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Performance evaluation of policies on banned agrochemicals among marketers in Nigeria

Fakayode S.B.[1]*, Agunbiade B.O.[1], Omolehin R.A.[1], Olatawura O.O.[1] and Olowogbon T.S.[2]

[1]Department of Agricultural Economics and Farm Management, Federal University Oye-Ekiti, Nigeria
[2]Center for Sustainable Agriculture and Empowerment. Ilorin, Nigeria

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Abstract
Agrochemical use is known to have many challenges that need to be properly addressed in order to realize the desirable results. The different players in the agrochemical value chain must contribute significantly to ensure the safe production, distribution, handling and use of these substances towards mitigating the adverse impacts. The current study evaluates the effectiveness of policies on banned agrochemicals among the market chain actors in Nigeria. A total of 50 marketers of agrochemicals were randomly selected from two Local Government areas in Ekiti state, Nigeria for this study. The primary data was collected with the aid of questionnaire and subjected to descriptive analysis such as frequency counts, percentages, weighted mean and standard deviation. Results show that only 5 out of the 30 listed banned agrochemicals could be identified by more than 50.0% of the marketers. The level of compliance with the ban on agrochemicals showed that more than 50% of marketers were still into the sales of 30 to 40% of these banned chemicals with the attendant negative implications both to man and the environment. The study recommends adequate enlightenment by extension agents on banned agrochemicals to the suppliers and marketers in Nigeria.

Keywords: Agrochemical marketers, Banned agrochemicals, Compliance level, Nigeria.

Introduction

Banned agrochemicals are farm chemicals that have been prohibited by government regulation for use in agriculture. These chemicals were banned for a variety of reasons, including health and safety concerns, environmental concerns as well as economic concerns. Some agrochemicals were banned because they are harmful to human health, while others because they are harmful to the environment (Wang et al., 2008; Boedeker et al., 2020). The history of these banned pesticides started with a misguided search for an ultimate chemical weapon, which could be used to kill any pest species on crops. Over the last century, some of these weapons have ended up causing unintended harm (Aktar et al., 2009; Boedeker et al., 2020). It has been discovered that agrochemicals residual becomes concentrated higher up in the food chain and do serious damage to wildlife as well as human health and this has led to the urgent need for chemicals that will break down more quickly (Damalas and Eleftherohorinos, 2011; Kim et al., 2016). The use of the non-residual organophosphates was found to cause serious human health problems, demonstrating the need for a more selective chemical. Even the far-more-selective neonic pesticides led to problems, necessitating a new way of thinking (Dowler, 2020).

Agrochemicals can significantly harm people and the environment due to improper handling and exposure. They cause acute and chronic toxicity in humans and impact animals, plants, water, soil and the ozone layer (Sarkar et al., 2021). Additionally, they affect insects, biodiversity and the entire food chain. These adverse impacts can stem from the nature of the agrochemicals themselves and their inappropriate usage. Despite these adverse effects, there is no universally accepted legal framework addressing the ecological impact of agrochemicals. Safety of an agrochemical is often considered to be the sole responsibility of the agrochemical companies. However, the different players in the agrochemical value chain must contribute significantly to ensure the safe production, handling and use of agrochemicals towards mitigating the adverse impacts. The regulations relating to the production, access to markets, distribution and use of agrochemicals varies across countries and can be strongly influenced by the parties in power (Asogwa and Dongo, 2009).

In the late 1990s and early 2000s, a number of high-profile agrochemical poisoning cases drew the attention that led to increased public pressure for action. In particular, the use of the pesticide Endosulfan in Kano state, Nigeria led to widespread health problems, including birth defects and

* Author for Correspondences: Phone :: +234-8060236283; Email: segunfakayode@gmail.com

neurological disorders. The health impacts of Endosulfan use were so severe that a global ban was placed on its manufacture, distribution and use of the chemical in April 2011, under the Stockholm Convention (Mathew, 2021). Since the ban on Endosulfan, Nigeria has continued to take steps to address the problem of agrochemical use. In 2012, the country ratified the Stockholm Convention, which calls for the phase-out of a number of persistent organic pollutants, including DDT. In addition, the government has established the National Action Plan for Pesticide Management, which aims to reduce the use of agrochemicals and promote the use of alternatives.

