ASSESSMENT OF AGROCHEMICALS USAGE ON THE JOS PLATEAU, NIGERIA: PROBLEMS AND PROSPECTS

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ABSTRACT.
The application of agrochemicals on the Jos Plateau has become imperative as farm labour has drastically reduced and pests and have increasingly ravaged farms. This study was undertaken to determine the factors that militate against the successful utilization of agrochemicals by farmers. Results indicate that 28% of the farmers have used agrochemicals for over 30years. This long usage without scientific approach could have resulted in some pests and weeds developing resistance to the agrochemicals as pesticide ineffectiveness was reported by farmers. Pesticide poisoning, killing of non-target organisms, drifts and application difficulties have been cited as problems experienced by farmers. Suggestions to remedy these problems experienced by farmers include proper education on the best methods of pesticide application and regulation of pesticides supplied to farmers. We believe that a detailed study of the pesticides (along with laboratory analysis) and exploration of the botanical pesticides in the communities needs to be undertaken.

INTRODUCTION

Crop production in the under developed parts of tropical Africa rely very heavily on manual labour for all field/cultural operations with the aid of crude tools. The demand for manual labour becomes more serious due to the need to synchronize the operations with the season to ensure optimum crop yield. With rapid urbanization and mass movement of young capable young people from the rural farming communities, the availability and efficiency of the labour had fallen drastically(Omonogho and Olaniyan, 2013).

The need to apply agrochemicals for crop production and for agriculture generally has become very necessary not only to circumvent high cost and scarcity as well as the poor quality of the farm labour, whenever it is available but also to control pests and diseases. These reasons and the need to synchronize field operations in order to ensure maximum productivity have all combined to influence farmers to resort to the use of agro-chemicals, in Nigeria. The apparent rise in the volume of chemical usage has attendant detrimental environmental impacts (Jeong and Foster,2003; Griffins and Malburg, 2012), severe and or chronic health problems (Atreya,2008; Bhandari, 2014) and heavy dependence on imported chemicals with far reaching economic implications. It is generally believed that the recent shift in agricultural production, most

especially crop production, characterized by extensive use of agrochemicals will pose these very serious challenges and most likely others (problems) that may not have been assessed adequately.

The area of study is located on the Jos Plateau covering about 700 KM^2 with the following co-ordinates [9^0, 33^I N -9,^{0}88^I N; 8^0,61 ^{I}-9^0.18^I E] situated about 1500M above Sea Level. With a relatively high altitude, the area commands mild (temperate-like) temperatures that can sustain the production of both tropical and some temperate crops such as potato (*Solanum tuberosum*), wheat (*Triticum aestivum*) and barley (*Hordeum vulgare*), as well as a wide range of temperate vegetables and fruits such as celery, radish, strawberries, cauliflowers as well as apples and grapes. These moderate climatic conditions have attracted a lot of animal nomads from all over West Africa, a major factor that led to the establishment of the National Institute For Veterinary Research(NVRI) located in K-Vom (09^0 , 44^I N and 08;45^I E).

In recent years however, there has been indiscriminate introduction of some of these temperate crop varieties without adequate quarantine, appropriate seed certification procedure and adherence to necessary bio-safety measures. This had partly been responsible for the upsurge in some crop pests and diseases like the potato blight epidemics recorded on the Jos Plateau in the last two years (Chuwang, 2014). In order to control these pests, diseases and weeds, the farmers are compelled to use all sorts of agro-chemicals with varying degrees of success and failures but most importantly, the unquantifiable and far reaching levels of impact to the environment (Muhibullah *et al,* 2005, Wikipedia encyclopedia, 2016).

It has also been documented that synthetic chemicals used for agriculture have impacts on ground and surface water, composition of atmospheric gases, soil properties, responses of organisms to stimuli etc (Bhanbari, 2014; Gregg, 2015).

There has been an increase in the reported cases/incidences of food poisoning resulting from the consumption of farm produce such as cowpea and grains as well as fruits and vegetables that had been improperly preserved with chemical substances. In addition to this, the EU (European Union) had recently banned importation of agricultural food produce from Nigeria because these products contained unsafe residual levels of harmful pesticides (Anon, 2013; Adejumo *et, al,* 2014; Anon, 2015). The consumption of other farm produce are similarly likely to pose danger to

both livestock and human consumers (Muhibullah *et al*, 2005) if the question of agrochemical usage is not thoroughly addressed.

