

PESTICIDE USE IN IRRIGATED CROPS AND ITS
EFFECT ON HUMAN AND ANIMALS HEALTH AND
ENVIRONMENT

Background

- Pest problems is more pronounced in agricultural ecosystem where the natural balance of host and pests is interfered much.
- Intensification of modern agriculture made pest problem more complex. Large acreage of mono cropping system required specialized crop protection system and heavy dependence in agricultural chemicals especially pesticides.
- The use of pesticides has brought new problems such as hazard to human, animals and the environment. This has created concerns on the environment by the general public.

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- In Ethiopia obsolete pesticides accumulation caused problems and is being cleared.
- There is a need for the research and development of pest management system that comprises the available control methods.

Pesticides for agricultural use

The pesticide classes most frequently responsible for acute toxicity are

1. Organophosphates

- Most diagnosed cases of poisonings are caused by organophosphates

Eg. Deldrin , LD₅₀ 10 mg kg body weight

Endosulphan LD₅₀ 80 mg kg body weight

2. Carbamates

- Vary widely in their acute toxicity such as Aldicarb (LD50 0.9 mg kg body weight to less toxic products such as Carbaryl LD50 300 mg kg body weight)

continued

3. Pyrethrum and Pyrethroids

- Pyrethrum and Pyrethroids are insecticides that are often classified as Bio pesticides
- Pyrethrum is a natural product derived from certain species of chrysanthemum. As a pure substance it breaks down very rapidly in the environment and in living organisms. The unpurified raw extracts have a low acute oral toxicity.
- Pyrethroids are synthetic descendants of pyrethrum. The products commonly used today are pyrethrin, deltamethrin etc. These products have generally low acute oral toxicity.

