

# Pesticide Residues Analyses experiences and achievements in MALI (West Africa)

---

**Dr. DEM Safiatou BERTHE**  
**Environmental Toxicology and Quality Control Laboratory**  
**CVL, Bamako Mali**  
[berthesafiatou@yahoo.com](mailto:berthesafiatou@yahoo.com)  
**2008 TPSA Conference**  
**Asheville, North Carolina**



# ABSTRACT

---

- **One of the quality assurance missions of the Central Veterinary Laboratory is to provide analytical services to ensure food quality and public health, and to provide environmental monitoring of soil and water. The ETQCL based in Mali (West Africa) was created in 1998 as a public entity to analyse pesticide residue in soils, water, food commodities. The laboratory play and important role in the food security scheme of the country and the ETQCL is the leading laboratory in Mali for routine pesticide residue analyses of food commodities and environmental samples to ensure the safety of public health.**



# ABSTRACT

---

- **The laboratory collaborates with other international institutions. Numerous studies have been realized in the laboratory. Recently a study was undertaken to analyse soil and water samples from contaminated areas. The laboratory hosted in August 2007 a workshop on a new method called QuEChERS which provided technical training to West African Chemists. The ETQCL is currently engaged in the ISO 17025 accreditation process.**



# CENTRAL VETERINARY LABORATORY

---

- **Established in 1979**
- **Public Missions**
- **Environmental Toxicology and Quality Control Laboratory created in 1998**



# MISSIONS/ ASSIGNMENTS OF CVL

---

- **to contribute to the prevention and eradication of animal diseases through diagnostic and research activities**
- **to insure as far as public health is concerned, the screening of animal diseases transmissible to man, as well as the quality control of food, water and beverages**



## **MISSIONS/ ASSIGNMENTS OF CVL**

---

- **to insure the production of vaccines and sanitary protection of livestock against infectious diseases and**
- **to participate in the technical training and continuous education of technicians in the field of laboratory techniques**



# HOW DID ETQCL START?

---

- **Conception of ETQCL dates back to 1994**
- **CVL was mandated by the government to expand its diagnostic and research activities to physicochemical quality control of foodstuffs, water and pesticides**
- **From this mandate, the development of ETQCL began**
  - **-by first assessing and defining laboratory objectives**
  - **- by implementing an action plan**



# SOURCES OF FUNDING

---

- **Malian Government: salaries, electricity, reagents**
- **USAID through projects (Apex, Virginia Tech, West African IPM CRSP): facility, equipment and personnel training**
- **PIP (Pesticides Initiative Program): accreditation**
- **West African Monetary Union Quality Program : implementation of quality assurance program in the laboratory**
- **IAEA Technical Cooperation project: analysis of pesticide residues in fresh products**



# FACILITY

---

**1998-2005**



○ **2005-2008**





# COLLABORATION WITH

---

- **Virginia Tech Pesticide Residue Laboratory (strengthening of analytical capacities)**
- **Official Analytical and Chemical Researches Laboratory, Casablanca, Morocco (Training)**
- **Polytechnic School of Zurich, Swiss Tropical Institute (Healthy Milk Project for the Sahel)**
- **Agronomic Research Center of Gembloux, Belgium (Training, accreditation)**



# COLLABORATION WITH

---

- **International Agency for energy atomic (Training, project)**
- **National Agency for food safety, ANSSA (Studies)**
- **National Direction of the Veterinary Services (samples analyses)**
- **Institut d'Economie Rurale (Research projects)**



# AREAS OF ACTIVITY

---

- **Pesticide residues analyses in water, soil, food commodities**
- **Antibiotics residues analyses in milk**
- **Air sampling and analysis for persistent organic pollutants**



# METHODS USED

---

- **DFG : water, soil, plant and animal tissues**
- **AOAC : animal tissues**
- **QuECHERS : fruits and vegetables**
- **ISO 10382:2002 (modified AFNOR X31 C.): soil**

# ROLE OF ETQCL IN THE FOOD SAFETY SCHEME OF MALI

---

Participation at studies initiated by ANSSA (i.e):