With all the aforementioned initiatives and actions of the Government however, the problem of agrochemical use in Nigeria still remains a significant challenge (Ojo, 2016). Despite the efforts, the problem of agrochemical use in Nigeria is likely to persist for some time. One of the reasons for this is the growing demand for food, which is putting pressure on farmers to increase yields. In addition, the country's agricultural sector is still largely underdeveloped, and farmers often lack access to the resources and knowledge they need to adopt more sustainable practices. Since 2015, the Nigerian Government has grappled persistently with the growing issue of its food exports consistently being rejected by the European Union, United States, Asia, and other nations that prioritise food safety for their citizens and their environment. These countries have stringent measures to ensure food safety, responsible chemical usage, and standardised import monitoring system. Paradoxically, they generate revenue and secure employment by promoting the export of their locally banned toxic chemicals, including pesticides, to countries like Nigeria, which have little or no food safety laws, poor manpower capacities, and little or no enforcement regulations (Boedeker et al., 2020; Dowler, 2020; Sarkar et al., 2021).

Inappropriate time of application and dosage, mishandling, ignorance of safety precautions, and the use of adulterated or expired agrochemicals in circulation have been shown to impact both aquatic and terrestrial ecosystems. It is also degrading the quality of groundwater destined for human consumption (PestizidAktions-Netzwerk [PAN], 2012; Ojo, 2016). The use of pesticide continues as agricultural production intensifies yet agricultural production is fraught with abuse, misuse and over-use of the chemicals (UNICEF, 2018). The cumulative health impacts of human exposures to various agrochemicals can be in the range of chronic health conditions and diseases like cancer, reproductive, endocrine, immunological, congenital and developmental disorders (Tsimbiri et al., 2015; Hassaan and Nemr, 2020).

Inadequate laws and regulatory lapses exist in Nigeria which affects the effectiveness of the regulations for the banned agrochemicals. This trend has caused many regulatory agencies in Nigeria to operate contrary to their regulatory mandate instead of professionally regulating in an unbiased manner to ensure consumer protection and a healthy market. The toxic alliance between regulators and private companies in the food sector has not only resulted in significant compromises of food safety laws in Nigeria but also explains the growing food safety hazards and numerous deaths in the country. In view of the various issues raised, this study examines the performance of policies on banned agrochemicals among the market chain actors in Nigeria.

Materials and methods

The study was conducted in Ekiti state. The state is situated in the southwestern region of Nigeria, with its capital city located in Ado-Ekiti.The state is completely located in the tropical zone. It spans from longitudes 40°512 to 50°4512 East of the Greenwich line and from latitudes 70°1512 to 80°512 North of the Equator. Agriculture is the primary work for the inhabitants of Ekiti, serving as the primary means of earning for numerous individuals within the region. It offers both as source of earnings and jobs for over three-quarters of Ekiti's residents. Ekiti's agricultural output includes profitable crops like oil palm, cocoa, kolanut, bananas, plantain, cashew, timber and citrus; crops grown for food consumption like rice, yam, cassava, maize, and cowpea (Government of Ekiti state, Nigeria, 2024).

Data collection

The data covered information such as socio- economic characteristics of the agrochemical marketers, knowledge of banned agrochemicals, level of compliance with the ban on these chemicals and prospects for safe and environmentally friendly agrochemicals usage.A multistage sampling procedure was adopted in selecting representative sample for the study from two Local Government Areas (LGAs); namely Oye and Ikole LGAs in the state. Primary data was obtained from the field survey with the use of well-structured questionnaire in year 2024.The collected data were analysed using descriptive statistics such as frequency counts, percentages, weighted mean and standard deviation.

