DOSSIER OF REGISTERED AND UNREGISTERED PESTICIDES IN THE NIGERIAN MARKET

Health Implication and Regulatory Status Locally & Internationally (Volume 1)

A compilation by

AAPN Alliance for Action on Pesticide in Nigeria

HOMEF HEALTH OF MOTHER EARTH foundation

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Executive Summary

People have a right to choose the type of chemicals they want to expose themselves, their family, and their children to, and nobody is allowed the right to deprive anyone of all the necessary information needed to enable them make that individual choice.

The use of chemical pesticides poses risks to the environment, human health, and the economy, particularly when tight regulatory measures, full disclosure of pesticide product risks, and precautionary principles are not followed. The three factors that determine the likelihood of pesticide-related biodiversity loss and health problems are - exposure level, pesticide toxicity, and access to comprehensive information. Users can make better decisions about which products to use or whether to use pesticides by being aware of the risks associated with them. To limit the negative effects on the environment, safeguard human health, and ensure the reduction, safety, and responsible use of these chemicals, users, the general public, and the government must be aware of the risks connected with them

The "Right to Know" is an inherent human right, acknowledging every citizen's entitlement to accurate and comprehensive information for his or her safety and well-being. This right is enshrined in Article 9 of the African Charter on Human and People Rights and Section 39 (1) of the 1999 Constitution of the Federal Republic of Nigeria. In Nigeria, citizens are protected by law from being denied necessary information that compromises their right to life, health, and well-being.

Agrochemical companies, pesticide manufacturers, and promoters have financially benefited from their products, whether legally or illegally and should bear responsibility for the products' impact; especially when they fail to support and provide comprehensive information on the risks associated with the products, to aid consumers and communities in making informed decisions. Citizens, as outlined in the Constitution of the Federal Republic of Nigeria, are obligated to uphold Nigeria's sovereignty, and reputation, and contribute positively to the community; defend Nigeria and render such national service as may be required. Nigerian Citizens are expected to make positive and useful contributions to the advancement and well-being of the community where they reside. The Government, on the other hand, under Section 20 of the Constitution – "shall protect and improve the environment and safeguard the water, air and land, forest and wild life of Nigeria"; emphasizing the importance of safeguarding citizens' health and their environment.

Based on the above, the Alliance for Action on Pesticides in Nigeria (AAPN) has prepared this dossier to provide up-to-date information on registered, traded, and used pesticides in Nigeria. The dossier categorizes pesticides, analyses active ingredients, showcases potential effects on human health and biodiversity, highlights the local and international regulatory status of the pesticides, and presents recommendations to mitigate associated risks.

The dossier is based on secondary data. Data on all registered pesticides from 2017 were pooled from the NAFDAC Green Book and List of Registered Pesticides Products of the Agency. The NAFDAC Pesticide Registration Regulation 2021 {section 12 (1)} prescribes that pesticide registration will be valid for five (5) years. This informed the timing of this dossier; hence, products registered within the period from 2017 to date were considered part of the sample. To narrow down, the dossier excludes registered products used as feeds, fertilizers, vitamins, drugs, biocide, seed treatment and specific reptile/bird repellents that were classified under Pesticides & Agrochemicals in the Agency's Green Book. Ninety-five (95) registered pesticide active ingredients across 670 products (excluding animal repellent, biocide, feeds, fertilizer, drugs, seed treatments, plant boasters, and vitamins) from 2017 and 2019 were generated. Of this figure, 45 (47%) of the active

ingredients are already banned in Europe, while 50 are approved in Europe (53%) – see Appendix 1.

Sixteen (16) insecticides, nine (9) herbicides, and five (5) fungicides were captured in this volume because most of them are Highly Hazardous Pesticides (HHPs), banned in the European Union (EU) and commonly used in Nigeria. Of the 30 active ingredients reviewed, 25 are categorised as Highly Hazardious Pesticides (83.3%), 3 are categorised as Moderately Hazardous Pesticides, 1 falls under the category of Slightly Hazardous Pesticide, while the last 1 is a pesticide unlikely to Present Acute Hazard.

Eighteen (18) of the active ingredients are categorised as cancer-causing (60%)

Twenty-two (22) of the active ingredients are endocrine disruptors (73%)

Nineteen (19) of the active ingredients are immunotoxins (63%)

Eighteen (18) of the active ingredients are neurotoxic (60%)

Eighteen (18) of the active ingredients are toxic to the reproductive system (60%)

The dossier makes the following recommendations for consideration by the relevant stakeholders in Nigeria:

1. Regulatory Measures: The National Agency for Food and Drug Administration and Control (NAFDAC) and the Federal Ministry of Agriculture and Food Security (FMAFS) should consider a ban on the importation, sale and purchase of highly hazardous pesticides in line with Article 7.5 of the International Code of Conduct on Pesticide Management, as developed by WHO and FAO. NAFDAC and FMAFS should collaborate to enforce a comprehensive prohibition on the importation of pesticides that are internationally banned due to their high levels of hazard. This action aligns with global best practices and ensures that Nigeria does not serve as a repository for substances deemed unsafe elsewhere.

2. Phase-Out of Registered HHPs: Implement a systematic and decisive phase-out plan for registered highly hazardous pesticides within the country. This phased approach will allow for a smooth transition, providing farmers and stakeholders with adequate time to adopt safer alternatives while mitigating any potential disruptions to agricultural activities e.g. supporting farmers to access safer and appropriate alternatives like biopesticides, IPM equipment, organic fertilizers, etc.

3. Enforcement against Unregistered Sales: Strengthen enforcement measures against the open and unregistered sale and purchase of pesticides in Nigeria. This involves increased surveillance, strict penalties for violators, and the establishment of a robust regulatory framework to monitor and control the sale of pesticides.

4. Promotion of Safe Alternatives: Actively promote and support the adoption of safe alternatives, such as organic/biopesticides and Integrated Pest Management (IPM) approaches. Government agencies, agricultural organizations, and extension workers should collaborate on comprehensive awareness campaigns to educate farmers about the benefits of transitioning to these alternatives.

5. Government Oversight: The Nigerian government at both federal and state levels should enforce stringent regulations on pesticide manufacturers, traders, and promoters. Substantial fiscal and political support is essential for NAFDAC and other pertinent agencies to effectively implement their regulatory frameworks.

6. Promotion of Responsible Practices: FMAFS, Farmers Associations, and other agricultural agencies and organizations should actively promote the responsible choice and application of pesticides. This can be achieved by disseminating comprehensive information on the health and environmental toxicity associated with various pesticides.

7. Community Engagement: Traditional leaders, religious heads, cultural advisors, and farm associations should actively seek and disseminate comprehensive information on pesticides and good farm practices. This collaborative effort aims to assist farmers in making informed decisions, minimizing unnecessary pesticide use, and fostering safer, sustainable farm systems.

8. Emergency Response: Emergency services and healthcare providers play a crucial role in facilitating effective emergency responses. They should provide detailed information on the pesticides, data on pesticide hazards, and appropriate measures for first responders and medical professionals.

9. Supply Chain Transparency: The government should encourage transparency and traceability within the agricultural supply chain. Investors should support initiatives that promote clear documentation and disclosure of the types and amounts of pesticides used, fostering accountability among all stakeholders.

10. Stakeholder Education and Training: Invest in educational programs and training sessions for farmers, providing them with knowledge and skills to adopt sustainable and responsible pesticide practices. This proactive approach can contribute to the overall success and longevity of agricultural investments.

Disclaimer

The following statement is provided to clarify the fundamental objectives, ethical principles, and methodology behind this exercise;

This exercise on registered pesticide products in Nigeria, their registration status, and their potential health and environmental effects is intended solely for informational and educational purposes.

The inclusion of company names and product brands in this study is purely to conduct a comprehensive and unbiased analysis. It is important to emphasise that the inclusion of these names is not intended to disparage any specific entity or hinder the lawful sale of any particular product. Instead, the intent is to equip the government, product promoters, farmers and consumers with essential information. The information provided in this dossier empowers individuals to make informed and responsible decisions regarding the production, selection and use of pesticide products.

For emphasis, the inclusion of company names and product brands is to provide comprehensive and accurate information to policymakers, farmers and consumers. The aim of this exercise is not to discredit any company or deter the sale of any specific product. Rather, it is designed to raise awareness and empower farmers and consumers with detailed information on pesticide-active ingredients. This information would perhaps enable them to make informed decisions on their farm practices and about the selection and usage of pesticide products in a responsible manner.

It is the shared responsibility of all stakeholders, including governments, agro companies, associations, farmers, and consumers, to ensure the safe and responsible use of pesticide products and improve our food and farm systems. This study seeks to contribute to that collective responsibility by providing valuable insights and data, to assist stakeholders make more informed choices. We encourage all parties involved to prioritise the well-being of both humans and the environment and to consider the long-term impact of their actions on our shared resources and vision.

Foreword

The use of pesticides comes at a terrible cost – a cost to the environment, human health, and the economy, particularly when the principles of responsible regulatory oversight and the disclosure of pesticide risks are neglected.

This comprehensive dossier prepared by the Alliance for Action on Pesticide in Nigeria (AAPN), is not merely a compilation of facts and figures but a clarion call for collective action and informed decision-making. It navigates the nexus between the role of pesticides in agriculture and the imperative to mitigate the risks associated with their use.

At its core, this dossier advocates for a fundamental human right—the "Right to Know." Every citizen, under their inherent right to accurate and comprehensive information, is entitled to make informed choices about the chemicals they and their families may be exposed to. The principles enshrined in the African Charter on Human and People Rights and the Constitution of the Federal Republic of Nigeria underscore the importance of this right in preserving life, health, and well-being.

The analysis of registered pesticides in Nigeria presented within these pages sheds light on a crucial aspect of our agricultural landscape. By categorizing pesticides, scrutinizing their active ingredients, and highlighting potential effects on human health and biodiversity, this dossier lays the foundation for informed decision-making and regulatory action.

The alarming revelation that a significant percentage of active ingredients in registered pesticides are internationally banned is a call to immediate action. It prompts us to reconsider our regulatory measures, phase out highly hazardous pesticides, and fortify our commitment to protect and improve human and environmental health..

The recommendations outlined in this dossier are not mere suggestions but a roadmap for change. From regulatory modifications to stakeholder education and collaboration with agroecological initiatives, each recommendation is a proactive step toward a future where agriculture flourishes in harmony with the environment.

To the farmers who toil in the fields, the regulators tasked with safeguarding public health, the investors shaping the agricultural landscape, and the citizens contributing to community well-being, this dossier is a tool for empowerment. It is a guide to responsible practices, a call to action, and a testament to our shared responsibility in cultivating a sustainable and resilient agricultural future.

We hope that the insights presented here will inspire meaningful dialogue, catalyze positive change, and propel us toward a future where agriculture not only sustains but also enriches the lives of all.

Nnimmo Bassey
Executive Director
Health of Mother Earth Foundation (HOMEF).

Table of Contents

Our Reality: Risk Assessment from Pesticide Market Practice in Nigeria.

- More than 50 per cent of registered pesticides in Nigeria are Highly Hazardous Pesticides (HHPS). Over 40% of the registered active pesticides in Nigeria are already banned in the EU and other countries of the World.
- The EU and Asia reject over 76% of Nigeria's food exports for not meeting required safety standards. Agricultural products like beans, sesame seeds, melon seeds, dried fish, dried meat, peanut ships, groundnut, palm oil and yam, exported from Nigeria have in the past 10 years been banned by the EU partly due to the presence of dangerous pesticide residues.
- Many of these HHPs registered and used in Nigeria have been proven to be linked to chronic health diseases such as cancer, kidney diseases, reproductive complications, endocrine disruption – hormonal challenges, skin diseases, organ failures, etc., as well as biodiversity and environmental destruction.
- On 24 October 2022, NAFDAC banned with immediate effect hawking of all agrochemical formulations, and called for the "Mandatory listing of Dealers (distributors/marketers/retailers) of agrochemicals";
- On May 2, 2023, NAFDAC initiated action plans for the ban/phase-out of 12 active ingredients and the re-classification of 4 others;
- Despite the efforts of the Agency, pesticides are still sold indiscriminately in Nigeria. Regardless of their hazard level, toxic pesticides can be traded, sold or used anywhere and by anyone.
- The trade, use and exposure to Highly Hazardous Pesticides (HHPs) in Nigeria are largely unmonitored and poorly regulated along the entire pesticide value chain, especially at the point of usage – farms, stores, warehouses, and institutions needing fumigation.
- More than 80% of surveyed farmers in Nigeria do not know the chemicals they apply on their farms, and food-eating consumers do not know the chemicals in their food.
- Most farmers do not read product labels on pesticide products, due to issues of language difference (written in English, not the local languages of farmers), lack of means to act on the label instructions, and/or simply depend on agro-dealers for instructions).
- Most farmers, consumers, extension workers and agro-dealers are not aware of the various hazards associated with the pesticide-active ingredients in the products they use, because the manufacturers, promoters and sometimes regulators do not disclose the health hazards.
- Most surveyed farmers cannot apply pesticides safely in the right calibration. This leaves many pesticide residues in the soil, on surface water, in the crops and invariably in the human body. In addition, there are little or no trained and certified pest control organisations/service providers.
- Over 90% of farmers surveyed do not use Personal Protective Equipment (PPEs), mainly because they are not sold in most agrochemical stores/stalls/stands, are not affordable, or are considered comfortable.
- A vast majority of farming communities and villages across the country do not have functional hospitals and pharmacies but have several unregistered and untrained agrochemical dealers and stalls.
- Even though many of these farmers have a rich traditional background in traditional biological pest control methods, this knowledge is fairly applied, as agrochemical companies make them believe the use of chemical pesticides is safer and faster.
- There is no Pesticide Control law in Nigeria and attempted bills have been proven contentious and unscrupulous, as they only seek to ease the entry and registration processes for agrochemical companies and capture sector control.

People have a right to choose the type of chemicals they want to expose themselves, their family, and their children to, and nobody is allowed the right to deprive anyone of all the necessary information needed to enable them make that individual choice.

Background: Understanding Pesticide and their Classification

Pesticides use raises a lot of environmental, health and economic health concerns, that must not be ignored, especially when the precautionary principle, full disclosure of pesticide product risk and strict regulatory measures are not put in place and/or adhered to.

Pesticides are chemical substances or mixtures of chemicals specifically designed to control, repel, or kill pests that can harm crops, livestock, or humans. These pests may include insects, weeds, fungi, rodents, and other organisms that threaten agricultural productivity and human health.

The Food and Agriculture Organization (FAO) has defined pesticide as: “any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies”.

“Pesticide” is the umbrella term, describing a group of products used to kill “pests”. Under that pesticide umbrella, some insecticides control most insects and other arthropods. **Herbicides** are used to manage weeds in various environments. **Fungicides** are pesticides that kill or prevent the growth of fungi and their spores. **Bactericides** are used to kill or prevent bacteria. Rodenticides are used to kill rodents like mice, rats, and gophers. This classification is based on the types of pests which they kill.

Pesticides can also be categorised based on how they are biodegradable in the following areas:

Biodegradable: The biodegradable kind is those, which can be broken down by microbes and other living beings into harmless compounds.

Persistent: The persistent ones are those that may take months or years to break down.

Another way to classify pesticides is by their chemical formulation methods or how they work or affect the pest:

Organophosphate: Most organophosphates are insecticides. They affect the nervous system by disrupting the enzyme that regulates a neurotransmitter.

Carbamate: Similar to organophosphorus pesticides, carbamate pesticides also affect the nervous system by disrupting an enzyme that regulates the neurotransmitter. However, the enzyme effects are usually reversible.

Organochlorine insecticides: Organochlorine (OC) pesticides are synthetic pesticides that contain carbon, chlorine and, sometimes, several other elements. The compounds are characteristically stable, fat-soluble and bioaccumulate. Organochlorines pose a range of adverse human health risks and some are carcinogens (e.g., DDT, chlordane, and toxaphene).

Pyrethroid: These are a synthetic version of pyrethrin, a naturally occurring pesticide, found in chrysanthemums (Flower). They were developed in such a way as to maximise their stability in the environment.

Biopesticides: Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals.

Pesticides can be either Systemic or Contact pesticides. Systemic pesticides mean that the plants take up the pesticide from the soil by their roots and translocate it to all of its parts – the stems, leaves, fruit, and flowers. Systemic insecticides are most effective for insects with piercing-sucking mouthparts that feed on phloem or xylem sap. Systemic herbicides kill the weed from the inside out through various mechanisms. Systemic pesticides take longer to be absorbed into the plant, but they usually provide longer-lasting residual control.

On the other hand, contact pesticides control pests when they come in direct contact with the pests. Contact pesticides work by application to the plant surface or on the insect's body. The pesticide must make contact with the target pest to achieve effective control. Contact herbicides kill plant cells in the immediate covered area.

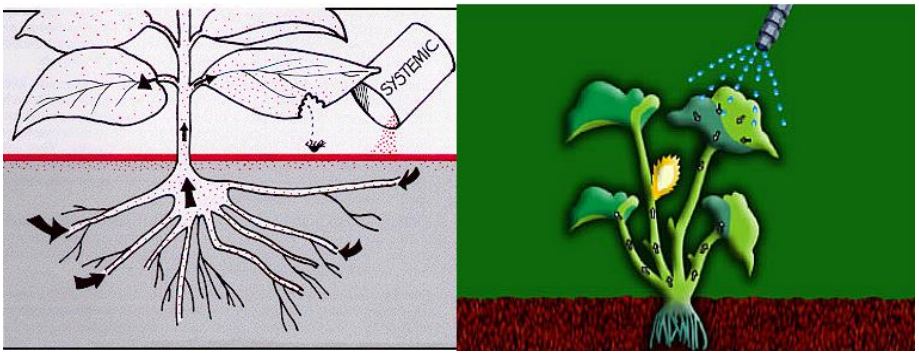


Image Source: IGCSE Biology (Cambridge) https://biology-igcse.weebly.com/translocation-of-applied-chemicals-throughout-the-plant.html

Pesticide products contain both "active" and "inert" ingredients: An "active ingredient" prevents, destroys, repels, or mitigates a pest, or is a plant regulator, defoliant, desiccant, or nitrogen stabilizer. All other ingredients are called "inert ingredients". They are important for product performance and usability. The loss of natural biodiversity and/or development of a health problem from pesticide(s) depends on three things:

1. The availability of information about pesticide(s),
2. The toxicity of the pesticide, and
3. The amount of exposure.

Knowing and understanding the risks of pesticides helps users decide whether they want to use them, and/or help users choose between different products. Knowing and understanding the risks associated with pesticides is essential for users, the public and the government to ensure the reduction, safe and responsible use of these chemicals, protect human health, and minimize environmental impact. Farm owners, farm workers, users and pesticide applicators need to be aware of the potential health risks associated with pesticide exposure. Understanding the risks can help them take appropriate precautions, such as using protective equipment, following safety guidelines, and adopting safer pest control practices.

Governments can use this knowledge to establish and enforce laws, regulations and guidelines that protect the health of pesticide users and general biodiversity. Governments can engage in public awareness campaigns to educate the general population about the responsible use of pesticides, potential risks, safety precautions and safe alternatives. This transparency helps build trust and fosters a more informed public. Farm owners, farm workers and pesticide applicators can benefit from research on alternative pest control methods, less toxic pesticides, and integrated pest

management strategies. This knowledge can contribute to more healthy and resilient farming practices.

Knowing and understanding the risks associated with pesticides also helps agrochemical investors. For instance, investors can assess the potential risks associated with the agrochemical products in which they are considering investment. This includes understanding any health, environmental, or regulatory risks that might affect the market acceptance of these products. Knowledge of pesticide risks allows investors to stay informed about regulatory developments. Changes in regulations can affect the approval, production, and sale of specific agrochemical products. Investors who are aware of regulatory trends can make more informed investment decisions on time.

Understanding pesticide risks allows investors to consider the public perception of agrochemical companies. Investors looking for sustainable and long-term growth opportunities can favour companies that prioritize environmentally responsible practices. As global awareness of environmental issues increases, agrochemical companies that align with sustainability goals may be more likely to thrive in the end.

Pesticides Classification by Hazard Level

Pesticides are classified based on their hazards to human health and the environment. The classification is typically done by regulatory agencies, and the criteria may vary depending on the country, region or agency. The classification helps in assessing the potential risks associated with the use of a particular pesticide.

A general overview of how pesticide hazards are commonly classified based on **criteria includes** -

Toxicity to Humans:

- Acute Toxicity: Pesticides are often classified based on their acute toxicity, which refers to the immediate harmful effects resulting from a single exposure. This is commonly expressed through categories such as Category I (highly toxic), Category II (moderately toxic), etc.
- Chronic Toxicity: Some pesticides may have long-term effects after repeated exposure over an extended period. Chronic toxicity classification considers potential health risks associated with prolonged or repeated exposure.

Ecotoxicity:

- Pesticides are also evaluated for their impact on the environment, including their toxicity to non-target organisms such as birds, fish, and beneficial insects. The classification may include considerations for acute and chronic effects on these organisms.

Persistence and Bioaccumulation:

- Persistence: This refers to the ability of a pesticide to remain in the environment for an extended period without breaking down. Persistent pesticides may have a more prolonged impact on ecosystems.

- Bioaccumulation: Some pesticides can accumulate in the tissues of living organisms over time, posing potential risks as they move up the food chain. Pesticides that exhibit high bioaccumulation may be subject to specific regulations.

Mode of Action:

- Pesticides may be classified based on their mode of action, which refers to the biochemical process through which they exert their toxic effects. This classification helps in understanding the specific ways in which a pesticide interacts with the target pest.

Risk Assessment:

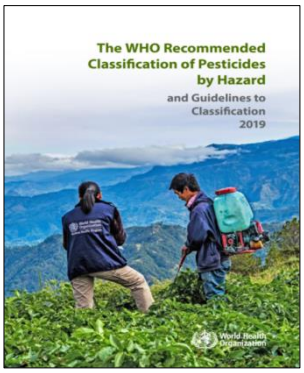
- Regulatory agencies may conduct risk assessments that take into account exposure levels, hazard characteristics, and other factors to determine the overall risk associated with a pesticide. Based on these assessments, pesticides may be classified as acceptable or unacceptable for use.

Classification System: based on the various criteria (s), classification systems are developed globally to determine Highly Hazardous Pesticides (HHPs). The World Health Organization (WHO) classification is just one of them. The Joint Meeting on Pesticide Management (JMPM) and Pesticide Action Network (PAN) also contribute significantly to the identification and classification of Highly Hazardous Pesticides.

Based on the assessor and the criteria employed, Pesticides are then categorised either as:

- Extremely Hazardous Pesticides (Ia),
- Highly Hazardous Pesticides (Ib),
- Moderately Hazardous Pesticide (II),
- Slightly Hazardous Pesticides (III)
- Pesticides Unlikely to Present Acute Hazard (U).

