

Pesticide use in Legume production in the Tamale Metropolis of the Northern Region, Ghana

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Abstract

This study was conducted in six communities namely Jangyili, Foosegu, Gawagu, Dundo, Kukuo and Dalogyili within the Tamale Metropolis of Northern Region. The study aimed at identifying the types of pesticides used for legume crop production and methods of handling them. Sixty (60) respondents were interviewed using semi-structured questionnaire. Majority (76%) of the respondents were males most of whom were youth (15-35). The percentage of respondents who lacked formal education was high (52%) among the respondents with the highest level of education being Senior High School. Cereals were the most commonly cultivated crops (40%) followed by legumes (30%). Among the leguminous crops cultivated, cowpea was the most common (38%) followed by groundnut (32%), soybean (13%), pigeon pea (5%), bambara groundnut (5%) and others (8%). Almost all respondents (91%) used pesticides. Thirteen out of the pesticides identified were herbicides with Atrazine being the most common (50%). The pesticides encountered during the study were mainly herbicides and insecticides and belonged to the highly toxic category i.e. Group II based on WHO classification. Majority (88%) of respondents obtained their pesticides from Agrochemical retailers in the communities while the rest (12%) depended on their friends and relatives. In spite of the high level of toxicity, most farmers (49%) did not wear protective clothing. Pesticides and their containers were disposed off indiscriminately; most unused pesticides were poured on the ground and containers were burnt or used at home. Most farmers (76%) were ignorant about banned and recommended pesticides. It is therefore not surprising banned pesticides like DDT were still being used. There is the need for farmers to be properly trained on the use of Integrated Pest Management Techniques. Farmers also need to be educated on the use of pesticides and the potential dangers associated with their use. Protective clothing should be made available at affordable prices. Finally existing legislation on importation and sale of pesticides should be strictly enforced to prevent or reduce of influx of pesticides in the country.

Keywords: Pesticide, legume, herbicide, disposal

INTRODUCTION

In most regions, leguminous crops are grown as secondary crops on marginal soils and under subsistence conditions. Farmers consider legume crop production as risky

with pests as a major constraint (Singh, 1990). Pesticides are known to increase agricultural production tremendously, as these chemicals act on pests that destroy agricultural produce (Glover-Amegor and

Tetteh, 2008). The use of pesticides in agriculture in tropical countries like Ghana has been instrumental in reducing crop losses before and after harvest. Crop losses of the order of 40 – 75 % have been reported (Clarke *et al.*, 1997). Pesticides use has increased over time in Ghana and is particularly high in cash crops and vegetables (Gerken *et al.*, 2001). Associated with the increased use of pesticides are health and environmental problems which have arisen due to indiscriminate use and inappropriate handling of the chemicals (Clarke *et al.*, 1997). Poor farmers in developing countries are paying an estimated US\$300 million for pesticides that do not meet internationally- accepted quality standards. These poor quality pesticides frequently contain hazardous substances and impurities that have already been banned or severely restricted elsewhere. Possible cause of low quality of pesticides can include poor production and formulation and the inadequate selection of chemicals (Williamson, 2001). Privatisation seems to be responsible for the rapid decline in quality of pesticides and their effective control at the retail level (Williamson, 2001). It is estimated that each year, 3 million workers in agriculture in the developing world experience severe poisoning from pesticides and about 18,000 of them die (Miller, 2004). According to Jeyaratnam (1990) as many as 25 million workers in developing countries may suffer mild pesticide poisoning yearly. Many farmers tend to misapply some poisonous pesticides like organophosphates which are placed in the World Health Organization hazards categories I and II. Some of the factors which are thought to have contributed to human poisoning include lack of education among users and handlers of pesticides, and of safety precautions to minimize or prevent their environmental and health effects