Results and discussion

Socio-economic characteristics of agrochemical marketers

The distribution of marketers shows that on cumulative basis, majority (82.0%) were in their active working age (21-60 years) while the mean age was estimated to be 50.4 years (Table 1). This finding is expected to contribute positively to the success of their business since the marketers were still agile and strong enough to cope with the stress involved

Table 1. Socio-economic characteristics of agrochemical marketers

Age category (years)	Frequency	Percentage	Cumulative frequency
21-30	2	4	4
31-40	11	22	26
41-50	13	26	52
51-60	15	30	82
61-70	5	10	92
71 and above	4	8	100
Min =23			
Max = 80			
Mean = 50.4			
Std. Dev= 12.50			
Gender			
Male	36	72	
Female	14	28	
Marital status			
Single	9	18	
Married	41	82	
Educational status			
Secondary education	13	26	
Adult education	27	54	
Tertiary education	10	20	
Primary occupation			
Artisan	8	16	
Civil servant	1	2	
Farming	20	40	
Business	21	42	
Marketing experience (years)			
1-5	1	2	2
6-10	12	24	26
11-15	15	30	56
16-20	9	18	74
21 and above	13	26	100
Min = 5			
Max = 60			
Mean = 17.98			
Std. Dev. = 10.99			
Source of initial capital			
Personal savings	4	8	
Family and friends	8	16	
Cooperative	13	26	
Microfinance bank	16	32	
Commercial bank	9	18	
Types of business organization			
Sole proprietorship	36	72	
Partnership	14	28	
Membership of marketing association			
Yes	37	74	
No	13	26	

Source: Field survey, 2024.

in marketing.In terms of gender, the male formed the majority (72.0%) while the female constituted the remaining 28.0%. This finding implies that the business was male dominated in the study area.With regards to marital status, the married formed the majority (82.0%) while the singles made up the remaining 18.0%.

The distribution of respondents on the basis of their educational status shows that 26.0% had secondary education and 20.0% (tertiary education) while 54.0% had adult education. It is expected that this fairly high level of educational status will assist the marketers in managing their business successfully. By extension, it is believed that the high level of education among marketers of agrochemicals will significantly contribute to their safe distribution and effective use of hazardous ones. The finding here is similar to that of Mokwunye et al. (2014) who reported high level of education among marketers of agrochemicals in south west Nigeria. The scholars maintained that this attribute provides an opportunity for training the marketers on banned agrochemicals by the relevant authorities in the agricultural sector. In addition, this will help in creating awareness as well as information flow to the end-users especially the farmers.

According to Ekwempu and Anderson (2019), level of education significantly contributed to safe agrochemical handling among users (farmers) of agrochemicals in Plateau state Nigeria. The analysis on primary occupation of respondents shows that 42.0% were into business while 40.0% engaged in farming; the artisans formed 16.0% and only 2.0% engaged in civil service. This finding is a pointer

Table 2. Distribution of marketers on identification of banned agrochemicals

S/N	Pesticide	Category	Frequency	Percentage
1	Aldrin	Insecticide	22	44.0
2	Binapacryl	Fungicide	23	46.0
3	Captafol	Fungicide	15	30.0
4	Chlordane	Insecticide	24	48.0
5	Chlordimeform	Insecticide	24	48.0
6	DDT	Insecticide	32	64.0
7	Dieldrin	Insecticide	27	54.0
8	Dinoseb&dinoseb salts	Herbicide	22	44.0
9	Heptachlor	Herbicide	24	48.0
10	Lindane	Insecticide	21	42.0
11	Ethylene dichloride	Fumigant	27	54.0
12	Parathion	Insecticide	26	52.0
13	Methyl parathion	Insecticide	27	54.0
14	Phosphamidon	Insecticide	18	36.0
15	Monocroptophos	Insecticide	19	38.0
16	Methamidophos	Insecticide	24	48.0
17	Chlorobenzilate	Insecticide	19	38.0
18	Toxaphene	Insecticide	15	30.0
19	Pentachlorophenol	Herbicide, insecticide	17	34.0
20	Ethylene oxide	Fumigant, disinfectant	17	34.0
21	Hcf(mixed isomers)/bhc	Insecticide	15	30.0
22	Edb(1,2-dibromoethene)	Fumigant	17	34.0
23	2,4,5 trichlorophenoxy acetic acid	Herbicide	22	44.0
24	Endrin	Insecticide	15	30.0
25	Mirex	Insecticide	19	38.0
26	Ethylene dibromide	Fumigant	24	48.0
27	Hexachlorobenzene	Fungicide	14	28.0
28	Endosulphan	Acaricide, insecticide	13	26.0
29	Delta hch	Agricultural insecticide	16	32.0
30	Flouracetamide	Rodenticide	19	38.0

