POPs Pesticides in Barbados (2012)

Report

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Environmental Protection Department

Ministry of Environment and Drainage

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ABBREVIATIONS & ACRONYMS

BAMC	Barbados Agricultural Management Company Limited
DDT	Dichlorodiphenyltrichloroethane
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GEF	Global Environment Facility
HAZMAT	Hazardous materials
HCB	Hexachlorobenzene
NIP	National Implementation Plan
PCBs	Polychlorinated Biphenyls
POPs	Persistent Organic Pollutants
UNEP	United Nations Environment Programme

UNITS

kg	Kilogram
L	Litres

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EXECUTIVE SUMMARY

The Stockholm Convention on Persistent Organic Pollutants (POPs) came into force on May 17, 2004. POPs are a group of hazardous organic compounds that **persist** in the environment for long periods, are capable of **long-range transport**, **bioaccumulate** in human and animal tissue, **biomagnify** in food chains and have **potentially significant impacts** on human health and the environment. Currently, twenty-two (22) substances have been classified as POPs – fifteen (15) of which are pesticides.

In 2012, the Government of Barbados, with financial assistance from the Caribbean Community Secretariat, commissioned updated versions of the country's POPs inventories. This report provides an update on the locations where stockpiles of original and new POPs pesticides are likely to be present; as well as establishes their quantity and condition. It also reviews the current management and disposal of banned or obsolete pesticides in the island – which appears to be in an ad hoc manner.

By reviewing the Barbados National Pesticide Inventory Report (2003/2004) and the FAO Obsolete Pesticide Study Database (2010), stockpiles of POPs pesticides were identified and served as a point of reference. Investigations into these stockpiles revealed that:

- The condition of the stockpile of endrin located at Spencers Plantation remains unchanged since it was identified in the 2003/2004 inventory;
- Stockpiles of endosulfan and lindane held by the Ministry of Agriculture have been repackaged and are awaiting shipment overseas for disposal;
- Majority of the stockpiles of endosulfan held by private entities were either inappropriately disposed of, unaccounted for, or had been disregarded.

Apart from recommending that the Pesticides Control Board formally ban all fifteen POPs pesticides, one of the key suggestions coming out of the report is for greater collaboration between the regulatory agencies to better sensitise the general public about the dangers associated with these harmful substances and how they should be properly disposed of.

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1. INTRODUCTION

The Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted and opened for signatures in May 2001 in Stockholm, Sweden. It came into force on May 17, 2004, ninety days after its 50th ratification. Barbados became a Party to the Stockholm Convention by accession on June 7, 2004. The Convention entered into force for Barbados 90 days later (Government of Barbados, n.d.).

POPs are a group of hazardous organic compounds that are resistant to environmental degradation through chemical, biological and photolytic processes. The group includes pesticides, industrial chemicals, and unintended by-products of chemical and combustion processes. POPs **persist** in the environment for long periods, are capable of **long-range transport**, **bioaccumulate** in human and animal tissue, **biomagnify** in food chains and have **potentially significant impacts** on human health and the environment (Government of Barbados, 2007; UNEP, 2010). Exposure to POPs can cause certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and diminished intelligence (UNEP, 2010). They can also trigger adverse effects on ecosystems and biodiversity (UNEP, 2011). Currently, twenty-two (22) substances have been classified as POPs – fifteen (15) of which are pesticides.

In 2001, the United Nations Environment Programme (UNEP), with funding from the Global Environment Facility (GEF), initiated a pilot project to facilitate the development of National Implementation Plans (NIPs) for the Stockholm Convention in developing countries and countries with economies in transition. Barbados was one of 12 countries that participated in this project and the most significant output was the Barbados National Implementation Plan for the Management of Persistent Organic Pollutants which was submitted to the Stockholm Convention in 2007.

A key component of the NIP's development process was the creation of a national POPs inventory. In Barbados, the POPs inventory was divided into three (3) components:

- National Pesticides Inventory (2003/2004)
- National Inventory of Dioxins and Furans (2004); and

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- National Inventory of Polychlorinated Biphenyls (PCBs) (2004).