- Dried and smoked fish in 2006
- Dried cereals in 2006

Sample Type	Pesticides	Comments
Fish	Lindane DDT	No MRL set by Codex
Cereals	Chlorpyrifos Deltamethrin Malathion	All < MRLs

MRL = Maximum Residue Level

# ROLE OF ETQCL IN THE FOOD SAFETY SCHEME OF MALI

---

- **Fruits and vegetables exportations**



# ROLE OF ETQCL IN THE FOOD SAFETY SCHEME OF MALI

---

- **National Direction of the Veterinary Services:**
  - **Suspicious poisoning of animals**

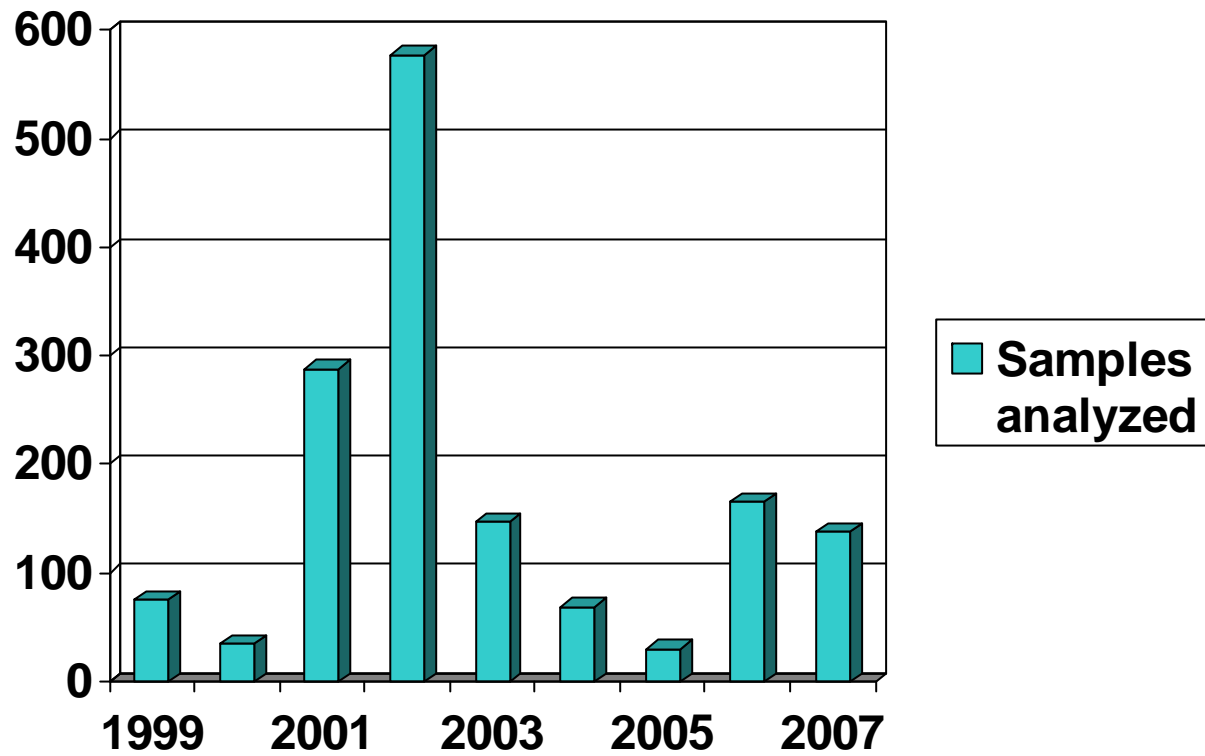


- **Camels in Kidal, Mali**