Source: Field survey, 2024.

to the fact that different categories of people in the society are into the sales of agrochemicals.

The distribution of marketers by years of marketing experience reveals that the minimum was 5 while the maximum was 60 and the average was estimated to be 17.98. It can be deduced from the result that the marketers had appreciable years of marketing experience and this is expected to enable them master the intricacies of the business. The distribution of respondents by source of initial capital reveals that personal savings formed 8.0%, family and friends (16.0%), cooperative (26.0%), microfinance bank (32.0%) and commercial bank (18.0%). The finding here shows that the marketers got the initial fund for the business through diverse means; with microfinance bank and cooperative being the mostly used.

Distribution of respondents by type of business organization shows that majority (72%) operated as sole proprietorship while only 28.0% engaged in partnership. In terms of participation in business organization, majority (74.0%) were member of one business association or the other. Membership of business organization could be described as social capital which will serve as support for the members.

Table 3. Marketers' level of compliance with banned agrochemicals

S/N	Pesticide	Category	Frequency	Percentage
1	Aldrin	Insecticide	16	32
2	Binapacryl	Fungicide	15	30
3	Captafol	Fungicide	18	36
4	Chlordane	Insecticide	11	22
5	Chlordimeform	Insecticide	16	32
6	DDT	Insecticide	16	32
7	Dieldrin	Insecticide	15	30
8	Dinoseb&dinoseb salts	Herbicide	14	28
9	Heptachlor	Herbicide	10	20
10	Lindane	Insecticide	15	30
11	Ethylene dichloride	Fumigant	15	30
12	Parathion	Insecticide	16	32
13	Methyl parathion	Insecticide	17	34
14	Phosphamidon	Insecticide	17	34
15	Monocroptophos	Insecticide	12	24
16	Methamidophos	Insecticide	12	24
17	Chlorobenzilate	Insecticide	17	34
18	Toxaphene	Insecticide	16	32
19	Pentachlorophenol	Herbicide, insecticide	20	40
20	Ethylene oxide	Fumigant, disinfectant	8	16
21	Hcf(mixed isomers)/bhc	Insecticide	10	20
22	Edb(1,2-dibromoethene)	Fumigant	9	18
23	2,4,5 trichlorophenoxy-acetic acid	Herbicide	7	14
24	Endrin	Insecticide	4	8
25	Mirex	Insecticide	6	12
26	Ethylene dibromide	Fumigant	8	16
27	Hexachlorobenzene	Fungicide	14	28
28	Endosulphan	Acaricide, insecticide	16	32
29	Delta hch	Agricultural insecticide	12	24
30	Flouracetamide	Rodenticide	11	22

Source: Field survey, 2024.

Identification of banned agro chemicals by the marketers

In an attempt to examine the ability of the marketers in identifying the thirty (30) listed banned agrochemicals by National Agency for Food and Drug Administration and Control (NAFDAC), Nigeria and other regulatory agencies, marketers in the study areas were asked to indicate if any of the chemicals have been banned for sale and use. The result in Table 2 shows that only 5 out of the 30 listed banned agrochemicals could be identified by more than 50.0% of the marketers. These 5 agrochemicals and the percentage of marketers that could identify them are as follows; DDT (64.0%), Dieldrin (54.0%), Ethylene dichloride (54.0%), Parathion (52.0%) and Methyl parathion (54.0%). The percentage of marketers that could identify the remaining 25 banned chemicals ranges from 26.0% to 48.0%. The results suggest that the awareness and knowledge of banned agrochemicals was low among the marketers in the study area. This finding agreed with that of Ojo (2016) who reported that lack of knowledge, awareness and ignorance by the market chain actors were among the challenges of pesticide distribution and use in Nigeria.