(Clarke *et al.*, 1997). Organochlorine pesticides such as DDT, lindane, and endosulfan are widely used by farmers because of their effectiveness and their broad spectrum activity (Darko and Acquah, 2007). Most pesticides especially the organochlorines are very resistant to microbial degradation. They can therefore accumulate in human body fats and the environment posing problems to human health. Through their persistence and lipophilicity, the pesticides and their residues may concentrate in the adipose tissues and in blood serum of animals leading to environmental persistence, bio-concentration and bio-magnifications through the food chain (Darko and Acquah, 2007). Although the organochlorines are banned from importation, sale and use in Ghana, there is evidence of their continued usage and presence in the ecosystem (Darko and Acquah, 2007). The bans and restrictions on pesticides are not working properly because of illicit trade often across national borders, which make them available for purchase (Williamson, 2001). Apart from banning 25 agrochemicals which include toxaphene, aldrin, endrin, chlordane, captafol and DDT because of their toxicological effect (Daily Graphic, 2008), Ghana was one of the first countries to sign the Rotterdam Convention on Prior Consent for Importation of pesticides consequent upon which Ghana Environmental Protection Agency banned nine problem pesticides in WHO Classes Ia, Ib and II (Williamson, 2001). In advanced countries, strict pesticide regulations and enforcement mechanisms are put in place to ensure safe use and proper handling. The control schemes further ensure that approval for the sale and use of pesticides is based on scientific data that support its effectiveness against target pests and that is not unduly hazardous to human health and the environment. Pesticide use in most

developing countries is however based solely on manufacturer's recommendations. These recommendations which include data on toxicological and environmental properties of the pesticides, though useful, may not be appropriate under local conditions since they were tested under different agro-climatic and socio-cultural conditions (Glover-Amegor and Tetteh, 2008). The objective of the study was to identify the types, sources, methods of handling and disposal of pesticides used for legume crop production in the Tamale Metropolis.

MATERIALS AND METHODS

Study area

The study was conducted in six different communities namely Jangyili, Foosegu, Gawagu, Dundo, Kokuo and Dalogyili within the Tamale Metropolis which is located in the Northern region of Ghana. According to the 2000 census, it has an area of about 70,384k m² with a population of 1,820,806. Northern region shares boundaries with Upper East, Upper West, Brong Ahafo, Volta Region and some parts of Togo. The study area is heterogeneous with Dagombas, Nanumbas, Kokombas and Gonjas as the major tribes. The study area lies on latitude 9°24'27"N and longitude 00° 51'12"W. It is located in the Guinea savanna zone of Ghana Northern region experiences two main seasons; the wet season lasts from May to October while the dry season starts in November and ends in April every year. Rainfall is monomodal with the average ranging from 750 mm to 1100 mm. The annual average night and day temperatures of the study area are 21°C and 42°C respectively. The average relative humidity is 62 %.

Sampling and Questionnaire Administration

Simple random sampling was used for data collection. Six different communities namely Jangyili, Foosegu, Gawagu, Dundo, Kokuo and Dalogyili in the Tamale metropolis where legume crop production was very intensive were selected. Semi- structured questionnaires were administered to 60 respondents made up of farmers and pesticide retailers. Ten respondents were randomly selected from each community for the questionnaire administration during which, common pesticides used by the farmers in the study area were identified. Secondary data were obtained from the Regional Co-ordinating Council, Ministry of Food and Agriculture (MoFA), Environmental Protection Authority (EPA), Agro-chemical Industries, Agricultural research stations and existing literatures. The study revealed that most farmers (48%) grew cereal crops while 30 % grew legumes. The rest of the farmers grew root and tuber crops (12 %), vegetables (5 %) or other crops (5 %). Cowpea was the most commonly cultivated crop (38%) followed by groundnut, soya bean, pigeon pea and Bambara groundnut respectively (Fig. 1).

Data Analysis

Data collected were analysed using Statistical Package for Social Scientists (SPSS, Version 16.0) software. The data were subjected to descriptive statistical analysis and presented as tables and charts.

RESULTS

Characteristics of respondents

The study revealed that majority (76%) of the respondents were males with the remaining (24%) being females. Most of the respondents (37%) were either youthful (15-35 years) or in the age range 35-45 years (35%). The rest of the respondents (28%) were above 45 years. Most of the respondents (52%) had no formal education while others

had either Basic School (33%) or Senior High School (15%) education. Majority (91%) of the respondents used pesticides. Out of a total of thirteen (13) pesticides identified,

nine were herbicides while four were insecticides (Table 1). Atrazine was the most commonly used pesticide (50%).