WHO Classification: The World Health Organization (WHO) classifies pesticides based on their acute toxicity to humans. The classification is primarily focused on the acute effects of pesticides, meaning the immediate and short-term impact on human health.

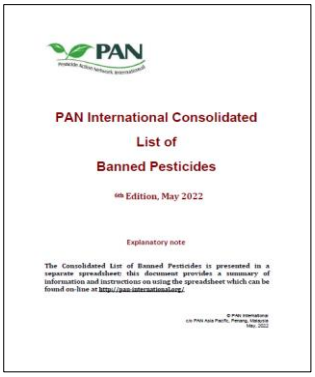


The World Health Organization's (WHO) pesticide hazard classification system, while valuable for assessing acute human toxicity, has several limitations. These include a focus on acute effects, limited consideration of chronic and environmental impacts, a single-dimension approach, and underestimation of real risk to humans, missing and/or incomplete evaluation of pesticide formulations, endocrine disruption is not included in the WHO classification, much dependence on industry data quality, and global variability in pesticide regulations.

JMPM Criteria: The Joint Meeting on Pesticide Management (JMPM) considers seven criteria to identify Highly Hazardous Pesticides. These criteria include acute toxicity, chronic toxicity, carcinogenicity, mutagenicity, reproductive toxicity, endocrine-disrupting properties, and environmental hazards.

Compared to WHO, the JMPM criteria consider a broader range of factors, including chronic toxicity, carcinogenicity, mutagenicity, reproductive toxicity, endocrine-disrupting properties, and environmental hazards. If a comprehensive assessment of various aspects of pesticide hazards is desired, the JMPM criteria may be more suitable.

PAN Criteria: PAN International's criteria for identifying Highly Hazardous Pesticides (HHPs) are known for their comprehensiveness. PAN considers a broad range of factors, including acute and chronic toxicity, persistence, bioaccumulation, long-range transport, and endocrine-disrupting properties. PAN's criteria place a significant emphasis on environmental considerations, including the potential impact of pesticides on ecosystems and non-target organisms. If the primary concern includes the ecological impact of pesticides, PAN's criteria are more relevant.



Other Criteria: Besides the WHO, JMPM, and PAN, various countries and regions may have their criteria for identifying highly hazardous pesticides. For example, the European Union has its system for pesticide classification based on potential risks to human health and the environment.

International Collaboration: International collaborations and agreements, such as the Rotterdam Convention and the Stockholm Convention, aim to regulate and restrict the use of certain hazardous pesticides globally. These conventions provide frameworks for listing and managing pesticides of international concern.

It is important to recognize the multifaceted nature of pesticide hazards, and different classification systems take into account various aspects to ensure a comprehensive evaluation. Users and regulators should consider multiple criteria and sources of information when assessing the risks associated with pesticide use to protect both human health and the environment.

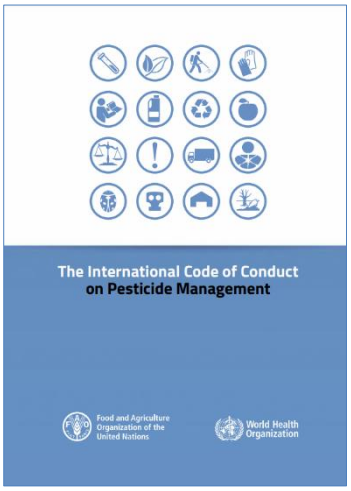
Application of Precaution in the Registration and Use of HHPs

Highly Hazardous Pesticides {HHPs - (lb),} are routinely dispersed over a sizable portion of the Earth every day. While all pesticides have the potential to be harmful, HHPs are a unique class of pesticides that are too risky for widespread usage. Given that, they have the most negative effects on both human health and the environment, HHPs should make up a relatively small portion of all pesticides that are registered and used.

Unfortunately, Highly Hazardous Pesticides (HHP) make up more than 50% of registered pesticide products in Nigeria, according to data sourced from January 2015, and April 2019. Over 40% of the registered active pesticides in Nigeria are already banned in the EU and other countries of the World.

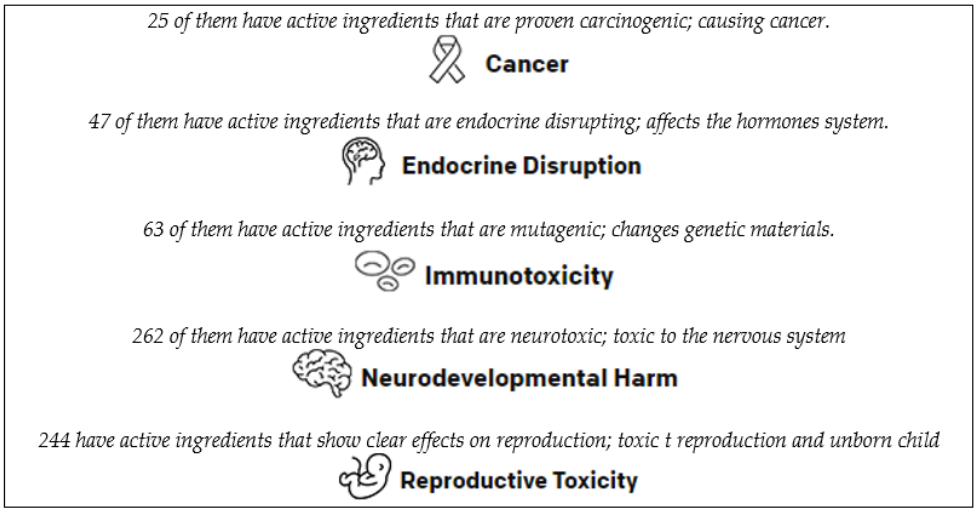
Article 7.5 of the International Code of Conduct on Pesticide Management developed by WHO and FAO, advice –

"Prohibition of the importation, distribution, sale and purchase of highly hazardous pesticides may be considered if, based on risk assessment, risk mitigation measures or good marketing practices are insufficient to ensure that the product can be handled without unacceptable risk to humans and the environment".



The survey carried out by AAPN and the SWOFON (Smallholder Women Farmers Organization of Nigeria) in 2022 shows that 7 out of the most common 13 pesticide products have active ingredients that are not only HHPs but also linked to cancer or proven to be carcinogenic. These active ingredients include Atrazine, Butachlor, Chlorpyrifos, Dichlorvos (DDVP), Endosulfan, Glyphosate, and Mancozeb. As at the time of writing this, the number of chronic health diseases is on the rise in Nigeria. Cancer is becoming more prevalent among men, women and even children, with 72,000 deaths and 102,000 new cases annually. As of April 2023, over 20 million Nigerians were reported to be living with chronic kidney diseases. The same survey shows that pesticide-active ingredients such as Paraquat and Butachlor are capable of causing kidney diseases. Several studies have presented lab results on crops, water and soil samples collected from farms, markets, and rivers in Nigeria showing the presence of highly hazardous pesticide residues that are toxic to mammals and biodiversity.

A 2020 study shows that of 1004 chemical pesticides registered in Nigeria between 2015 and 2019:



The Objective and Justification of the Study

As an inalienable human right, the "Right to Know" acknowledges that every citizen has the right to obtain accurate and thorough information necessary to keep themselves safe and secure, including, implicitly, complete information about the pesticides to which they may choose to expose themselves. Through the empowerment of information, every citizen can make decisions that protect their rights to life, health, and well-being, which are outlined in Article 9 of the African Charter on Human and People Rights and Section 39 (1) of the 1999 Constitution of the Federal Republic of Nigeria (CFRN) (enacted in 1983). According to the Nigerian constitution, it is illegal to deny any citizen all necessary, accurate and thorough information, in a manner that compromises their right to life, health, and well-being.

Agrochemical companies, pesticide manufacturers, marketers, and promoters have benefited financially from the use of their products, whether lawfully or illegally. As such, they should take responsibility for the usage, spread, and downsides of their products. Citizens are obligated by the Constitution {Chapter 2 (Sec. 24)} to uphold the authority, reputation, and good name of Nigeria; defend the country and perform any duties that positively and constructively contribute to the development and well-being of the community in which they reside; and assist legitimate and appropriate agencies in maintaining law and order. The safety of Nigeria's citizens and the country's biodiversity, which are essential to the country's existence and the growth of its economy, are ultimately the responsibility of the government. Section 20 of the Constitution of the Federal Republic of Nigeria requires the State to preserve and enhance the environment, as well as the country's water, air, and land resources, forests, and wildlife. Hence, the safety, integrity, unity, and national interest of the Nigerian people must be protected and promoted by all of her people and the government.

During her first term, the Director General of NAFDAC gave a directive to review and analyse the list of registered pesticides and agrochemical active ingredients in the NAFDAC Registered Product Automated Database (NARPAD) vis-à-vis active ingredients banned, non-approved or restricted in the European Union, other countries or by relevant international organizations. This led to several meetings with stakeholders and a November 2022 meeting when timelines were set for the phase-out ban of the various pesticides[1].

[1] NAFDAC Website (Accessed 01.12.23): Revised Press Release By Dg On The Ban, Phase-Out And Reclassification Of Pesticides https://www.nafdac.gov.ng/revised-press-release-by-dg-on-the-ban-phase-out-and-reclassification-of-pesticides/

The outcome of the review of NAFDAC's database for the pesticides was shared with stakeholders at a three (3) day virtual stakeholder engagement held on the 22nd, 24th, and 29th of November 2022. It focused on the proposed phase-out/ban of these active ingredients and had in attendance, proponent holders of marketing authorizations, Non-Governmental Organizations like the Alliance for Action on Pesticide in Nigeria (AAPN), Associations (All Farmers Association of Nigeria, CropLife Nigeria, and Nigeria Agro-Input Dealers Association etc.), Ministries, Departments and Agencies (MDAs), Research institutes amongst others.

At the end of the meeting, it was agreed that;

1. Pesticide and agrochemical importers and manufacturers would be advised to institute stewardship plans (such as Post Marketing Surveillance and research) in their companies.

2. NAFDAC to collaborate with research institutes in the conduct of research and scientific data generation on pesticides to enable the Agency to make evidence-based decisions and policies.

3. NAFDAC to intensify Post Marketing Surveillance nationwide.

4. There should be continual sensitization and education of relevant stakeholders on the safe and responsible use of pesticides.

5. NAFDAC to engage with other sister Agencies (Federal Ministry of Agriculture and Food Security, Standards Organization of Nigeria, National Environmental Standards and Regulation Enforcement Agency, Nigeria Agricultural Quarantine Service) to ensure synergy in the regulation of pesticide and agrochemical products.

Objectives of this Dossier: based on the above premise - to support the work of the Agency and other policymakers, as well as increase public knowledge on pesticide use and regulation, this dossier seeks to provide necessary, accurate, thorough and up-to-date information about pesticide active ingredients registered, traded and used in Nigeria.

To achieve this, the study;

1. Identifies and categorizes the various types of pesticides registered, traded and used in the Nigerian market; and analyses the specific active ingredients present in the products

2. Shows the potential effects of the identified active ingredients on humans, animals, the environment and the entire biodiversity – citing core scientific research findings.

3. Shows the regulatory status of the active ingredients locally and internationally, and

4. Proffers recommendations to alleviate the associated risk of pesticide hazards in Nigeria.

Justification: This exercise is about protecting the right of choice of every person by increasing public sensitization on pesticides used and traded in Nigeria. This dossier presents the details of pesticide active ingredients, their health effect, environmental implications, regulatory status locally and internationally, and the list of products in Nigeria containing these active ingredients. Full disclosure, precautions, and comprehensive information on pesticides are of paramount importance for several reasons:

1. Human Health Protection: Pesticides, by their nature, contain chemicals designed to kill or control pests. These chemicals can be toxic to humans if not handled properly. Providing detailed information and precautions helps reduce the risk of pesticide exposure among farmers, farmworkers, and anyone who comes in contact with treated crops, equipment, or contaminated soil, water or air. It also enables individuals to seek appropriate medical attention if exposure occurs.

2. Environmental Protection: Pesticides can have detrimental effects on the environment. They can contaminate soil, water bodies, and air, leading to unintended harm to non-target organisms, including beneficial insects, birds, and aquatic life. Proper information and disclosure help minimise these environmental impacts by guiding pesticide application methods and quantities.

3. Responsible Pesticide Use: Disclosure and information on the health and environmental toxicity of pesticides serve as a great motivation to ensure that these chemicals are applied responsibly and by recommended guidelines. This reduces the likelihood of overdependence, misuse, overuse, and the development of pesticide-resistant pests.

4. Promoting Safe Alternatives: Full disclosure and comprehensive information play a crucial role in promoting less hazardous pesticides, organic/biopesticides and Integrated Pest Management Approaches (IPM) as safer alternatives. When farmers have access to complete information about the risks associated with the use of Highly Hazardous Pesticides (HHPs) and the benefits of using agroecological methods, they are more likely to make informed choices that prioritise safety for both themselves and the environment.

5. Enhancing Precautionary Measures: Knowledge about the safety and effectiveness of less hazardous and organic/biopesticides enables farmers and pesticide applicators to take more effective precautionary measures. They can implement safety protocols that are specific to the chosen pesticide, reducing the risk of accidents and exposure to harmful chemicals.

6. Regulatory Compliance: Pesticide regulations are put in place to protect public health and the environment. Full disclosure and information ensure that pesticide manufacturers, distributors, and users comply with these regulations, reducing the risk of illegal or unsafe pesticide use.

7. Research and Development: Researchers and scientists need access to detailed information about pesticides to study their effects, develop alternatives, and assess long-term impacts on human health and the environment. This information supports ongoing efforts to improve pesticide safety and reduce environmental harm.

8. Investment Risk Management & Market Access: Knowledge of the health effects associated with pesticide active ingredients allows investors to assess potential liabilities and risks. Understanding these impacts helps investors gauge the long-term sustainability of agrochemical products and anticipate regulatory changes.

These are the justifications for this exercise.

Scope and Methodology

This exercise largely uses secondary data sources. Data on all registered pesticides from 2017 were pooled from the NAFDAC Green Book and List of Registered Pesticides Products of the Agency. The choice of this period is informed by the NAFDAC Pesticide Registration Regulation 2021 {section 12 (1)} that prescribes that pesticide registration will be valid for five (5) years. Hence, products registered within the period from 2017 to date were considered part of our sample. The exercise excludes registered products used as feeds, fertilizers, vitamins, drugs, biocide, seed treatment and specific reptile/bird repellent. Sixteen (16) insecticides, nine (9) herbicides and five (5) fungicides were captured in this volume. This volume is largely focused on pesticides that are already banned in Europe, those that are in the category of Highly Hazardous Pesticides, and those commonly used and traded in Nigeria (even if banned elsewhere).

The exercise also scouted for pesticide products in local markets in Abuja, Lagos, Kano, Port Harcourt, Markurdi, Bauchi, Ibadan, Gombe, Niger, Onitsha, Kaduna and Jigawa. Products were also identified from online shops like Farm Square, Jumia, Konga, Afrimash, and Jiji.

Information, scientific findings and conclusions on pesticide active ingredients was deliberately sourced, first from open (public) sources - reputable international agencies and organisations, non-profit organisations with international spread, state government agencies and specialised research institutions such as the World Health Organisation (WHO), Food and Agricultural Organisation of the United Nations (FAO), International Labour Organization (ILO), International Chemical Safety Cards (ICSCs), the United States Environmental Protection Agency (EPA), the National Cancer Institute, the USA Neurotoxicology Association, the British Industrial Biological Research Association, International Cancer Institute, PubChem - open chemistry database of the National Institutes of Health (NIH), the National Pesticide Information Centre (NIPC), the National Library of Medicine USA, the National Centre for Biotechnology Information, International Union of Pure and Applied Chemistry, European Chemicals Agency (ECHA); Australia's Safety Data Sheet Centre for Disease Control and Prevention Agency for Toxic Substances and Disease Registry, the Breast Cancer Prevention Partner (BCPP), the Rotterdam Convention, the Basel Convention Centre, the Centre for Disease Control and Prevention (CDC) USA, Pesticide Action Network, the Earth Justice, eChem Crop Protection, etc.

Cited peer review journals on the pesticide active ingredients were limited to 2013 and beyond, except where the cited journal is published in a reputable and specialised institutional journal.

Insecticides
Active Ingredients

Abamectin

Abamectin is an agricultural insecticide and a veterinary anthelmintic (kills parasitic worms and parasites in animals). Abamectin is a broad-spectrum systemic insecticide that attacks the nervous system of insects and causes paralysis within hours. It is used for controlling chewing and sucking insects in mainly beans and tomatoes but also in cabbage, broccoli, snow peas, chillies and potatoes. In Nigeria, Abamectin is/was registered in 4 products by NAFDAC.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazardous (la) ○ Highly Hazardous (lb), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Abamectin Active Ingredient

Abamectin is one of the Active Ingredients that are banned from field use in the EU; it can only be applied in greenhouse farms. It is also banned in Brazil. Earlier in 2011, Thailand, which is the world's largest rice exporter, banned the use of Abamectin. It is highly restricted in the USA, Canada and Australia.

General Aspects

Registered (NRN) / Unregistered Products Containing Abamectin		Applicants & Country	Crop Treated and Pest	
ABAMET	'A5-1084	Amarshal com. Agro & tec. Ltd (China)	Tomatoes, Cabbages, Beans, Cotton Citrus Maize	Broccoli, Snow peas, Potatoes Chilies
AXCEPT 240 SC	'A5-1585			
DYNAMASH	'A5-1583	Lionseal Industries Limited. (China)		
MITE FORCE	'???????			
VIPEOUT LIQUID	'A5-1585			
			Red Spider Mites, Leaf Miners, Thrips, Aphids, Grasshopper, Whiteflies	

Note:
'??????? – could not verify/identify NADFAC Reg Number (It does not imply Reg No. does not exist)

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns


Neurodevelopmental Harm


Reproductive Toxicity

Acute exposure (poisoning) to Abamectin causes nausea, vomiting, diarrhoea, sleepiness, agitation, and weakness; in severe poisoning, hypotension, tachycardia, coma, and respiratory failure are described (Selladurai, et al., 2021). Severely poisoned patients suffer unconsciousness, hypotension, metabolic acidosis, and even death (Bansod et al., 2013). Abamectin poisoning can induce brain cell apoptosis and affect the normal functioning of the nervous system (Dalzell et al., 2015).

According to eChem Australia's Safety Data Sheet (SDS, June 2021), Abamectin is highly toxic to insects and may be highly toxic to mammals as well. At very high doses, it can affect mammals, causing symptoms of nervous system depression such as incoordination, tremors, lethargy, excitation, and pupil dilation. Very high doses have caused death from respiratory failure. Abamectin is not readily absorbed through the skin. Tests with monkeys show that less than 1% of dermally applied Abamectin was absorbed into the bloodstream through the skin. Rats given 0.40 mg/kg/day of Abamectin had increased stillbirths, decreased pup viability, decreased lactation, and decreased pup weights. These data suggest that Abamectin may have the potential to cause reproductive effects at high enough doses. It is highly toxic to fish and extremely toxic to aquatic invertebrates. (de Faria et al., 2018)

Safety Caution for Application & Regulation

Strict restrictions should be imposed on its trade and use. It should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. This product should not be handled until all safety precautions have been read, understood and complied with. Otherwise, this product should be withdrawn immediately.

Acephate

The active ingredient Acephate is an organophosphate insecticide typically used as a foliar (relating to leaves) spray. It is used as a contact and systemic insecticide for field, fruit, and vegetable crops, forestry, food handling, ornamentals, and household applications. Acephate can kill target insects when they touch it or eat it. When insects eat Acephate, their bodies turn it into a chemical called methamidophos, which is another, stronger insecticide. It is also used for control of parasites in farm animals. Acephate products may be sold as powders, liquids, granules, tablets, and in water-soluble packets. In Nigeria, it is/was registered and sold in 2 products (and some yet-to-be-verified registered products). It is mostly registered for controlling chewing and sucking insects.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Acephate Active Ingredient

It is not approved for use in 27 countries in the EU. Acephate is banned in the EU for use as a biocide and agricultural insecticide. It is banned in 38 countries including the UK, Bosnia, Indonesia, Malaysia, Palestine, Saudi Arabia, Saudi Arabia, Serbia, Switzerland, Turkey, Norway, and Oman with limited use in Brazil. In China, it has been categorised as extremely and highly hazardous pesticides and prohibited for use on vegetables, melons, tea, fungus and Chinese herbal medicine since July 1, 2019.

General Aspects

Registered (NRN) / Unregistered Products Containing Acephate	Applicants & Country	Crop Treated
Ortain Powder 'A5-1809 Powertox 'A5-1809 Final Force Lancer Acephate 750 SP Lancer Gold	Coromandel Interl Nigeria Limited (India) Jubaili Agrotech ltd UPL Nigeria	Maize, Cotton, Rice, Vegetable Carrot, Tomatoes, Lettuce **Pest** Aphids, Armyworm, Bollworm, Brown Plant Hopper, Jassids, Stem Borer, Thrips, White Fly, Caterpillars.

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Cancer

Neurodevelopmental Harm

Even at low levels of exposure, Acephate can lead to serious negative health effects – Earth Justice (2023). According to the USA National Pesticide Information Centre (NPIC), the United States Environmental Protection Agency (EPA) classifies Acephate as a "possible human carcinogen." Acephate in their diets for two years, a greater number of them had liver or adrenal gland tumors. Mice that were fed high doses of Acephate all at once had DNA damage in blood cells. Acephate can cause cholinesterase inhibition in humans as with any other organophosphate, which can result in overstimulation of the nervous system and which can cause nausea, dizziness, confusion, blurred vision, difficulty in breathing, muscle weakness and at very high exposures (e.g., accidents or major spills), respiratory paralysis, convulsion, coma and death. Acephate has been shown to cause liver cancer in animals (Christianen et al, 2011). According to the New Jersey Health Department Right to Know Hazardous Substance Fact Sheet (2017), Acephate should be handled as a CANCINOGEN –with extreme caution.

Acephate is highly toxic to birds and honeybees, and moderately toxic to most aquatic species and earthworms. It has a high toxicity towards wild bees and stingless bees.

Safety Caution for Application & Regulation

NAFDAC should consider phasing out Acephate in Nigeria; stop the registration and importation of all Acephate-based pesticides. Improve regulation that encourages investors to divest to safe alternatives. For users, always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully.