The objective of this paper is to provide some valid information on the level and scope of chemical usage for agricultural production in the Jos area. It is also hoped that this information will provide a basis for making sound decisions on the problems at hand. The problems highlighted here will provide basis for further investigation and some suggestions made by the respondents presented. The study should answer certain pertinent questions that emerged from agrochemical usage

- When the farmers in the Jos Plateau start to apply agrochemicals on their fields and the type as well as the frequency of usage
- Effectiveness of the chemicals in achieving the purpose for which they were used
- The major problems encountered by the farmers as they apply agrochemicals and when they were first noticed and
- Suggestions made by the farmers on how to handle the problems
- Perceived environmental impact indices

METHODOLOGY

The field assessment of the farming system(s) of the study area was carried out through oral/written interviews where questionnaires were administered to 10 respondents in 10 selected locations namely *Barkin-ladi, Bokkos, Heipang, K-Vom, Vwang, Gassa, Mangu, Kerang, Ampang-West* and *Gindiri.* Most of these areas are located on the higher plains of the Jos Plateau, North Central Nigeria.

Information was collected from the respondents on the main areas covering the objectives of this study as stated. The data collected was analyzed statically using the simple percentage technique with the aid of MS-Excel, 2010 version. All deductions and or conclusions arrived at in this study were based on the outcome of this analysis.

RESULTS/DISCUSSION

History of Agrochemical use by farmers in Jos

The questions on when and how frequent the farmers were engaged in using agro chemicals was answered by Figs1 and 2. Fertilizer application have enjoyed a relatively longer period of usage by the farmers in the Jos area than all other agrochemicals because about 17% and 29% of the respondents had been applying the substances to their crops for more than 30 years and between 20 and 29 years respectively. About 40% of the farmers have used fertilizers for between 10 and 19 years. Other categories of agrochemicals that have had a relatively long history of application were herbicides, insecticides and fungicides. The most extensive application in terms of volume/quantum started recently (less than 10 years ago).

Most of the agrochemicals investigated in this study were used by the farmers quiet frequently as most respondents confirmed that they used the chemicals often and fairly often. Fertilizers, insecticides and herbicides are the most frequently used (Fig 2) by the farmers in these locations probably because of the longer history of usage in the area (Fig 1) because farmers tend to rely on what they have been used to, in this case fertilizers, insecticides and herbicides.