The Barbados NIP was scheduled to be reviewed and evaluated every five years. While the first such review was to take place in 2010, and is therefore overdue, the Government of Barbados remains cognisant of its obligations to the Stockholm Convention. In 2012, with the financial assistance of the Caribbean Community Secretariat, the Government commissioned updated versions of the country's POPs inventories. These new inventories would facilitate the revision of the nation's NIP.

1.1 Aim

The primary aim of the inventory of POPs pesticides in Barbados is to provide an update on the locations where stockpiles of original and new POPs pesticides are likely to be present; and to establish the quantity and condition of those stocks.

1.2 Objectives

In order to develop a context for the management and disposal of banned or obsolete pesticides in Barbados and to update the inventory of POPs pesticides present in the country, the following objectives were established:

1. To identify stockpiles of POPs pesticides (original and new) by reviewing the Barbados National Pesticides Inventory Report (2003/2004) and the Food and Agriculture Organisation (FAO) Obsolete Pesticides Study (2010);
2. To determine the status (present, disposed of, used) of the identified POPs pesticides stockpiles;
3. To determine what restrictions, if any, have been instituted in Barbados for the 15 POPs pesticides; and
4. To determine the management of banned or obsolete pesticides in Barbados – particular the disposal procedures.

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2. BACKGROUND

2.1 Barbados

Barbados, the most easterly island in the Caribbean, has a total land area of approximately 432 km^2 and possesses a tropical climate with two main seasons, rainy and dry. It is an independent sovereign state within the Commonwealth with a parliamentary democracy. In 2010, the population stood at approximately 276,300 persons (Barbados Statistical Service, pers. comm., 2012).

Historically, the Barbadian economy was dependent on sugar cane production. However, tourism and the service sectors currently dominate the island's economy. In 2011, the agricultural sector contributed 1.475% to GDP (Barbados Statistical Service, pers. comm., 2012).

2.2 Stockholm Convention

The objective of the Stockholm Convention is "to protect human health and the environment from the harmful impacts of persistent organic pollutants" (Secretariat of the Stockholm Convention, 2010). In order to realise this aim, the Convention aims to:

a. Eliminate and/or restrict the intentional production and use of POPs;
b. Reduce unintentional production of POPs with the aim of elimination; and
c. Ensure that wastes containing POPs are managed safely and in an environmentally sound manner (UNEP, nd).

There are currently 22 chemicals classified as POPs under the Stockholm Convention. At its inception in 2001, 12 chemicals were designated as POPs; nine of which are pesticides: aldrin, dieldrin, endrin, chlordane, Dichlorodiphenyltrichloroethane (DDT), heptachlor, hexachlorobenzene (HCB), mirex and toxaphene. In 2009, nine more chemicals were added to the list of POPs, including five pesticides: alpha and beta hexachlorocyclohexane, chlordecone, lindane, and pentachlorobenzene (UNEP, 2010). Endosulfan was also added to the list in May 2011, bringing the total number of POPs pesticides to 15 (Secretariat of the Stockholm Convention, 2011). Table 1 lists the 22 POPs currently included in the Stockholm Convention.

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Table 1: The 22 POPs listed under the Stockholm Convention

		Name	Type	Annex(es)		
				A	B	C
2001	1	**Aldrin**	Pesticide	✓		
	2	**Chlordane**	Pesticide	✓		
	3	**Dichlorodiphenyltrichloroethane (DDT)**	Pesticide		✓	
	4	**Dieldrin**	Pesticide	✓		
	5	**Endrin**	Pesticide	✓		
	6	**Heptachlor**	Pesticide	✓		
	7	**Hexachlorobenzene**	Pesticide/ Industrial Chemical/ By-Product	✓		✓
	8	**Mirex**	Pesticide	✓		
	9	**Toxaphene**	Pesticide	✓		
	10	**Polychorinated Biphenyls (PCB)**	Industrial Chemical/ By-product	✓		✓
	11	**Polychlorinated dibenzo-p-dioxins**	By-Product			✓
	12	**Polychlorinated dibenzofurans**	By-Product			✓
2009	13	**Alpha hexachlorocyclohexane**	Pesticide/By-Product	✓		
	14	**Beta hexachlorocyclohexane**	Pesticide/By-Product	✓		
	15	**Chlordecone**	Pesticide	✓		
	16	**Hexabromobiphenyl**	Industrial Chemical	✓		
	17	**Hexabromodiphenyl ether and heptabromodiphenyl ether(commercial octabromodiphenyl ether)**	Industrial Chemical	✓		
	18	**Lindane**	Pesticide	✓		
	19	**Pentachlorobenzene**	Pesticide/ Industrial Chemical/ By-Product	✓		✓
	20	**Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctanesulfonyl fluoride**	Industrial Chemical		✓	
	21	**Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether)**	Industrial Chemical	✓		
2011	22	**Technical endosulfan and its related isomers (Endosulfan)**	Pesticide	✓		