Pesticides Identified	Type	Number of Users	Percentage
Atrazine	Herbicide	30	50.0
Calliherb	Herbicide	7	11.6
Condemn	Herbicide	6	10.0
Propanele	Herbicide	5	8.3
Roundup	Herbicide	2	3.2
Sarosate	Herbicide	2	3.2
Batchlor	Herbicide	1	3.2
Karate	Insecticide	1	0.6
Lambda Super 25EC	Insecticide	1	0.6
Thionex	Insecticide	1	0.6
Herbextra	Herbicide	1	0.6
DDT	Insecticide	1	0.6
Agricstrom 500E	Herbicide	1	0.6
Total		60	100

Types of Crop Cultivated

The study revealed that most farmers (48 %) grew cereal crops while 30 % grew legumes. The rest of the farmers grew root and tuber crops (12 %), vegetables (5 %) or

other crops (5 %). Cowpea was the most commonly cultivated crop (38%) followed by groundnut, soya bean, pigeon pea and Bambara groundnut respectively (Fig. 1).

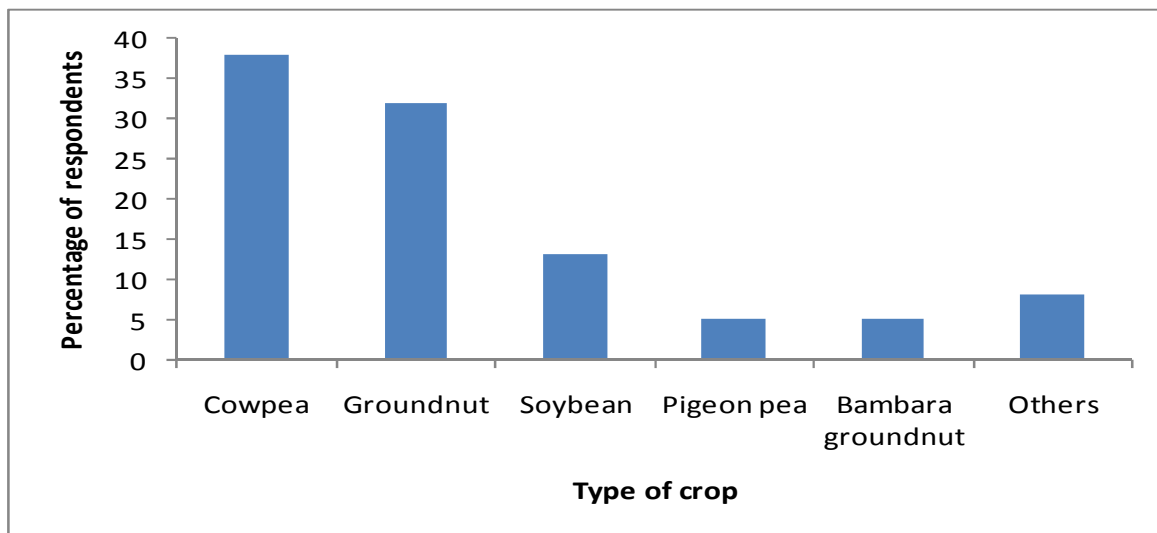


Figure 1. Types of Leguminous Crops Pesticide Use

Categories and Sources of Pesticides

The types of pesticides used by respondents were categorized into four groups based on the World Health Organization (WHO) classification as follows: extremely toxic (Group 1), highly toxic (Group 2), dangerous (Group 3) and requiring a lot of care (Group 4). Most of the pesticides (62 %) were highly toxic. The rest were extremely toxic (24 %), dangerous (8%) or required a lot of care (7 %). Most of the farmers (88 %) in the study area obtained their pesticides from Agro-chemical retailers. However, about 12 % of the respondents obtained their pesticides from friends and relatives due

to their inability to identify the right pesticide for the right purpose. Most of the farmers (76 %) reported that they did not know recommended pesticides. However, a few (24 %) could distinguish between recommended and banned pesticides.

