

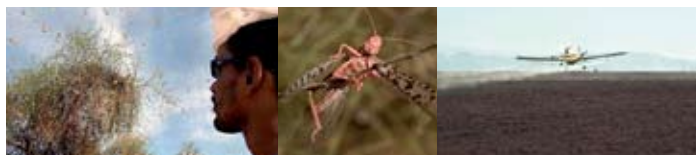


An African approach for Risk Reduction of Soil Contaminated by Obsolete Pesticides

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Problem

Large amounts of pesticides have been shipped to Africa for locust control from the fifties of last century, but did not arrive on the proper place or proper moment thereby be coming obsolete. Stockpiles of these pesticides have created a serious problem and The Africa Stockpiles Programme (ASP), launched by FAO, is designed to rid Africa of stockpiles and to dispose them in an environmentally sound manner.



From problem to solution

- Complete clean-up of contaminated soil is difficult
 - Northern technology is not locally available
 - Northern technology is expensive
 - Logistics are a problem (transfer of equipment or transfer of large amounts of polluted soil)
- Risk reduction?
- **Is there a local African way to solve the problem?**

The way to the solution

Investigate (July, 2007) the possibilities to reduce the risks of the contaminated sites using:

- Biodegradation of pesticides
- Local possibilities for stimulation of biodegradation
- Local possibilities for isolation of pollution

Make a plan for sustainable management of the sites (Discussed May, 2008)

Start implementation (July, 2008)



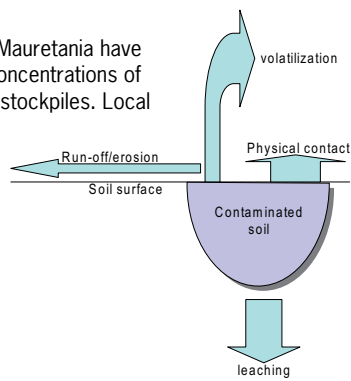
Old vessels on the depot near Niogoméra (Mali) An old depot in Nouakchott (Mauretania)

Site investigation

Three sites in Mali and three sites in Mauretania have been visited and investigated. High concentrations of pesticides were found in soils on the stockpiles. Local Risks were identified.



Sampling



Risks to be considered

Soil sampling in Molodo (Mali)

Measured concentration of pesticides in soil samples from Molodo (all concentration in mg/kg)

	Center							Distance	
	10	50	100	150	200	220	240	7 m	21 m
Depth in cm	10	50	100	150	200	220	240	10	10
smell	HS	HS	HS	HS	HS	HS	HS	NS	NS
dieldrin	26	12.5	651	25	1300	76	171	3.5	24
cyhalothrin				0.2	1.3				1.3
fenitrothion	33				6.7	0.4	0.1		
parathion ethyl	76,000	3,900	2,300	266	5,900	375	920		
parathion methyl					5.1	0.5	1.2		
phenthoate					5	0.4	0.1		
fenvalerate	19						0.1		

No Value means below detection limit

HS= high smell

NS= no smell

- Vegetated and biological active zones were present.
- The amount of precipitation is limited, From 20-200 mm/year in Nouakshott to 250-600 mm/year in Molodo.
- Transport of contaminants by surface run-off caused by heavy rains (Mali)
- In Mauretania polluted soils can be transported by wind.
- In Mauretania formation of sand dunes covers the pollution

Remediation strategy

The following strategy has been followed.

1. Removal of the contamination by biological treatment using landfarming
2. Evaporation of the precipitation using vegetation to prevent leaching
3. Isolation of the contamination by using natural covers (e.g. sand dunes)
4. Increasing adsorption capacity of soil by local available charcoal.

Implementation

Started in Molodo in June 2008, followed by Sévaré.

Activities Molodo:

- Remove source
- Stimulate biodegradation (parathion) in a landfarm
- Use surface soil for inoculation of the landfarm
- Use local depots.
- Immobilize Dieldrin



Vegetation as fence and to evaporate water.

Biodegradation on the landfarm (Molodo)

	July 16, 2008 (g/kg d.m.)		November 11, 2008 (g/kg d.m.)	
	Parathion-ethyl	Dieldrin	Parathion-ethyl	Dieldrin
1	0.53	0.79	0.0095	0.44
2	1.50	0.52	0.021	0.74
3	1.62	0.87	0.011	2.78
4	3.08	1.08	0.01	0.78
5	0.87	0.46	< 0.003	0.12
Average	1.52	0.74	0.011	0.97

Conclusions

A lot of sites in Africa are polluted with obsolete pesticides, sent to Africa for locust control. In pilots in Mali and Mauretania, remediation strategies are developed that reduce risks and can be used under difficult African conditions. The remediation strategies are based on application of bioremediation using landfarming and isolation of the center of contamination. Implementation has been started in 2008 and was successful.



Charcoal addition to prevent leaching of Dieldrin.