

Survey on Pesticides Application Practices in Leafy Vegetables Production and Public Health Risk Amongst Farmers In Lagos And Ogun States, Nigeria

Adekalu; O. A., Atanda; S. A., and Adarabierin; I. G.
Nigerian Stored Products Research Institute (NSPRI), Km 3 Asa Dam Road
Ilorin, Kwara State.

Abstract: Excessive use of pesticides constitutes public health concern due to its accumulation over long period of time and poses significant health risk to humans. This study was carried out among vegetable farmers in parts of Lagos and Ogun States to ascertain pesticide usage, class of pesticide, and awareness on the danger of using banned pesticides among others; structured questionnaires were administered to the farmers. The survey revealed that 96% of respondents applied pesticides, combination of pesticides for killing pests during the dry and rainy seasons. A banned organochlorine pesticide well known for acute toxicity, Gammalin 20 is being used by respondents. Sniper was applied in some farms visited. 100% of respondents applied them on their cultivars. Over 80% of respondents do not have agricultural training or formal education. There is an urgent need by relevant bodies to embark on sustained massive enlightenment and training on the safe use of approved pesticides and the risks of using banned pesticides. Farmers should be encouraged to adopt Good Agricultural Practices to minimize the use of pesticides. This study is a necessitated response to public complaints of dysentery, diarrhoea and cholera outbreak associated with consumption of local meal of leafy vegetables. Pesticide can cause short term effects as well as chronic adverse effects that can occur months later. Or years after exposure.

Keywords: Leafy vegetables, Pesticides, Questionnaire, Respondents, Good Agricultural Practices

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I. Introduction

During the last half century the use of chemical pesticides and fertilizers have dominated agricultural practices, expanded the use of synthetic chemicals in the product we consumed and industrial goods (Anasta and Williams, 1996).

Postharvest losses of fruits and vegetables through the value chain range between 30 – 70% in Nigeria; it is imperative to devise proper control methods or measures in Good agricultural practices and appropriate application of fungicide or pesticides in loss reduction and attainment of Food security goal (NSPRI, 2015; Adekalu, 2014). The increasing demand for food safety has stimulated research regarding the risk associated with consumption of fruits and vegetables as they constitute major part of human diet (Ibrahim *et al.*, 2018).

Leafy vegetables are highly perishable plant leaves eaten in many African dishes. They are a major source of micro nutrients such as minerals and vitamins, providing an inexpensive source of energy and other essential nutrients, however, they are prevalently exposed to pests and diseases attack leading to the inherent use of synthetic pesticides (insecticides, herbicides, fungicides and some antimicrobials) which are widely used in fruits and vegetables cultivation. Acute health effects include stinging eyes, rashes, blisters, blindness, nausea, diseases, diarrhea and death. (World Health Organization / IPC (2010)). Residues which remain on agricultural commodities are established carcinogens or toxins; therefore residue reductions should be ensured (Ojo, 2016; Akan, 2014; Fasuyi, 2006).

The existence of an increasing awareness on food safety and quality control on residual pesticide concentrations in harvested/stored produce serves the prejudice on which this survey was undertaken; using structured questionnaires for obtaining cogent information on the prevailing pesticides practices amongst leafy vegetable farmers.

II. Materials and Methods

Study areas: Idi Araba, Iyana-Iba, Maya Aladiye, Igbogbo and Akoka were selected farming communities specialized in the cultivation of vegetables in Lagos state; while in Ogun state, Lusada was the only farm selected; the study was undertaken between July and August, 2018.

Sampling Procedure: Discrete survey was conducted in the six farms through administration of structured questionnaire (a closed-ended question), validated by Outreach Department of Nigerian Stored Products Research Institute (Lagos Zonal Office). Random sampling was adopted and a total of forty nine farmers participated in the exercise. The questionnaire averagely took ten minutes to complete, its constituent being demographic information, types of vegetables planted, years of farming experience, income generated from vegetable farming, pesticide form, mode of application, source of purchase, planting time and period of application, training on the application of pesticides, labelling on pesticide containers among others. English, Hausa, ‘Pidgin’ English and Yoruba (Native Languages) were means of communication.

Statistical Analysis: Data were analyzed using SPSS software version 21 (2012). Descriptive statistics distribution, cumulative frequencies, graphs and percentages were used to describe the findings according to each specific objective.