# SAMPLES ANALYZED SINCE 1999

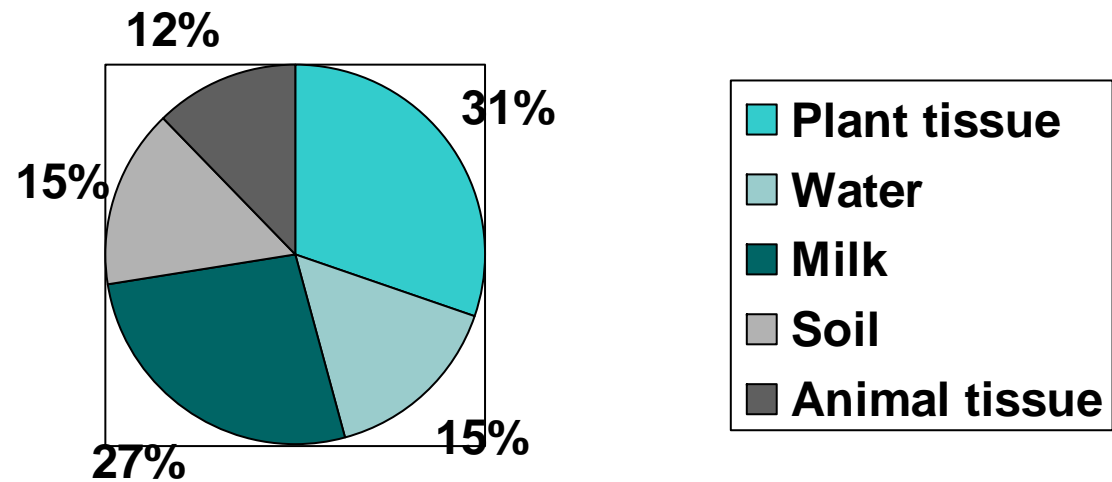
---



# TYPES OF SAMPLES ANALYZED

---

## Types of samples analyzed





# **COST OF ANALYSIS**

---

<b>Sample Type</b>	<b>Cost of analysis (one pesticide)</b>	<b>Cost of analysis (class of pesticide)</b>
<b>Plant tissue</b>	<b>74 USD</b>	<b>100 USD</b>
<b>Animal Tissue</b>	<b>70 USD</b>	<b>100 USD</b>
<b>Soils and sediments</b>	<b>70 USD</b>	<b>100 USD</b>
<b>Liquid and Water</b>	<b>70 USD</b>	<b>100 USD</b>
<b>Textile fibers</b>	<b>76 USD</b>	<b>100 USD</b>