Environmental hazard associated with pesticides use

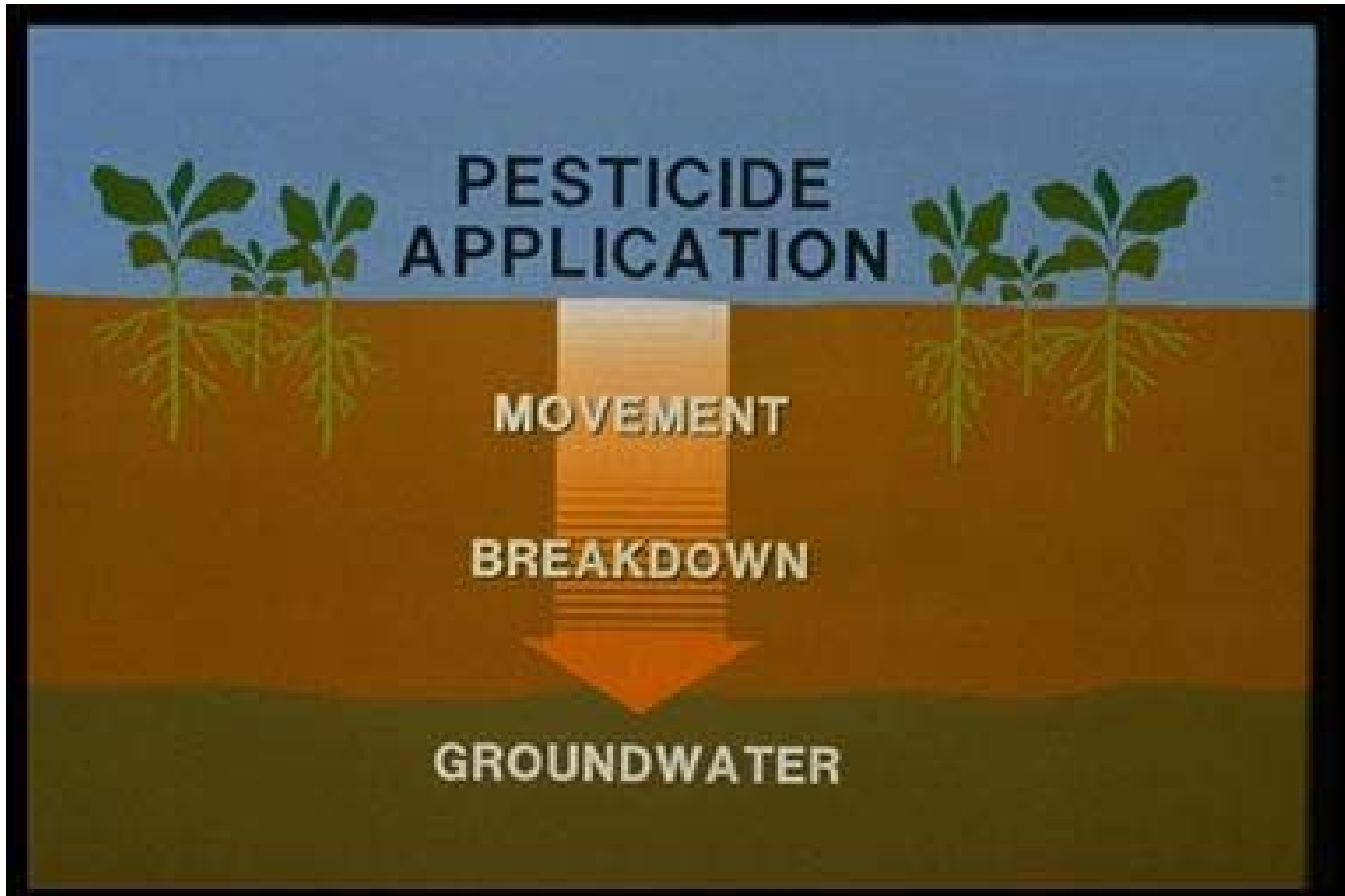
1. Pesticide poisoning

- Population groups at risk are pesticide workers mixing or applying pesticides and children and others ingesting pesticides accidentally.

2. Pesticide residue in the soil

- Pesticides residue in the soil may concentrate in the bodies of arthropods and other soil invertebrates. From these, they may be transported into the bodies of higher organisms through the food chain.
- eg. DDT at a level of 9.9 ppm in the soil reached 144 ppm in earth worms 444 ppm in the brain of rabbits. Such high level of DDT proved toxic to some birds.

3. Water contamination



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- Pesticides reach water either by **direct application** for controlling water-inhabiting pests or through **surface run-off**, industrial waste **discharges**, **sewage effluents**, **accidental spillage**, etc.
- Pesticide contamination of water can be hazardous both directly and indirectly to human beings and animals that live in water. The greatest damage owes to **bio concentration or bio magnification** of persistent pesticides such as organochlorine insecticides.

4. Pesticide contamination of air

- Takes place by drift and volatilization from soil or water.
- Contamination of air may prove hazardous to persons engaged in the pesticide application. In general, contamination of pesticides in air being quite small is unlikely to be harmful to the general public.

