

PESTICIDE USAGE AND CROP PROTECTION PRACTICES AMONG FARMERS: A CASE STUDY OF THREE LOCAL GOVERNMENT AREAS IN EKITI STATE

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SUMMARY

Ecological and health challenges arising from the use of pesticides in agriculture are global issues. Crop protectionists and environmentalists are mounting campaigns for the appropriate and safe use of pesticides; while also advocating for non-pesticide approaches in pest and disease management of field crops. Few records exist on the usage of pesticides by farmers in Nigeria, at a time when the whole world is discouraging pesticide applications to field crops but promoting organic production of crops. It is pertinent to understand and follow up on the activities of farmers who constitute the bulk of the pesticide users. A survey of pesticide applications by farmers from three local government areas of Ekiti State (Ikole, Ikere and Ekiti-West LGAs) was carried out. A multistage sampling technique involving three local government areas, three communities and ten farmers per community was explored. A total of 90 farmers were involved as respondents in a structured questionnaire. The study revealed high adoption of pesticides, principally the organophosphates and Glyphosate by the farmers. Ninety percent of farmers in Ekiti-West LGA applied pesticide in response to pest and disease situations. The majority of the farmers involved in the study had little or no education. Twenty-eight percent had absolutely no formal education while 32 % had up to secondary school education. The majority of the farmers lack the technical expertise required for the safe use of pesticides without agricultural extension support services. Consequently, consumers of agricultural produce from these farms may potentially expose themselves to toxic levels of pesticide residues with its associated health risks because of inappropriate and unsafe pesticide applications.

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The increasing application of agrochemicals for increase agricultural production and productivity is a major contribution to the chemical pollutants in food and water supply. The need to meet up with the food demand of a geometrically increasing population was the driving force for

industrialization of agriculture. A leading factor mitigating crop production is the issue of pest and diseases. Cultivation of large acreage left farmers contending with weeds and other obnoxious plants. In an attempt to address the teeming problems of crop production, agriculture became a leading source of environmental pollution, second only to industrial waste effluence (Nicolopolou-Stamati *et al* 2016). Commonly used pesticides include the organochloride, organophosphate, carbamates, and pyrethrum formulations.

In Nigeria an estimated 125, 000- 130,000 metric tons of pesticides are used annually in agriculture (Apeh, 2018) while, an estimated 2.5 metric tons are used globally with the bulk attributed to agriculture (Michael and Alavanja, 2009). Many of these pesticides are associated with health risk having been found in underground water (Manahan, 2000). Pathogenesis of Parkinson's disease and Alzheimer diseases have been linked to pesticide usage (Sarawal, *et al.* 2018) as well as other endocrine malfunctions (Nicolopolou-Stamati, *et al* 2016). Poisoning from pesticides is a global issue accounting for nearly 300,000 deaths annually (Sarawal *et al.* 2018).

Before World War II, the Nigerian farmer fought pests by the traditional methods with no technical assistance available to him. The current dependence on synthetic inputs for the management of pests rest on farmers' bulk of whom are illiterates or have minimal education (Apeh, 2018). In India, high knowledge level is not reflected in practice (Minnikanti *et al.* 2019). Over the years there has been radical advocacy for minimal pesticide usage, validation of cultural practices and organic agriculture with a strong emphasis on zero pesticide approach. Despite the health risk involved and the mounting campaigns, pesticides and other synthetic inputs have continued to attract the patronage of farmers because of the increasing demand for food. Given the importance of the issue of pesticides and eco-pollution, a constant review of the activities of farmers is extremely vital. The objective of this paper is to evaluate the level of pesticide usage among farmers in three local government areas of Ekiti State; to assess the compliance to safe use

knowledge based application of pesticides and crop protection practices by farmers in crop production.

MATERIALS AND METHODS

A multi-stage sampling technique was applied in the administration of questionnaires. Three local government areas (LGA) known for their prominent agricultural activities in the state were selected for the study. These LGAs includes Ikere-Ekiti, Ikole-Ekiti and Ekiti-West. Three communities were randomly selected from each local government and lastly, ten (10) farmers were selected per community. Data was collected from the information gathered from the questionnaire and subjected to descriptive statistics.