Carbofuran

Carbofuran is a systemic insecticide, which means that the plant absorbs it through the roots, and from there, the plant distributes it throughout its organs where insecticidal concentrations are attained. Carbofuran is listed under Annex III of the Rotterdam Convention. Chemicals listed in Annex III include pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by two or more Parties. Although the NAFDAC Green Book 2017 to 2019 does not show any pesticide product registered with Carbofuran active ingredient, there are products with Carbofuran used by Nigerian farmers. A survey on smallholder women farmers in Nigeria in 2020 shows that Carbofuran-based pesticides are among the most common pesticide products used by farmers.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Carboforan Active Ingredient

Carbofuran is banned in 87 countries across the world. It is banned in countries like Turkey, United Arab Emirate, UK, USA (since 2009), Vietnam, Antigua & Barbuda, Argentina, Brazil, Cabo-Verde, Canada, Chad, Chile, Colombia, Costa Rica, Ecuador, Egypt, Korea, Gambia, Jordan, New Zealand, Panama, Nepal, Mexico, Saudi Arabia, Switzerland, India, and Sri-Lanka. It is banned in 27 EU countries, and also in African countries like Togo, Niger, Senegal, Gambia, Chad, etc. The Nigerian Federal Ministry of Agriculture and Food Security (FMAFS) banned its use on 7 March 2022, BUT NAFDAC is yet to add it to the list of banned pesticides.

General Aspects

Registered (NRN) / Unregistered Products Containing Carboforan	Applicants & Country	Crop Treated and Pest	
Carbodan Curaterr 10 GR Curaterr 5G Furadan 3G Furaha Worm Force	Adama Group Bayer FMC Corporation Jubaili Agrotech Group Syngenta Producing Countries India, USA, Germany, Switzerland	Tomatoes, Potatoes, Corn/maize, Soybeans, Yam/cassava, Cabbage, Onion, Banana Vegetables, Pepper, Cucumber, Watermelon Carrot, Kale, Sugar cane	
		Black worm Wireworm Rootworm Maggots in ground Nematodes Mealybugs	Caterpillar Bollworm Thrips Stalk borer Leafhoppers

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

According to details from the National Library of Medicine (NIH)-PubChem, Carbofuran has one of the highest acute toxicities to humans of any insecticide widely used on field crops. 1 ml (1/4 teaspoon) can be fatal to humans. Carbofuran is an endocrine disruptor and a probable reproduction/development intoxicant. At low-level exposures, Carbofuran may cause transient alterations in the concentration of hormones. These alterations may consequently lead to serious reproductive problems following repeated exposure. As with other N-methyl carbamate pesticides, the critical effect of Carbofuran for various exposure duration is cholinesterase inhibition; that is, it can overstimulate the nervous system causing nausea, dizziness, confusion, and at very high exposures (e.g. accidents or major spills), respiratory paralysis and death. Carbofuran is classified as “Not Likely” to be a human carcinogen. According to the International Union of Pure and Applied Chemistry in Lewis et all (2016), Carbofuran is highly toxic to birds and honeybees whilst having moderate to high toxicity to most aquatic organisms. It is moderately toxic to earthworms.

Safety Caution for Application

NAFDAC on May 2, 2022, placed an immediate ban on all products with Carbofuran. Products with active ingredient - Carbofuran should be withdrawn immediately. NAFDAC should include Carbofuran in the List of Banned Pesticides.

Chlorpyrifos

Chlorpyrifos is an organophosphate insecticide, acaricide and miticide used primarily to control foliage and soil-borne insect pests. It acts on the nervous system of insects. It is characterised as a highly toxic, colourless, white, or light brown crystalline solid with a mild rotten egg or garlic odour, and exposure occurs by inhalation, ingestion, or contact. The EU also applied to have Chlorpyrifos listed under Annex A of the Persistent Organic Pollutant (POP) under the Stockholm Convention on Persistent Organic Pollutants. Annex A (elimination) of the POP Stockholm Convention means - "Parties must take measures to eliminate the production and use of the chemicals listed under Annex A".

Chlorpyrifos is registered in over 42 agricultural insecticides and insecticide brands in Nigeria, between 2017 to April 2019. It is one of the commonly active ingredients in pesticide brands used by farmers in Nigeria. The Nigerian Federal Ministry of Agriculture and Food Security (FMAFS) banned its use on 7 March 2022.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (la) ○ Highly Hazardous (lb), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Chlorpyrifos Active Ingredient

It is not approved for use in 39 countries. It is planned for phase out in Canada by December 2023. It has been banned in Egypt, Morocco, Indonesia, Palestine, Saudi Arabia, Sri-Lanka, Turkey, Switzerland, Sweden, Thailand, the UK (since 1 April 2016), Vietnam, and the EU since 2020. It has been banned from residential and garden use in South Africa since 2010. It has been banned in India since 2019. Chlorpyrifos is highly restricted in China. The EU also applied to have Chlorpyrifos listed as a persistent organic pollutant under the Stockholm Convention on Persistent Organic Pollutants. Chlorpyrifos is no longer used on food and animal feed crops since 2022. The U.S. Environmental Protection Agency (EPA) determined that risks of dietary exposure to Chlorpyrifos, especially for children, were too high. – NPIC (2023). The U.S. Environmental Protection Agency (EPA) stopped the use of the pesticide Chlorpyrifos on all food to better protect human health, particularly that of children and farmworkers. Several other countries, including the European Union and Canada, and some states including California, Hawaii, New York, Maryland, and Oregon have taken similar action to restrict the use of this pesticide on food. The Nigerian Federal Ministry of Agriculture and Food Security (FMAFS) banned its use on 7 March 2022 BUT NAFDAC is yet to add it to the list of banned pesticides.

General Aspects

Registered (NRN) / Unregistered Products Containing Chlorpyrifos		Applicants & Country	Crop Treated
Actforce	'???????	Afcott Nig Ltd (India)	Maize, Cotton
Actforce Gold	'???????	Amarshal Com.Agro & Tech Ltd	Rice, Sorghum
Atragold Powder	'A5-1571	(China)	Potatoes,
Atronol	'A5-1560	Coromandel International Limited	Vegetables,
Carasiv Powder	'A5-1830	(India)	Banana, Citrus
Cashield	'A5-1637	Goldstar Crop Science Nig Ltd	fruits, Tomatoes
Chlorpalin 20 Ec Liquid '	04-9556	(India)	Avocado,
Clearpest Insecticide Powder	'A5-1656	Hangzhou Agrochemical Nig Ltd	Soybeans, Millet
Chloview	'A5-0799	(China)	**Pest**
Combicot 505	'A5-1560	Jubali AgroTech ltd	Aphids
Cyperdigold	'A5-1651	Kesai Eagrow Nig Company Ltd	Armyworm
Dual Gold 960 Ec	'A5-1830	(China)	Bollworm
Duduall Liquid	'A5-0052	Osi Agro & Industrial Chem Co. Ltd	Brown Plant
Duduall Liquid	'A5-1651	(China)	Hopper
Dursban	'A5-1571	Royal Tee Square Trade & Invest	Mosquito larvae
Eagrowkil	'A5--0466	Co Ltd (China)	Leaf miner
Fatrazin	'A5-1561	Springfield Agro Ltd (India)	Jassids
Garatox	'A5-1850	Tropical Crop Sciences Ltd (???)	Stem Borer
Kik-Off Lotion	'A5-1833	Vista Int'l Ltd (India)	Thrips
Kolar Insecticide	'??????	Wacot Ltd (China)	White Fly

Metmelon Plus Liquid	'A5-1850	The Scientific Fertilizer Company	Termites
Perfect Killer Liquid	'A5-0052	Ltd (India)	Mealy bugs
Perfect Killer Tre | 250 Ml	'??????	Harvest Field Nigeria	Caterpillar
Predator 170 Ec Liquid	'A5-1636	Sara Agro Tech	Ants
Robust 20 Liquid	'A5-1836		
Robust 48 Liquid	'A5-1837		
Robust Super Liquid	A5-1833		
Rocket	'??????		
Royachloprid Liquid	'A5-1656		
Spotlight	A5-1641		
Super Kill Pest	'A5--0466		
Sweed-Ga	'A5-1836		
Termex 480g/Lit	'??????		
Termifos 20	'??????		
Termiclor	'??????		
Termikem 20 Ec	'A5-1636		
Terminator	'A5-1641		
Wiper	'A5-1561		
Yuki Maton Insecticide	'04-9556		

Health Impact, Environmental Toxicity and Social? Behaviours Concerns

The health risks associated with exposure to Chlorpyrifos are well documented. These include increased risk of neurodevelopmental conditions such as learning disabilities in children and attention deficit hyperactivity disorder (ADHD) following prenatal exposure, and link to cancer, endocrine disruption, and other health problems including dizziness and confusion. Exposure to small amounts of Chlorpyrifos can cause runny nose, tears, and increased saliva or drool. People may sweat, and develop headaches, nausea, and dizziness. More serious exposures can cause vomiting, abdominal muscle cramps, muscle twitching, tremors and weakness, and loss of coordination. It is not known whether Chlorpyrifos can cause cancer in people. However, The EPA has classified Chlorpyrifos as a possible human carcinogen - CDCP. Laboratory studies indicate that exposures to chronic low doses of Chlorpyrifos lead to an increased risk of developing mammary tumours. Wives of pesticide applicators who used Chlorpyrifos in their homes had a significantly increased risk of developing breast cancer. The effect was most pronounced for women diagnosed with premenopausal breast cancer. (Engel, Lawrence S et al 2017). Adult female rats who were fed low doses of chlorpyrifos for eight weeks developed several reproductive system abnormalities. They also developed abnormalities in their mammary glands that are predictive of increased mammary tumour risk (e.g., higher numbers of terminal end buds [TEB] and ductal branching, larger TEB diameters, and higher oxidative stress). (Nishi and Swarndep, 2013). Researchers studied the blood of women who were exposed to Chlorpyrifos and the blood of their children from birth for three years. Children who had Chlorpyrifos in their blood had more developmental delays and disorders than children who did not have Chlorpyrifos in their blood. Exposed children also had more attention deficit disorders and hyperactivity disorders. They also inform that Chlorpyrifos is highly toxic to mammals, and is classified as a reproduction toxicant, an acetyl cholinesterase inhibitor and a neurotoxicant. It is also a skin and eye irritant. It is highly toxic to birds, fish, aquatic invertebrates and honeybees and moderately toxic to aquatic plants, algae and earthworms. - USA National Pesticide Information Center (NPIC). The EU also applied to have Chlorpyrifos listed as part of Annex A under the Persistent Organic Pollutant (POP) under the Stockholm Convention on Persistent Organic Pollutants. – EU Council Decision 2021/592

Safety Caution for Application

In line with FMAFS's ban on Chlorpyrifos on March 7, 2022, NAFDAC should immediately ban the active ingredient for agricultural use. Chlorpyrifos active ingredients for agricultural use should be withdrawn immediately and repurposed strictly for non-agricultural use. Stricter regulations should also be put in place to push agrochemical manufacturers towards the production of safer alternatives.

Cypermethrin

Cypermethrin (CP) is a synthetic pyrethroid used as an insecticide in large-scale commercial agricultural applications as well as in consumer products for domestic purposes. It behaves as a fast-acting neurotoxin in insects. It is easily degraded on soil and plants but can be effective for weeks when applied to indoor inert surfaces.

Cypermethrin is the primary active ingredient in at least 40 registered products in Nigeria. It is also present in many popular, but yet to be verified (NAFDAC certified) products in the market. It is also present in over 80 registered agricultural insecticide and home insecticide products either as primary or secondary active ingredients from 2017 to April 2019.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Cypermethrin Active Ingredient

Cypermethrin is highly restricted in India, banned in Canada and highly restricted in the EU. It is neither banned nor highly restricted in Nigeria. It is also banned in Turkey, the United Kingdom (UK), Saudi Arabia, and Bosnia & Herzegovina. Cypermethrin (beta, zeta, and alpha) is banned in 27 EU countries.

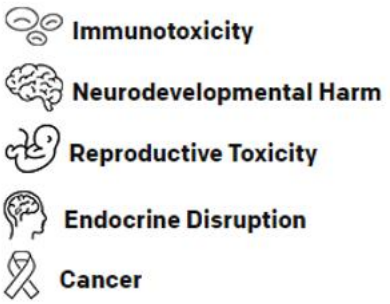
General Aspects

Registered (Nrn) / Unregistered Products Containing Cypermethrin		Applicants & Country	Crop Treated and Pest
Act Force 55	‘???????	Abdul Bakai Farms Ltd (China) Afcott Nig Ltd (India) Comfort Agro Chemical Nig Ltd (India) Give Agroscience Ltd (India) Goldstar Crop Science Nig Ltd (India) Harvestfield Industries Ltd (China) Lionseal Industries Limited. (China) Mclarrince Nigeria Ltd (Nigeria) Multichem Ind. Ltd (India) Nelpharm Nigeria Limited (India) Osi Agro & Industrial Chem Co. Ltd (China) Power Agrochemicals Limited (Nigeria) Public Health Strategic Results Concepts Ltd (Tanzania) Reliable Agro Allied Limited (China) Reva Agrochemical Co. Ltd (China) S A Diamond Nig Enterprises (Nigeria) Tropical Crop Science Ltd (India) Vista International Ltd. (India)	Tomato, Cucumber, Potato, Capsicum, Onion, French beans, Runner Beans, Rice, Maize
Al-Cypernet 10sc	‘???????		
Alexander Liquid	'A5-1608		
Atrazine 80%	'A5-1565***		
Avesthrin	'A5-0543		
Bakme	'A5-1871		
Best Action	‘???????		
Bugslock Mosquito Repellant	'A5-1574		
Clearpest Insecticide Powder	'A5-1919		
Cymo	'A5-1548		
Cype Force	‘???????		Sucking and Chewing irritations, for example Whiteflies, Aphids, Thrips, Bollworms, Pod drills, Leaf rollers, Leafhoppers, Stem drills, Beetles, Caterpillars, Cutworms, Spider Vermin, Ants Cockroaches fleas and other Insects
Cypergreen	‘???????		
Cyperkill	‘???????		
Cypavest	‘???????		
Cypercal Liquid	'A5-1654		
Cyperchlor Insecticide	'A5-1619		
Cypercom Eraser	'A5-0291		
Cypercot Liqud	'A5-0508		
Cyperdigold	'A5-1570		
Cyprus	'A5-2015		
Cypyripos	'A5-1566		
Cypyripos	'A5-1654		
Damet Plus Liquid	A5-0542		
Dominator 440 Ec	'A5-1647		
Defender Insecticide Spray	'A5-1608		
Deurozine	'A10-0401		
Droplin	'A5-1919		
Endorazine	'A5-0508		
Flushout	‘???????		
Kickout	'A5-1567		
Multistar 80 Wp	'A5-1566		
Nelthrin 5wp	'A5-0604		
Night Lad	'A5-0543		

Olyset Net	'A5-1619	Wacot ltd	
Power Pesticide 80wp	'A5-1915	Jubaili aggrotech	
Powertrazine Powder 80wp	'A10-0400	Harvest Filed Nig	
Relithrin	'???????		
Rid W Powder	'A5-1548		
Sixtrazine Wp	'A5-1567		
Sharpshooter	'??????		
Stave Off	'A5-1915		
Striker Gold Liquid	'A5-0604		
Superchopper	'A5-1871		
Superthrin 10 Ec Liquid	'04-6900		
Titan	'A5-1574		
ZZ Paff Plus	'04-6900		

*** wrong classification

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



A range of hormone-related adverse effects (e.g., reduced male fertility, altered hormone levels and gene expression). The European Joint Research Centre (JRC) considered Cypermethrin a full endocrine disruptor in 2016. Developmental Neurotoxicity Studies also showed effects, but more studies are needed to understand the impacts (e.g., possible relation to Parkinson's disease). In addition, the review of Marettova (2017) points to the wider group of Pyrethroids with neurodevelopmental, reproductive, and immunological effects that may result following exposure to some pyrethroid at levels below those that induce overt signs of neurotoxicity. Pyrethroids are endocrine disruptors that reduce steroid hormone levels and cause reproductive damage. Cypermethrin is among the Pyrethroids causing the most severe damage. Cypermethrin is highly toxic to fish, bees and aquatic insects.

According to the National Pesticide Information Centre (NPIC), Cypermethrin is classified as a possible human carcinogen, because it causes an increase in the frequency of lung tumors in female mice. Cypermethrin has been linked to an increase in bone marrow micronuclei in both mice and humans.

Cypermethrin is a broad-spectrum insecticide, which means it kills beneficial insects as well as the targeted insects. Fish are particularly susceptible to Cypermethrin, but when used as directed, application around residential sites poses little risk to aquatic life.

Safety Caution for Application

NAFDAC should impose strict restrictions on its trade and use. Cypermethrin should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. . NAFDAC should encourage manufacturers towards safe alternatives.

Dichlorvos (2, 2-dichlorovinyl dimethyl phosphate, DDVP)

Dichlorvos is an organophosphate fumigant insecticide. Dichlorvos is used as a household and agricultural insecticide on crops, stored products, and animals. Dichlorvos is used as an anthelmintic (worming agent) for dogs, pigs, and horses, and as a botacide (agent that kills fly larvae).

Between 2017 and April 2019 over 35 agricultural pesticides and insecticides were registered in the NAFDAC green book. Several pesticide brands have been registered after this period, some of which have been included in the list. NAFDAC banned the importation and manufacture of 100ml pack size of Agricultural formulations of Dichlorvos in 2019.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Dichlorvos (DDVP) Active Ingredient

It is banned in India, Canada, China, and Argentina and Banned in the EU since 2006. It is highly restricted in the USA. It is also banned in Bangladesh, Fiji Island, India, Indonesia, Morocco, Nepal, Palestine, Saudi Arabia, Switzerland, Turkey, and the UK. On October 24 2022, NAFDAC banned the importation and manufacture of 100ml pack size of Agricultural formulations of Dichlorvos with immediate effect.

FMAFS issued a ban on its use on 7 March 2022, but NAFDAC is yet to add it to the list of banned pesticides. NAFDAC banned the importation and manufacture of 100ml pack size of Agricultural formulations of Dichlorvos in 2019.

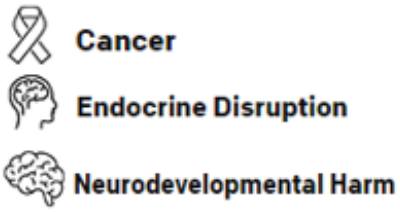
General Aspects

Registered (NRN) / Unregistered Products Containing Dichlorvos (DDVP)		Applicants & Country	Crop Treated
Afripower DDVP	'A5-1652	Agrofeast Nig Ltd ((China))	Fruit trees,
Agrosect Liquid	'A5-0388	Choice Agrochemical Ltd China	Vegetables,
Amitex	'A5-1918	Comfort Agro Chemical Nig Ltd	Rice,
Butacal	'A5-2020	(India)	Wheat,
Choke (Liquid)	'A5-0408	Coromandel International (Nigeria)	Maize,
Clearpest Insecticide [Aka Pestak]	'A5-1918	Limited (India)	Coffee,
Corovas Liquid	'A5-1838	Duraayu Int'l Ltd (China)	Tea,
Daksh 250ml | 1l	'??????	Etong Agrotech Nig Ltd(China)	Cocoa,
Damet Plus Liquid	'A5-1652	Hk Imperio Nigeria Limited (China)	Banana,
DDcom Eraser	'A5-0308	Lionseal Industries Limited (India)	Plantain,
DDempire (Liquid)	'A5-1528	Lond And Hudds Limited Nigeria	Yam,
DD Force	'A5-0107	Masco Agro Allied Industries	Cassava,
Ddmax Liquid	'A5-1587	(India)	Sugarcane e.t.c.
Didwell Liquid	'A5-0469	Multichem Industries Ltd (India)	**Pest**
Dola	'A5-1547	Osi Agro & Ind Chem Co Ltd	Spider mites,
Dvapor	'A5-2020	(China)	Sucking and
Eagrowrise	'A5-2008	Reva Agrochemical Co. Ltd	Chewing insects,
Garamacut Super Liquid	'A5-1985	(China)	Aphids,
Glo-Nomi Gold	'A5-1838	Royal Tee Square Trade & Invest	Caterpillars,
Gladiator	'??????	Co Ltd (China)	Whiteflies
Kickout	'A5-1567	Rumfaku Ventures And Supply	
Killvos Liquid	'A5-1485	Limited (China)	
Mulvap Liquid	'A5-0545	S A Diamond Nig Enterprises	
Nopest	'A5-0545	(Nigeria)	
Pendiseal	'A5-1528	Vista International Ltd.(India)	
Pestoff	'???????	Ymdy Co Nig Ltd (China)	
Rampage	'A5-1657	Harvest Field Nigeria	
Ridoff	'???????	Saro Nigeria tld	

Royap DDVP Liquid	'A5-1657	WACOT NIG LTD	
Rumfaku DDVP	'A5-2008		
Satellite Liquid	'A5-0408		
Seedgold	'A5-1587		
Sixtrazine	'A5-1567***		
Stargold	'A5-1692		
Titan	'A5-0545		
Tpestfree Insecticide	'A5-1985		
Weedpecker 80wp	'A5-1547		
Wiper	'A5-0388		
Ymdy DDVP	'A5-1692		

*** wrong classification

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Acute (short-term) and chronic (long-term) exposures of humans to Dichlorvos results in the inhibition of an enzyme, acetylcholinesterase, with neurotoxic effects including perspiration, vomiting, diarrhoea, drowsiness, fatigue, headache, and high concentrations, convulsions, and coma. No clear information is available on the reproductive, developmental, or carcinogenic effects of Dichlorvos on humans. A study by the National Toxicology Program (NTP) reported an increased incidence of tumours of the pancreas, mammary glands, and fore stomach in animals. EPA has classified Dichlorvos as a Group B2, probable human carcinogen.

Dichlorvos attack important enzymes in the nervous system of insects and humans. People can get sick from breathing too much Dichlorvos pesticide vapour in the air. Early symptoms of overexposure in people include headache, lack of appetite, nausea, vomiting, and difficulty breathing.

Safety Caution for Application

NAFDAC should restrict its trade and use (no use in households and farms). Dichlorvos should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. Certified users must not handle it until all safety precautions have been read, understood and complied with. NAFDAC to immediately execute the FMAFS imposed ban on DDVP for agricultural use. Limit use only for industrial applications.

Dimethoate

Dimethoate is a systemic and contact organophosphorus insecticide. Dimethoate is non-volatile, water-soluble, and not mobile in soil, where it degrades with a half-life of approximately 2-4 days, based on soil conditions.

It is registered in at least 20 products to repel reptiles and control various insect pests on coffee, potatoes, tobacco, melon, and cotton. It acts both by contact and through ingestion. It is readily absorbed and distributed throughout plant tissues and is degraded relatively rapidly.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Dimethoate Active Ingredient

Dimethoate is banned in 27 EU countries. It is also banned in Cameroon, Indonesia, Saudi Arabia, Sri Lanka, Suriname, and the UK. It is highly restricted in China - Prohibition of use on vegetables, melons, tea, fungus and Chinese herbal medicine since 1 July 2019 due to its high toxicity.