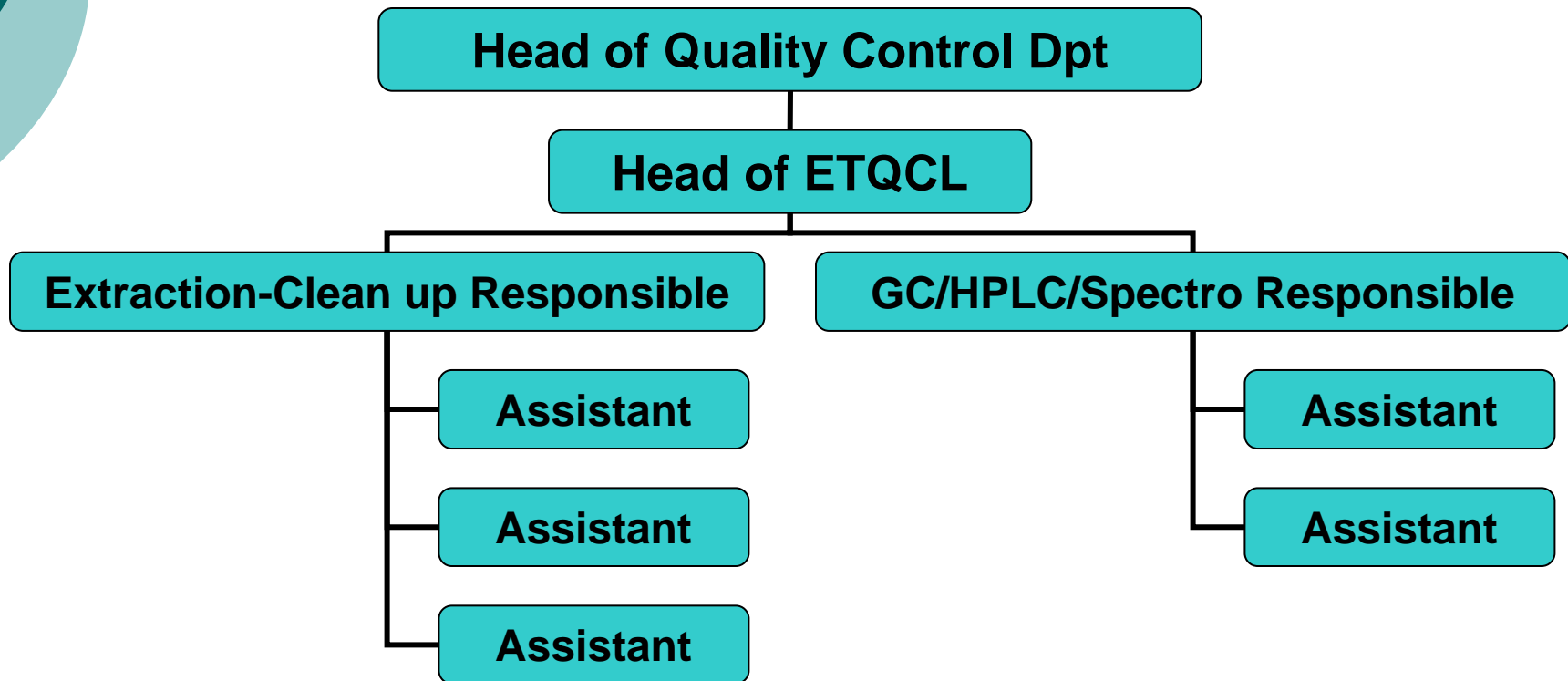
# ETQCL HUMAN RESOURCES

---

- **1 Specialist in Environmental Sciences**
- **1 Specialist in Environmental Chemistry**
- **3 Chemists technicians**
- **1 Engineer in biochemistry**
- **1 Veterinarian**
- **2 Veterinarian Technicians**

# Organization chart

---



# AVAILABLE EQUIPMENT

---

- 1 Gas chromatograph ( $\mu$ ECD, NPD) w/ autosampler
- 1 Gas chromatograph (FPD, FID)
- 1 HPLC (UV-Visible, Fluorescent)
- 1 spectrophotometer
- 1 Nitrogen/Air generator and 1 Hydrogen generator
- 2 Freezers, 3 refrigerators
- 3 analytical balances
- 3 rotary evaporators
- 1 Hood
- 1 water distiller





## **DIFFICULTIES ENCOUNTERED**

---

- **Nearest Hewlett Packard (Agilent) maintenance company in Morocco and Egypt**
- **Metrology – no calibration services available**
- **Orders of reagents and analytical standards take time before final delivery**
- **Cost of Gases very expensive (about 500 US dollars for Nitrogen versus 30 dollars in the US)**



# ACHIEVEMENTS

---

- **Pesticide residues analysis in soil and water**
- **Analysis of pesticides in fruits and vegetables:  
Support to mango and Green Beans exporters**
- **Studies on pesticide residues in fish and cereals**
- **Monitoring of some Persistent Organic Pollutants in soil and water following storage contamination**
- **Recently, air sampling to provide baseline data on POPs in three areas (desert, urban and agricultural)**