RESULTS

The result from the study revealed wide adoption of the use of farm inputs such as fertilizer, insecticide, and herbicide by farmers in Ekiti state. In Ekiti- West all the farmers that participated in the study applied insecticide in their field along with either fertilizer or herbicide while in Ikere and Ikole-Ekiti 80 % and 50 % respectively of the farmers used insecticides (Fig 1). In the three locations zero synthetic input (organic farming) was not well received by farmers. In Ikole –Ekiti and Ikere only 23.3 and 6.7 % respectively, of farmers carried out production organically while in Ekiti West not a single farmer engaged in organic approach in pest management (Fig. 1). The use of insecticide is widely adopted in the three locations. Herbicide application is highly practiced by farmers in Ikere (73.33%) while a considerably lower percentage of 45% and 40% of farmers in Ikole and Ekiti West used herbicide. In response to leaf defoliation 33 % of farmers applied insecticides. In all the locations the farmers carried out application without the supervision of Agricultural extension personal and without protective clothing. The most common pesticide used were the insecticide Cypermethrine, a synthetic pyrethroid, DD-Force an organophosphate and; the herbicides Atrazine and Glyphosate. Farmers in Ikere were more acquainted with improved methods of crop production as the use of fertilizers, insecticides and herbicides were highly

adopted by them when compared with the other locations (Fig 1). Grasshoppers, stem borers and armyworms were the most reported pest (Table 1).

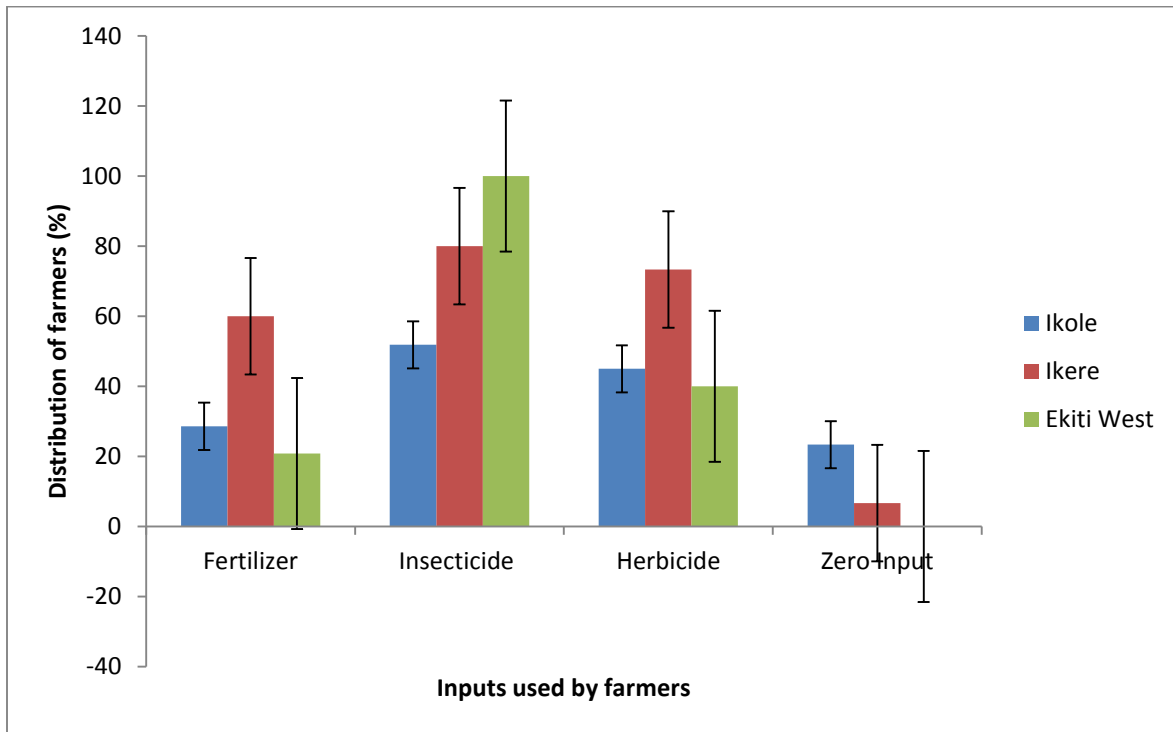


Figure 1: Inputs used by farmers in Ikole, Ikere and Ekiti west Local Government Areas of Ekiti State