General Aspects

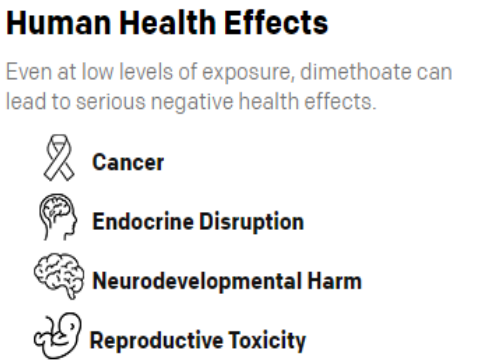
Registered (NRN) / Unregistered Products Containing Dimethoate		Applicants & Country	Crop Treated and Pest
Action 40/42 E.C	'???????	Amarshal Com. Agro & Tec. Ltd (China) Ausa Building Materials Ltd (China) Comfort Agro Chemical Nig Ltd (China) Gice Agroscience Ltd (India) Goldstar Crop Science Nig Ltd (India) Jubaili AgroTech Lionseal Industries Limited (China) Multichem Ind. Ltd (India) Osi Agro & Industrial Chemical Co Ltd (China) Rainbow Agrosciences Co.Ltd (Republica De Panama) Vista Int'l Ltd (India) Wacot Ltd (China)	Coffee, Potatoes, Tobacco, Melon, Cotton **Pest** Aphids, Thrips, Planthoppers, Armyworms, Termitesites and other chewing insects
Afripower Glyphosate	'A5-2001		
Atrano	'A5-1563		
Cyperdigold	'A5-1570		
Cypyripos	'A5-1566		
Damet Plus Liquid	'A5-0542		
Dimeforce	'???????		
Dimeking	'A5-1991		
Dimeplus	'A5-2001		
Dimeshi	'A5-1563		
Duramil	'A5-2007		
Grass Cutter	'A5-1991		
Jackpot 500 Ec	'A5-2014		
Magic Force	'???????		
Multistar 80 Wp	'A5-1566		
Saafex	'A5-2014		
Scorpion Liquid	'A5-0430		
Sumifast 40 Ec	'A5-2007		
Super Fifty (Liquid)	'A5-0385		
Titan	'A5-1574		
Triple Action	'???????		
Vestrazine	'A5-1570		
Vitoate 40 Ec	'A5-0385		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Dimethoate is absorbed from the gastrointestinal tract, the lungs, and through the skin. General population exposure to Dimethoate or Omethoate can occur by eating foods treated with Dimethoate or by drinking water. The toxicity of Dimethoate results in deleterious effects on many organs and systems in humans and other mammals such as the liver, kidney, pancreas, brain, nervous system, immune system, and reproductive system (Bakir, 2020).

Carcinogenicity studies in animals have been inconsistent, with tumours of spleen, skin, and lymph systems in male but not female rats, lung tumours and lymphoma in male mice and liver tumours in female mice. Dimethoate is considered mutagenic, but it is not a teratogen.

Reproductive toxicity was seen at doses that also caused overt maternal toxicity (IPCS, 2003; U.S. EPA, 1995). The U.S. EPA classified Dimethoate as a possible human carcinogen (U.S. EPA, 1995). The National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC) have not evaluated the linkage of Dimethoate or Omethoate to human carcinogenicity. However, Pardo et al (2020) report that Dimethoate increases the risk of prostate cancer among male applicators.



Dimethoate is neurotoxic when consumed, inhaled, or absorbed via the skin (Nazam et al., 2015). Dimethoate is reported to induce a variety of symptoms leading to cholinergic morbidity among farm workers and pesticide handlers. It is also reported to affect neurological and cognitive function among other health effects in humans and non-target mammalian species (Sinha and Shukla, 2003; Young et al., 2006).

It is highly toxic to Honey Bees. There is evidence that usage can be linked with lower pollination and yields in sunflower cultivation. Dimethoate has high toxicity to fish and invertebrates.

Safety Caution for Application
Active ingredients should be withdrawn immediately. Biological alternatives like neem extracts and other biological pesticides should be encouraged. NAFDAC should consider phasing out the active ingredient in Nigeria; stop registration and stop the importation of products with the active ingredient. Improve regulation that encourages investors to divest to safe alternatives. For users, always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully.

Endosulfan

Endosulfan is used as a broad-spectrum, non-systemic poison to control a wide variety of insects. It is a chlorinated hydrocarbon belonging to the cyclodiene sub-group of the organochlorine family of pesticides. It is a cream- to brown-coloured solid that may appear in the form of crystals or flakes. Endosulfan is used to control insects on food and non-food crops and also as a wood preservative. However, it is now an off-patent organochlorine insecticide and acaricide that is being phased out globally due to its very toxic potency. Because of its threats to human health and the environment, a global ban on the manufacture and use of Endosulfan was negotiated under the Stockholm Convention in April 2011. Though banned in most of Africa, Endosulfan is sold off/under the shelves under a variety of trade names, including Caiman, Callisulfan, Cotofan, Endofan, Endocoton, Mistral, Phaser, Plexus, Rocky, Thiodan, and Thiofanex.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Endosulfan Active Ingredient

There is a global ban on the manufacture and use of Endosulfan, which was negotiated under the Stockholm Convention in April 2011. The ban took effect in mid-2012. Banned in more than 130 countries - including 27 EU countries, Australia, New Zealand, USA, Brazil, Albania, Argentina, Benin, Cameroon, Brazil, Botswana, Burkina Faso, Canada, Chile, China, Colombia, Egypt, Eritrea, Ecuador, India, Gambia, Indonesia, Iran, Iraq, Japan, Jamaica, Jordan, Malawi, Mali, Lebanon, Malaysia, Mexico, Morocco, Nepal, Niger, New Zealand, Norway, Pakistan, Qatar, Russia, Peru, Saudi Arabia, Senegal, South Africa, Switzerland, Thailand, Tunisia, Turkey, Zambia, etc. It is also banned in Nigeria. Endosulfan is listed under Annex III Chemicals of the Rotterdam Convention - banned or severely restricted for health or environmental reasons.

General Aspects

Registered (NRN) / Unregistered Products Containing Endosulfan	Applicants & Country	Crop Treated and Pest
Endofan	Ilonex International Nigeria Limited	Maize, Potatoes, Cabbage, Cocoa, Cassava, Millet, etc.
		Whiteflies, Aphids, Leafhoppers, Potato beetles, Cabbage worms.

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Endosulfan is responsible for many fatal pesticide poisoning. Endosulfan is an endocrine disruptor, causing reproductive and developmental damage in both animals and humans. Endosulfan is acutely neurotoxic to humans. Symptoms of acute poisoning include hyperactivity, tremors, convulsions, lack of coordination, staggering, difficulty breathing, nausea and vomiting, diarrhoea, and in severe cases, unconsciousness. Farm workers with chronic Endosulfan exposure are at risk of rashes and skin irritation. Some studies have documented that Endosulfan can also affect human development. Researchers studying children from many villages in India have linked Endosulfan exposure to delays in sexual maturity among boys (Saiyed, et al. 2003). According to the European Chemicals Agency (ECHA), Endosulfan is predicted as likely to meet criteria for category 1A or 1B carcinogenicity, mutagenicity, or reproductive toxicity. Over 270 people died in Benue state as a result of Endosulfan poisoning in the community river where they fish, and get water for bathing and drinking.

Safety Caution for Application

NAFDAC should take regulatory measures to enforce the ban; put in place operational control and inspection mechanisms; strengthen monitoring capacities; and enforce the FAO guidelines and advice on the disposal and prevention of inventory accumulation.

Fipronil

Fipronil is a broad-use insecticide that belongs to the phenylpyrazole chemical family. Fipronil is used to control ants, beetles, cockroaches, fleas, ticks, termites, mole crickets, thrips, rootworms, weevils, and other insects. Fipronil is a white powder with a mouldy odour. Fipronil was first registered for use in the United States in 1996. Fipronil kills insects when they eat it or come in contact with it. Fipronil works by disrupting the normal function of the central nervous system in insects. NAFDAC proposed a re-classification plan for Fipronil from crop protection products to household use only in the next three years. NAFDAC to stop receipt of new applications and renewal of expired licences by 31ST December 2023. NAFDAC will be stopping the importation of active Crop Protection Products by 31st December 2025. The Agency will withdraw its registration licence for Crop Protection products with Fipronil by December 2026. Product Ban for Crop Protection with Fipronil will be in effect from 1st January 2027.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Fipronil Active Ingredient

Fipronil is banned in Turkey, UK, Vietnam, Senegal, Niger, Mauritania, Gambia, Egypt, 27 EU countries, and Chad. It is highly restricted in China due to its very high risk to bees and its slow rate of degrading in water and soil. Its scope of use is limited to seed coating for corn and other seeds only.

General Aspects

Registered (NRN) / Unregistered Products Containing Fipronil		Applicants & Country	Crop Treated
Bullet	'A5-2013	Saro Agrosciences Ltd (China) Vista Int'l Ltd (India) Jubaili AgroTech Merchant Investors Limited (Nigeria)	Banana, Cotton, Asparagus, Ginger, Grape, Mushroom, Potatoes, Sorghum, Sugarcane, etc.
Fipro Force	'??????		
Fipro Liquid	'A5-1665		
Fipronil 100 Sc	'??????		
Gicecot	'A5-2013		**PEST**
Mazik Granule	' A5-1810		Ants, Beetles, Fleas, Cockroaches, Ticks, Termites, Mole crickets, Thrips, Rootworms, Weevils, and other insects.
Powerline Powder Cockroach Killing Bait'	A5-1810		
Sniper Cockroach Killer	'A5-1994		
Speed	'A5-1994		
Vectoclor Pour On	'A5-1665		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Cancer

According to the National Pesticide Information Centre (2023), scientists have not found any evidence of Fipronil causing cancer in humans, as not enough information exists. Researchers fed Fipronil to rats in their diet for nearly two years to find out if Fipronil can cause cancer. Researchers found thyroid tumours in both male and female rats fed the highest dose. While these findings are considered to apply only to rats, Fipronil is classified as a "possible human carcinogen" by the United States Environmental Protection Agency (U.S. EPA).

Fipronil is highly toxic for crustaceans, and insects (including bees and termites). It is also highly toxic to many fish. In May 2003, the French Directorate-General of Food at the Ministry of Agriculture determined that a case of mass bee mortality observed in southern France was related to acute Fipronil toxicity.

Safety Caution for Application

NAFDAC should enforce the implementation of reclassification of the use of Fipronil from agricultural use to household use and ensure that the composition of the substance in household products is at the barest minimum. Initiate large sector and consumer awareness programs in the proposed reclassification of the product use and inform consumers of the associated risk in the use of Fipronil-based products to ensure proper handling and monitoring. Promote other nature-based biological alternatives.

Imidacloprid

Imidacloprid is a systemic neonicotinoid insecticide, which means that plants take it up from the soil or through the leaves and it spreads throughout the plant's stems, leaves, fruit, and flowers. Insects that chew or suck on the treated plants end up eating the Imidacloprid as well. Once the insects eat the Imidacloprid, it damages their nervous system and they eventually die. Imidacloprid is made to mimic nicotine. Nicotine is naturally found in many plants, including tobacco, and is toxic to insects. Imidacloprid is used to control sucking insects, termites, some soil insects, and fleas on pets. Over the past decade, the EU has been tightening regulations on neonicotinoid insecticides in response to an increasingly strong body of research suggesting they are lethal for pollinators such as bees. In 2018, the EU banned the use of three neonicotinoids - Imidacloprid, Thiamethoxam and Clothianidin. There are an increasing number of studies that show exposure to neonicotinoids poses potential risks to mammals and even humans.

Imidacloprid is present in at least 23 products in Nigeria.

The Federal Ministry of Agriculture and Food Security (FMAFS) banned the use of all neonicotinoid pesticides on 7 March 2022 BUT NAFDAC is yet to add Imidacloprid to the list of banned pesticides.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (la) ○ Highly Hazardous (lb), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

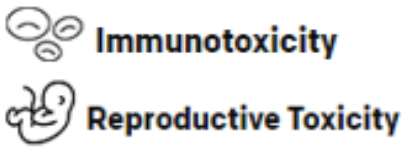
International Regulatory Status of Imidacloprid Active Ingredient

Banned in Europe since May 2013. It is banned in 27 EU countries. It is banned in Fiji Island, the UK, Canada, China, India, and France. FMAFS banned the use of all neonicotinoid pesticides on 7 March 2022, BUT NAFDAC has yet to add Imidacloprid to the list of banned pesticides.

General Aspects

Registered (NRN) / Unregistered Products Containing Imidacloprid		Applicants & Country	Crop Treated
Acidor Liquid	'A5-1601	Gold Star Crop Science Nig Ltd (India)	Rice, Maize, Tomato, Cotton, Vegetables.
Carasiv Powder	'A5-0659	Harvest Field Industries Ltd (South Africa)	
Caricom Liquid	'A5-1482	Jubaili Agrotech Ltd (China)	
Contender	'A5-1983	Lionseal Industries Limited (China)	**Pest**
Cypertex 10 Ec	'A5-1669	Masco Agro Allied Industries (India)	Whiteflies, Aphids, Armyworms, Borers, Bollworms, Thrips Termites Flea
Dizprofen 44 Ec	'A5-1482	Osi Agro & Industrial Chemical Co Ltd (China)	
Dominator 440 Ec	'A5-1601	Rainbow Agrosciences Co.Ltd (Republica De Panama)	
Dress Force	'???????	Reva Agrochemical Co. Ltd (China)	
Igr Force	'A5-1611	Bayer	
Imidacron Ec	'A5-1911		
Imidaseal Liquid	'A5-1611		
Imidastar Liquid	'A5-1609		
Imiforce Liquid	'A5-0659		
Iron Force	'A5-1609		
Kachi Insecticide	'???????		
Lara Force	'???????		
Pesover	'A5-1911		
Premise 200 Sc	'A5-1669		
Punto	'A5-1983		
Quickbayt	'A5-1908		
Root Star Liquid	'A5-1908		
Spartan 300 Od	'???????		
Thunder	'???????		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Imidacloprid like most neonicotinoid pesticides is toxic to humans causing only mild symptoms such as vomiting, abdominal pain, headache and diarrhoea in the majority of cases. Large ingestions may lead to sedation and respiratory arrest. Scientists fed Imidacloprid to mother rats and rabbits during their pregnancies. The exposure caused reproductive effects including reduced bone growth in the babies.

Imidacloprid can last for months or years in the soil. The residues become more tightly bound to the soil with time. Imidacloprid is broken down rapidly by water and sunlight. The pH and temperature of water affect the speed of the Imidacloprid breakdown process. Imidacloprid may leach from soil into groundwater under some conditions. Imidacloprid is broken down into several other chemicals depending on which bonds in the molecule are broken. Imidacloprid is not very toxic to birds and slightly toxic to fish, although this varies by species. Imidacloprid is very toxic to honeybees and other beneficial insects. The role, if any, of Imidacloprid in Colony Collapse Disorder is not yet clear. Scientists have shown that plants grown in treated soil may have Imidacloprid residues in their nectar and pollen at levels that are below those shown to cause effects on bees in laboratory experiments.

In 2022 the European Food Safety Authority (EPA) concluded that Imidacloprid is likely to adversely affect 79 percent of federally listed endangered or threatened species and 83 percent of critical habitats. The pesticide has been banned for all outdoor use in the entire European Union since 2018 but has partial approval in the U.S. and other parts of the world, where it is widely used.

Safety Caution for Application

The active ingredients must be withdrawn immediately, especially those for farm use. NAFDAC should enforce the implementation of reclassification of the use of Imidacloprid Initiate large sector and consumer awareness programs in the proposed reclassification of the product use and inform consumers of the associated risk in the use of Imidacloprid based products to ensure proper handling and monitoring. Other nature-based biological alternatives should encouraged.

Lambda-Cyhalothrin

Lambda-Cyhalothrin is a common pyrethroid broad-spectrum insecticide with contact and stomach poisoning effects. It is used to control various pests on fruit trees and vegetables, and it is also used to control underground pests. In addition, it is also used as an active ingredient in mosquito coils and sprays. This type of pesticide was developed from natural pyrethrin after changing the structure, and quickly developed into a new type of pesticide in the 1970s.

The physical properties of lambda-Cyhalothrin are that it is a colourless chemical but can also appear beige in solid form and have a mild odour. It has a low water solubility and is non-volatile. Lambda-Cyhalothrin comes in several different forms of pest control products--from liquid insecticide concentrates to dust and granules and even granular formulations.
It is in at least 25 products in Nigeria.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Lambda-Cyhalothrin Active Ingredient

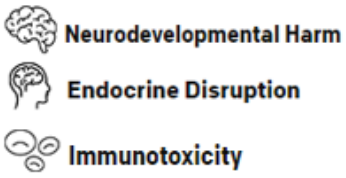
The European Union announced in 2020; number 892, no longer approving the re-assessment application for Lambda-Cyhalothrin. The announcement came into effect in July 2020. According to the announcement, the relevant preparation products should be withdrawn from the market within 6 months of the effective date of the announcement. Each member state could grant a grace period of 6 months, and the authorization of all products containing lambda-Cyhalothrin should be revoked no later than July 20, 2021. Canada announced that the domestic use of lambda-Cyhalothrin on any crops or commodities for feed will be cancelled in April 2023. Additional crops will also see uses cancelled due to concerns about risks to human health.

General Aspects

Registered (NRN) / Unregistered Products Containing Lambda-Cyhalothrin				Applicants & Country
Attacke	'??????	LYMO	'A5-1490	Amarshal Com. Agro & Tec Ltd (China)
Bakme	'A5-0470	Marshal	'??????	Jubaili Agrotech Ltd (China)
Choke	'??????	Magic Force	'??????	Kesai Eagrow Nig Company Ltd (China)
Combicot 505	'A5-0661	Maxforce Platin	'A5-0045	Lionchem Industries Limited (China)
Dimeforce	'??????	Metador Liquid	'A5-1635	Masco Agro Allied Industries (India)
Dusuban B Super	'A5-1820	Relambda	"???????	Multichem Ind. Ltd (China)
Efdicon	'A5-0645	Ronfos 550 Ec	'A5-1596	Osi Agro & Ind. Chem. Co. Ltd (China)
Endocrop	'A5-1912	Royamda Liquid	'A5-1596	Reva Agrochemical Co Ltd (China)
Engeo 247 Zc	'A5-1490	Scorpion	'???????	Royal Tee Square Trade & Invest Co. Ltd (China)
Faskill	'A5-1588	Springfos Plus	'A5-0233	Saro AgroSciences
Funkill	'A5-0554	Springfos	'A5-1487	Syngenta
Glo-Ababeta	'A5-1912	Superunion	'A5-1618	Tata Africa Services Nig Ltd (China)
Helarat	'A5-1870	Tanlamb Plus	'A5-1618	Three-Kay Int'l Concept (India)
Hi-Kill Action	'A5-0554	Terminator	'A5-1635	Umaru Abubakar Agro Chem Ent (China)
Hot Shot Insecticide	'A5-1870	Cotofan Liquid	'A5-1663	Vertex Agro Ltd (China)
Kachi Insecticide	'??????	Morestar Liquid	'A5-1663	Vista Int'l Ltd (India)
Karate	'??????	Vanguish 1litre	'A5-0938	Wacot Limited
Kabadii Liquid	'A5-0645			GABITO & SONS INT'L SERVICES LTD (CHINA)
Karto 2.5 Ec	'A5-0045			Harvest Field Nigeria
				Wacot LTD
				Jubaili Agro Tech

Knockoff Kungfu Lambdamagic Lambdamid Liquid Lambdatex Liquid Laraforce	'?????? 'A5-0470 'A5-1487 'A5-1588 'A5-0233 'A5-0661	**Crop Treated** Tomatoes, Rice, Mango, Cotton, Maize, Sorghum, Potatoes, Beans, Corn, Green beans, Onion, Cocoa, Water Melon	**Pest** For control of Bollworms, Jassids, Thrips In Cotton; Rice – Leaf Rollers, Stem Borers, Green Leaf Hopper, Gall Midge, Hispa, Aphids, Spider Mites, Caterpillars, Whiteflies, Locust, Grasshopper.

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Health Hazards: Acutely toxic in short-term exposure. Very neurotoxic: bystanders are advised to keep a 10-meter distance from spraying. Independent studies suggest interactions of lambda-Cyhalothrin with receptors of the endocrine and immune systems.

Environmental Hazards: Highly toxic to mammals and fish, aquatic invertebrates and honey bees; moderately toxic to earthworms. Classified as acute and chronic very toxic to aquatic life.

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment. Special attention should be given to mammals and bees. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be taken to avoid any additional release, for example through inappropriate disposal.

Safety Caution for Application

NAFDAC should impose restrictions on its trade and use. lambda-Cyhalothrin should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. For users: do not handle it until all safety precautions have been read, understood and complied with. NAFDAC should consider a phase-out plan and withdraw products from the market.

Permethrin

Permethrin is an insecticide in the pyrethroid family. Pyrethroids are synthetic chemicals that act like natural extracts from the chrysanthemum flower. As a contact insecticide, Permethrin affects insects if they eat it or touch it. Permethrin affects the nervous system in insects, causing muscle spasms, paralysis and death. It is registered in 8 products to control maize stalk borer, but more in household insecticides.

NAFDAC on 2 May 2022 proposed a re-classification plan for Permethrin from crop protection products to household use only in the next three years. NAFDAC is to stop receipt of new applications and renewal of expired licenses by 31st December 2023. NAFDAC will be stopping the importation of active Crop Protection Products by 31st December 2025. The Agency will withdraw its registration licence for Crop Protection agrochemicals products with Permethrin by December 2026.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

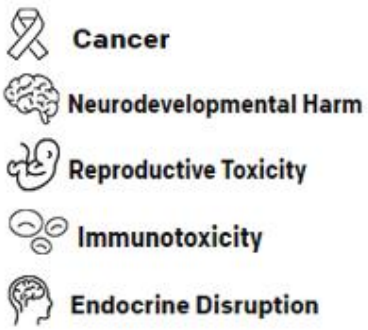
International Regulatory Status of Permethrin Active Ingredient

It is banned in the UK, Switzerland, the Syrian Arab Republic, Turkey, Saudi Arabia, Egypt, and 27 EU countries.