Protection during Pesticide Application

Most of the farmers (49 %) applied pesticides without using any protective clothing (Fig. 2). The rest used one (8 %), two (17 %), three (22 %) or four protective equipments (4 %).



Figure 2: A farmer spraying his field without full protection

Disposal of pesticides and Containers

Respondents disposed of pesticides by pouring on the ground (82%), pouring them at any available place or pouring into nearby streams, rivers or other water bodies (18 %). Pesticide containers were disposed of by burning (65 %), destroying (4.4 %), discarding (27 %), using at home (3 %) or burying in the farm (0.6 %).

Effect of Pesticides Application on Health

Majority (77 %) of respondents experienced health problems after pesticide application while 23 % felt normal irrespective of the toxicity level. Some of the health problems included diarrhoea, headache, vomiting and dizziness

DISCUSSION

Legume cultivation is dominated by males (76 %) most of whom are the youth (15-35 years). This could be due to the fact that legume cultivation is labour intensive; land preparation and other operations are relatively difficult. Most of the farmers lacked formal education though the study area was endowed with many schools. Cereals constitute the major staple food in the study area. It is therefore not surprising that cereals were the most commonly cultivated crops followed by legumes. Of the legumes, cowpea was the most commonly cultivated. This could be attributed to the fact that cowpea is used in making many local dishes such as 'Waakye' (rice and beans), 'Tubani' and cakes popularly called 'Kooshie'. Almost all respondents (91 %) used pesticides but most of them had no formal education (52 %) with the highest level of education being Senior High School (SHS). This has serious implications for the farmers in terms of choice of appropriate pesticides, reading and understanding labels and therefore applying the right dosages. It is therefore not surprising that most of them used highly toxic pesticides (62%) without any form of protection and disposed of their left over pesticides and their containers indiscriminately. This has serious health implications since ground water and other water sources used by humans and animals could be polluted. The use of pesticides without personal protective equipment in this study confirms the findings of Clarke *et al.* (1997) who reported that despite knowledge of some health risks associated with pesticides, the use of personal

protective equipment (PPE) was minimal, a situation they attributed to financial constraints.

The pesticides identified in this study are mostly herbicides, an indication that weeds are becoming a major hindrance to crop production. It may well be that farmers are abandoning traditional methods of pest and weed control such as slashing with a cutlass or hoeing. It is also possible that herbicides are being damped here in Africa and for that matter Ghana leading to their abundance and misuse. These pesticides are mainly used for pest and weed control to maximise yield because of their efficacy and reliability. This confirms the report by Saitoh *et al.* (2000) in Japan that without the use of pesticides, crop yield may be reduced by about 10 %. It also agrees with the report by Kellogg *et al.* (2000) that pesticides help farmers to maximise profit by preventing crop losses to insects and often pests. According to Miller (2004) the use of pesticides can have unintended effects on the environment. For instance, over 98 % of sprayed insecticides and 95 % herbicides reach a destination other than their target areas including non-target species, air, water, bottom sediments and food. Most of the pesticides identified in the area are in the organochlorine group which have various ecological and human health impacts.

In spite of the global outcry against the use of pesticides and the consequent ban by the EU and some other countries like Ghana, some banned pesticides like DDT and organochlorine are still in use. This confirms the report by Williamson (2001) that the bans and restrictions on pesticides

are not working properly because of illicit trade often across national borders. In 1996, the Pesticides Control and Management Act, Act 528 of Ghana was passed. The enactment of this act coupled with existence of the Environmental Protection Authority of Ghana and other regulatory bodies such as the Ghana Standards Authority and the Food and Drugs Authority of Ghana does not seem to have made the necessary impact. This situation could be attributed to poor or no enforcement of the existing legislation on pesticides.

CONCLUSION

Most of the pesticides used in the study area were herbicides which are used without protection. Those who handled the pesticides mostly lacked formal education for which reason unused pesticides and their containers were disposed off indiscriminately. There is the need to train farmers in pest management especially the use of Integrated Pest Management techniques which are more environmentally friendly. DDT, a banned pesticide is being used in the study area, an indication that the necessary legislation preventing the importation and use of banned pesticides is not properly enforced

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