior with Cyhalothrin-Lambda as active ingredient and Attacker with Cyhalothrin-Lambda as active ingredients. The herbicides used are Roundup with Glufosinate ammonium as active ingredient, Touchdown with active ingredient, Glufosinate ammonium, Dicamba as active ingredient for Vanquish and Express with active ingredient Tribenuron methyl. About 87% of the farmers applied the pesticides and herbicides at prescribed dosage while 13% applied them indiscriminately. All the farmers agreed that the trend of pesticide usage is increasing and the frequency of pesticides application is high. About 38% of the farmers applied occasionally depending on insect infestation. About 54% of the farmers applied them on a monthly basis. 86% of the farmers reported of not using any preventive measures due to high cost. These results can be used to develop a tool to quantify the effect of pesticides and herbicides on farmers and consumers of these crops produced by farmers at Oko-Mayon and similar fadama areas. The need for proper education and rigorous extension work among the farmers are highlighted.

Key words: Fadama • Pesticide • Herbicide • Farmers • Perception

INTRODUCTION

Despite today's advances in agricultural sciences, losses due to pest and weed range from 10-90% for all potential food and fibre crops. The growth in synthetic pesticides accelerated in the 1940s with the discovery of the effect of DDT, BHC, Aldrin, 2, 4-D, Parathion and Chlorodane. These products were effective and inexpensive with DDT being the most popular because of its broad spectrum activity [1].

Pesticides and herbicides have posed a number of problems for agriculture, including the killing of beneficial insects, secondary pest outbreak, the development of pesticides resistance pests, health problems for farmers that handle the chemicals such as abdominal pain, dizziness, headache, nausea, vomiting as

well as skin and eye problems [2]. WHO [3] estimated that each year, 3 million farmers in the developing world experience severe poisoning from pesticides, about 18,000 of whom die.

Exposure to pesticides may cause chronic effects on health such as cancer, interference with the development of the fetus and child, disruption of the reproductive, endocrine, immune and central nervous system [4]. One of the impacts of pesticides and herbicides on living organisms have been the widespread development of resistance in which some insects and weeds are no longer killed by the chemicals at the prescribed dosage formally found to be lethal [5]. In addition to the problem of pesticides resistance, millions of dollars worth of crops have been lost as a result of improper pesticide application [6].

Most pesticides are known to bio-accumulate, which means that the pesticides dissolves willingly in fats and oils which gives explanation as to why the pesticides accumulate and become more concentrated in an organisms body. They could present danger to farmers, consumers and factory workers, indirectly through inhalation, dermal absorption and ingestion or indirectly through dietary intake of food or water [7].

The level of exposure to organisms vary considerably over time, ranging from fully registered application rate arising from drift or soil application, to the nanogram or pictogram level [8]. Garcia [9] reported that pesticides and herbicides exposures are associated with long term health problems such as respiratory problems, memory disorders, miscarriages, birth defects, dermatologic conditions, cancer, depression, neurological deficits, brain tumors, brain cancer, breast cancer, prostate cancer, child leukemia, learning disabilities, canine malignant, lymphoma and various acute effects. Jeyaratnam [10] in his study found that as many as 25 million workers in developing countries may suffer mild poisoning from pesticides yearly. A separate study also conducted by Macauley, *et al.* [11] estimate that each year, 3 million workers in agriculture in the developing world experience severe poisoning from pesticides, about 18, 000 of who die. According to Poston, *et al.* [12], there is a growing concern in regard to the developmental neurotoxicity due to pesticide been fuelled by recent epidemiologic observations that children exposed prenatally or during early postnatal life suffer from various neurological deficits.

Many of these products which include herbicides as well as insecticides act on a very broad spectrum. In order words, they kill non targets species as well as target species. This characteristic has a negative effect on the food chain on wild life habitats and consequently there is an indirect impact on species that eat certain prey or use the affected habitats.

MATERIALS AND METHODS

The study was conducted at Oko-Mayon in Okun-Owa area of Odogbolu Local Government of Ogun State. A questionnaire consisting of structured items was designed. Data was collected through a farm survey by face to face interviews with farmers during farm activities.

A total of seventy (70) questionnaires were administered but fifty two (52) was returned valid. The site was selected based on the crops grown, pesticide usage, ease of accessibility and shallowness of the land (irrigated land). The study was aimed at exploring robust,

valid and reliable methodologies for assessing the knowledge and perceptions of farmers towards the usage of pesticides and herbicides, damages caused by arthropod pest and preventive measures taken.