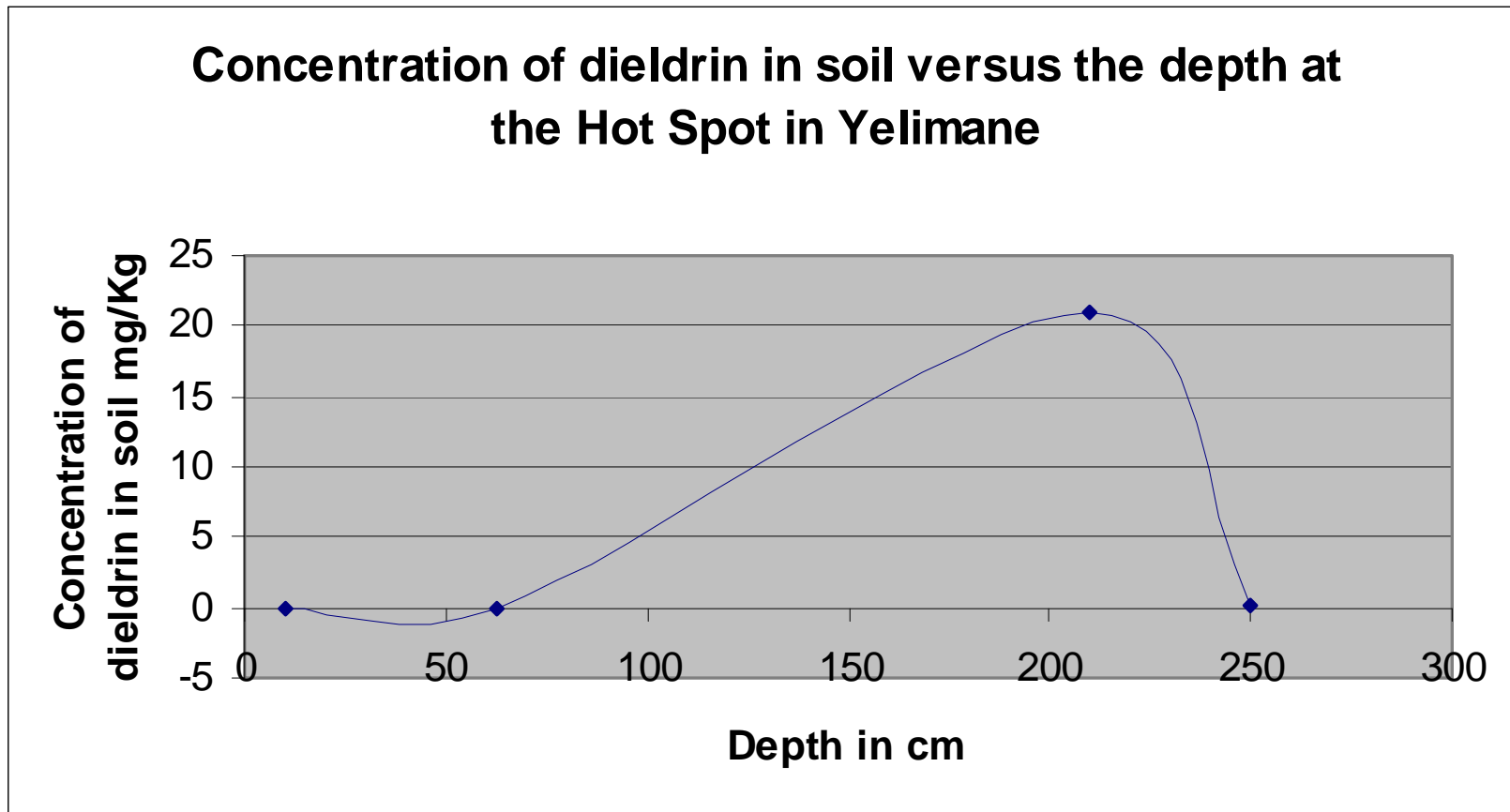


# POPs MONITORING IN MALI

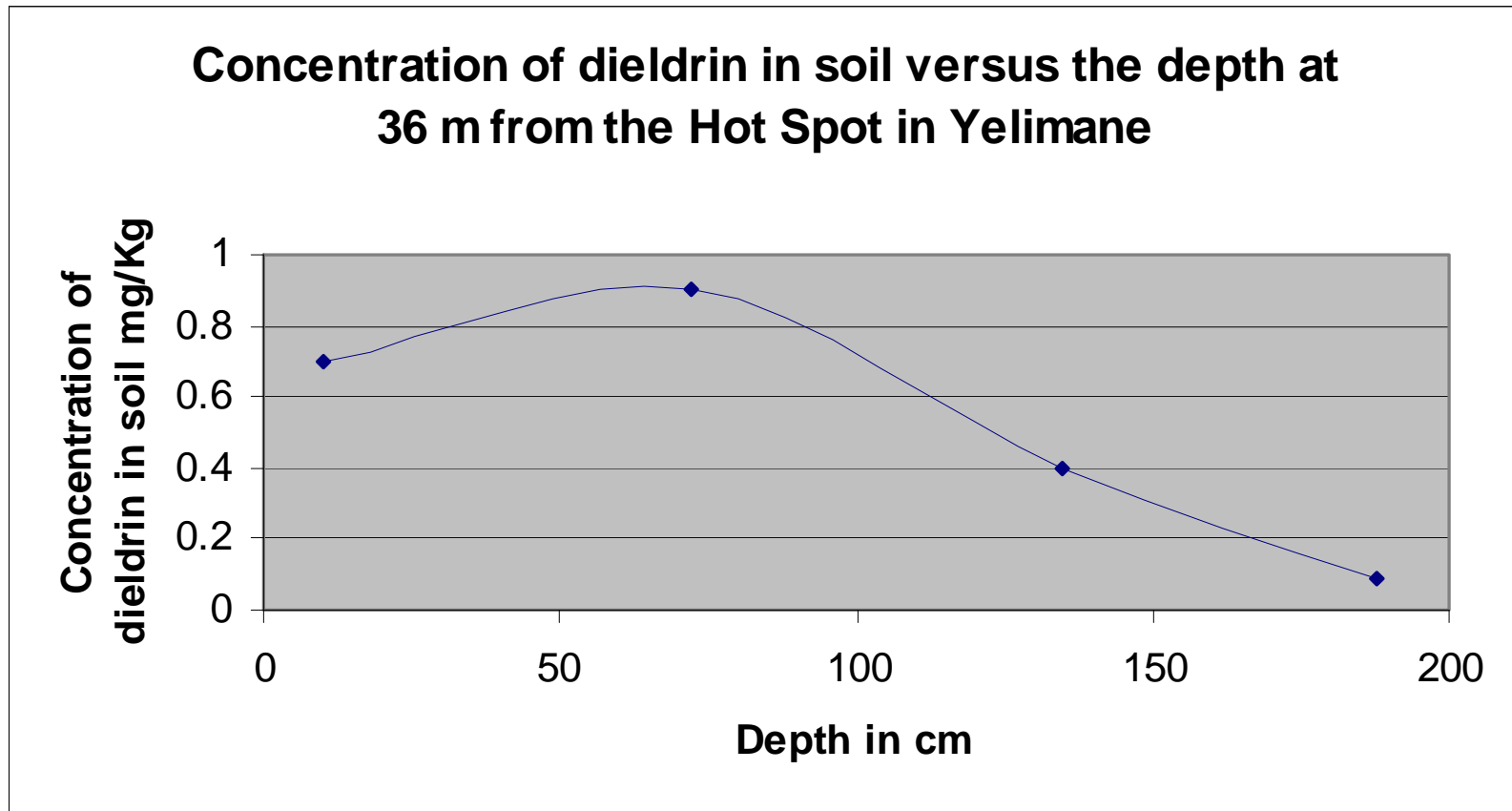
- 428.000 liters of dieldrin were eliminated by TREDI.SA
- FAO project to monitor soils and water