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2.3 Other Related International Agreements

There are a number of international instruments that make direct reference to or have implications for the management of pesticides, obsolete or otherwise. Chief among these are the Basel Convention, the Rotterdam Convention and the FAO International Code of Conduct on the Distribution and Use of Pesticides. These instruments reinforce the requirements of the Stockholm Convention.

2.3.1 The Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was opened for signature on March 22, 1989 and came into force in 1992 after the 50th ratification. Barbados is both a signatory and Party to the Basel Convention, which aims to: "protect, by strict control, human health and the environment against the adverse effects which may result from the generation and management of hazardous wastes and other wastes", including waste pesticides and herbicides, by stipulating environmentally sound management, transboundary transportation and ultimate disposal of hazardous materials.

The Basel Convention therefore reinforces the requirements, outlined in Article 6 of the Stockholm Convention, that pesticide wastes should be handled, collected, transported, stored and disposed of in an environmentally sound manner.

2.3.2 The Rotterdam Convention

The Rotterdam Convention was opened for signatures on September 10, 1998 and came into force on February 24, 2004 after the 50th signature. Barbados is signatory to the Rotterdam Convention.

The Convention applies to banned or severely restricted chemicals and to several hazardous pesticides formulations, and aims to:

> *"Promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human*

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health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties."

Parties are additionally encouraged to establish and strengthen their national infrastructures and institutions for the effective implementation of the Convention by adopting or amending national legislative or administrative measures such as:

- The establishment of national registers and databases, including safety information for chemicals; and the encouragement of initiatives by industry to promote chemicals safety.

2.3.3 FAO International Code of Conduct on the Distribution and Use of Pesticides

The FAO International Code of Conduct on the Distribution and Use of Pesticides is a voluntary instrument adopted by the FAO in 1985 and revised in 2003. This document is currently under revision and a draft has been circulated to member countries for comment. The reference made here is to the 2003 document.

The objective of the Code is to establish voluntary standards of conduct for all public and private entities engaged in or associated with the distribution and use of pesticides, particularly where national legislation to regulate pesticides is absent or inadequate.

The Code takes a life-cycle approach to pesticide management, and addresses a myriad of issues including the reduction of health and environmental risks and the labelling, packaging, storage and disposal of pesticides. Of specific relevance to the Stockholm Convention and the execution of the national pesticides inventory are the recommendations made in Article 10 of the Code:

> **Article 10.5 –** Governments, with the help of the pesticide industry and with multilateral cooperation, should inventory obsolete or unusable stocks of pesticides and used containers, establish and implement an action plan for their disposal, or remediation in the case of contaminated sites, and record these activities.

Article 10.6 – The pesticide industry should be encouraged, with multilateral cooperation, to assist with the disposal of any banned or obsolete pesticides as well as used containers in an environmentally sound manner. Such initiatives should also promote reuse with minimal risk where approved and appropriate.

Article 10.7 – Governments, the pesticide industry, international organisations and the agricultural community are also encouraged to implement policies and practices to prevent the accumulation of obsolete pesticides and used containers.

2.4 Regulation of Pesticides in Barbados

The management of pesticides in Barbados is influenced by both national regulatory provisions and international chemicals management instruments (e.g. Basel Convention and FAO Code of Conduct). The key legislative instrument in place to govern pesticide management in Barbados is the Pesticide Control Act [1974] which provides for "the control of the importation, sale, storage, and use of pesticides" and empowers the Minister to make regulations in all areas of pesticides management. The Pesticides Control Act falls under the aegis of the Ministry of Agriculture, Food, Fisheries, and Water Resource Management and is administered by the Pesticides Control Board.