RESULTS

None of the farmers was less than 25 years old, about 9.6% were in the 26 to 35 age bracket, 34.6% were between 36 and 45 years of age, 46.2% were between 46 and 55 years old while 9.6% of the farmers were 56 years and above, 98% are married. Majority 79% of the farmers are male, while 21% are female.

Table 1: Socioeconomic Characteristics of Farmers Status

Factors	Categories	Frequency	%
Age(yrs)	15 – 25	----	----
	26 – 35	5	9.6
	36 – 45	18	34.6
	46 – 55	24	46.2
	56 and above	5	9.6
	Total	52	100
Marital Status	Single	----	----
	Married	51	98.1
	Separated	----	----
	Divorced	----	----
	Widowed	1	1.9
	Total	52	100
Sex	Male	41	78.8
	Female	11	21.2
	Total	52	100
Religion	Christianity	38	78.8
	Islam	8	15.4
	Traditionalist	5	9.6
	Others	1	1.9
	Total	52	100
Education	No formal education	29	55.8
	Primary education	21	40.4
	Secondary education	2	3.8
	Total	52	100
Ethnic Group	Yoruba	22	42.3
	Hausa	----	----
	Isoko	20	38.5
	Igbo	8	15.4
	Others	2	3.8
	Total	52	100

Table 2: Methods of farming/ Status

Factors	Categories	Frequency	%
Method of Farming	Manual	52	100
	Mechanised	----	----
	Total	52	100
Size of the Land	Plot(s)	43	82.7
	Acres	9	17.3
	Total	52	100
No of Small Holdings	Less than 5	52	100
	5 – 10	----	----
	11 – 15	----	----
	16 – 20	----	----
	21 and above	----	----
	Total	52	100

Table 3: Farmer's usage of Pesticides and Preventive Methods

Factors	Categories	Frequency	%
Frequency of Usage	Hourly	----	----
	Daily	----	----
	Weekly	4	7.7
	Monthly	28	53.8
	Occasionally	20	38.5
	Total	52	100
Usage period	Before planting	3	5.8
	Immediately after planting	41	78.8
	Occasionally	8	15.4
	Total	52	100
Pesticides Used	Trichlorfon (Nequvon)	6	11.5
	Cyhalothrin – Lambda (Warrior)	36	96.23
	Cyhalothrin – Lambda (Attacke)	10	19.23
	Total	52	100
Dosage Used	As prescribed	45	86.5
	Overdosage	7	13.5
	Total	52	100
Perception of Preventive Measures	Yes	15	28.8
	No	9	17.3
	After the day's work	28	53.8
	Occasionally	----	----
	Total	52	100
Preventive Measures	Use of overall only	2	3.8
	Use of nose guards only	----	----
	Use of handkerchief only	----	----
	Use of overall and nose guards	45	86.5
	Use of overall and handkerchiefs	----	----
	Use of nose guards and handkerchief	----	----
	All	3	5.8
	None	2	3.8
	Total	52	100

Table 4: Farmers knowledge of Arthropod Pests

Factors	Name of Pest	Frequency	%
Arthropod Pests	<i>Zonocerus variegatus</i> only	6	11.5
	<i>Busseola fusca</i> only	4	7.7
	<i>Spodoptera</i> sp. only	6	11.5
	<i>Zonocerus variegatus</i> and <i>Busseola fusca</i>	6	11.5
	<i>Zonocerus variegatus</i> and <i>Spodoptera</i> sp.	5	9.6
	<i>Busseola fusca</i> and <i>Spodoptera</i> sp.	12	28.8
	All	13	25.0
	Total	52	100.0
Most dreaded Insect(s)	<i>Zonocerus variegatus</i> only	8	15.4
	<i>Busseola fusca</i> only	5	9.6
	<i>Spodoptera</i> sp. only	10	19.2
	<i>Zonocerus variegatus</i> and <i>Busseola fusca</i>	3	5.8
	<i>Zonocerus variegatus</i> and <i>Spodoptera</i> sp.	6	11.5
	<i>Busseola fusca</i> and <i>Spodoptera</i> sp.	8	15.4
	All	12	28.8
	Total	52	100.0
Vulnerable stage	Larva only	22	42.3
	Adult only	11	21.2
	Larva and Adult	19	36.5
	Total	52	100.0
Damage extent and	Mild	3	3.8
	Severe	49	94.2
	Total	52	100.0