III. Results and Discussion

Local spinach, *Amaranthus* sp. (Tete), *Celsoia argentea* (Shoko yokoto), *Corchorus olitorius* (Ewedu), Bitter leaf *Vernonia amygdalina* (Ewuro), Pumpkin leaf *Telfaria occidentalis* (Ugu), Water leaf *Talinum triangulare* (Gbure), Curry leaves, Onion and Lactuna (Lettuce) were leafy vegetables cultivated by the interviewed farmers. Results showed that above 60% of the vegetables farmers were males while less than 31% were females. Approximately 41% had one to five years’ experience in vegetable cultivation in all the farms visited, while Six to Ten years’ experience was averagely 26.54% in all the farms visited, while eleven to thirty years experienced farmers were 24.49%. All the farmers visited responded well to high income / profit generated.

All the respondents conceded to prevalent utilization of pesticides for vegetable cultivation, with above 90% interviewed farmers using different pesticides in liquid, granules, pellets forms; the products used were: Gammalin 20, Lamadex, Abamectin, Scouth insecticide, Megan, Choloriphyphos, Bemamechin benzoate to control insects (Figure1). Respondents also reported that they use some organic pesticides such as: pepper spray and Neem oil . Most of the pests were: aphids, flies, stem borers and worms. Averagely, 60 – 80% of these farmers in the discrete locations (farms) lack formal and agricultural education on the use of pesticides. 81% of farmers in Akoka farm apply pesticide; 45% apply liquid and 36% apply granular and 9% apply pellets. 63% apply pesticides occasionally and 18% always, with corresponding success recorded. 81% do not have formal education while only 19% were educated. All respondents in Iyana-Iba farms apply pesticides. 61% apply it occasionally. 61% lack formal education while others do. 100% respondents in LUSADA farms apply pesticides (Liquid). They spray the leaves (foliar) as infused. Some apply neem oil. 100% of respondents Idiaraba farm do not have formal education/ training. 100% of respondents use pesticides. 60% apply liquid while 40% apply pellets. Approximately 60% apply GAMALIN 20 while some 20% use pepper spray and Neem oil. Forty-eight percent of respondents do not have formal education. 20% can read instructions. 100% respondents in Igbe farm Igboabo apply pesticides. 60% use liquid while 40% use pellets and 10% use granules, 60% respondents use SNIPER and all had no formal education. Averagely, over 70% applied these pesticides in rainy season while a decline to 65.3% applied in dry season cultivations.

All farmers applied pesticides in the morning and evening, with about 47% undertaking the activity in the morning while ten of the studied forty-nine farmers are of the evening choice on respective pesticide applications, and 32.7% undertake this activity both in the morning and evening. About 70% of the farmers apply pesticides during cultivation and others after cultivation, depending on their respective choices of products and experiences. Majority (>70%) of these farmers procure their pesticides from accredited agro-chemical merchants while less than one-third of the populace obtain their pesticides from provided government arms such as the ADPs and a small fragment (<9%) are associated with other sources of purchase. Figure 2 presents the success rate associated with the utilization of pesticides in vegetables cultivation as given by the interviewed farmers; averagely about 70% of the farmers testified to enhanced productivity with increased profit by their utilization of different pesticides, while 30.4% had failures from their attempt at utilizing pesticides, affecting their yield and generated income over different instances of their respective years of experience.

Poor pesticide education is associated with extensive misuse as established by this study; issues with correct effective and safe application of cheap but deadliest types of pesticides in terms of persistent toxicity were also reported by Ojo (2016). A definitive association between the consumption of leafy vegetables and human disease provides implicit evidence of transfer from animal sources to field crops and retail commodities including minimal processed fresh cut products. It is important to have afore knowledge of crops/vegetables to be stored, this reduce incidence of food poisoning through pesticide. The survey revealed prevalent application of Gamalin 20. Synthetic pesticides especially the organochlorines and organophosphate used in the control of insects, microorganism of stored products have been of major public health concern to Government and all stakeholders. Pesticides are classified by the acute, oral and dermal toxicity using the estimated respective

lethal dose (LD50) as reported by Ogunjimi and Farinde (2012). Some people are more foxic than others to pesticides impacts.

Infants and young children are known to be more susceptible than adults to the toxic effects. Farm workers and pesticides applicators are more vulnerable because they receive greater Exposure.

However, pesticides are toxic substances and persistence in character as results of direct applications to crop growing in the field had been reported. It contributes to serious challenges of public health. The hazards of toxin residues can be considerably reduced if pesticides are used in accordance with Good agricultural practices (Akan *et al.*, 2014).

Some pesticides particularly pyrethrin/ pyrethroid, organo chlorines, Organophosphate and carbamates are pesticides that causes chronic effects may not appear for weeks or months even years after exposures making it difficult to link to link health impacts to pesticides.