Regulations to accompany and implement the Act are:

- Pesticides Control (Approval of Pesticides) Regulations, 1974; and
- Pesticides Control (Labelling of Pesticides) Regulations, 1976.

The Act and its attendant regulations make provisions for restricting and prohibiting the use of particular pesticides or classes of pesticides, and mandating all other elements of pesticide management including record keeping, labelling and manufacture.

2.5 Importation and Production of Pesticides in Barbados

In 2011, approximately 1,630,237 kg of pesticide products was imported into Barbados. Several pesticide formulation plants operate in Barbados for local and external markets. However, due to the privacy clauses of the Statistics Act, Cap 192 [1984] of the Laws of Barbados, it is not possible to present data on the production and formulation of pesticides in Barbados. Table 2 shows the quantities of pesticide products imported into Barbados for the years 2004-2011.

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Table 2: Quantities of pesticide products imported into Barbados 2004-2011

Product	Amount of pesticide imported/kg							
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Anti-sprouting products	3,811	17,149	24	630			5	
Disinfectants, in retail packages	535,072	635,726	684,825	617,271	835,880	577,546	656,393	524,266
Fungicides	6,920	16,392	2,268	11,874	12,115	11,926	25,946	10,222
Herbicides	464,538	509,958	492,172	465,681	539,230	497,104	352,048	499,774
Household aerosol insecticides		71,682	49,569	164,883	684,763	168,083	150,217	80,131
Insecticides for agricultural use whether or not in retail packages	121,470	193,409	124,190	178,455	205,284	134,954	242,636	139,525
Mosquito coils	93,737	83,473	77,482	50,801	23,774	21,611	9,067	19,654
Disinfectants, not in retail package	104,759	100,577	116,560	113,988	102,523	86,654	97,067	108,137
Other insecticides in packages for retail sale	78,133	17,883	26,540	12,998	55,540	64,216	27,184	33,463
Other insecticides	54,430	67,040	37,452	47,163	40,229	25,585	48,488	33,040
Other rodenticides, not in retail packages	36,465	19,464	19,251	23,266	21,456	15,113	18,389	21,777
Plant growth regulators	17,735	37,788	21,996	14,250	18,763	24,033	27,662	33,532
Other pest killers, not in retail packs	17,001	17,985	75,298	76,999	91,095	99,310	180,950	115,763
Other pest killers, in retail packs	4,766	8,036	7,003	3,458	9,980	419	13,629	8,936
Rodenticides, in retail packages	10,171	23,819	14,209	26,521	18,428	16,893	5,206	2,017
Total	**1,549,008**	**1,820,381**	**1,748,839**	**1,808,238**	**2,659,060**	**1,743,447**	**1,854,887**	**1,630,237**

Source: (Barbados Statistical Service, pers. comm., 2012)

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3. METHODS

The *FAO Training Manual for Inventory Taking of Obsolete Pesticides (2010)* was the guidance document used to update the inventory. The Barbados National Pesticide Inventory Report (2003/2004) and the FAO Obsolete Pesticide Study Database (2010) were reviewed to identify previously recorded stockpiles of POPs pesticides.

To establish the current management of banned or obsolete pesticides in Barbados, the Pesticides Control Board and the Barbados Agricultural Management Company Limited (BAMC) were administered a questionnaire. The status and current condition of previously identified POPs pesticides stockpiled by the Ministry of Agriculture and its subsidiaries were determined through representatives from the Pesticides Control Board and the Plant Pathology Unit. Private entities were also contacted via telephone and email correspondence to determine the status and condition of their POPs pesticides stockpiles.

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4. FINDINGS

This section outlines the current management of banned or obsolete pesticides in Barbados; as well as presents the status and current condition of the previously identified stockpiles of POPs pesticides in the country as of December 2012.