Table 5: Plants attacked mostly by Pests

Name of Plant	Frequency	%
<i>Abelmoschus esculentus</i> only	3	5.8
<i>Telfiaria occidentalis</i> only	14	26.9
<i>Zea mays</i> only	3	5.8
<i>Lycopersicum esculentus</i> only	3	5.8
<i>Abelmoschus esculentus</i> and <i>Telfiaria occidentalis</i>	1	1.9
<i>Abelmoschus esculentus</i> and <i>Zea mays</i>	1	1.9
<i>Telfiaria occidentalis</i> and <i>Zea mays</i>	4	7.7
<i>Abelmoschus esculentus</i> and <i>Lycopersicum esculentus</i>	----	----
<i>Telfiaria occidentalis</i> and <i>Lycopersicum esculentus</i>	----	----
<i>Zea mays</i> and <i>Lycopersicum esculentus</i>	18	35
<i>Abelmoschus esculentus</i> + <i>Lycopersicum esculentus</i> + <i>Zea mays</i>	1	1.9
<i>Abelmoschus esculentus</i> + <i>Lycopersicum esculentus</i> + <i>Telfiaria occidentalis</i>	1	1.9
<i>Zea mays</i> + <i>Telfiaria occidentalis</i> + <i>Abelmoschus esculentus</i>	----	----
All	2	43.8
Total	52	100

Many of the farmers interviewed (73%) are Christians while about 15% are Muslims, 10% are traditionalist while the remaining 2% do not practice any religion. More than half of the farmers have no formal education (55.8%), 40.4% of them have primary education and only a scanty 3.8% had secondary education, none had tertiary education. 42.3% belong to the Yoruba tribe, while about 38.5% are Isoko, 15.4% are Igbo while 3.8% are from other tribes.

The survey showed that all the farmers still use manual method. The size of the land owned by the farmers range from as little as a plot to as much as 10ha (about 25 acres) in different farmstead. Many of them had small holdings. Some of them have spent over 40 years in farming; others are relatively new in the business with just about 2 years experience.

More than half of the farmers (54%) use pesticide on a monthly basis, 38% of them uses the pesticides occasionally while only few of the farmers (8%) use the pesticides on a weekly basis. Majority (79%) of the farmers administered pesticide immediately after planting, 15% use them occasionally while very few of them (6%) use them before planting.

An estimated 12% of the farmers use Trichlorfon, an active ingredient of (Nequvon) on their farm while majority of the farmers (80%) use Cyhalothrin. Majority of the farmers (87%) use the pesticides at the prescribed dosage while 13% have always use overdose which could pose a threat to the consumers of these crops.

Most of the farmers (98%) showed a degree of awareness about insect pests. An estimated 42.3% of the farmers opined that the larva stage of the arthropod pest was more vulnerable on their crops. This may be because insect larva live and feed on the crops they invade 21.2% of the farmers opined that the adult stage was most

vulnerable while 36.5% of the farmers said that both the stage and larva were vulnerable as they attack, feed and live on different parts of the crop.

DISCUSSION

The use of pesticides and herbicides was observed to be high, most the pesticides were used frequently, probably because farmers assumed that the only solution to pest is to spray frequently as Dinham, [13] also found out in Indonesia. In similar studies conducted in Tanzania, Ngowi [14], it was revealed that farmers were not receiving agricultural extension services hence have attempted various means especially in pesticides use when dealing with pest problems but were constrained by the lack of appropriate knowledge.

It was observed that the little percentage of the divorced female may explain why they went into farming business to sustain themselves and their families. The large number of male farmers and small number of female farmers is an indication of southern western culture where the male is the farmer who brings home the produce from the farm and the female sells them. Majority of the farmers planted *Abelmoschus esculentus*. This may be because of its on high demand in this part the country; it may also be because the area is an irrigated land. Some other crops like *Zea mays*, *Lycopersicum esculentus*, *Telfiaria occidentalis* are grown in the area. Cucumber was also grown.

However, in most cases, many farmers were unable to identify other insect pests from the larger and more common once like grasshopper, larva and adult of weevils, stem borers, probably owing to the fact that majority of them had no tertiary education. Insect pests that could not be identified correctly were simply called "kokoro"

even by some of few of them that had secondary education. The opinion of the farmers about the most dreaded insects was quite alarming as many of them opined that all the insects were harmful at their larva stages of life and that both the young and the adult insects are dangerous and attack young plants, fully grown crops and those in the nurseries.

The variegated grasshopper, *Zonocerus variegatus* is the only serious grasshopper pest in the humid coastal areas of West Africa, where it can attack almost any crop. Of all the insects regarded as pests by the farmers, the grasshopper, *Zonocerus variegatus* is the most dreaded pest of all, attacking a variety of crops followed by *Spodoptera* sp. which was perceived by some farmers as piecing insect that could not be handled culturally because of its rough surface. *Abelmoschus esculentus* and *Zea mays* were mostly attacked because they serve as food for some insects found in the study area.