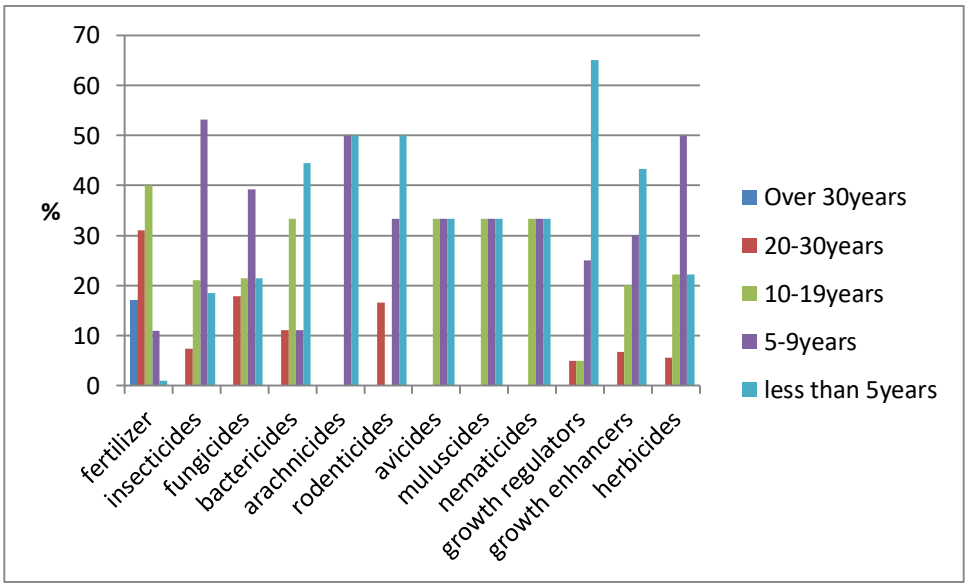

Fig 1: *History of when farmers began to use agrochemicals on the Jos Plateau*

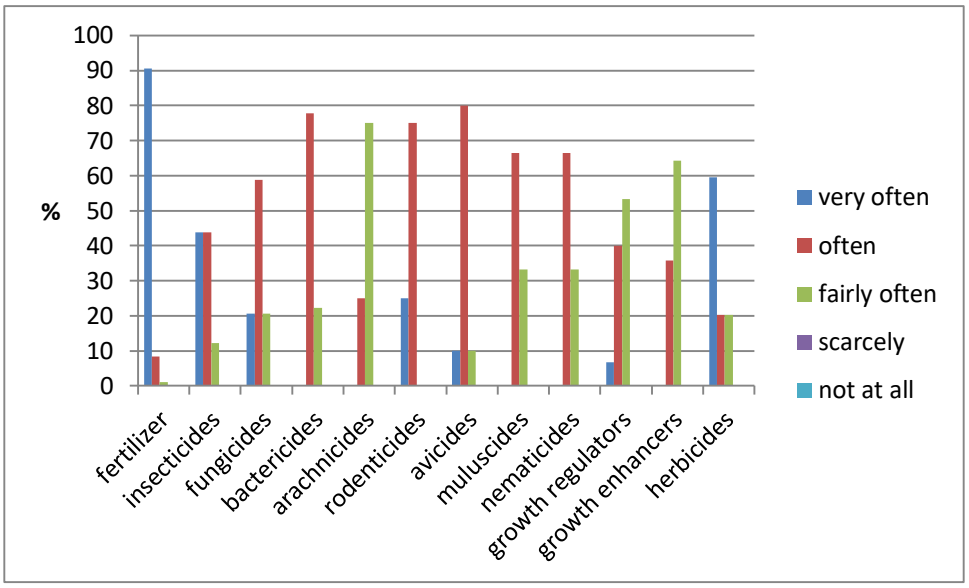

Fig 2:*Frequency of the use of agrochemicals by farmers on the Jos Plateau*

Effectiveness of The Agrochemicals used by the farmers

The investigation looked into whether the agrochemicals used for field/farm operations were effective or not in achieving the purpose for which they were employed and if so how effective or ineffective they were. This information is as presented in Fig 3. where Over 60% of the respondents asserted that fertilizers, insecticides, bactericides, arachnicides and growth regulators as well as growth enhancers and herbicides were very effective. However some level of

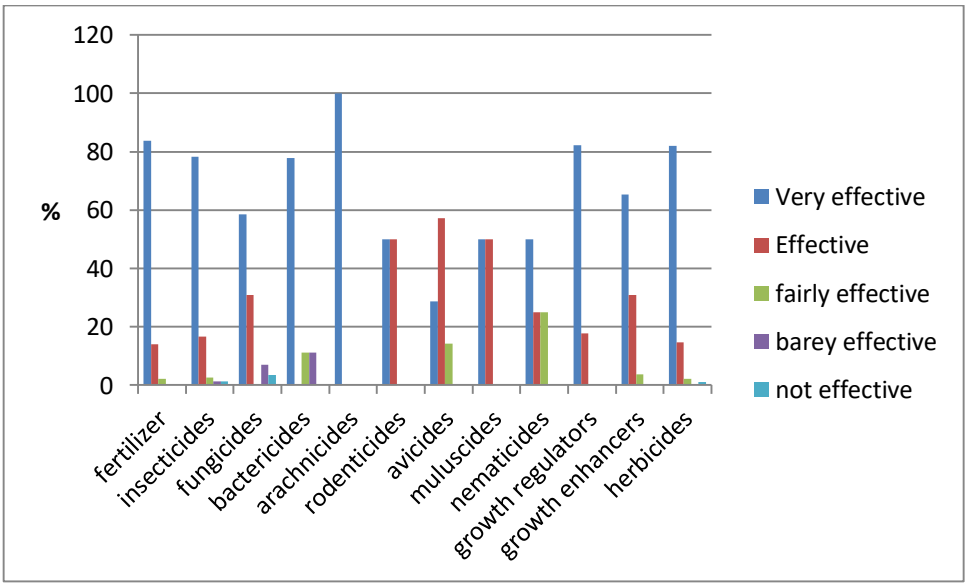

Fig3: The level of effectiveness of the agrochemicals used by farmers on the Jos Plateau