4.1 Management of Banned or Obsolete Pesticides in Barbados

As of March 2012, the Pesticides Control Board has listed 30 pesticide products as banned in Barbados (see Table 3). Of these, only 8 of the 15 POPs pesticides have been banned: Aldrin; Chlordane; DDT; Dieldrin; Endosulfan; Endrin; Heptachlor; and Lindane. However, the BAMC reports that none of the 15 POPs pesticides are currently in use by its holdings (pers. comm., 2012).

Table 3: List of pesticides banned by the Pesticides Control Board

Trade Name	Common Name
Aldrin*	Aldrin
Alicarb	
Alichlor	
Arkotin D18*	DDT
Azodrin	Monocrotophos
Bidrin	Dicrotophos
BHC Dust	
Bromadiolone	Bromadiolone
Chlordane*	
Dieldrin*	Dieldrin
Endosulfan*	
Endrin*	Endrin
E.P.N.	Dichlorfenthion
Folidol M	Parathio-methyl
Furadan 4F	
Galecron	Choldimeform
Heptachlor*	Heptachlor
Mashall 25EC	Carbosulfan
Nemagon	Dibromochloropropane CBCP
Phosvel	Leptophos

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Trade Name	Common Name
Rentokil Lindane*	Lindane
Streptomycin 20WP	Streptomycin Sulphate
Tamaron	Methamidophos
Terracur	Fensulfothio
Vegatrol A-4T	2,2,5-T
Vydate L	Oxamyl
Weedar 2,4,5-T	
Weedone Bush Killer 64	
Weedone L V6	
Weedone 2,4,5-TP	

*POPs pesticides

Source: (Ministry of Agriculture, 2012)

Once pesticides have been classified as banned, the Chairman of the Pesticides Control Board sends a written letter to importers notifying them of the ban. Subsequent to this, the Customs and Excise Department is alerted to the ban; and at a later date the general public is informed through the media. Occasionally, Pesticide Inspectors distribute printed lists of the banned chemicals as they carry out their site visits. Additionally, a list of the banned pesticides is placed on the Ministry's website.

At present there is no written policy addressing the disposal of banned or obsolete pesticides in Barbados. Furthermore, the island is hindered in its capacity to address the challenges of chemical disposal by limited land space and high population density. Typically, persons and entities in possession of banned or obsolete pesticides keep them in storage until they receive an official notification of an opportunity for disposal by transportation overseas. The chemicals and related waste which are shipped abroad for processing at recycling and disposal facilities are handled in accordance with the Basel Convention. Alternately, some persons independently initiate the process of shipping their banned or obsolete chemicals oversees for disposal by seeking approval from the relevant agencies (i.e. Pesticides Control Board and Environmental Protection Department) (Pesticides Control Board, pers. comm., 2012).

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4.2 Barbados National Pesticides Inventory (2003/2004)

Barbados' National Pesticides Inventory aimed to identify, locate and quantify stockpiles of:

- The first nine (9) POPs pesticides;
- Persistent toxic substances;
- Severely hazardous pesticide formulations; and
- Obsolete pesticides.

Surveys and site visits were used to accomplish the data collection phase of the report, which included identification, quantification, assessment of status, management practices and storage conditions of the stockpiles. The inventory also sought to identify likely hotspots for environmental contamination and threats to human health arising from the presence of the stockpiles in question. At the time, only one stockpile of a POPs pesticide (endrin) was identified. Due to the absence of labels on most of the containers in that stockpile, the exact amount of the substance could not be quantified.

A review of the chemist list of the Barbados National Pesticides Inventory showed that there were stockpiles of endosulfan (179.33 L in total) and lindane (66 kg and 17.27 L in total), which were originally classified as persistent toxic substances but have since been reclassified as POPs. Table 4 shows the list of POPs pesticides identified.