Significant populations of the farmers do not have more than secondary education. In Ikole, 26% of the farmers lack formal education while, 33.3% of them attained tertiary education (Table.2). In Ikere, 50 % of the farmers had secondary school education while on the contrary, 56.67 % of the farmers in Ekiti West have no formal education (Table 2.).

The study showed that 70 % of farmers in the surveyed areas engage in mixed cropping. In Ikole LGA 80 % of the farmers were involved in mixed cropping (Fig.2). The major crop of choice is

maize or yam planted as sole or in mixture with varied crops such as, cassava, cocoyam, plantain and other horticultural crops. Farmers engaging in sole planting cultivated mainly maize while Maize-Yam -Cassava is the most preferred combination for mixed cropping in all locations except Ikerre were farmers cultivate maize-yam with cocoyam (Fig 2).

DISCUSSION

Most of the pesticides indicated in this study are a major source of health problems having been implicated in various cancers and endocrine diseases. The herbicide Glyphosate is associated with endocrine and erythrocyte disorder. There are studies connecting glyphosate usage and health issues such as hypertension, diabetes, stroke, kidney failure, cancer, Alzheimer and Parkinson's disease in the USA (Kwiatkowska *et al.* 2014).

Table 1: Prevalence of Insect pest in Ikole, Ikere and Ekiti west Local Government Areas of Ekiti State

Pest	Prevalence (%)			
	Ikole	Ikere	Ekiti West	Mean ± SE
Grasshopper	44	23.08	6.67	24.58±10.80
Stem borers	28	0.00	43.33	23.78±12.69
Armyworm	28	53.85	36.67	39.51±7.60
Black ant	0.00	7.69	0.00	2.56±2.56
Termite	0.00	15.38	0.00	7.69±6.28
Yam beetle	0.00	0.00	6.67	3.34±2.72
Aphids	0.00	0.00	6.67	3.34±2.72

Table 2: Educational qualification of farmers in Ikole, Ikere and Ekiti-West Local Government Areas

Educational Qualification	Ikole	Ikere	Ekiti West	Mean ± SE
No formal education	26.67	0.00	56.67	27.78±16.37
Primary school	6.67	30.00	13.33	16.67±6.94
Sec' school	30.00	50.00	16.67	32.22±9.69
Tertiary education	33.33	20.00	13.33	22.22±5.88
Adult education	3.33	0.00	0.00	1.11±1.11

EVALUATION OF ANTIMICROBIAL POTENTIALS OF SELECTED BOTANICALS AGAINST KOLANUT STORAGE ROT PATHOGEN (*LASIODIPLODIA THEOBROMAE*) IN NIGERIA