General Aspects

Registered (NRN) / Unregistered Products Containing Permethrin	Applicants & Country	Crop Treated
Defender Insecticide Spray 'A5-1917 Jorkemil Plus 72 Wp 'A5-1747 Killtox Insecticide 'A5-1747 Krisleaf Powder 'A5-1798 Lancer Gold Insecticide 'A5-1917 Miteforce 'A5-1797 Mr Gecko Insecticide spray (Lemon frag.) 'A5-1797 Mr Gecko Insecticide spray (Ocean frag.) 'A5-1798	Be Happy Integrated Services (Nigeria) Golden Dream Commodity Fze (Nigeria) Skolpoint Manufacturing Company Ltd. (Turkey)	Maize **Pest** Large grain borer, Lesser grain borer, Termite, Angoumois Grain moth, Maize Weevils, Aphids and Mosquitos

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Permethrin was classified by the International Agency for Research on Cancer (IARC) as "not classifiable as to its carcinogenicity to humans" in 1991. This means that IARC could not decide whether or not permethrin can cause cancer. The U.S. EPA decided that permethrin was "likely to be carcinogenic to humans" if it was eaten. This decision was based on the structure of permethrin, what happens to it in the body, laboratory tests that caused tumours in mice and evidence of tumours in rats (Corcellas et al 2014). Researchers fed dogs and mice permethrin for up to 2 years and found that their livers increased in weight. The dogs fed permethrin had more tremors than dogs that did not eat it. Permethrin is categorized as a carcinogen, an endocrine disruptor, or a neurotoxin (Lewis et al., 2016).

Rats that were fed permethrin when they were pregnant had offspring that weighed less, and some of their offspring developed extra ribs more often than control rats. Pregnant rabbits that were fed permethrin lost their foetuses more often and the offspring that lived had less bone growth. Metabolites of permethrin were detected in breast milk from women (Corcellas et al., 2014).

Permethrin can cause a variety of toxicities in humans such as neurotoxicity, reproductive toxicity, immune toxicity, genotoxicity, hepatotoxicity and cardiotoxicity (Carloni et al., 2012, 2013; Falcioni et al., 2010; Issam et al., 2011; Gabbianelli et al., 2009; Turkez and Aydin, 2012, 2013; Turkez and Togar, 2011; Gabbianelli et al., 2013; Vadhana et al., 2011, 2013; Drago et al 2014).

It is also a skin and eye irritant (Lewis et al., 2016). Some of the symptoms associated with excessive exposure to permethrin include epidermal lesions, sore throat, nausea, vomiting, abdominal pain, gastrointestinal mucosal irritation, salivation, respiratory distress and headaches (Skolarczyk et al., 2017). The use of permethrin in households is often associated with allergies and asthma, especially in children. Long-term exposure to children can result in increased aggressive behaviours (Oulhote et al., 2013). Permethrin causes childhood leukemia and it causes genotoxicity and cytotoxicity in humans (Ramos-Chavez et al., 2015).

Permethrin disrupts hormone activity towards farm workers (Weng et al., 2016). It inhibits androgen receptors and thus causes male reproductive dysfunction (Sheikh and Beg, 2021). It causes immaturity, degeneration and loss of spermatogonia in male rats and it is secreted in breast milk (Chrustek et al., 2018). It also inhibits oestrogen-sensitive cell proliferation (Sheikh and Beg, 2021).

People can be exposed to pesticides by eating them, breathing them in, getting them on their skin, or getting them in their eyes. Permethrin may be breathed in if it is used indoors, or if wind causes a spray or dust to be blown in someone's face. People can have skin exposure or breathe in products containing permethrin while applying the products or during public health mosquito control efforts. Permethrin may be eaten if people forget to wash their hands after using products that contain permethrin. When people get permethrin on their skin, they may have irritation or tingling, burning and itching at that spot. If permethrin gets in the eyes it can cause redness, pain or burning. If people eat permethrin it could cause sore throat, abdominal pain, nausea and vomiting. People who have breathed in permethrin have had irritation in the nose and lungs, difficulty breathing, headaches, dizziness, nausea and vomiting.

Permethrin is highly toxic to fish and other animals that live in either salt water or fresh water. Permethrin is low in toxicity to birds, but some aerosol products made with permethrin may also contain other ingredients that can harm birds if they inhale it. Permethrin is highly toxic to bees and other beneficial insects.

Safety Caution for Application

NAFDAC should immediately stop receipt of new applications and renewal of expired licenses by 31st December 2023. Ban the importation of all pesticide-active ingredients with Permethrin and advise investors to seek more nature-based alternatives.

Consumers should always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully or visit a functional hospital.

Profenofos

Profenofos is an organophosphate insecticide. Profenofos is a neurotoxin that acts as a cholinesterase inhibitor in the nervous system of insects. It is a liquid with a pale yellow to amber colour and a garlic-like odour. It is registered in 17 products in Nigeria from 2017 to 2019.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

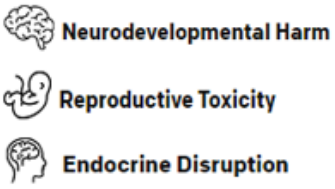
International Regulatory Status of Profenofos Active Ingredient

It is banned in Switzerland, Turkey, the UK, Indonesia, Malaysia, and Saudi Arabia. It is unapproved in Europe and banned in India. It is highly restricted in the USA. It is neither banned nor highly restricted in Nigeria.

General Aspects

Registered (NRN) / Unregistered Products Containing Profenofos		Applicants & Country	Crop Treated and Pest
BLAST	'A5-1852	Dizengoff W.A Nigeria Ltd (India)	Roses, Carnations, Tomatoes, Cucumber, Potatoes, Capsicum, Onions, French beans, Runner beans, Rice, Maize Cotton, Soybeans, Vegetables
CHAMPION	'A5-1801	Masco Agro Allied Industries (India)	
DAY-ONE	'A5-1982	Rainbow Agrosciences Co.Ltd	
DIZPROFEN 44 EC LIQUID	'A5-1839	(Republica De Panama)	
DOMINATOR 440 EC	'A5-1647	Reva Agrochemical Co. Ltd (China)	
EFDICON	'A5-1801	Springfield Agro Ltd (India)	
FASKILL	'A5-1556	Tropical Crop Sciences Ltd (India)	
JUBAILI TOTALFORCE	'A5-1556	WACOT Ltd	
KILCRON LIQUID	'A5-1486		Aphids, Thrips, Whiteflies, Jassids, Caterpillar, Spider, Mites, Stem borer, Leaf roller
NANJU	'A5-1486		
PROFIT POWDER	'A5-1851		
RONFOS 550 EC	'A5-1982		
SHARP SHOOTER	'A5-0190		
SPRINGFOS PLUS	'A5-1852		
SPRINGFOS	'A5-1851		
TRIBEL	'A5-1839		
TRICEL	'A5-1647		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



According to the USA EPA, Profenofos can cause cholinesterase inhibition in humans; that is, it can overstimulate the nervous system causing nausea, dizziness, confusion, and at very high exposures (e.g., accidents or major spills), respiratory paralysis and death. It is a human cholinesterase inhibitor; it causes morphological changes and a decrease in the count and motility of mice sperm after five days of dosing. Liver function is affected by acute and sub-chronic dosing in rabbits based on enzyme testing. Certain reproductive effects in fertility, growth, and development for males and females have been linked specifically to organophosphate pesticide (OP) exposure. Most of the research on reproductive effects has been conducted on farmers working with pesticides and insecticides in rural areas. In females, menstrual cycle disturbances, longer pregnancies, spontaneous abortions, stillbirths, and some developmental effects in offspring have been linked to organophosphate pesticide exposure. Prenatal exposure has been linked to impaired fetal growth and development. Neurotoxic effects have also been linked to poisoning with OP pesticides causing four neurotoxic effects in humans: cholinergic syndrome, intermediate syndrome, organophosphate-induced delayed polyneuropathy (OPIDP), and chronic organophosphate-induced neuropsychiatric disorder (COPIND). These syndromes result from acute and chronic exposure to OP pesticides. According to PubChem, Profenofos is very toxic to aquatic life with long-lasting effects. A United States Environmental Protection Agency report identified profenofos as toxic to birds, small mammals, bees, fish, and aquatic invertebrates, noting several fish kill incidents in which profenofos exposure, primarily due to runoff, was implicated as a probable cause

Safety Caution for Application

Products should be highly restricted in Nigeria. Avoid release to the environment in circumstances different from normal use.

Tetramethrin

Tetramethrin is a potent synthetic insecticide in the pyrethroid family. Pyrethrin are pesticide found naturally in some chrysanthemum flowers. They are a mixture of six chemicals that are toxic to insects. Pyrethrin is commonly used to control mosquitoes, fleas, flies, moths, ants, and many other pests.

Tetramethrin is a white crystalline solid with a melting point of 65–80 °C. It is commonly used as an insecticide and affects the insect's nervous system. It is found in many household insecticide products. It is registered in 7 products in Nigeria by NAFDAC between 2017 and 2019.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ●

International Regulatory Status of Tetramethrin Active Ingredient

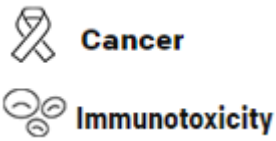
Tetramethrin is banned in China. As of 1 April 2022, it is not approved in 27 EU countries. It is also not approved in the UK.

General Aspects

Registered (NRN) / Unregistered Products Containing Tetramethrin		Applicants & Country	Crop Treated
Cu-Bas Insecticide	'A5-0483	Cubas Int'l Nig, Ltd (Nigeria)	It is not and should not be used on food crops.
Kris Leaf Rat Killing Bait	'A5-0483	Eloben Cosmetics Industry Limited (Nigeria)	
Top One Insecticide Spray	'A5-1603	Isa Top Investment Ltd (China)	
Saathi 10 Wp	'A5-1603		
Sunfree Insecticide	'A5-1610	Masindy Integrated Resources Limited (China)	**Pest** Mosquitoes, Cockroaches, Wasps, Fleas, Flies, Moths, Ants, etc.
Great Insecticide Spray	'A5-1995		
Glyspeed	'A5-1995		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Exposure to Tetramethrin can cause headaches, dizziness, fatigue, excessive salivation, muscle weakness, nausea, and vomiting. Tetramethrin can cause liver damage. According to PubChem, it is suspected of causing cancer.



The substance is very toxic to aquatic life with long-lasting effects.

Safety Caution for Application

NAFDAC should consider phasing out the active ingredient in Nigeria; stop registration and stop the importation of products with the active ingredient. Also, the agency should improve regulation that encourages investors to divest to safe alternatives.

For users, always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully

Release to the environment should be prevented in circumstances different from normal use.

Thiamethoxam

Thiamethoxam is a neonicotinoid insecticide that is used to kill sucking and chewing insects that feed on roots, leaves, and other plant tissues. Thiamethoxam is a broad-spectrum, systemic insecticide, which means it is absorbed quickly by plants and transported to all of its parts, including pollen, where it acts to deter insect feeding. An insect can absorb it in its stomach after feeding, or through direct contact, including through its tracheal system. Syngenta is the primary manufacturer of Thiamethoxam

NAFDAC on May 2, 2023, imposed a THREE-YEAR PROPOSED PHASE-OUT ACTION PLAN FOR THIAMETHOXAM. By 31 December 2024, NAFDAC will stop the importation of all agrochemical products with Thiamethoxam active ingredients, and a total ban will be in effect from January 1, 2026.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

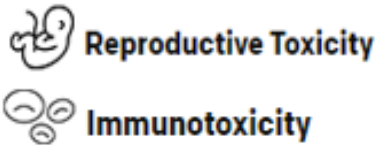
International Regulatory Status of Thiamethoxam Active Ingredient

It is banned in 27 EU countries.

General Aspects

Registered (NRN) / Unregistered Products Containing Thiamethoxam	Applicants & Country	Crop Treated
Tiamaul 350 Fs 'A5-1909 Ortain Powder 'A5-1909 RENOVA	Rainbow Agroscience Co Ltd (Republica De Panama) UPL	Cassava, Cocoa, Mango Potato, Rice, Tomato, Vegetables, Corn, Soy Beans, Okro, etc.
		Pest Aphids, Jassids, Myridis, Plant Hopper, Termites White Fly, Leafhopper, Scales, Stem borer, Gall Midge, Thrips,

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



According to the Minnesota Department of Health, USA, exposure to high levels of Thiamethoxam over time has been shown to cause adverse developmental, male and female reproductive, and liver effects in animal studies. Animal testing showed that short-term exposure to high levels of Thiamethoxam caused adverse developmental, female reproductive, and liver effects. Animals exposed to Thiamethoxam for longer durations, but at lower doses, experienced changes to the male reproductive system.

Because Thiamethoxam is an insecticide, insects and aquatic invertebrates are most likely to be affected by low levels of Thiamethoxam in the environment

Safety Caution for Application

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NAFDAC is to stop receipt of new applications and renewal of expired licenses by 31st December 2023. Stop the importation of products by 31st December 2024

Triazophos

Triazophos 40% EC is an organophosphate insecticide used in crops to manage a range of insect pests. It is commonly used in agriculture to effectively control a wide range of pests.

Triazophos acts by inhibiting the activity of acetylcholinesterase, an enzyme essential for normal nerve impulse transmission in insects and mites. This leads to the accumulation of acetylcholine, causing prolonged nerve stimulation and eventual paralysis in the pests, leading to their deaths. It is registered in 2 products.

Class of Pesticide:

Herbicide ☐ Insecticide ■ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Triazophos Active Ingredient

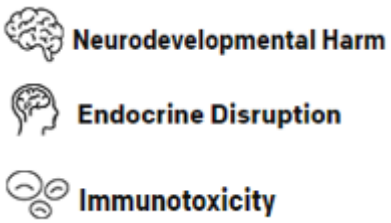
It is banned in India., Canada, EU, and highly restricted in the USA and China. It is neither banned nor highly restricted in Nigeria. It is also banned in Antigua & Barbuda, Cabo Verde, Cambodia, Chad, Colombia, Egypt, Gambia, 27 EU countries, India, Indonesia, Malaysia, Mauritania, Nepal, Niger, Saudi-Arabia, Senegal, Togo, Turkey, UK, and Vietnam

General Aspects

Registered (NRN) / Unregistered Products Containing Triazophos	Applicants & Country	Crop Treated
Trizoseal 'A5-1544 Vestamine 'A5-1544	Lionseal Industries Ltd (India)	Cotton, Rice, Soybeans **Pest** Pink bollworm, Spotted bollworm, White fly, Stem borer, Leaf folder, Green leaf hopper, Hispa, Brown plant hopper, White-backed plant hopper, Girdle beetle, Stem borer, Leaf minor

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Acute exposure to Triazophos may produce the following signs and symptoms: sweating, blurred vision, headaches, dizziness, profound weakness, muscle spasms, seizures, coma, mental confusion and psychosis, excessive salivation, nausea, vomiting, anorexia, and diarrhoea. Respiratory signs include dyspnoea, pulmonary oedema, respiratory depression and respiratory paralysis. Chest pains are also reported.



Acute Toxicity: In mice, rats and guinea-pigs, the acute LD50 value of triazofos ranged from 26–82 mg/kg body weight, while dogs have higher values up to 500 mg/kg body weight. Deaths occurred within minutes to several days after oral administration, resulting in WHO's consideration of triazofos as a highly hazardous compound. In the study on toxicity and carcinogenicity effects in mice and rats, Triazophos induced no significant or consistent increase in any tumour types. Signs of toxicity such as aggressive behaviour and decreased body weight and food consumption were seen only in F1 parents. Hence, there is no significant effect observed for reproductive toxicity.

Mechanism of action: Triazophos interacts with several enzymes and signalling pathways according to various bio-assay results.

Safety Caution for Application

The active ingredient must be withdrawn immediately. NAFDAC should place an immediate ban on its importation and initiate a phase-out plan for products with the active ingredient.

Herbicides
Active Ingredients

Atrazine

Atrazine is in a group of man-made systemic herbicides called triazines. Specifically, atrazine is a chlorotriazine herbicide. It is used for broadleaf weeds both before and after they sprout. It is also used on some grassy weeds. According to the National Pesticide Information Centre, Atrazine interferes with photosynthesis in some broadleaf plants and grasses. It is taken up by roots and leaves and moves upward in the plant to areas of new growth. The plant dries out and dies. Older leaves on plants may be affected more than new leaves. Root growth is not affected by atrazine. It is present in over 45 products in Nigeria; both registered and unregistered. In 2020, NAFDAC in a collaborative effort reviewed the safety profile of some registered agrochemicals in Nigeria and consultation with relevant stakeholders, initiated a four-year phaseout plan for Atrazine products considering the health risks these products pose to public health, bearing in mind the need to have in place, adequate and suitable replacements for these products. The importation of Atrazine is to stop on 31 December 2023. A moratorium for the exhaustion of available stock for Atrazine will be January- December 2024. Ban and enforcement action for Atrazine will commence on 1st January 2025.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ● Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Atrazine Active Ingredient

Atrazine is banned in 27 EU countries since 2004. Atrazine has been banned in the UK from use on non-cropland. Banned in some States in America – Hawaii, Puerto Rico, Guam, etc. It is also banned in China, and Canada, and highly restricted in the USA. It is banned in Cabo-Verde, Chad, Egypt, Gambia, Mauritania, Morocco, Niger, Palestine, Senegal, Switzerland, Togo, Turkey, United Arab Emirates, South Africa, and Uruguay. It is neither banned nor restricted in Nigeria.

General Aspects

Registered (NRN) / Unregistered Products Containing Atrazine				Applicants & Country
Aminex	'A5-1597	Penpal	'A5-1531	Choice Agrochemical Ltd (China)
Atra Force	'???????	Potasun 50 Ec	'A5-1848	Endo Agro Chemicals Ltd (Nigeria)
Atragold Powder	'A5-1634	Powerforce	'??????	Esan United Farmers Multipurpose Association (China)
Atramagic Powder	'A5-1481	Power Combi 80wp	'A5-2023	Floret Agro Care Enterprises (China)
Atramax Liquid	'A5-1599	Powertrazine Powder 80wp	'A5-1913	Goldstar Crop Science Nig Ltd India
Atraspring	'A5-1826	Propashi Liquid	'A5-1599	Huxley Global Trading Co Ltd (China)
Atraz Sachet Powder	'A5-0377	Ratimor Block	'A5-1821	Jubalii Agrotech
Atrazimore	' A5-1989	Ratimor Pasta	'A5-1822	Kesai Eagrow Nig Co Ltd (China)
Best Cypermethrin	'A5-0465	Retrazine	'???????	Lionseal Industries Ltd (China)
Chemsate	'A5-0377	Royatrazine	'A5-1696	Masco Agro Allied Industries (India)
Cornglad	'A5-0465	Rid W Powder	'A5-0410	Power Agrochemicals Ltd (Nigeria)
Cypernel	'A5-1535	Sixofast (Liquid)	'A5-1530	Saro Agrosciences Ltd.(China)
Cyperseal	'A5-1536	Sixtrazine Wp	'A5-1531	Sixon Agrochemicals Ltd (China)
Deurozine	'A5-1822	Sun-Atrazine	'A5-2998	Springfield Agro Ltd(China)
Eagrowmaize	'A5-1536	Touchclear 276 Liquid	'A5-1989	Wynca Sunshine Agric (Nig) Ltd (China)
Eagrowatr	'A5-0473	Tpestfree Insecticide	'A5-1913	Harvest Field
Eagrowcare Herbicide	'A5-1535	Vestrazine	'???????	
Endorazine	'A5-1821	Xtravest	'???????	
Esanzine 80 Wp	'A5-1848	Xtrazine Plus	'A5-1597	
Flozine	'A5-2023	Xtraforce	'???????	
Garatox	'A5-1634	**Crop Treated and Pest**		
Holdown Liquid	'A5-0410	Pineapple, Maize, Yam, Sorghum, Sugarcane,		
Martan	'A5-1530			
Mr Gecko Insecticide [Ocean Frangrance]Spray	'A5-1481			
Nuxim Gold	'A5-1826			

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Atrazine may cause cancer. Atrazine can affect a person's health by altering the way that the reproductive system works. Maternal exposure to atrazine in drinking water has been associated with

low fetal weight as well as heart, urinary, and limb defects in humans. According to the Breast Cancer Prevention Partnership, Atrazine is an endocrine disruptor and exposure to atrazine has been associated with an increased risk of developing breast cancer.

Pregnant rabbits were given 75 mg/kg per day of atrazine for 12 days after the first week of pregnancy. They lost more pregnancies than rabbits which did not get atrazine. The rabbit litter had fewer and smaller babies. They also showed slower bone formation (Califonia EPA 2001). Pregnant rats ate moderate doses of 100 mg/kg of atrazine for seven days during the third week of pregnancy. More infant rats died than when their mothers were not fed atrazine (Davis et al 2011)

Research from the US EPA (2018), shows that female rats ate moderate doses of 100 mg/kg per day of atrazine for at least five days during the last week of pregnancy. Their daughters reached puberty later than expected. This did not happen at doses of 20 mg/kg per day. Reproductive cycles were disrupted in female rats after eating low doses of 3.12 mg/kg per day for four days. It also happened in rats fed 3.65 mg/kg per day for six months. However, this did not harm pregnancies or change the female rats' fertility. Puberty was delayed in young male rats fed low doses of 12.5 mg/kg per day of atrazine for at least 20 days.

Several epidemiology studies have looked at possible human health effects from exposure to atrazine. Some studies found effects on human health, for instance, a study (Agopian et al 2013) in Texas found that mothers who lived in areas where more atrazine was used had a greater chance of giving birth to children with birth defects in their faces and skulls than mothers who did not. The more atrazine used in the county, the greater the chance of birth defects. Researchers collected urine from pregnant women in France. They tested the urine for atrazine or its metabolites to estimate exposure to atrazine. Babies whose mothers were exposed to atrazine while they were pregnant grew more slowly. They had a smaller head circumference than babies whose mothers were not exposed to atrazine during pregnancy (Chevrier et al 2011). Women living in areas in Illinois where atrazine is heavily used had more irregular menstrual periods than women living in Vermont, where less atrazine is used. Atrazine measured in the residential water was 0.4 µg/L in Vermont but 0.7 µg/L in Illinois. The more water women in Illinois drank, the more likely they were to have delayed periods. (Cragin et al 2011)

Farmers have reported information on their health and use of pesticides in the Agricultural Health Study (Hoppin et al 2017). Farmers who used atrazine were more likely to have both allergic and non-allergic wheezing. The chance of reporting wheezing increased with how often the farmers reported using atrazine. Researchers using Agricultural Health Study data found that people who had been exposed to more atrazine had a higher risk of end-stage renal disease (kidney failure) compared to people who had not been exposed. As atrazine use increased, the risk of end-stage renal disease also increased (Lebov at al 2016). Farmers in the Agricultural Health Study who used more atrazine also had a greater increase in body-mass index (BMI) than other farmers as they got older. (LaVerda at al 2015)

Safety Caution for Application
The active ingredient must be withdrawn immediately. NAFDAC should ban the importation of Atrazine-based products immediately. The Federal government and other stakeholders should support NAFDAC to effect the ban as proposed.