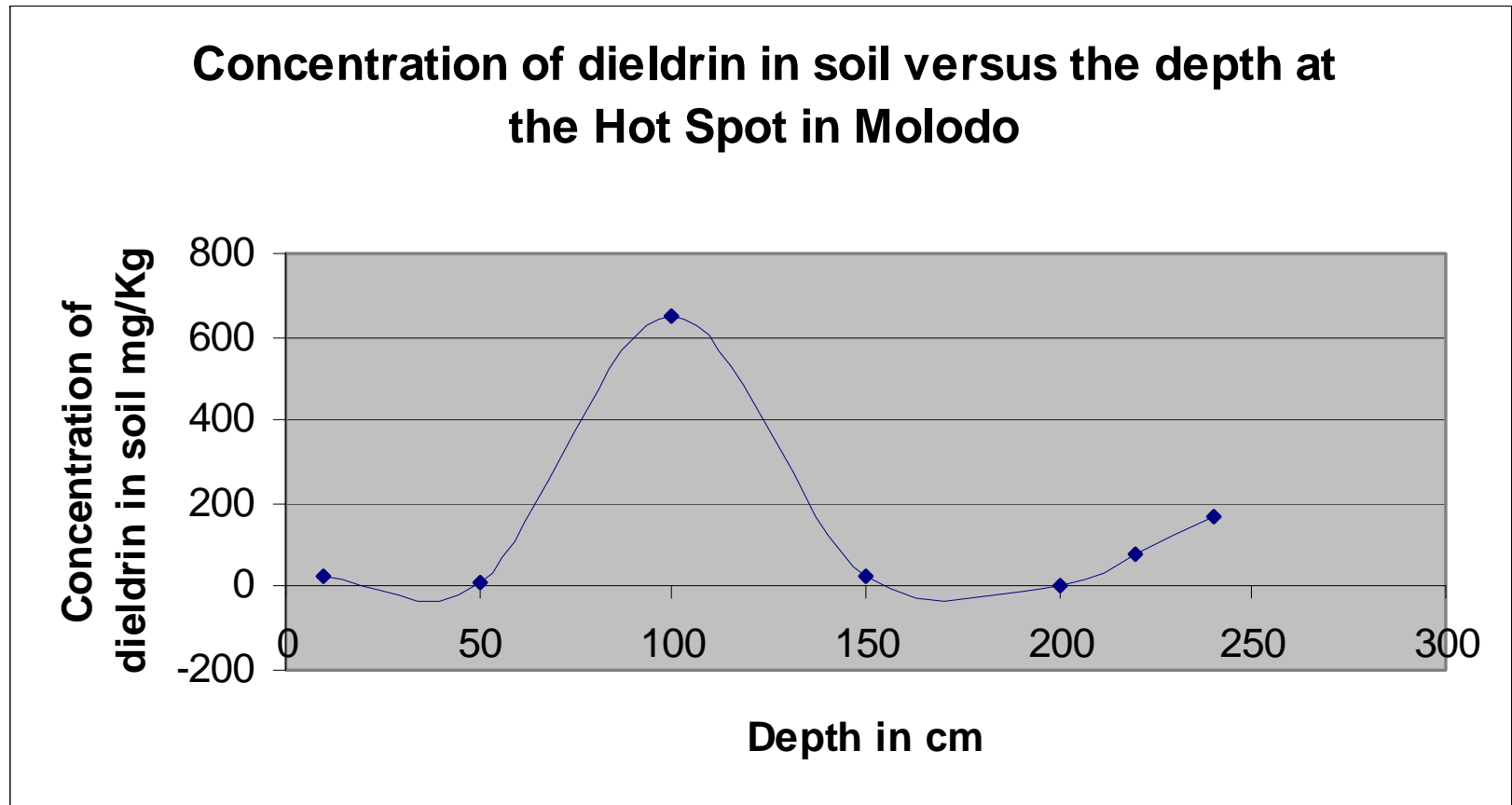
# CONCENTRATION OF DIELDRIN IN SOIL VERSUS THE DEPTH AT THE HOT SPOT IN YELIMANÉ