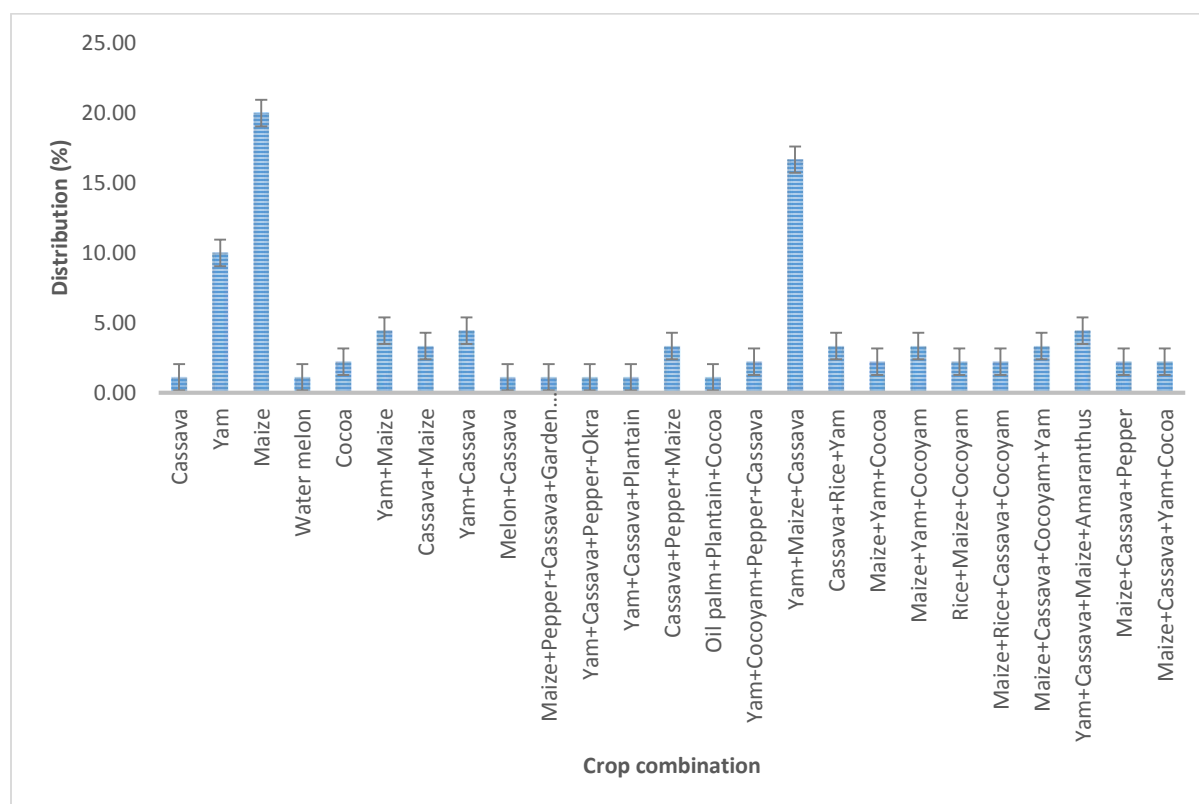


Figure 2: Crop combination planted by farmers in the three Local Government Areas surveyed in Ekiti State.

Cypermethrine, a synthetic pyrethroid is the major insecticide applied in the field. Pyrethroids that were considered safe have in recent times shown to disrupt endocrine activities (Mnif, *et al.* 2011; Nicolopolou-Stamati, *et al.* 2016). Organophosphate are considered health risk. In most developed nations they have been de-registered but, in Nigeria the organophosphates are still available under different trade names. Insecticides were observed to be the most commonly used pesticide similar to the report from Tanzania and the USA (Manahan, 2000). The application of insecticide in response to leaf defoliation a nonspecific symptom, is a strong indication of abuse of pesticides among farmers. The campaign and concept of judicious use of pesticides and green agriculture being advocated by different environmental- friendly groups are not making much

impact among Nigerian farmers. A similar observation was made among farmers in other African countries where interest in the use of plant materials as pesticide is scanty (Kamanula, *et al.*, 2011; Grywacz *et al.* 2014). Even when the concentration of pesticides is in the miniscule level as permitted by legislation, it does not undermine the health risk probably associated with the synergy of pesticides as often obtained in the field (Nicolopolou-Stamati, *et al.* 2016).

This careless application of pesticides has far reaching consequences. The mortality of natural enemies of pest due to exposure to pesticide is a major cause of pest resurgence. Mortality of natural enemies of pests has followed the application of traditional insecticides such as organochlorines, organophosphates, carbamates and pyrethroids. However, recent findings have also reported pest resurgence associated with alteration of resistant and nutritious substances in host by pesticides including fungicides leading to host induced susceptibility (Wu *et al.* 2018).