Butachlor

Butachlor is a selective herbicide used worldwide in corn, soybean and other crop cultures. Elevated concentrations of these herbicide and its degradation products have been detected in surface and groundwater. It is used as herbicide for pre-emergence control of most annual grasses and some broadleaf weeds in seeded and transplanted rice grown in Asia, South America, Europe, and Africa. It is registered in 15 products between 2017 and 2019 in Nigeria.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ● Unlikely to Present Acute Hazard (U) ○

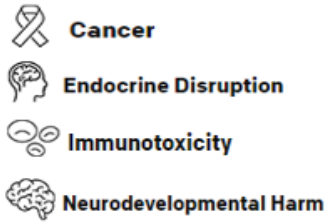
International Regulatory Status of Butachlor Active Ingredient

Butachlor is banned in 27 EU states, the UK, and India and highly restricted in the USA. It is also banned in Brazil, Colombia, Egypt, and Malaysia. It is not banned in Nigeria.

General Aspects

Registered (NRN) / Unregistered Products Containing Butachlor		Applicants & Country	Crop Treated and Pest
Asmaco Attack Multipurpose Insect	'A5-0463	HK Imperio Nigeria Limited (China)	Preemergence control of most annual grasses, and certain broadleaf weeds in seeded and transplanted rice grown in certain Asian, South American, European and African countries.
Break Up	'A5-1856		
Butacal	'A5-1638	Kesai Eagrow Nig Company Ltd (China)	
Butashi	'A5-2015		
Butacrush	'???????	Power Agrochemicals Limited (Nigeria)	
Butaforce	'???????		
Chlorpalin 20 Ec	'A5-1638	Royal Tee Square Trade & Invest Co. Ltd (China)	
Delmin	'A5-1914		
Eagrowrise	'A5-0463	Tropical Crop Sciences Ltd (China)	
Hkbutachlor (Liquid)	'A5-1533		
Killtox Insecticide	'A5-1605	Vista Int'l Ltd (India)	
Missile	'A5-1533	Harvest Field NIG	
Power Combi 80wp	'A5-1914		
Royachlor	'A5-1605		
Strim	'A5-1856		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Butachlor is carcinogenic, mutagenic, and tumour-promoting (Hsu et al 2005; Lie et al 2011, Panneerselvam et al 1999). It can cause serious eye damage/eye irritation, skin sensitization, and respiratory tract irritation. It can also lead to problems with the kidney, thyroid, liver, gallbladder, pancreas, and urinary bladder. Previous investigations have indicated that Butachlor is a suspected carcinogen. To understand more about the biological effects of Butachlor on cultured cells and the mechanism(s) of its carcinogenicity, Chem. Res. Toxicol. (2000) studied the alteration of the growth characteristics that were induced by Butachlor in normal mouse liver cells. Their study demonstrates that Butachlor stimulates liver cell proliferation. To support this finding, a thymidine incorporation assay was conducted and a similar result that Butachlor stimulates cell proliferation was elucidated. In addition, they show that Butachlor increases the saturation density of the liver cells. These findings indicate that Butachlor alters the growth characteristics of liver cells and suggest that Butachlor may induce malignant transformation through stimulation of cell proliferation, alteration of cell cycle regulation, and suppression of cell density-dependent inhibition of proliferation. It is very toxic to aquatic life with long-lasting effects.

Safety Caution for Application

NAFDAC should consider phasing out Butchalor in Nigeria; stop registration and stop the importation of products with the active ingredient. Regulation that encourages investors to divest to safe alternatives should be improved. For users, always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully.

Diuron

Diuron, also known as DCMU (3-(3, 4-dichlorophenyl)-1, 1-dimethylurea), is a herbicide in the urea chemical family that inhibits photosynthesis. It was introduced by Bayer in 1954 under the trade name of Diuron. DCMU is a very specific and sensitive inhibitor of photosynthesis, the process by which plants use light, water, and carbon di-oxide from the atmosphere to form plant sugars and cellulose. Diuron is a photosynthesis inhibitor that is used mainly for general weed control in non-crop areas. It has also been used in the selective control of germinating broadleaf and grass weeds in sugarcane, citrus, pineapples, cotton, asparagus, and temperate climate trees and bush fruits. It is also used as a soil sterilant. It is present in 11 products in Nigeria.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ● Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Diuron Active Ingredient

It is Banned in 27 EU states. USA EPA identified cancer risks from dietary and residential painting exposures to Diuron in a human health risk assessment released in 2021. It also found risks to wildlife in ecological assessments. It is banned in Egypt, Mozambique, Saudi Arabia, and the UK.

General Aspects

Registered (NRN) / Unregistered Products Containing Diuron		Applicants & Country	Crop Treated and Pest
A-ONE	'A5-2000	Foodview Nigeria Limited (China)	Used for the control of weeds – broadleaf, grass weed, etc.
CLEAR FORCE	'??????	Multichem Industries Ltd (China)	
CYPRUS	'A5-0571	Osas International Agro Science Ltd (China)	
DIUCOT 80 WP	'A5-0571		
DIUOVIEW	'A5-1980	Harvest Field Nigeria	
DOUBLE FORCE	'??????	Jubaili AgroTech	
FORCE-URON	'??????		
PENTAGON	'A5-1980		
RELIRON	'??????		
VESTIRON	'??????		
WEEDALL 480 SL	'A5-2000		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

EPA identified cancer risks from dietary and residential painting exposures to Diuron in a human health risk assessment released in 2021. Diuron is carcinogenic to the rat urinary bladder at high dietary levels. It may irritate the skin, eyes, or nose. Diuron is cytotoxic in vitro in human cells and oxidative stress contributes to its toxicity. Diuron has been reported to bind to androgen receptors. This suggests that Diuron may block the receptors and result in toxicity in the reproductive system. Diuron has reproductive and teratogenic effects and organ toxicity in mammals. Diuron induces urinary bladder cancer, mammary gland carcinoma hepatocellular adenomas in mice, kidney tumours and testicular interstitial cell adenomas in rats. High-level Diuron exposure can cause central nervous system depression. Chronic exposure can affect bone marrow, and spleen in rats. Anaemia, increase mortality, and growth retardation are also seen. It also found risks to wildlife in ecological assessments. (Britt 2022)

Safety Caution for Application

Immediate steps should be taken to limit its spread to the environment. Impose restrictions on its trade and use. It should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. Users should not handle it until all safety precautions have been read, understood and complied with. The government should consider a phase-out plan and withdraw products from the market.

Glyphosate

Glyphosate is a broad-spectrum systemic herbicide and crop desiccant. It is an organophosphorus compound, specifically a phosphonate, which acts by inhibiting the plant enzyme. It is used to kill weeds, especially annual broadleaf weeds and grasses that compete with crops. Monsanto chemist John E. Franz discovered its herbicidal effectiveness in 1970. Monsanto brought it to market for agricultural use in 1974 under the trade name Roundup. Glyphosate is absorbed through foliage, and minimally through roots, and from there translocated to growing points. It is present in over 66 products in Nigeria.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ● Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Glyphosate Active Ingredient

Glyphosate is banned in Mexico, Sri Lanka, Vietnam, Canada, and India (since 2018). It was banned in France in 2017. The Netherlands banned all non-commercial use of glyphosate. Qatar and five other countries in the Gulf Cooperation Council (GCC) have also banned glyphosate. It is highly restricted in USA cities i.e. Alaska, Arizona, California, Colorado, Connecticut, Florida, Michigan, Nevada, etc. According to the European Commission, glyphosate was approved for use in the European Union until Dec. 15, 2022. Austria became the first EU country to ban glyphosate in July 2019. German cabinet approves legislation to ban glyphosate from 2024. It is neither banned nor highly restricted in Nigeria. However, reports from NAFDAC indicate that agrochemical companies had been given a grace period until December 2019 to withdraw all glyphosate formulations with tallow-amine from the Nigerian market

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General Aspects

Registered (NRN) / Unregistered Products Containing Glyphosate				Applicants & Country
Afripower Glyphosate	'A5-1658	Manosforce	'A5-1921	Amarshal Com. Agro & Tec. Ltd (China)
Agrobenta	'A5-0578	Morherb 480 Sl	'A5-1844	Candel Company Limited
Albasaforce Plus	'??????	Nwura Wura	'???????	Ceejeeh Philip (China)
Atraforce Plus	'A5-1819	Ogasate Liquid	'A5-1632	Coromandel International (Nigeria) Limited (India)
Atraforce Wg	'A5-1557	Pirifos 480 Ec	'A5-1639	Duraayu Int'l Ltd (China)
Bida Aerosol	'A5-1828	Preet	'A5-1484	Ezzylite Nigeria Limited (India)
Bi-Mix Growers	'A5-1159	Razedown	'???????	Goldstar Crop Science Nig Ltd (India)
Brush Down	'A5-1868	Redbolt	' A5-1627	Green Wood Industry Ltd (India)
Bush Klear	'A5-1159	Relisate	'???????	Gromor Seeds Limited (China)
Champion	'??????	Roundup Turbo	'A5-0555	HarvestField
Chemsate	'A5-0187	Roundup 360xl	'A10-1016	Hangzhou Agrochemical Nig Ltd (China)
Clearweed	'???????	Roya 2,4 D Liquid	'A5-1905	Hk Imperio Nig Ltd (China)
Clearforce	'???????	Royasate Herbicide	'A5-1622	Kesai Eagrow Nig Company Ltd (China)
Corosate	'A5-1834	Sarosate	'A5-1640	Lionchem Industries Limited (China)
Cypertop Pour On	'A5-1658	Speed	'A5-1543	Lionseal Indusries Ltd (China)
Decal 720 Liquid	'A5-1540	Stormpower	'A5-1554	Jubaili AgroTech
Eagrowup	'A5-0464	Sunphosate 360l	'???????	Masco Agro Allied Industries (India)
Ezzysate Liquid	'A5-1828	Surplus 500ec	'A5-0187	Monsanto Agricultural Nig. Ltd (Belgium)
Ezzyquat Liquid	'A5-1616	Tackle	'???????	Morrison Industries Plc (China)
Force-Up	'???????	Tansate 41% Sl	'???????	Multichem Industries Ltd (China)
Genakill	'A5-1921	Tan-Supreme	'A5-1582	Osi Agro & Industrial Chemical Co Ltd (China)
Glymash	'A5-1554	Tercom	'A5-1632	Reva Agrochemical Co Ltd (China)
Glymor Liquid	' A5-1627	Terminus	'A5-1640	Royal Tee Square Trade & Investment Ltd (China)
Glyphomagic Liquid	'A5-1484	Top-Sate	'A5-1979	Saro Agrosciences Ltd (China)
Glysate Liquid	'A5-0624	Touch Down	'A5-2280	Saro Pharma Ltd (China)
Glyspeed	'A5-1540	Ultima Chick Crumble	'A5-1616	Syngenta
Gobara Wdg	'A5-1639	Uproot	'???????	Tata Africa Services Nigeria Ltd (India)
Gramoxone Super	'A5-1979	United Force 306	'???????	Vista Int'l Ltd (India)
Great Insecticide	'A5-1834	Vinash	'A5-0505	

Herbitox Liquid	'A5-1819	Ward Off	'A5-1905	Wacot Ltd (China) Wynca Sunshine (Ghana)
Hk-Glymax Liquid	'A5-1832	Weed Zero	'A5-1557	
Kilcron Liquid	'A5-1622	Weedall 480 Sl	'A5-1538	
Killoff	'A5-0578	Wheatgold Powder	'A5-0505	

Crop Treated and Pest

It is used for the control of stubborn, annual and broadleaf weeds, Striga seeds, spear grass, elephant grass, and members of the cyperaceous family, in arable and plantation crops.

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Glyphosate is being banned because of its potential link to cancer in humans. According to the Global Glyphosate Study (GGS), glysophate could be linked to certain types of cancer, particularly non-Hodgkin lymphoma. The GGS is the most comprehensive toxicological study ever conducted on glyphosate and glyphosate-based herbicides. It provides vital data for government regulators, policy makers and the general public. It examines the impacts of glyphosate and glyphosate-based herbicides on carcinogenicity, neurotoxicity, multi-generational effects, organ toxicity, endocrine disruption and prenatal developmental toxicity. Multiple peer-reviewed papers from the study are set to be published from early 2024 onwards.

A new study by Robin Mesnage et al (2022) published ground breaking data on how low levels of glyphosate herbicides - that have previously been assumed to be safe - caused cases of leukaemia in young rats, following early life exposures. In this long-term study, glyphosate alone and two commercial formulations, Roundup BioFlow (MON 52276) used in the EU and Ranger Pro (EPA 524-517) used in the U.S., were administered to rats via drinking water beginning in prenatal life, at doses of 0.5, 5, and 50 mg/kg body weight/day. These doses are currently considered safe by regulatory agencies and correspond to the EU Acceptable Daily Intake (ADI) and the EU's No Observed Adverse Effect Level (NOAEL) for glyphosate. These findings were later confirmed in a human population of mothers and new-borns exposed to glyphosate during pregnancy (Corina Lesseur et al 2022).

The GGS previously published a pilot study, which showed endocrine and reproductive toxicity in rats at glyphosate doses currently considered safe by regulatory agencies in the U.S. (1.75 mg/kg bw/day)

Symptoms of exposure to Glyphosate include irritation of the skin, gastrointestinal and respiratory tract, convulsions and coma. It may also cause enhanced breathing. People who breathed in spray mist from products containing glyphosate felt irritation in their nose and throat. Swallowing products with glyphosate can cause increased saliva, burns in the mouth and throat, nausea, vomiting, and diarrhoea. Fatalities have been reported in cases of intentional ingestion. Glyphosate is suspected of causing genetic damage. Glyphosate causes serious eye damage.

Safety Caution for Application

NAFDAC should impose restrictions on its trade and use. Glyphosate should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. For users: do not handle it until all safety precautions have been read, understood and complied with. The government should consider a phase-out plan and withdraw products from the market.

Nicosulfuron

Nicosulfuron is a selective post-emergence herbicide used to control annual grass weeds, broad-leaved weeds and perennial grass weeds in maize farms. Nicosulfuron is a systemic selective herbicide, displaying genera-selectivity, therefore ensuring it is effective at killing other plants growing near the maize – even those grasses closely related to maize.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ○ Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ●

International Regulatory Status of Nicosulfuron Active Ingredient

It is approved in Europe.

General Aspects

Registered (NRN) / Unregistered Products Containing Nicosulfuron		Applicants & Country	Crop Treated and Pest
Cypernel	'A5-1535	Amarshal Com. Agro & Tec Ltd (China)	**Uses:** Nicosulfuron controls annual grass weeds, broad-leaved weeds, and perennial weeds such as Sorghum halepense and Elymus repens
Dynamash	'A5-1902		
Eagrowcare	'A5-1535	Dymota Agro Nigeria Limited (China)	
Fortress	'A5-2018		
Guard Force	'???????	Jubaili Agrotech.	
Nico-Action	'A5-2018	Kesai Eagrow Nig Company Ltd (China)	
Nico'namu	'A5-1902		
Nicoshi Granules	'A5-1589	Osas International Agro Science Limited (China)	
Nicoshi Liquid	'A5-1600		
Ourryce Liquid	'A5-1589	Reliable Agro Allied Limited (China)	
Propanil 36%	'A5-1621	Saro Agrosciences Ltd. (China)	
Propercare	' A5-1600		
Relifuron 75% Wdg	'A5-1620		
Relifuron Od	'A5-1621		
Springbond	'A5-1620		
Stomp 455 Cs	'A5-0481		
Striker (Liquid)	'A5-0481		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Nicosulfuron is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable. It is toxic to plants and may adversely impact the forage and habitat of non-target organisms, including pollinators, in areas adjacent to the treated area. Nicosulfuron has some concerning characteristics such as strong solubility, low volatility, and photo-degradation difficulties, and it continues to be used in large quantities in agricultural production, bringing about environmental problems that cannot be ignored (Huang et al., 2017; Li et al., 2019; Li et al., 2021; Liu et al., 2022 cited in Jianfeng el at 2023).

Studies have shown that Nicosulfuron can often be found on soil surfaces and in groundwater, which indicates the residual problem of Nicosulfuron in the environment (Li et al., 2020). In addition, Nicosulfuron has the potential to threaten a variety of organisms, including toxic effects on a variety of aquatic plants, damage to crops , and impacts on soil microbial populations (Zhang et al., 2020a). As for the harm done to humanity, Nicosulfuron has been confirmed to induce hypoglycaemia in humans and it brought about a risk of cardiovascular disease in research (Green and Palatnick, 2003).

Safety Caution for Application

Users should always follow label instructions and take steps to avoid exposure. If any exposures occur, they should ensure to follow the First Aid instructions on the product label carefully or visit a functional hospital.

Paraquat

Paraquat dichloride, commonly referred to as “Paraquat,” is an herbicide registered for the control of weeds in many agricultural and non-agricultural use sites. It is also applied as a pre-harvest desiccant on some crops. Paraquat was first manufactured in the UK in the early 1960s and is sold globally - 377 companies have registered it for sale. It is one of the World’s most popular and effective herbicides, millions of farmers have used it to kill weeds. But it is also one of the most dangerous and has caused thousands of poisoning/deaths.

Paraquat is registered and present in over 65 products in Nigeria. However, NAFDAC claims that by the end of December 2022, it will no longer process the renewal of registration of Paraquat products, and a total ban will come into effect on 1st January 1, 2024.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Paraquat Active Ingredient

It is banned in Burkina Faso, Cabo Verde, Cambodia, Chad, China, India, Canada, and Brazil. Fiji, Gambia, Guinea, Guinea-Bissau, Korea, Kuwait, Lao-PDR, Malaysia, Mali, Mauritania, Morocco, Mozambique, Niger, Oman, Palestine, Peru, Saudi Arabia, Senegal, Sri-Lanka, Sweden, Switzerland, Taiwan, Togo, Turkey, United Arab Emirates, Vietnam, and 27 European countries. The US Environmental Protection Agency classifies Paraquat as “restricted use pesticide.” that should not be accessible to the general public.

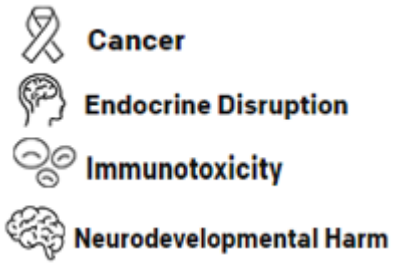
In Nigeria, it is neither banned nor highly restricted. However, NAFDAC had declared that by the end of December 2022, it will no longer process the renewal of registration of Paraquat products, and a total ban will come into effect on January 1, 2024.

General Aspects

Registered (NRN) / Unregistered Products Containing Paraquat				Applicants & Country
Abatin	'A5-1906	Paramash	'A5-1564	Afcott Nig Ltd (China)
Afripower Paraquat	'A5-1653	Paramash	'A5-1990	African Agro Products Ltd (China)
Allquit Liquid	'A5-1480	Parmor Liquid	'A5-1623	Agrofeast Nig Ltd (China)
Assail	'A5-0630	Pellucid	'A5-1802	Amarshal Com. Agro & Tec. Ltd (China)
Atatop	'A5-1990	Pentash	‘???????	Ceejeeh Philip Int'l Co Ltd (China)
Atramax Liquid	'A5-1599	Perfect Killer	'A5-0535	Dizengoff W.A.[Nigeria] Ltd (China)
Attrastar	'A5-0024	Peterquat Liquid	'A5-1835	Duraayu Int'l Ltd (China)
Baycox Solution 2.5%	'A5-1845	Powerforce	‘???????	Ezzylite Nigeria Limited (India)
Crezendo	'A5-0500	Premium Liquid	'A5-0630	Floret Agro Care Enterprises (China)
Day One	' A5-1546	Propashi Liquid	'A5-1599	Gabito & Sons Int'l Services Ltd (China)
Day-One	'A5-1546	Ricetop	'A2-0468	Goldstar Crop Science Nig Ltd (India)
Dizquat 20% Sl	'A5-0387	Reliquat	‘??????	Green Wood Industry Ltd (India)
Double Force	‘???????	Robust 20 Liquid	'A5-1633	Gromor Seeds Ltd (China)
Dragon	‘???????	Royaquat	'A5-1799	Harvestfield Industries Limited (Nigeria)
Dursban	'A5-0387	Slasher	‘A5-0101	Humaifat Nig. Ltd. (China)
Eagrowzone	'A2-0468	Stamdax (Powder)	'A5-1617	Kishon Resources Nig Ltd (China)
Ezzyquat Liquid	'A5-1616	Starkill Liquid	'A5-1633	Lionseal Industries Limited (China)
Fadazim	'A5-1996	Stellar Star	'A5-1827	Masco Agro Allied Industries (India)
Fend Off	'A5-1906	Suniquate Liquid	'A5-1661	Miagro Limited (China)
Fivestar 325 Sc	' A5-1546	Sunparaquat Liquid	'A5-1802	Morrison Industries Plc (China)
Flozone Liquid	'A5-1996	Swan Diamond Coil	'A5-1653	Ningbo Sunjay Agroscience Co. Ltd
Garamacut Super Liquid	'A5-1662	Swift (Liquid)	'A5-0500	Osi Agro & Industrial Chemical Co Ltd (China)
Grammoquit Liquid	'A5-1827	Tanmite	'A4-0097	Reva Agrochemical Limited (China)
Grant Powder	'A5-1480	Target Liquid	'A5-1825	Royal Tee Square Trade & Invest. Co. Ltd. (China)
Laphsate	'A5-1799	Tetrakill 20 Ec	'A5-0510	Saro Agrosciences Ltd. (China)
Massacre	'A5-1623	Tiamaul 350 Fs	'A5-1835	Springfield Agro Ltd (China)
				Umaru Abubakar Agro Chem Ent (China)
				Vista International Ltd. (India)
				Wacot ltd
				Wynca Sunshine Agric Product (China)
				Jubaili Agrotech

Miazon 200 Sl	'A5-0535	Touchclear 276	'A5-1617	**Crop Treated and Pest**
Morquat 20% Sl	'A5-1845	Ultima Chick Crumble	'A5-1616	Widely used as an herbicide (plant killer), primarily for weed and grass control.
Ortiva Top 325 Sc	'A5-1564	Weedcrusher	'A5-0510	
Paracot Liqud	'A5-0024	Weedburner	???????	
Paraeforce	'???????	Weedex Liquid	'A4-0097	
Paraq Herbicide	'???????	Weedoff	'A5-0260	
Para-D Liquid	'A5-1758			

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Paraquat is highly toxic to humans; one small accidental sip can be fatal and there is no antidote. Paraquat is an herbicide that has been linked to Parkinson's. Paraquat causes damage to the body when it touches the lining of the mouth, stomach, or intestines. Paraquat may also damage the kidneys, liver, and oesophagus. Approximately 1,800 Paraquat lawsuits have been filed at the USA federal courts, mostly by farmers and agricultural workers against the chemical makers Syngenta and Chevron. Plaintiffs allege that the companies failed to warn them about the association between handling the weed killer and Parkinson's disease, a neurological condition that can take many years to develop.