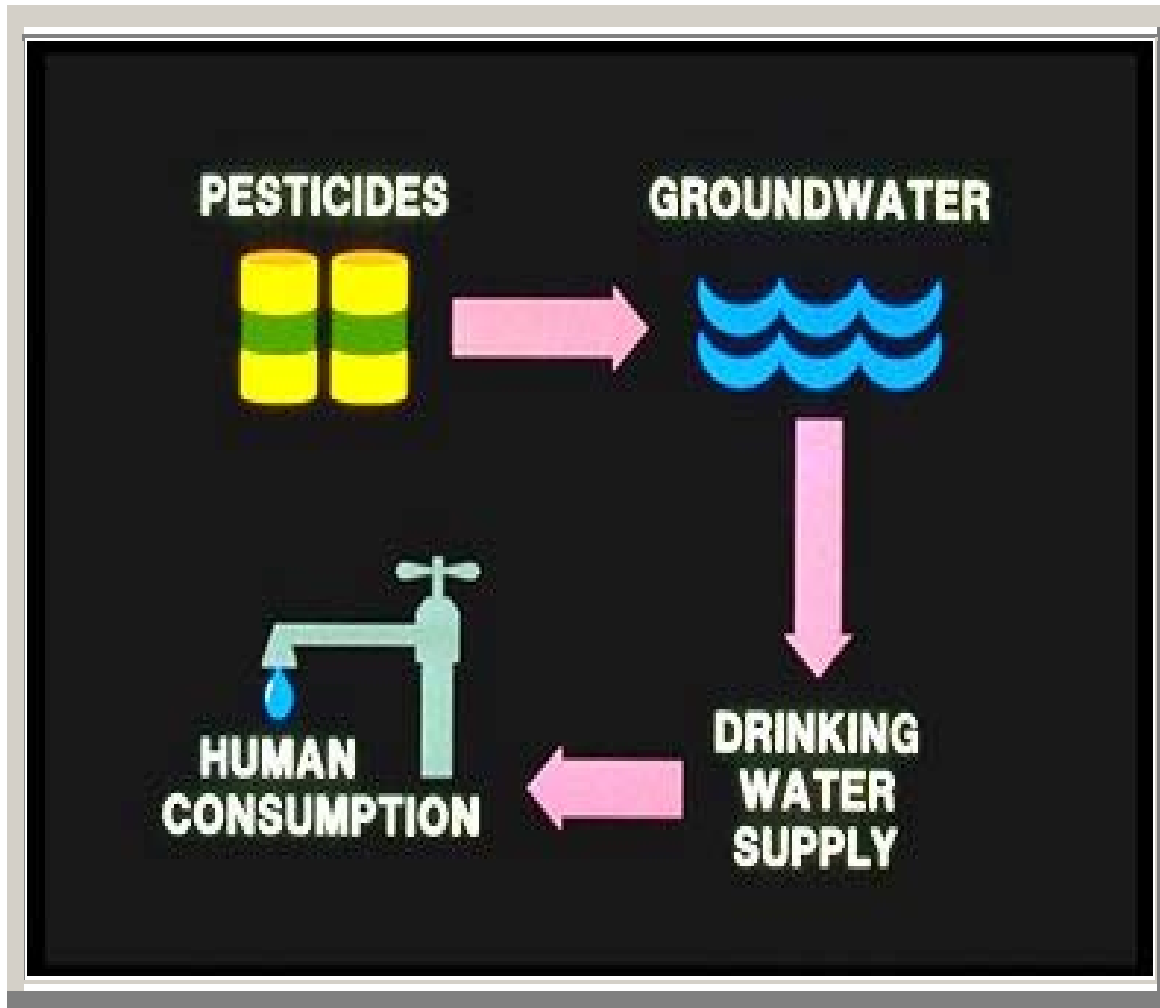
4.0 RESIDUE IN FOOD

- The residues, which build up in food owing to the application of pesticides to crops and the feeding of animals in contaminated food are great concern to the public.
- Pesticide residues in agricultural products may also have a detrimental effect on export crops.
- If pesticide residue is above the maximum acceptable level set by codex committee, the product is rejected

HAZARD OF PESTICIDE TO HUMAN AND ANIMALS

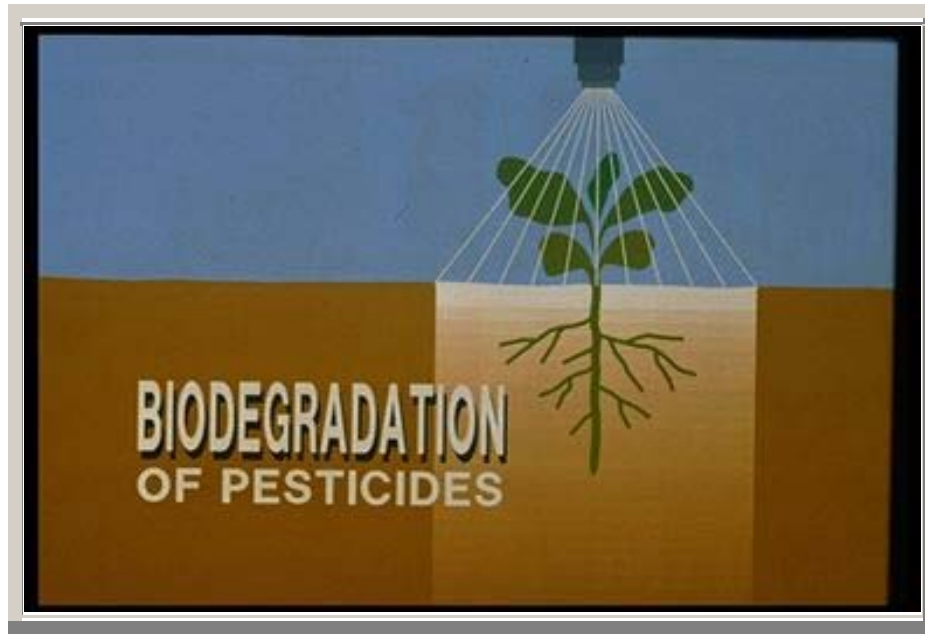
- Special notice must be paid to organochlorines , owing to their high **persistence and lipophilicity** accumulation along the **food chain**. The process of accumulation may start, for example, with smallest living organisms in water. These are consumed by fish, which in turn are eaten by raptors or by people.
- Another path of accumulation leads through contaminated **fodder via livestock** to humans.