Table 4: POPs Pesticides identified in the Barbados National Pesticides Inventory (2003/2004)

Organisation	Common Name	Type of Container	Condition of Container	Number of Containers	Quantity (kg)	Quantity (L)
Central Agronomic Research Station (CARS)	Endosulfan	Drum	Good			25
	Endosulfan	Jug	Poor	1		9.46
	Endosulfan	Jug	Good	1		9.46
Cotton Project	Endosulfan	Jugs	Good	11		104.09
Drax Hall Plantation	Endosulfan	Glass bottle	Good	1		3.78
Hunte's Nurseries	Endosulfan	Glass Bottle	Good	3		1.42
Indoor Plant Services	Endosulfan	Glass Bottle	Good	1		0.1
Rentokil Initial (Barbados) Ltd.	Lindane	Plastic buckets	Good	22	66	

Organisation	Common Name	Type of Container	Condition of Container	Number of Containers	Quantity (kg)	Quantity (L)
Soil Conservation Unit	Endosulfan	Plastic Bottle	Poor	1		9.46
	Lindane	Glass Bottle	Soiled	5		1.18
	Lindane	Glass Bottle	Soiled	2		0.95
	Lindane	Glass Bottle	Good	8		15.14
Spencers Plantation	Endrin	Metal Cans	Reasonable	1		22
The Mount Plantation	Endosulfan	Jug	Good	1		9.46
Mount Pleasant (formally known as Vineyard)	Endosulfan	Jug	Good	1		7.1

The inventory report revealed a number of weaknesses characteristic of Barbadian pesticide stock management systems, and recommended that:

- The Pesticides Control Board should take measures to formally ban the importation and use of all POPs pesticides in Barbados; and
- Further investigation of defunct farms and estates on the island should be undertaken to identify any additional stockpiles of POPs pesticides.

4.3 FAO Obsolete Pesticides Study (2010)

In 2010, the Ministry of Agriculture, along with the Environmental Protection Department, and under the guidance of the FAO, compiled a database of pesticides in Barbados. This undertaking was a requirement of the FAO Project on Obsolete Pesticides Inventories around the world.

From the approximately 90 sites visited for the project, it was determined that:

- Generally, many of the sites surveyed did not have obsolete pesticides;
- Obsolete pesticides and banned chemicals were recorded at most of the plantations visited; and
- Limited stocks of pesticides were kept in storage at the sites visited.

Table 5 below shows the POPs pesticides identified in the study.

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Table 5: POPs Pesticides identified in the FAO Obsolete Pesticides Study (2010)

Organisation	Common Name	Condition of Product	Container type	Container Size	Amount in Container	Container Condition	Number of Containers
Drax Hall (Storage 1)	Endosulfan	Expired	Glass Bottle	1 gallon (US)	Not Available	Undamaged	1
Soil Conservation Unit	Lindane	Expired	Glass Bottle	0.5 gallon	0.75	Undamaged	7
	Endosulfan	Expired	Plastic Bottle	Not Available	Not Available	Undamaged	

4.4 Current Status of POPs Pesticides as Identified by the Inventories

4.4.1 POPs Pesticides Stockpiled by the Ministry of Agriculture

In 2011, the Ministry of Agriculture undertook a project to dispose of the Ministry's pesticide stockpiles – inclusive of those classified as POPs pesticides. The approximately 30 containers of pesticides which were identified in 2004 and 2010 and that were held by the Central Agronomic Research Station, Cotton Project, and Soil Conservation Unit were repackaged by the firm Clean Harbours and stored in a 50 gallon drum. The container in which the drum is stored is located at the Ministry's compound (Plant Pathology Unit, pers. comm., 2012). Transportation overseas is expected to occur within a year; that is, between December 2012 to December 2013 (Environmental Protection Department, pers. comm., 2012).

4.4.2 POPs Pesticides Stockpiled by Private Entities

Table 6 outlines the status of POPs pesticide stockpiles held by private entities.

Table 6: Status of POPs pesticides stockpiles held by private entities as of December 2012

Organisation	Status as of December 2012
Drax Hall Plantation	The one bottle of endosulfan should still be on site. The chemical has not been used in recent times.
Hunte's Nurseries	The owner stated he was advised by a governmental agency (unsure which) to place the three bottles of endolsunfan in a bag and dispose of them in the landfill.
Indoor Plant Services	The business has changed location (was previously at Francia Plantation) – and no longer possesses the bottle of endosulfan.
Rentokil Initial (Barbados) Ltd.	The company made the decision to discontinue the use of lindane about 7 years ago. In 2011, the stockpile of twenty-two plastic buckets of lindane was transported to a disposal

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	facility in Canada.
Spencers Plantation	The metal can of endrin has not been removed from the site.
The Mount Plantation	The jug of endosulfan was used up on onions.
Mount Pleasant (formally known as Vineyard)	The jug of endosulfan is no longer on site; it was likely used.