In the US, a 17-year-long study found Paraquat contributed to Parkinson's onset and progression. Research by the National Institute of Environmental Health Sciences - part of the US Department of Health - found people who used Paraquat developed Parkinson's two-and-a-half times more often than non-users. In the US, nearly 900 farmers and field workers have joined forces to sue the manufacturer, claiming not only is there a link between Paraquat and Parkinson's, but that Syngenta has deliberately hidden the health risks from the authorities. Parkinson's Disease is believed to be the world's fastest-growing neurological condition. It affects neurons in a specific area of the brain called the substantia nigra.

It is degenerative, gradually leading to tremors and stiffness in the limbs. Global studies show rural, agricultural areas often have higher rates of the disease. According to the New Jersey Department of Health Right to Know - Hazardous Substance Fact Sheet on Paraquat, Paraquat should be handled as a carcinogen – with caution. The exposure to Paraquat may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency. Repeated exposure to Paraquat may cause scarring of the lungs (fibrosis) and lung function with symptoms of coughing and shortness of breath. Paraquat may damage the liver and kidneys and affect the heart.

Safety Caution for Application

The active ingredient must be withdrawn immediately. The importation of Paraquat-based products should be banned immediately. The Federal government and other stakeholders should pressure NAFDAC to effect the ban as proposed. Investors should seek more nature-based alternatives.

Pendimethalin

Pendimethalin is a systematic herbicide of the dinitroaniline class used in pre-emergence and post-emergence applications to control annual grasses and certain broadleaf weeds. It inhibits cell division and cell elongation. Pendimethalin is listed in the K1 group according to the Herbicide Resistance Action Committee (HRAC) classification and is approved in Europe, North America, South America, Africa, Asia and Oceania for different crops including cereals (wheat, barley, rye, and triticale), corn, soybeans, rice, potato, legumes, fruits, vegetables, nuts as well as lawns and ornamental plants.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Pendimethalin Active Ingredient

It is banned in Norway.

General Aspects

Registered (NRN) / Unregistered Products Containing Pendimethalin		Applicants & Country	Crop Treated & Pest
FADAZIM	'A5-2021	Etong Agrotech Nig Ltd (China)	Artichoke, Carrot, Cereals, Corn (maize), Fruits, Garlic, Gladiolus, Herbs, Legumes, Onion, Ornamentals, Peanut, Potato, Safflower, Sorghum, Soybean, Sugarcane, Sunflower, Tobacco, Tomato, Established Turfs, Aubergines, Primrose
FLOZINE	'A5-1805		
FORCETOP	'???????	Lionseal Industries Limited (China)	
HOLDOWN LIQUID	'A5-1701		
ORIZOPLUS	'A5-1591	Riceco International Ltd (India)	
PENPAL	'A5-2021		
SATELLITE LIQUID	'A5-1805	Vista Int'l Ltd (India)	
TOPGINGER LIQUID	'A5-1591	Harvest Field	
VESTALIN	'???????	Jubaili AgroTech	**PEST** It is used for controlling most annual grasses and many annual broad-leaved weeds in cereals, soya beans, cowpeas, groundnuts, etc.
WEETOX	'A5-1857		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Inhaling Pendimethalin can irritate the nose and throat. Exposure to Pendimethalin can cause headache, dizziness, nausea and vomiting. Susceptible individuals may cause a skin allergy. Pendimethalin should be handled as a carcinogen with extreme caution. According to the New Jersey Department of Health (2012), Pendimethalin may be carcinogenic in humans. There is no safe level of exposure to a carcinogen so all contact should be reduced to the lowest possible level. It should be recognised that Pendimethalin can be absorbed through the skin, thereby increasing exposure. Health Hazards: Toxic to reproduction ("R2" classified). Thyroid effects. Chromosome aberrations. Developmental effects. Endocrine disruptor according to the EU Joint Research Centre (JRC). Environmental Hazards: A high risk was identified for aquatic organisms (particularly algae). Classified as acute and chronic very toxic to aquatic life. Possibly a persistent (P) bioaccumulative (B) and toxic (T) or PBT substance.

Safety Caution for Application

NAFDAC should impose restrictions on its trade and use. It should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. For users: do not handle it until all safety precautions have been read, understood and complied with. The government should consider a phase-out plan and withdraw products from the market

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Propanil

Propanil is a selective post-emergent use herbicide registered to control broadleaf and grass weeds on rice, and wheat. Propanil acts by inhibiting photosynthesis and its selectivity is attributed to the presence of high levels of aryl acylamidase in rice and wheat, which causes the hydrolysis of Propanil into 3, 4-DCA and propionic acid. It is present in 13 products in Nigeria.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ○ Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

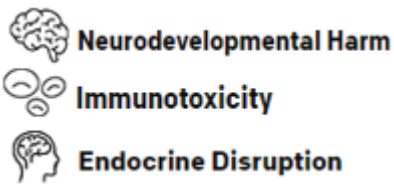
International Regulatory Status of Propanil Active Ingredient

Banned in 27 EU countries, Saudi Arabia, Switzerland, Turkey, and the UK.

General Aspects

Registered (NRN) / Unregistered Products Containing Propanil		Applicants & Country	Crop Treated and Pest
AMINEX	'A5-1923	Osi Agro And Industrial Chemical Co Ltd (China) Springfield Agro Ltd (India) Indamina Nig. Ltd (China) Amarshal Com. Agro & Tech Ltd (China) Rice Co. International Ltd. (India) Harvest Field Jubaili Agro Tech	used for the control of broadleaf and grass weeds on rice
ASATAF	'A5-1923		
FLOROPLUS-GA	'A5-1602		
GRANT POWDER	'A5-1703		
OURRYCE LIQUID	'A5-1602		
PENDI SHI	'A5-1529		
PL2FORCE	'???????		
PROPASHI LIQUID	'A5-1666		
PROPAFORCE PLU	'??????		
RAZER LIQUID	'A5-1703		
SPRINGBOND	'A5-0296		
STAMDAX (Powder)	'A5-1529		
VESPANIL	'???????		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



Propanil has low acute toxicity, with toxicity categories of III (oral) and IV (dermal, inhalation and primary skin irritation). No dermal sensitization was observed; however, primary eye irritation was observed in rabbits. Propanil is considered neither carcinogenic nor mutagenic. According to ILO and WHO (2021), Propanil may cause effects on the central nervous system and blood. Tumours have been detected in experimental animals but may not be relevant to humans. The reported toxicities for Propanil exposure include methemoglobinemia, immunotoxicity, hepatotoxicity (toxic to the liver) and nephrotoxicity (toxic to the kidney). (Rankin et al 2008)

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain. Avoid release to the environment in circumstances different to normal use.

Acute risks are estimated for birds, small mammals, freshwater invertebrates and non-target aquatic plants although RQs are relatively low. Chronic risks are potentially a concern for small mammals freshwater fish and invertebrates.

Safety Caution for Application

NAFDAC should impose restrictions on its trade and use. It should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. For users: Do not handle it until all safety precautions have been read, understood and complied with. The government should consider a phase-out plan and withdraw products from the market.

Quizalofop-Ethylene

Quizalofop-ethyl is a selective, post-emergence phenoxy herbicide. It is used to control annual and perennial grass weeds in potatoes, soybeans, sugar beets, peanuts vegetables, cotton and flax. The compound is absorbed from the leaf surface and is moved throughout the plant. It accumulates in the active growing regions of stems and roots.

It is registered in 4 products in Nigeria.

Class of Pesticide:

Herbicide ■ Insecticide ☐ Fungicide ☐ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ○ Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

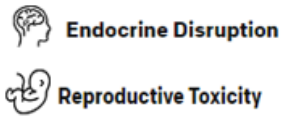
International Regulatory Status of Quizalofop-Ethylene Active Ingredient

Not approved in the EU. It is also banned in Turkey and the UK.

General Aspects

Registered (NRN) / Unregistered Products Containing Quizalofop-Ethylene	Applicants & Country	Crop Treated and Pest
POTASUN 50 EC 'A5-1993 ROUNDUP TURBO 'A5-1993 NUXIM GOLD 'A5-1869 Powerfist-Ga 'A5-1869	Hangzhou Agrochemical Nig Ltd (China) Lionchem Industries Limited (China)	Used as a selective post-emergence herbicide for control of annual and perennial grass weeds in potatoes, soybeans, sugar beets, peanuts, vegetables, cotton, and other crops.

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



In high-dose animal studies: Quizalofop-ethyl caused enlargement of liver cells; it is not classifiable due to human carcinogenicity; may irritate; and can be absorbed through skin. According to the USEPA Office of Pesticide Programs, Health Effects Division, and Science Information Management Branch: "Chemicals Evaluated for Carcinogenic Potential" (April 2006), Quizalofop-ethyl is classified in Group D - Not Classifiable as to Human Carcinogenicity. Quizalofop ethyl has very low acute toxicity via the oral, dermal, and inhalation routes of exposure, is not an eye or skin irritant, and is not a skin sensitizer. There were no adverse effects observed in the oral toxicity studies that could be attributable to a single-dose exposure.

Repeated-dose toxicity studies indicate the liver as the target organ, as evidenced by increased liver weights and histopathological changes. Following oral administration, Quizalofop ethyl is rapidly excreted via urine and faeces. In the subchronic oral toxicity rat study, effects of decreased body weight gains, increased liver weight, and centrilobular liver cell enlargement were observed. In the subchronic oral toxicity dog study, an increased incidence of testicular atrophy was observed. In the combined chronic toxicity/carcinogenicity study in rats, an increased incidence of centrilobular liver cell enlargement was observed in both sexes and mild anaemia in males.

According to USA-EPA (2018), based on the results of acceptable toxicity studies, Quizalofop ethyl does not show evidence of neurotoxicity or neuropathology. Quizalofop ethyl showed no evidence of immunotoxicity.

Safety Caution for Application

Restrictions on its trade and use should be imposed. It should be sold, used and applied only by certified pesticide professionals, and organisations with evidence of safety certification/process in place. For users: do not handle it until all safety precautions have been read, understood and complied with.

Fungicides
Active Ingredients

Carbendazim

Carbendazim is a systemic fungicide and is registered in 2 products for controlling fungal diseases mainly in beans and tomatoes but also in snow peas, squash, broccoli, onions and capsicum, in staple crops like rice, barley, wheat and in fruits like mangoes, citrus, pawpaw.

Class of Pesticide:

Herbicide ☐ Insecticide ☐ Fungicide ■ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ●

International Regulatory Status of Hexaconazole Active Ingredient

It is banned in Egypt, Morocco, Mozambique, Switzerland, Turkey, the United Arab Emirates, the UK, and 27 EU countries.

General Aspects

Registered (NRN) / Unregistered Products Containing Hexaconazole	Applicants & Country	Crop Treated
Companion Powder 'A5-1483 Insectpel 'A5-1483	Masco Agro Allied Industries (India)	Beans, Mangoes, Citrus, Pawpaw, Tomatoes, Rice, Capsicum **Pest** Powdery mildew, Botrytis, Heterosporium, Rhizoctonia, Anthracnose sclerotinia, Grey mould, Fruit rot, Root rot, Angular leaf spot, Rice Blast, Early and late blight, Yellow and stem rust, Phytophthora blight

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Carbendazim is not acutely toxic via the oral, dermal and inhalation routes. It is not a skin or eye irritant but is a skin sensitizer. However, it shows a wide range of chronic effects. Carbendazim causes embryotoxicity, apoptosis, teratogenicity, infertility, hepatocellular dysfunction, endocrine-disrupting effects, disruption of haematological functions, mitotic spindle abnormalities, mutagenic and aneugenic effects, hepatocellular dysfunction, hepatocellular dysfunction, endocrine-disrupting effects, disruption of haematological functions, mitotic spindle abnormal (Rama et al., 2014; Salihu et al., 2015; Prashantkumar et al., 2012; Daundkar and Rampal, 2014; Adedara et al., 2013).

Neurotoxic signs, consisting of leg weakness, ataxia and/or “goose-stepping” gait, were observed in hens (Goldenthal, 1978; Li et al., 2020).

Carbendazim along with carbomyl are classified as possible human carcinogens (Goodson et al., 2015). It causes numerical chromosome aberrations (aneuploidy and/or polyploidy) increasing the incidence of combined hepatocellular adenomas and carcinomas (Wood, 1982). Under the conditions of 2-year studies, there was evidence of carcinogenic activity of Carbendazim in rats based on increased incidences of hormone-dependent tumours without clear dose dependence and reduction of their latent period (Lisovska et al., 2020). It induces hepatic cell proliferation leading to hepatocellular adenomas in mice (APVMA, 2009).

In terms of reproduction, Carbendazim causes birth defects and impairs human fertility. Carbendazim is known to cause adverse effects on male reproductive systems, including decreased testicular and epididymal weights and reduced epididymal sperm counts and fertility in

rats (Gray et al., 1990). Yu et al. (2009) showed effects on spermatogenesis and fertility in rats. The effect on placenta cells is shown by Zhou et al. (2015). Carbendazim influences the hypothalamus–pituitary–gonad axis and is a testicular toxicant (Rama et al., 2014). Exposure of mice to carbendazim caused severe seminiferous tubular atrophy (> 85% of tubules were atrophic) with 16 of the 24 treated males failing to induce a pregnancy, as compared with no failure in the control (Carter et al., 1987).

In addition, the safety of Carbendazin needs to be evaluated further, especially the bioaccumulation toxicity and potential genotoxic effects (Li et al., 2020). Carbendazim has a long half-life (up to 6 months) and therefore occupational re-entry exposure can occur for a significant length of time following application.

Carbendazim has a low aqueous solubility, is volatile and moderately mobile. It is moderately persistent in soil and can be very persistent in water systems under certain conditions. Although it has not been in use in Europe for several years, carbendazim has been found in a recent study in almost all surface water samples around Europe (Casado et al., 2019). There is no sufficient information to address the route of degradation of carbendazim in soil under aerobic conditions (DE, 2010; EFSA, 2010; Lewis et al., 2016). Carbendazim degradation results in the formation of 2-amino-benzimidazole, a highly toxic component, which binds to the spindle microtubules causing the nuclear division blockade (Yenjerla et al., 2009). It is highly toxic to aquatic animals.

Carbendazim significantly reduces earthworm weight and earthworms show avoidance response at field-relevant soil concentrations (Rico et al., 2016; Huan et al., 2016). This is critically important as earthworms are crucial for good soil health.

Safety Caution for Application
The active ingredient should be withdrawn immediately. Less Hazadious alternatives like - Bupirimate, Sulphur, Captan, Thiophanate-Methyl, Trifloxystrobin, Azoxystrobin, Prothioconazole, Benalyaxl-M, Dimethomorph, Copper Oxide, etc should be encouraged, as well as biopesticides and fertilizers with proper applications.

Hexaconazole

Hexaconazole is a broad-spectrum systemic triazole fungicide used for the control of many fungi, particularly ascomycetes and basidiomycetes; powdery mildew, scabs and rusts. It is also used for control of diseases in various fruits and vegetables. It is registered in 6 products in Nigeria.

Class of Pesticide:

Herbicide ☐ Insecticide ☐ Fungicide ■ Rodenticide ☐ Nematocide ☐

WHO Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ○ Moderately Hazardous (II), ○

Slightly Hazardous (III), ● Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Hexaconazole Active Ingredient

It is banned in Brazil, Egypt, Morocco, Palestine, Saudi Arabia, Switzerland, Turkey, and 27 EU countries.

General Aspects

Registered (NRN) / Unregistered Products Containing Hexaconazole		Applicants & Country	Crop Treated and Pest
CONTROL TOTAL	'A5--0376	African Agro Product Limited (India)	used to control powdery mildew, scabs and rust
HEXACAL 50SC	'A5-1646	Amarshal Com. Agro & Tec Ltd (China)	
HEXASHI LIQUID	'A5-1598	Tropical Crop Sciences Ltd (India)	
IRON FORCE	'A5-1598		
JUBAILINOFEAR	'A5-1646		
UNITHRIN	'A5--0376		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

It has a low aqueous solubility and a low viscosity. It tends to be environmentally persistent in both soil and aquatic systems. It is moderately toxic to birds, fish, aquatic invertebrates, algae and earthworms but has a low toxicity to honeybees. It has a low mammalian toxicity and no information on other health issues has been identified although it may be a skin and eye irritant.

Cancer

Endocrine Disruption

According to the US EPA, it is categorised as - a possible human carcinogen. It also presents endocrine issues - Inhibition of aromatase activity, and decrease of the estrogens production. (Lewis ae al 2016)

Safety Caution for Application

NAFDAC should consider phasing out the active ingredient in Nigeria; stop registration and stop the importation of products with the active ingredient. Improve regulation that encourages investors to divest to safer alternatives. For users, always follow label instructions and take steps to avoid exposure.

Mancozeb

Mancozeb is a commonly used fungicide. Mancozeb, (ethylene-bis-dithiocarbamate), commercially known as Diathan-M is an important fungicide useful against a wide range of fungi affecting ornamental plants, crops, and fruits. It is registered in 18 products to control fungal diseases in tomatoes, potatoes, beans and cabbage. However, the effective use of Mancozeb is compromised by its associated toxic effects on both animals and humans.

Class of Pesticide:

Herbicide ☐ Insecticide ☐ Fungicide ■ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ●

International Regulatory Status of Mancozeb Active Ingredient

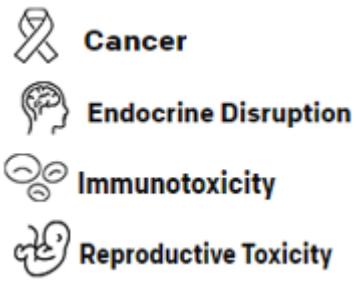
Mancozeb is not approved in the 27 EU states. Mancozeb was declared obsolete in the EU in January 2001. It was withdrawn on July 4, 2021. It is banned in the USA. It is also banned in Canada, the UK Vietnam, Morocco, Saudi Arabia, United Arab Emirates. It is neither banned nor highly restricted in Nigeria

General Aspects

Registered (NRN) / Unregistered Products Containing Mancozeb		Applicants & Country	Crop Treated
APRON STAR 42 WS	'A5-0561	Amarshal Com. Agro & Tec. Ltd (China)	Tomatoes, Potatoes, Beans, Cocoa, Cabbage. Cotton, Chili Pepper, Rice, Citrus, Vegetables, Sugarcane, Groundnut, Orchards, Soybean, Banana, Horticulture and other fields.
BRET P-20	'A5-1986		
COMPANION POWDER	'A5-1483	Coromandel International Nigeria Limited (India)	
EMEXYL POWDER	'A5-1807		
EMZEB 80 POWDER	'A5-1806	Dizengoff W.A. Nigeria Ltd (India)	
FATRAZINE	'A5-1807		
FUNGU FORCE	'??????	Kishon Resources Nig Ltd (China)	
INSECTPEL	'A5-1483		
MECCOZSHI	'A5-1576	Valency Agro Nigeria Ltd	
METAZEB	'A5-0561	Masco Agro Allied Industries (India)	**Pest** Black pod disease (Phytophthora sp.) on cocoa, Potato Blight, Leaf Spot, Scab, Downy Mildew, Rust, Botrytis, and Angular leaf spot
POWER INSECTICIDE	'A5-1986		
RICHCOAT	'A5-1842	Jubaili AgroTech	
RIDOMIL GOLD 68W	'??????	Power Agro Chemical Ltd (Nigeria)	
ROLAX	'A5-1576		
SAAF FUNGICIDE	'A5-1121	Upl	
VIPEOUT LIQUID	'A5-1842	Syngenta	
XTRASEAL 500	'A5-1806		
Z-Force	'A5- 0224		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Mancozeb demonstrates low acute toxicity by the oral, dermal and inhalation routes. It is neither a skin nor an eye irritant, but it is a moderate skin sensitizer. Mancozeb has been classified as a probable human carcinogen. Mancozeb has the potential to cause goitre, a condition in which the thyroid gland is enlarged and has produced birth defects and cancer. The European Chemicals Agency (ECHA; 2017, 2018, 2019) has classified Mancozeb as being toxic to reproduction, while the European Food Safety Authority (EFSA) has identified it as an endocrine disruptor.



Mancozeb is a multipotent carcinogenic agent: Animals treated with Mancozeb in food from age 8 weeks through age 104 weeks and followed until spontaneous death showed a significant increase in total tumours and in tumours of a specific type that were often sex-specific. Mancozeb was shown to be carcinogenic based on the number of total malignant tumours and the tumours at various

sites that included malignant mammary tumours, Zymbal gland and ear duct carcinomas, hepatocarcinoma, malignant tumours of the pancreas, malignant tumours of the thyroid gland, osteosarcomas of the bones of the head, and hemolymphoreticular neoplasias (Fiorella, et al., 2002). Srivastava et al., (2012) proved genotoxicity.

Results from in vitro studies provide evidence that Mancozeb may indirectly disrupt or impair reproduction at the cellular level and should be regarded as a reproductive toxicant. Animal studies confirm reproductive and developmental toxicity in mammals and suggest that males chronically exposed to Mancozeb experience significant changes in physiological, biochemical, and pathological processes that may lead to infertility (Runkle et al., 2017).

Mancozeb exposure is associated with an increased incidence of thyroid disease in female spouses of pesticide applicators (Goldner et al., 2010). Hypothyroxinemia early in pregnancy is associated with adverse effects on the developing nervous system and can lead to impaired cognitive function and motor development in children (Adjrah et al., 2013). Thyroid toxicity was manifested as alterations in thyroid hormones, increased thyroid weight, microscopic thyroid lesions (mainly thyroid follicular cell hyperplasia), and thyroid tumours.

Mancozeb has been shown to have detrimental effects on fish and invertebrates (Sharma et al., 2016). There is a high mortality rate of fish exposed to Mancozeb irrespective of the exposure time (Nimai et al., 2016). The metabolite of Mancozeb (ethylenethiourea) contaminates the groundwater (Srivastava and Singh, 2012). Ethylenethiourea is responsible for thyroid dysfunction and carcinogenic effects in various organisms (Sharma et al., 2016).

Safety Caution for Application
NAFDAC should consider phasing out Mancozeb in Nigeria; stop registration and stop the importation of products with the active ingredient. Improve regulation that encourages investors to divest to safer alternatives. For users, always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully.

Metalaxyl

Metalaxyl is a systemic fungicide used to control plant diseases caused by oomycete fungi or water mould fungi. Its formulations include granules, wettable powders, dust, and emulsifiable concentrates. Metalaxyl is mostly used as a multi-purpose, protective, contact and residual fungicide for effective disease control and protection of field crops, fruits, and vegetables. It is present/registered in 25 products in Nigeria.