Organochlorines and many banned pesticides such as Lindane (including DDT/ Gammalin 20) which are still used by the farmers in Nigeria can cause nervous system tremors, hyper excitability and seizures in humans. (California for Pesticides Reform 2029) They persist in the environment and tend to accumulate in tissues as they pass up the food chain, they are extremely hazardous. Pesticides residue on the food you eat can have an effect on your health. (Healthfully.com. Lisa Weber 2018).

The study also revealed that farmers lack knowledge of pest, diseases and their management and rely heavily on combined use of pesticides. The use of pesticides/chemicals gradually destroy the environment, posing serious threats to human and animal life, plant forms, soil and water (Marton, 2016) and leading to emergence of resilient species of life forms that are becoming more resistant to fungicides, insecticides and herbicides.

Residue of pesticides could affect the ultimate consumers especially when those commodities are freshly consumed; food is the main exposure to pesticide residue through the diets. It is estimated to be five orders of magnitude higher than other exposure routes such as air, and drinking water (Juraske *et al.*, 2009).

Given the potential risk of pesticides for public health, use of pesticides in fruits and vegetables should be subjected to constant monitoring. Entry of pesticides into the food chain coupled with their bioaccumulation and biomagnifications trigger effects of unforeseen consequences (Ezemoye and Ogbomida, 2010; Watterson, 1999).

Many authors have reported lethal and sublethal effects of Gamallin 20 on targeted fishing in Nigeria (Ezemoye and Ogbomide, 2010; Dede and Dogara, 2010; Oti, 2003). Elgueta *et al.* (2017) reported pesticide residue in leafy vegetables and human health risk assessment in North-central agricultural areas of Chile. Ibrahim *et al.* (2018) reported presence of pesticides residue in Pumpkin, spinach and sorrel leaves grown in Akwanga, Nasarawa state. Akunyili (2008) reported cases of beans meal prepared from Gammalin 20-treated beans; deaths were reported in Bekwara Local governments of Rivers state and Government girls secondary school, Doma, Gombe state.

Exposures to pesticides are one of the most occupational hazards (Corona de Cristo *et al.*, 2004). The results of the interviews showed that one major factor to poisoning is the unsafe use of pesticides such as, lack of attention to safe precautions and availability of banned cheap chemicals: DDT, Chlorpyrifos, Lindane (Gamallin 20) popular in developing countries like Nioeria, with unregistered importers and criminal organizations smuggling the said substance through various means, all in attempt to beat security points at borders (Abdullahi, 2010). This study informs all agricultural stakeholders, government agencies, environmentalists, researchers and consumers that Gammalin 20 used in cocoa and cowpea are still applied in leafy vegetables farming.

Some of the respondents use plant extracts and natural oil *especially Azadiracta indica* (Neem) oil and Pepper spray, which are natural protectants and repellants, classified as Reduced Risk Pesticides/Biopesticides, which inherently are less toxic than conventional pesticides. Green chemistry biopesticides and biofertilizers are recommended as alternative tools for safer products, less hazardous environmental consequences and broader issues which can promote sustainable developments (Ubuoh, 2016; George, 2011)..

The presence of pesticides residue is a major bothle neck in international trade of agricultural commodities. This is in agreement with the study.