Ineffectiveness was observed in some groups of agrochemicals such as insecticides, bactericides, fungicides and herbicides used for field/cultural operations on the Jos Plateau. In view of the fact that this study was not designed to carry out a thorough diagnosis of the root causes of this apparent ineffectiveness, we can therefore submit that a more precise instrument be designed in the future to find the main causes in order to avoid speculations.

Problems associated with the use of agrochemicals on the Jos Plateau

The introduction of agrochemicals for farming on the Jos Plateau is closely linked with some problems like poisoning, killing non-target organisms, drift, climatic issues, loss of viability, irregular/undesirable reactions, application difficulties, ineffectiveness and accidents are as contained on Figs 4 and 5.

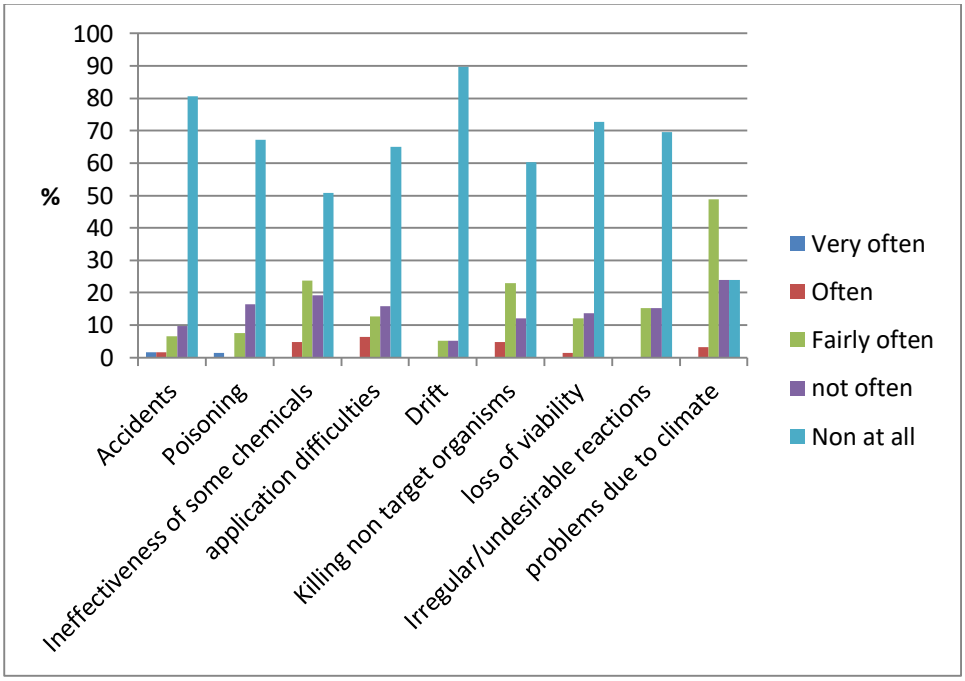

Fig 4: The problems encountered by farmers in using agrochemicals and how often they occur