Lycopersicum esculentus and *Abelmoschus esculentus* are mostly attacked by pests at the young stage and adult stage. Very few of them said that the extent of damage was mild. This may be because their constant use of pesticides when they notice pests on their crops. The farmers in the study area select the type of pesticides and herbicides to use on their farm. This is not situation in many developing countries where the choices of pesticides and herbicides to use by farmers are influenced by the suppliers as Epstein and Bassein [15] found out with farmers in California.

In African countries, many Government extension programmes encourage the use of pesticides and herbicides as opined by Abate, *et al.* [16] but do not consider their effect in the environment and health risks and coupled with lack of basic knowledge of pesticides and herbicides, farmers decision on what pesticides and herbicides and how to use them do not have a bearing on health and safety of the environment as opined by Epstein and Bassein, [15] that farmers used more pesticides and herbicides because they based the application on calendar spray pesticide program without necessarily given much priority to health and environmental considerations.

Trichlorfon (Nequvon), Cyhalothrin - Lambda (Warrior), Cyhalothrin - Lambda (Attacke) were the most used pesticide while Glufosinate ammonium (Roundup), Glufosinate ammonium (Touchnodown, Dicamba (Vanquish), Tribenuron methyl (Express) were the most herbicides used. Most of the farmers preferred the pesticides above to others in the market because they are cheaper and they kill a wide range of insect pests.

They also preferred the herbicides simply because they are broad spectrum as they kill perennial plants.

The family members were deployed to duties such as transporting and harvesting. It was common scenery in this study to see women and children transplanting and harvesting especially on Okro and maize farms. This trend of labour division exposed majority of the community to pesticides and herbicides in one way or the other. The trend of pesticides and herbicides use by farmers over the years is probably based on farmers' knowledge and perception in relation to effectiveness of pesticides, herbicides, pest, farm size, price and weather condition.

Trichlorfon and Cyhalothrin - Lambda are highly hazardous organophosphate pesticides which are applied as granules in the soil to control insect eggs, larva and adult which can cause acute effects despite the fact that the formulation type is solid to mitigate risks from pesticides exposure to farmers health, non target organisms and the environment. These pesticides can be fatal if inhaled, swallowed or absorbed through the skin, even though the effects of contacts and / or inhalation may be delayed due to its formulation as found out by Santo, *et al.* [17] in groundnut plantation in Senegal. The effects of exposure in even of a short duration can be delayed but there is possibility of accumulative effects as opined by Gupta [18] in his work. The risk of long term effects of the pesticides and herbicides that were being used in the study area is high especially due to exposure to carcinogens and suspected endocrine disruptors because the pesticides and herbicides were being used wrongly and mishandled.

In general, the frequency of pesticides and herbicides application by farmers were high, such heavy use of pesticides may result in frequent contact with pesticide which can lead to significant health problems. Usually, farmers assume that pesticides and herbicides poisoning symptoms are normal, so they got used to them, Kishii, *et al.* [19] found out in similar studies in Indonesia and as found out by Ajayi, [20] in similar work in Cote d' Ivore. Health and environmental problems cannot be isolated from economic concerns due to the fact that incorrect pesticide use results not merely in actual yield loss but also in health and pesticide effects of air and water pollution. The problems of farmers' health should be an important concern for policy makers when looking at the economic efficiency of crops.

Therefore, there is need to carry out studies in order to educate and advice farmers on how to protect themselves. The high dependence on pesticide by these

farmers is an indication that they are not aware of other pest management strategies that are effective, inexpensive and yet friendly to the environment. Pest management strategies includes intercropping as opined by Lugutowska, *et al.* [21] and tillage type and crop rotation as suggested by Humel, *et al.* [22] have been shown to significantly reduce insect pests. There is need to bring to attention of these farmers existing alternative pest management strategies that are cost effect and environmentally friendly.

In conclusion, the indiscriminate and frequent application of pesticide and herbicide on the farm should be discouraged. Government should also discourage the use of pesticides and herbicides that have been banned by the WHO and FAO. Government should also emulate countries like America, Mexico, China, Bangladesh and Australia in educating the farming on Integrated Pest Management as a means of reducing or eradicating health hazards posed by pesticides and herbicides usage.

Hence, we recommend that farmers should be subjected to training by the Agricultural Extension Officers how to adopt Integrated Pest Management and the benefit of taken preventive measures on the farm so that they can remain healthy. Further studies should be carried out to ascertain the symptoms of pesticides and herbicides usage; at the same time, the effects of pesticides and herbicides should further be study on non-target organisms.

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