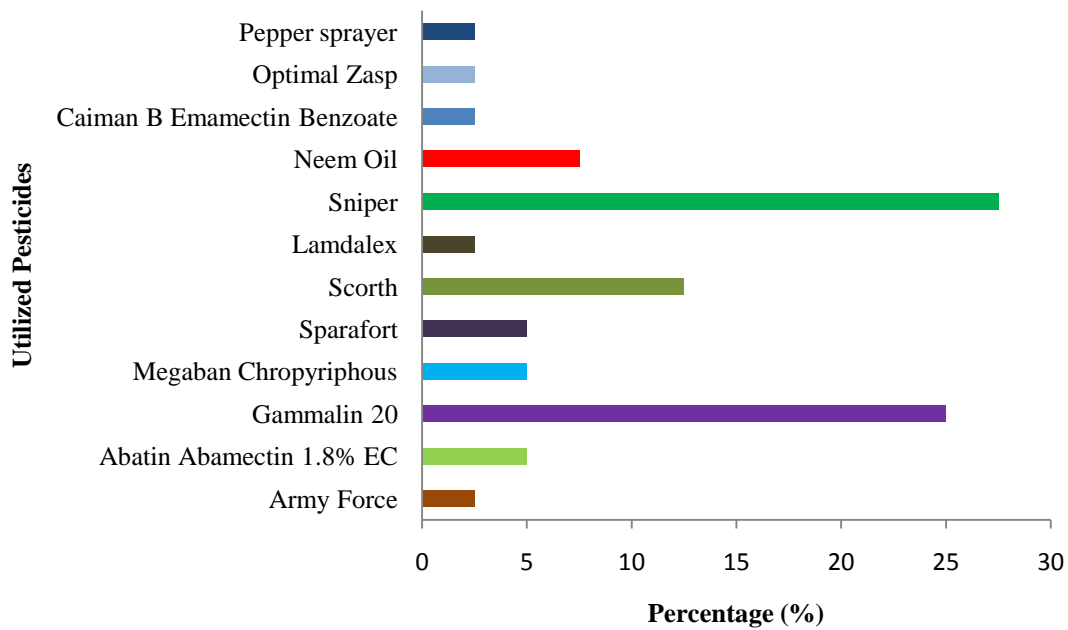


Figure 1: Pesticides used by farmers in the study area

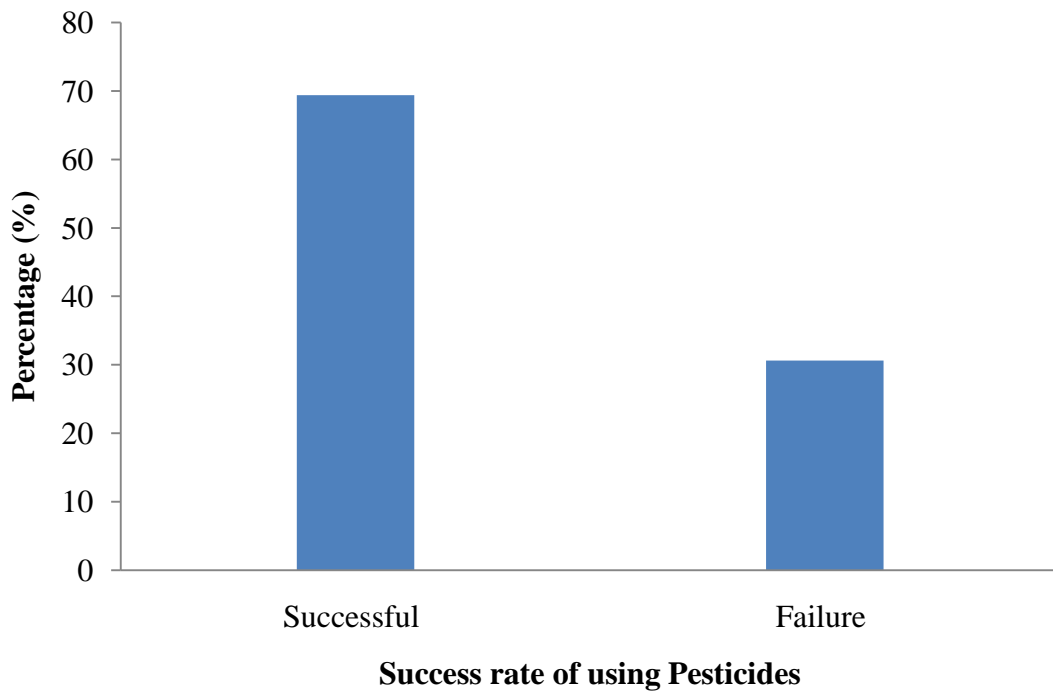


Figure 2: Success rate of using pesticides by the farmer in the study area

IV. Conclusion

Agrochemicals are extensively used in Nigeria, but without much regulation, evaluation, supervision, it will remain a challenge. Farmers' combinatory use of pesticides in daily activities to combat army worm, parasitic nematodes, aphids, flies and stem borer is highly worrisome especially the broad utilization of a banned pesticide GAMALLIN 20.

Intensified trainings on safe use of pesticides, spraying techniques, avoidance of environmental pollution and pesticide application in compliance with maximum residue limit and Good Agricultural practices (GAPs) are largely needed in these states.

There is no gainsaying, the facts that without Agrochemicals, food security may remain a mirage. The introduction of an integrated pest management is highly recommended with routine monitoring of pesticides residue in all agricultural produce farms and stores. Insurance benefits and compensation for contaminated agricultural crops consumers and payment of medical bills should be practised, as in developed countries.

V. Recommendation

Wash your produce with water to remove the pesticide residue.

Soak in solutions of salt or some chemicals such as Chlorine, Hydrogen peroxide etcetera. Various thermal processing treatments like pasteurization, blanching, Cooking steaming, Canning etcetera have been found valuable in degradation of various pesticides and various pesticides and length of treatments.

Processing methods such as fermentation, milling, curing, and refining have been reported to reduce the pesticides residue level.

Dehydration / Concentration increase the pesticide content many folds,

Cold storage have been found to be very effective.

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