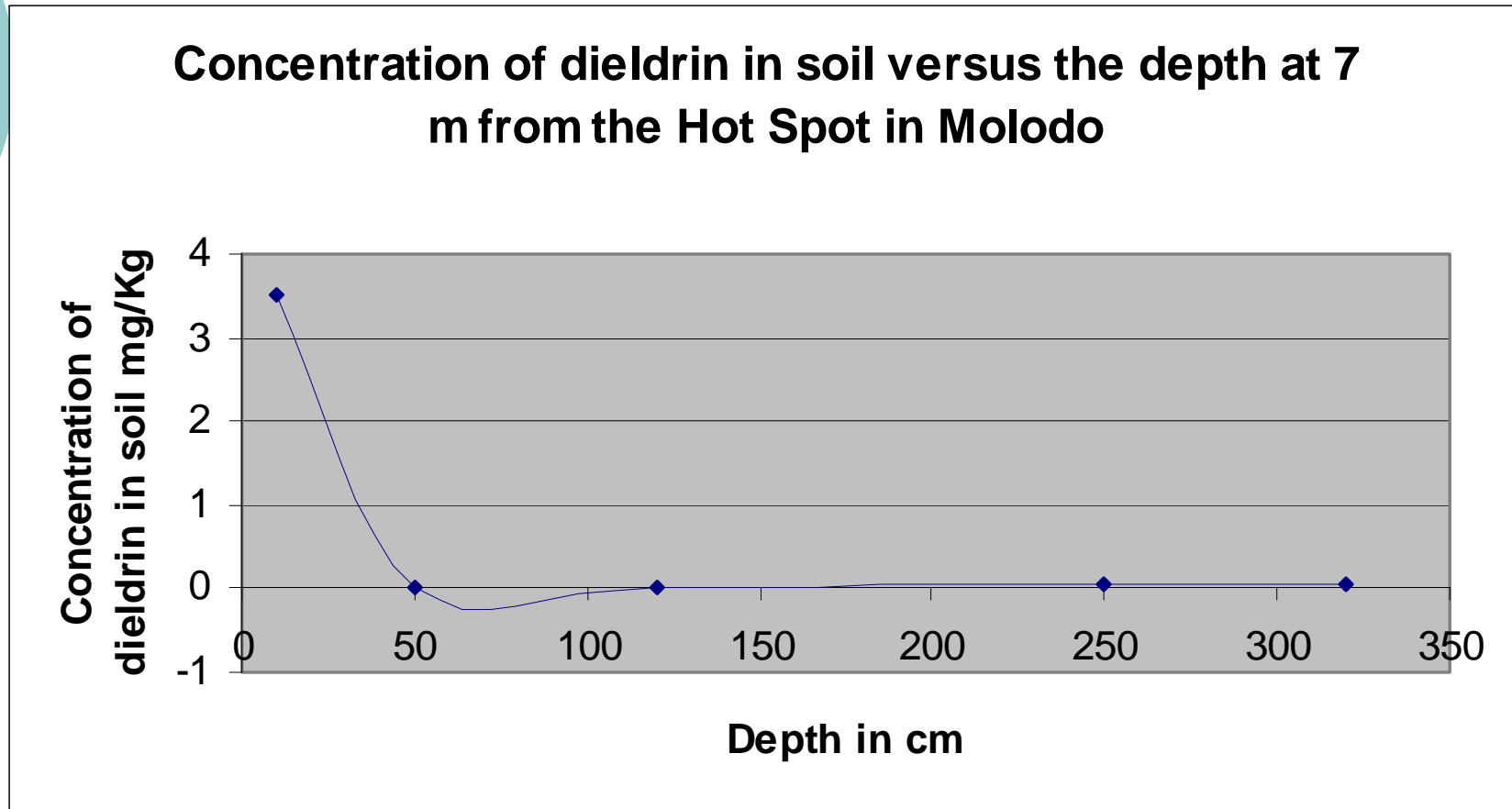
# CONCENTRATION OF DIELDRIN IN SOIL VERSUS THE DEPTH AT 36 M FROM THE HOT SPOT



# CONCENTRATION OF DIELDRIN IN SOIL VERSUS THE DEPTH AT THE HOT SPOT IN MOLODO



# CONCENTRATION OF DIELDRIN IN SOIL VERSUS THE DEPTH AT 7 M FROM THE HOT SPOT IN MOLODO





# SUMMARY

---

- **As expected:**
  - Higher concentrations in dieldrin at Hot Spot than at 7 meters or 36 meters from the hot spot
- **Releases of dieldrin in soil come from the improper storage of old stock**



# RESEARCH CURRENTLY UNDERWAY

---

- **Validation of a new method in green beans**
- **Pesticide residues analysis in plants, soil, water from cotton growing areas**
- **Persistent Organic Pollutants monitoring in air, and soon in human milk, in collaboration with the United Nations Environment Programme**



## **UPCOMING WORK**

---

- **Air, blood and human milk monitoring**
- **Study on PCB and Dioxines**
- **ISO 17025 Accreditation underway (formal recognition of a competence)**
- **Participation at inter-laboratory studies in West Africa in 2008**





- Thank you for your attention