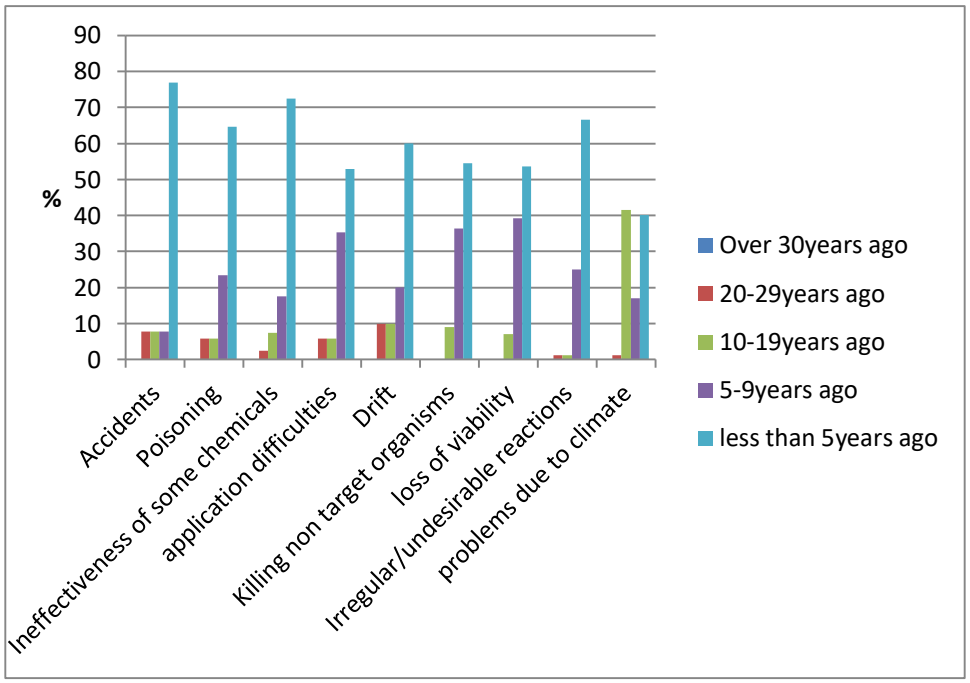

Fig5: History of the when the problems associated with agrochemical used started, on the Jos Plateau

A majority of respondents, ranging from 40% to over 70%, depending on the type of chemical, declared that these problems emerged in recent years (Less than 5 years ago). A noticeable population also believed it started earlier (5-9years ago). The problems related to climate such as rainfall and wind were said to have been noticed for quiet sometime (10-19years). Problems of accidents, poisoning, ineffectiveness of chemicals, drift and application difficulties as well as undesirable reactions and climate problems were believed by a very tiny proportion of the respondents to have been observed much earlier (20-30years ago)

Some of these problems were said to occur fairly often in some cases and not often in a few cases. However most of the respondents reported that almost all the problems associated with agrochemical use were not regular in occurrence (Fig. 4). It can be observed that almost 50% of the respondents reported that the problem associated with the climate as it affects agrochemical application was fairly regular in occurrence. Other problems that were fairly regular were killing of non target organisms and the ineffectiveness of some of the chemicals as reported by over 20% of all the respondents.

Suggestions given by farmers to manage the problems associated with agrochemical use

Most of the respondents (over 60%) blamed the poor quality of the agrochemicals for the lack of effectiveness in achieving the purpose for which they were applied to the field. As we mentioned previously, this study did not include any laboratory analysis of the chemicals to accept the farmers' postulate or reject it. However some of the farmers (20%) suggested that they usually increase the dosage of the chemicals per unit area in order to solve this problem of ineffectiveness, but the question of whether the ineffectiveness is due to the development of some sort of tolerance by the organisms such as weeds and insects, as some farmers seem to suggest, remains to be answered. Some farmers (28%) seem to suggest that application of fertilizer in addition to organic matter by the ring method can help to reduce the ineffectiveness, cost and wastage. As many as 32% of the respondents believe that some of the problems can be minimized through increased awareness through workshops, field days and consultation with experts.

Other farmers (16%) talked about strict adherence with safety precautions and establishment of statutory bodies by the authorities to regulate the usage of agrochemicals to ensure safety and less damage to the environment. On the problems associated with the weather, about 18% of the farmers only said they had learned to observe the weather very closely but their knowledge appears to have little value in the face of the erratic weather being observed in recent years.

Conclusion

This study was able to outline the history of the beginning of the use of agrochemicals on the Jos Plateau and the intensity of usage as well as the problems encountered by the farmers as they used the chemicals. We were also able to capture the efforts/suggestions which the farmers made in managing these problems. A detailed study of the available bio-pesticides on the Jos Plateau as suggested with a view to recommending some for use as many of these may not have the deleterious effects presently associated with the synthetic pesticides.

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