Class of Pesticide:

Herbicide ☐ Insecticide ☐ Fungicide ■ Rodenticide ☐ Nematocide ☐

WHO Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ○ Moderately Hazardous (II), ●

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ○

International Regulatory Status of Metalaxyl Active Ingredient

It is not approved in Brazil.

General Aspects

Registered (NRN) / Unregistered Products Containing Metalaxyl		Applicants & Country	Crop Treated
Apron Star 42 Ws	'A5-0561	Comfort Agro Chemical Nig Ltd (Saudi Arabia)	Potatoes, Grapes, Tobacco, Vegetables (onions, eggplant, and other leafy vegetables), Citrus, Tomatoes, Cocoa, Soybeans, Turf, and Ornamentals.
Atraz Sachet Powder	'A5-1572		
Defendstar 72wp	'A5-2019	Coromandel International	
Dress Force	'??????	Nigeria Limited (India)	
Emexyl Powder	'A5-1807	Dizengoff W.A. Nigeria Ltd	
Fatrazine	'A5-1807	(India)	
Funkill	'A5-2012	Etong Agrotech Nig Ltd	
Fungu Force	'??????	Kishon Resources Nig Ltd	
Go Gecko Spray	'A5-1843	(China)	
Gobara Wdg	'A5-1998	Lionseal Ind Ltd (china)	
Koppersuper	'A5-1572	Royal Tee Square Trade &	**Pest**
Mattock	'A5-2019	Invest. Co. Ltd. (China)	*An effective fungicide for the control of Oomycete fungi (including late blight and Downy mildew).*
Metazeb	'A5-0561	Y.B.U Agrochemical & Tec	
Red Force	'A5-0229	Company Ltd (Nigeria)	
Ricadem	'A5-1843	Aidereim Limited Nigeria	
Richcoat	'A5-1842	Syngenta	
Rolax	'A5-1800	Jubaili AgroTech	
Ridomil Gold Plus	'???????		
Tackle	'A5-1997		
Tanchlor	'A5-2012		
Ultimax Plus	'A5-0046		
Vinash	'A5-1800		
Vipeout Liquid	'A5-1842		
Ybu Dress Seed	'A5-1997		
Ybu Gran Gobee	'A5-1998		

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns

Metalaxyl has both curative and systemic properties. Its mammalian toxicity is classified as EPA toxicity class III and it is also relatively non-toxic to most non-target arthropod and vertebrate species. Metalaxyl generally is of low acute toxicity but is a moderate eye irritant and has been placed in Toxicity Category II (indicating the second highest degree of acute toxicity) for eye irritation effects. In a subchronic feeding study using rats, reduced food consumption and liver cell effects were noted at the highest dose tested. In a dermal study using rabbits, no treatment-related effects were observed. In a chronic toxicity study using beagle dogs, blood serum enzyme effects and increased liver weights were noted in the highest dose group. A study using rats resulted in liver effects. Cancer studies using rats and mice raised concerns about the incidence of thyroid, adrenal and liver tumours.

Safety Caution for Application

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully or visit a functional hospital.

Propineb (Antracol)

Propineb is a foliar-applied fungicide with long residual activity used on a wide range of crops. Propineb is a protectant foliar-applied fungicide with long residual activity and belongs to the dithiocarbamate group of compounds. It is used as a protective treatment on several crops for the control of various fungi, especially Oomycetes, Ascomycetes, Basidiomycetes and Fungi imperfecti.

Class of Pesticide:

Herbicide ☐ Insecticide ☐ Fungicide ■ Rodenticide ☐ Nematocide ☐

WHO/PAN Hazard Classification:

Extremely Hazard (Ia) ○ Highly Hazardous (Ib), ● Moderately Hazardous (II), ○

Slightly Hazardous (III), ○ Unlikely to Present Acute Hazard (U) ●

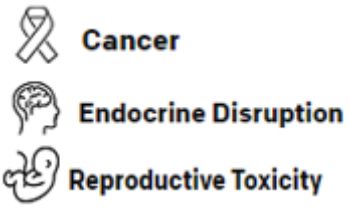
International Regulatory Status of Propineb Active Ingredient

It is not approved in the EU; banned in 27 EU countries. It is banned in Egypt, Morocco, Turkey, and the UK.

General Aspects

Registered (NRN) / Unregistered Products Containing Propineb	Applicants & Country	Crop Treated and Pest
YBU DRESS SEED 'A5-1997 Tackle 'A5-1997	Bayer Middle Africa Ltd (Germany)	Used for the control of Downy mildew; Black rots; Grey moulds; Scab; Leaf spots; Blossom wilt in Grapes; Tomatoes; Potatoes; Pome fruit; Onions; Melons; bell peppers

Health Impact, Environmental Toxicity and Environmental Behaviours Concerns



According to PubChem, Propineb disrupts the thyroid gland; it is potentially a thyroid toxicant. It may damage the lungs or cause muscular problems. According to the US EPA, Propineb is probably a human carcinogen. Carcinogenicity - Category 1B (A category 1B (Carc1B) is a substance which is presumed to have carcinogenic potential for humans, classification is largely based on animal evidence.). Propineb is also Reproductive toxicity - Category 2; Substances are classified in Category 2 for reproductive toxicity when there is some evidence from humans or experimental animals, possibly supplemented with other information, of an adverse effect on sexual function and fertility, or development, and where the evidence is not sufficiently convincing to place the substance in Category 1 (Known or presumed human reproductive toxicant.) Specific target organ toxicity - Repeated exposure - Category 1 (thyroid), Category 2 (nervous system).

Propineb is hazardous to the aquatic environment.

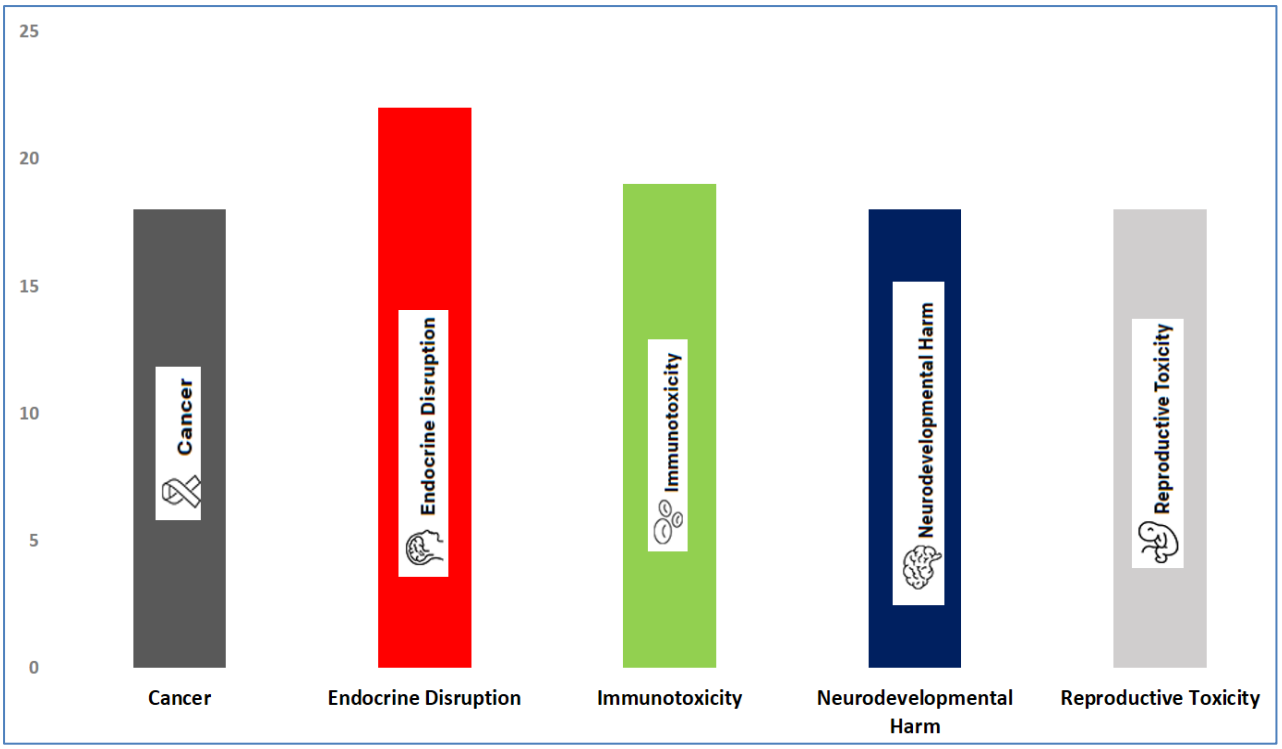
Safety Caution for Application

NAFDAC should consider phasing out the active ingredient in Nigeria soon; stop registration and stop the importation of products with the active ingredient. Improve regulation that encourages investors to divest to safer alternatives. For users, always follow label instructions and take steps to avoid exposure.

Conclusion and Recommendations

Sixteen (16) insecticides, nine (9) herbicides, and five (5) fungicides were captured in this volume. Of the 30 active ingredients reviewed, 25 are categorised as Highly Hazadious Pesticides (83.3%), 3 are categorised as Moderately Hazadious Pesticide, 1 falls under the category of Slightly Hazadious Pesticide, while the last one is a pesticide unlikely to Present Acute Hazard.

- Eighteen (18) of the active ingredients are categorised as cancer-causing (60%)
- Twenty-two (22) of the active ingredients are endocrine disruptors (73%)
- Nineteen (19) of the active ingredients are immunotoxins (63%)
- Eighteen (18) of the active ingredients are neurotoxic (60%)
- Eighteen (18) of the active ingredients are toxic to the reproductive system (60%)



In light of the prevalent suboptimal market practices in the trade and utilization of pesticide products in Nigeria, coupled with inadequate regulatory oversight throughout the agrochemical value chain, this dossier endeavours to safeguard citizens' right to make informed decisions regarding their selection of pesticide products. Simultaneously, it underscores the imperative for prudence in the application of and exposure to pesticides.

Given the aforementioned concerns, pertinent stakeholders in Nigeria propose the following recommendations for contemplation and subsequent implementation:

1. Regulatory Measures: NAFDAC and FMAFS are urged to consider the modification and adoption of Article 7.5 of the International Code of Conduct on Pesticide Management, as developed by WHO and FAO. This involves prohibiting the importation of internationally banned pesticides into Nigeria; decisively phasing out registered Highly Hazardous Pesticides (HHPs), and curbing the open, unregistered sale and purchase of pesticides within the country.

2. Prohibition of Importation: The National Agency for Food and Drug Administration and Control (NAFDAC) and the Federal Ministry of Agriculture and Food Security (FMAFS) should

collaborate to enforce a comprehensive prohibition on the importation of pesticides that are internationally banned due to their high levels of hazard. This action aligns with global best practices and ensures that Nigeria does not serve as a repository for substances deemed unsafe elsewhere.

3. Phase-Out of Registered HHPs: Implement a systematic and decisive phase-out plan for registered highly hazardous pesticides within the country. This phased approach will allow for a smooth transition, providing farmers and stakeholders with adequate time to adopt safer alternatives while mitigating any potential disruptions to agricultural activities.

4. Enforcement against Unregistered Sales: Strengthen enforcement measures against the open and unregistered sale and purchase of pesticides in Nigeria, particularly those that are internationally banned and known to be hazardous. This involves increased surveillance, strict penalties for violators, and the establishment of a robust regulatory framework to monitor and control the sale of pesticides.

5. Promotion of Safer Alternatives: Actively promote and support the adoption of safe agroecological methods, such as organic/biopesticides and Integrated Pest Management (IPM) approaches. Government agencies, agricultural organizations, and extension services should collaborate on comprehensive awareness campaigns to educate farmers about the benefits of transitioning to these alternatives.

6. Government Oversight: The Nigerian government at both federal and state levels should enforce stringent regulations on pesticide manufacturers, traders, and promoters. Additionally, incentives and guidance should be provided to agrochemical companies to invest in the research and development of safer and more environmentally friendly pesticide alternatives. Substantial fiscal and political support is essential for NAFDAC and other pertinent agencies to effectively implement their regulatory frameworks.

7. Promotion of Responsible Practices: FMAFS, Farmers Associations, and other agricultural agencies and organizations should actively promote the responsible choice and application of pesticides. This can be achieved by disseminating comprehensive information on the health and environmental toxicity associated with various pesticides.

8. Advocacy for Safe Alternatives: FMAFS, NAFDAC, FMITI, state governments, farmer associations, and advocacy groups should advocate for and promote safe alternatives such as organic/biopesticides and Integrated Pest Management Approaches (IPM). This can be achieved through comprehensive disclosure and education initiatives.

9. Training for Agricultural Extension Officers: Agricultural extension officers and service providers should undergo training on pesticide risk, equipping them with accurate information on pesticide selection, application rates, timing, and safety precautions. This knowledge will empower farmers to safeguard both their crops and health.

10. Community Engagement: Traditional leaders, religious heads, cultural advisors, and farm associations should actively seek and disseminate comprehensive information on pesticides and good farm practices. This collaborative effort aims to assist farmers in making informed decisions, minimizing unnecessary pesticide use, and fostering safer, sustainable farm systems.

11. Emergency Response: Emergency services and healthcare providers play a crucial role in facilitating effective emergency responses. They should provide detailed information on the pesticides involved, data on pesticide hazards, and appropriate measures for first responders and medical professionals.

12. Research and Scientific Support: Research institutions and scientific organizations should support researchers and scientists by providing detailed information on pesticides. This support facilitates the study of pesticide effects, the development of alternatives, and the assessment of long-term impacts.

13. Accountability in Agriculture: Farm owners, farmer association leaders, and development partners in the agricultural sector, as well as agricultural training institutions, should prioritize accountability and responsibility. This involves not only providing Personal Protective Equipment (PPE) but also ensuring that workers and members possess comprehensive knowledge about all associated risks of pesticide products. Documents such as this dossier can serve as valuable guides in this regard.

14. Support for Integrated Pest Management (IPM): Governement should invest in agricultural projects that adopt Integrated Pest Management (IPM) approaches. These holistic strategies focus on minimizing pesticide use through the integration of natural predators, crop rotation, and other sustainable practices, aligning with environmentally conscious and economically viable farming methods.

15. Supply Chain Transparency: The government should encourage transparency and traceability within the agricultural supply chain. Investors should support initiatives that promote clear documentation and disclosure of the types and amounts of pesticides used, fostering accountability among all stakeholders.

16. Stakeholder Education and Training: Invest in educational programs and training sessions for farmers, providing them with knowledge and skills to adopt agroecological/organic pesticide management practices. This proactive approach can contribute to the overall success and longevity of agricultural investments.

APPENDIX

Registered Pesticide Active Ingredients in Nigeria

Not Approved in Europe	Approved in Europe
1. Acephate	1. 2, 4 Dimethylamine
2. Acetochlor	2. 2,2-Dichlorovinyl Diphophate
3. Alpha-Cypermethrin	3. 2,4-D Amine
4. Beta-Cypermethrin	4. 2,4-Dextro Butylate
5. Ametryn	5. 2-Methyl-4-Chlorophenoxyacetic Acid
6. Atrazine	6. Abamectin
7. Azamethiophos	7. Acetamiprid
8. Bendiocarb	8. Acetochlor
9. Bromadiolone	9. Acrylate
10. Butachlor	10. Aluminium Phosphide
11. Camphor Solvent	11. Azoxystrobin
12. Carbendazin	12. Bensulfuron Methyl
13. Chlorpyrifos	13. Bentazone
14. Clothianidin	14. Benzoate
15. D- Allethrin	15. Bergmeal
16. Dichlovors (DDVP)	16. Bispyribac-Sodium
17. Dimethoate	17. Brodifacoum
18. Diuron	18. Carbonxin
19. D-Trans-Allethrin	19. Chlorantraniliprole
20. Fipronil	20. Clodinafop Propargyl
21. Glufosinate-Ammonium	21. Clomazone
22. Hexaconazole	22. Copper Hydroxide
23. Imidachloprid	23. Copper-1-Oxide
24. Imiprothrin	24. Cyhalofop Butyl
25. Isothiazolinone	25. Deltamethrin
26. Mancozeb	26. Denatonium
27. Maneb	27. Difenoconazole
28. Metolachlor	28. Emamectin/Enamectin
29. Oxadiargyl	29. Esbiothrin
30. Paraquat	30. Fluazifop-P-Butyl
31. Permethrin	31. Fluopyram
32. Pretilachlor	32. Glyphosate
33. Profenfos/ Profenofos	33. Halosulfuron-Methyl
34. Prometryn	34. Imazamox
35. Propanil	35. Indazifim
36. Propineb	36. Isopropylamine Salt Of Glyphosate
37. Pyrazosulfuron-Ethyl	37. Isoxaflutole
38. Quinclorac	38. Lamda-Cyhalothrin
39. Rich-D-Transallethrin	39. Mesotrione
40. Tetramethrin	40. Metalaxyl
41. Thiamethoxam	41. Nicosulfuron
42. Transfluthrin	42. Oxyfluorfen
43. Tricyclazole	43. Pendimethalin
44. Trizophos	44. Piperonyl Butoxide
	45. Penoxsulam
	46. Quizalofop-Ethylene (P-Ethyl)
	47. Spinosad
	48. Tebuconazole
	49. Theta-Cypermethrin
	50. Triclopyr
	51. Zinc Phosphide

Animal Repellant Not Included

1. Ethanolamine
2. Methyl anthranilate
3. Silicone

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About AAPN

The Alliance for Action on Pesticide in Nigeria (AAPN) is a loose coalition of over 80 civil society organizations, farmers and farm input dealers associations, academia, researchers, and interested members of the public. The Alliance seeks to increase public awareness of pesticide issues for informed pesticide choice, and usage and shift to safer sustainable farm methods and Integrated Pest Management (IPM) systems/methods. The alliance also seeks to ensure improved pesticide regulations in Nigeria; protect both human and environmental health, guard Nigeria's food security, and improve food sustainability.

Members of the AAPN

Action Aid Nigeria
Agricultural Research Council of Nigeria (ARCN)
All Farmers Association of Nigeria (AFAN)
Alliance for Action on Pesticide in Nigeria (AAPN)
Association of Organic Agriculture Practitioners of Nigeria
Association of Women in Trade and Agriculture (AWITA)
Aubree Associates
Be The Help Foundation
BFA Food and Health Foundation
Biodiversity Education and Resource Centre (BERC)
Cal-Maji Foundation
Caritas Nigeria
Catholic Secretariat of Nigeria
Centre for Environmental Education and Development (CEED)
Centre for Journalism Innovation and Development (CJID)
Centre for the Protection of Rights of Consumers and Workers (CEPRICOW)
Chen Education and Development Empowerment (CEDE Nigeria)
Clean Energy and Safe Environment Initiative (CESEI)
CNC Consultation (Agric, Livelihood/Humanity)
Coalition Against Paraquat (CAP)
Cocoa Research Institute of Nigeria
Code Earth/RSECESSA
Community Action Against Plastic Waste (CAPws)
Dataphyte
Development Initiative for Change and Empowerment (DICE)
EAT Africa
Ecocykle
EnvironNews
Environmental Rights Action (ERA)/Friends of the Earth Nigeria (FoEN)
Evergreening Network for Forest and Land Restoration (ENFORLAR)
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Federation of Agricultural Commodities of Nigeria (FACAN)
Food Literacy Centre
Friends of the Earth Nigeria (FoEN)
Gender and Community Empowerment Initiative
Giolee Global
Good Governance Team, Nigeria
Health of Mother Earth Foundation (HOMEF)
Heinrich Boell Stiftung Nigeria
Hypertension Africa
Ikot Ekpene Women Food/Cash Crop MPCS
Justice, Development and Peace Commission (JDPC)
Leap Environmental Projects Limited
Michael Adedotun Oke Foundation
Nature Care Resource Centre
Network of Women in Agriculture Nigeria (NWIAN)
Nigeria Agro Inputs Dealers Association (NAIDA)
Nigeria Young Farmers
Nigerian Forum for Agricultural Advisory Services (NIFAAS)
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Surge Africa Organisation
Sustainable Research and Action for Environmental Development (SRADev Nigeria)
T.R.E.E Initiative,
Great League of Pioneers for Community Sustainable Development (GLOP-CSD)
Trade Network Initiative (TNI)
Transparency and Economic Development Initiatives
Urban-Rural Environmental Defenders (U-RED)
Village Farmers Initiative (VFI)
Women Empowerment Program (WEP)
Young Men's Christian Association Mada Hills
Independent Researchers, Farmers, Academia, Medical Laboratory Scientists & Public Health

About HOMEF

Health of Mother Earth Foundation (HOMEF) is an ecological think tank and an advocacy organization promoting environmental/climate justice and food sovereignty in Nigeria and Africa.

HOMEF's vision is for an ecologically just world where all beings live in harmony with Mother Earth and her driving mission is: working to support a wholesome ecological and socially cohesive/inclusive community where people live in solidarity and dignity.

HOMEF's work tackles problems created by the agricultural model that is colonial and sees food as a commodity thereby generating hunger and encouraging biodiversity erosion through approaches including using genetic engineering in agriculture and harmful agricultural chemicals such as the HHPs.

HOMEF also focuses on tackling problems relating to harmful extractives and the exploitation of nature and people. HOMEF has created a dynamic knowledge space through her Ikike Programme to drive the change she seeks. This space fosters the development and sharing of knowledge as well as interrogation of concepts, policies and actions on various issues, ranging from environmental/climate justice, agriculture, re-source democracy and overall socio-ecological transformation.

Compiled by

Prof. Simon Irtwange
Professor of Agricultural Processing and Storage, Federal University of Agriculture, Makurdi, Nigeria
Co-founder, Alliance for Action on Pesticide in Nigeria (AAPN)

Donald Ikenna Ofoegbu
Program Coordinator of the Sustainable Nigeria Program, Heinrich Boll Foundation, &
Coordinator Alliance for Action on Pesticide in Nigeria (AAPN)

Joyce Brown
Director of Programmes, Health of Mother Earth Foundation (HOMEF)/ Coordinator AAPN

Aniebet Obot,
Researcher and program manager, Surge Africa.

Review / Editing

Mariann Bassey-Orovwuje
Deputy Executive Director ERA/FoEN and Coordinator Food Sovereignty Program
Friends of the Earth Africa.

Prof. Ekpere Johnson
Fmr. Executive Secretary, Scientific, Technical and Research Commission of the Organisation of African Unity (OAU/STRC), now Africa Union

Endorsed by

Members of the Alliance for Action on Pesticide in Nigeria (AAPN)

Design and Layout: Babawale Obayanju

Health of Mother Earth Foundation (HOMEF)
Head Office: #30, 19th Street, off Ugbowo-Lagos Road, Ugbowo, Benin City 300212, Nigeria
Tel: +234 906 975 6927 | +234 817 370 6095
Email: home@homef.org