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5. DISCUSSION

The 2003/2004 POPs pesticides inventory revealed that the largest quantities of POPs pesticides stockpiles were held by the Ministry of Agriculture. To date, the approximately 157.47 L of endosulfan and 17.27 L of lindane that were collectively held by the Central Agronomics Research Station, Cotton Project, and Soil Conservation Unit have been repackaged, stored and is currently awaiting shipment overseas for disposal in accordance to HAZMAT standards and the Basel Convention. Similarly, the 22 containers of lindane which were held by Rentokil Initial (Barbados) Ltd. were transported to Canada for disposal.

In the absence of a policy and local facility for the disposal of banned or obsolete pesticides, an ad hoc approach to discarding these hazardous chemicals appears to have been adopted by private entities. There also seems to be poor record keeping and a lack of accountability for the type and quantity of pesticides entities possess. These points are especially apparent in the cases of Hunte's Nurseries where the owner disposed of approximately 1.42 L of endosulfan in the public landfill; and Indoor Plant Services and Mount Pleasant where the containers of endosulfan are no longer in their possession due to changes in location or the probability that it was used.

It could also be deduced that the lack of policy and ineffectual public awareness strategies on the status of banned or obsolete pesticides may have contributed to the continued use of these substances. For instance, despite the fact that endolsulfan was banned in Barbados since 1998 (Environmental Protection Department, 2003/2004), the Mount Plantation reported that they used up their remaining stockpile on onions.

The bottle of endosulfan at Drax Hall Plantation is likely to still be on site – the 2010 FAO study indicated that it was still present at that time. Also, since the bottle of endrin was discovered at Spencers Plantation 8 years ago, no definitive steps have been taken to have the substance removed from the site and properly disposed. This indicates a need for greater commitment and adherence to the FAO Code of Conduct which encourages Government and stakeholders in the pesticide industry to collaborate on the safe disposal of banned or obsolete pesticides and used containers.

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6. CONCLUSION

To date, only 8 of the 15 POPs pesticides have been banned in Barbados. The study revealed that actions have been taken to safely dispose of the majority of the POPs pesticides stockpiles that were identified in the Barbados National Pesticides Inventory Report (2003/2004) and FAO Obsolete Pesticide Study (2010). However, in the absence of a national policy for the management and disposal of banned or obsolete pesticides, ad hoc and potentially harmful disposal practices have been identified. In some instances, there appears to be a lackadaisical attitude towards the removal of harmful stockpiles. Two stockpiles of POPs pesticides (at Drax Hall Plantation and Spencers Plantation) are still present; and there is no indication that steps will be taken for their disposal in the near future. Reforms to the management of banned or obsolete pesticides in Barbados are therefore required to ensure the protection of human health and the environment.

7. RECOMMENDATIONS

Based on the findings of the study, the following actions are recommended:

1. The Pesticides Control Board should formally ban all fifteen (15) POPs pesticides. Steps should be taken to ensure all stakeholders are notified of the ban.
2. The Pesticides Control Board and the Environmental Protection Department should collaborate to increase public awareness on POPs pesticides and their implications for human health and the environment.
3. In the absence of a national policy on the management and disposal of banned or obsolete pesticides, more stringent adherence to the FAO Code of Conduct should be practiced by regulatory bodies and stakeholders in the pesticide industry. Stakeholders can be made more aware of proper disposal procedures through campaigns and workshops.
4. Improved record keeping by importers, regulatory agencies and buyers of the type, quantity, and use of pesticides should be enforced by the Pesticides Control Boards. Pesticide Officers should conduct routine checks of properties to ensure that proper labelling and storage of pesticides are practiced. They should also report on the presence of any banned or obsolete substances; and initiate the disposal process.
5. There should be greater collaboration between regulatory agencies and private entities to have banned or obsolete stockpiles of pesticides disposed of in an environmentally sound and timely manner.

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8. REFERENCES

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