Marketers' compliance level with banned agrochemicals

On marketers' compliance level with the ban on these agrochemicals, the result shows that up to 40.0% of the marketers were still into the sales of Pentachlorophenol while the least (8.0%) was obtained for Endrin (Table 3). The compliance level could also be said to be low and unacceptable since majority of the banned chemicals were still being displayed for buyers in the market. This finding suggests that there was poor implementation and enforcement of the ban on these chemicals; a situation that calls for serious concern by the relevant stakeholders in respect of the subject matter. Poor legislation and lack of enforcement of available legislation were also cited by other studies including Ojo (2016) as factors militating against safe pesticide use in Nigeria. PAN Germany (2011) for example reported that worldwide, close to four hundred (400) hazardous pesticides active substances were on the market. In a study conducted by Northern Presbyterian Agricultural Services [NPAS] (2012) in Ghana, it was found out that some of the pesticides sold in local markets were banned, adulterated and fake.

Prospects and challenges of achieving environmentally friendly agrochemicals usage

Attempt was made to examine the feasibility of safe and environmentally friendly use of agrochemicals in the study area (Table 4). The result shows that majority (70.0%) of marketers claimed that they did not get regular supply of the government approved agrochemicals while 74.0% attested to the fact that customers still demanded and expressed preference for some of the banned agrochemicals. This

Table 4: Prospects and challenges of achieving environmentally friendly agrochemicals in Ekiti state

Issues	Frequency	Percentage
1. Do you get regular supply of the government approved agrochemicals?		
Yes	15	30.0
No	35	70.0
2. Do customers still make demand for some of the banned agrochemicals that you know?		
Yes	37	74.0
No	13	26.0
3.. Do you support the ban placed by the government on the use of certain agrochemicals?		
Yes	27	54.0
No	23	46.0
4. Does the ban on certain agrochemicals negatively impact on your sales?		Yes 33 66.0
No	17	34.0
5. Will you describe the enforcement on banned agrochemicals effective?		
Yes	28	56.0
No	22	44.0

finding is similar to that of Mokwunye et al. (2014) who reported that almost 50% of agrochemical marketers in south west Nigeria did not support the ban placed on some of the cocoa agrochemicals by Governments. The scholars cited fear of non-acceptance of the newly approved agrochemicals by the users (farmers) and inability to get regular supply of the products amongst others as the reasons the marketers were still into the sales of the banned agrochemicals.

Though 54% support the banned chemicals, it should be noted that only 5 out of listed banned agrochemicals were identified by more than 50% of marketers. About 66.0% of the marketers confirmed that the ban on certain agrochemicals negatively impacted on their sales and only 56.0% believed that the enforcement on these banned agrochemicals was effective. These findings suggest that unless serious efforts are directed towards achieving safe and environmentally friendly usage of agrochemicals by the concerned stakeholders, the goal of achieving it becomes a mirage.

Conclusion

The study concluded that the knowledge and awareness of ban on certain agrochemicals due to their negative impacts on man and environment is abysmally low in Ekiti state as revealed in the present study. In the same vein, the level of compliance on the ban placed on these chemicals is equally low. However, the goal of having a safe and environmentally friendly agrochemical usage is achievable if concerted effort is geared towards the subject matter by the relevant stakeholders. Based on the findings of the present study, it is recommended that there should be adequate enlightenment by extension agents on the banned and approved agrochemicals to the suppliers and marketers of agrochemicals for wider dissemination of this information. Also, there should be stricter laws that look into imports and registration of new pesticides in the country just as there should also be stricter enforcement of the laws that prevent the sales and use of banned pesticides especially in the agricultural sector. Policy and special financial incentives (subsidies) geared towards boosting local production of effective and cheaper alternatives to the banned agrochemicals should be promoted as well.

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