Common pesticides, example, carbamates and carbofuran have been implicated in this alteration of host physiology. Such a pesticide -induced host susceptibility were reported to be beneficial to feeding, survival and reproduction of Brown plant hoppers, a pest of rice (Wu *et al.* 2020). Resurgence attributed to such physiological changes of host as reported by Wu *et al.* 2020 is a possibility in the study area if proper research and monitoring is not applied.

This risky handling of pesticides by farmers is certainly as a result of poor education. Poor education has much impact on the ability of farmers to appreciate the danger associated with pesticide usage and; the importance of knowledge based production practices in pest management. All over the world cropping systems are being developed to meet ecological and socio-economic needs associated with crop production in different regions. In the surveyed area maize and yam are the major crops of choice and were grown in combination with other horticultural crops all of which share pest problems as such, are poor combinations. The concept of crop production as an integral part of pest management and reflected in the choice of crop/crop combinations and cultural

practices intentionally chosen to mitigate pest problems is largely not applied in the study area. Hence, the choice of crop in the study does not depend on host-pest relationship rather, the combination is solely on marketability and economic returns of the produce. This is seen in the popular combination of maize-yam-cassava observed in this study. Findings by Adebite *et al.* (2008) shows lesion nematode, *Pratylenchus* spp. and other lesion causing nematodes to have high prevalence and population in Ekiti State and neighboring states in the South-West. Yam and maize are very good host of *Pratylenchus* spp. making both poor choice that may escalate the population and impact on host resulting in increased demand for pesticide.

In Ghana, at least 75 % of the cultivated land is devoted to multiple or mixed cropping, with 50% to the combination of cereals and legumes (Diehl 1992). In the Sudan savannah belt of Nigeria and other West African countries maize is cultivated in combination with legumes such as cowpea and groundnut (Sallah, 1992) which improves soil nitrogen. Crops grown in impoverished soil are most liable to pressure from diseases and pest making them easily susceptible. This situation provides a vicious cycle of pest-disease - pesticides into the ecosystem. The combination of maize-yam-cassava as observed in this study is therefore, a poor choice that depletes the soil and increases pest situation (example nematodes), resulting in more pesticide usage.

In the surveyed areas, it appeared that the illiteracy level among farmers is very high. This may result in poor administration of synthetic inputs such as pesticides. Illiterate farmers are very unlikely to adhere to instructions. When a large population of practicing farmers cannot read they pose great danger to both consumers and the environment. Farmers engaged in the organic approach of management utilized incorporation of animal dung into the soil, cover cropping and crop rotation as means of improving soil fertility. The choice of organic practices often was a response to lack of finance for the purchase of input or the absence of motivation because of the small plot size. Poverty, ignorance and poor infrastructure results in lack of access knowledge and tools (Njuki *et al.* 2004). The use of animal dung and cover crop as means of improving soil fertility

is a practice that should be encouraged among farmers in the wake of calls by environmentalist on ecosystem preservation. The positive role of organic amendments and plant products in disease management has been extensively researched on with promising results in Nigeria (Agbenin, 2004; Bulus *et al.*, 2016). Use of organic amendment must be carried out with an understanding of the phytochemicals in plant -based products and the correct method of application (Agbenin, 2013).

CONCLUSION

Illiterate and semi-literate farmers have detrimentally assumed the responsibility of handling toxic agrochemicals in crop production. This has far reaching consequences on human health as we run the risk of our markets being filled with contaminated and unsafe farm produce that are neither fit for local consumption nor for international market.

There is clear absence of effective regulations on pesticide usage. This may result in lack of competitiveness for international market because, agricultural products are not able to meet international standards. There is need for the government to enact laws and framework for the practice of Plant Protection and; the use of pesticides in crop production and storage. It is pertinent for government to take the lead in not only supporting research in other non-synthetic modes of pest management but also, encourage farmer usage of such products by ensuring its availability. The extension arm of the agricultural chain must be strengthened both in the agricultural institutions and in the field to give farmers the desired technical support required.

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