PATH OF PESTICIDES ACCUMULATION

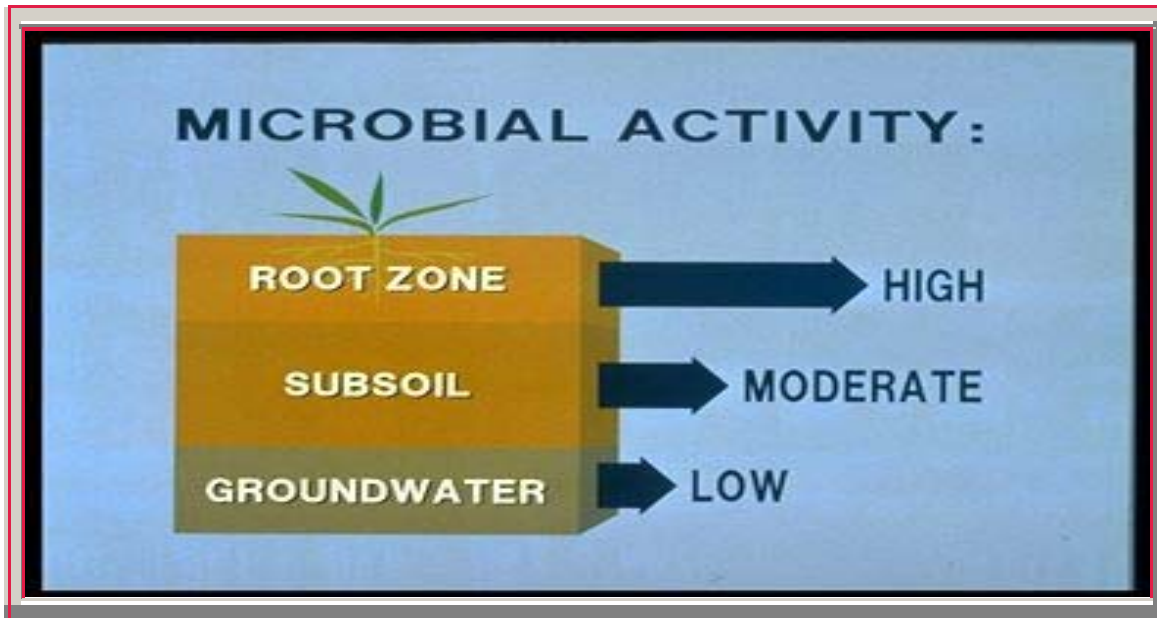


TO KEEP PESTICIDES OUT OF GROUNDWATER

1. Avoid pesticides that leach
2. Limit amount used
3. Follow label
4. Avoid spilling
5. Dispose properly
6. Use less persistent pesticides
7. Delay irrigation after pesticide use
8. Avoid over flooding during irrigation
9. Target spray area



For pesticides which enter soil, a key process is the pesticide's [degradation](#). Pesticides are degraded by sunlight, microorganisms in the soil, and chemical and physical processes. Breakdown is faster at warmer temperatures. The longer the compound persists before its degradation, the longer it is subject to the forces of leaching.



Degradation does not occur uniformly throughout the soil. For example, the vast majority of microbes live in the upper soil. If a chemical leaches or is introduced below the root zone, it will encounter far fewer microbes by whose actions it may be degraded. Also, temperatures are lower deeper in the soil. Therefore, if a pesticide moves below the root zone, it is a candidate leacher.

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Over irrigation should be avoided. Using the proper amount of irrigation and avoiding irrigation runoff will reduce soil erosion and pesticide entry into surface and groundwater



Delay irrigation after pesticide applications. Because pesticides frequently move with water down through the soil, it is better to delay irrigation for few days after applying a pesticide. This can reduce the chances of the pesticide reaching the groundwater.

Use IPM Techniques



There are non-chemical means of controlling pests as illustrated by this trap. Integrated Pest Management uses strategies such as economic thresholds and pest monitoring to determine timing for pesticide applications.

Summary of Pesticide use in Ethiopia

Pesticide use

- In general, the use of pesticides in Ethiopian agriculture is low.
- Most of the pesticides are used in large scale farming especially in cotton, sesame production and some in horticultural crops.
- Majority of small scale farmers are not using pesticides. However, some farmers use herbicides like 2 4- D for weed control in cereal crops and pesticides against migratory locust, army worms and bird are use during outbreaks.

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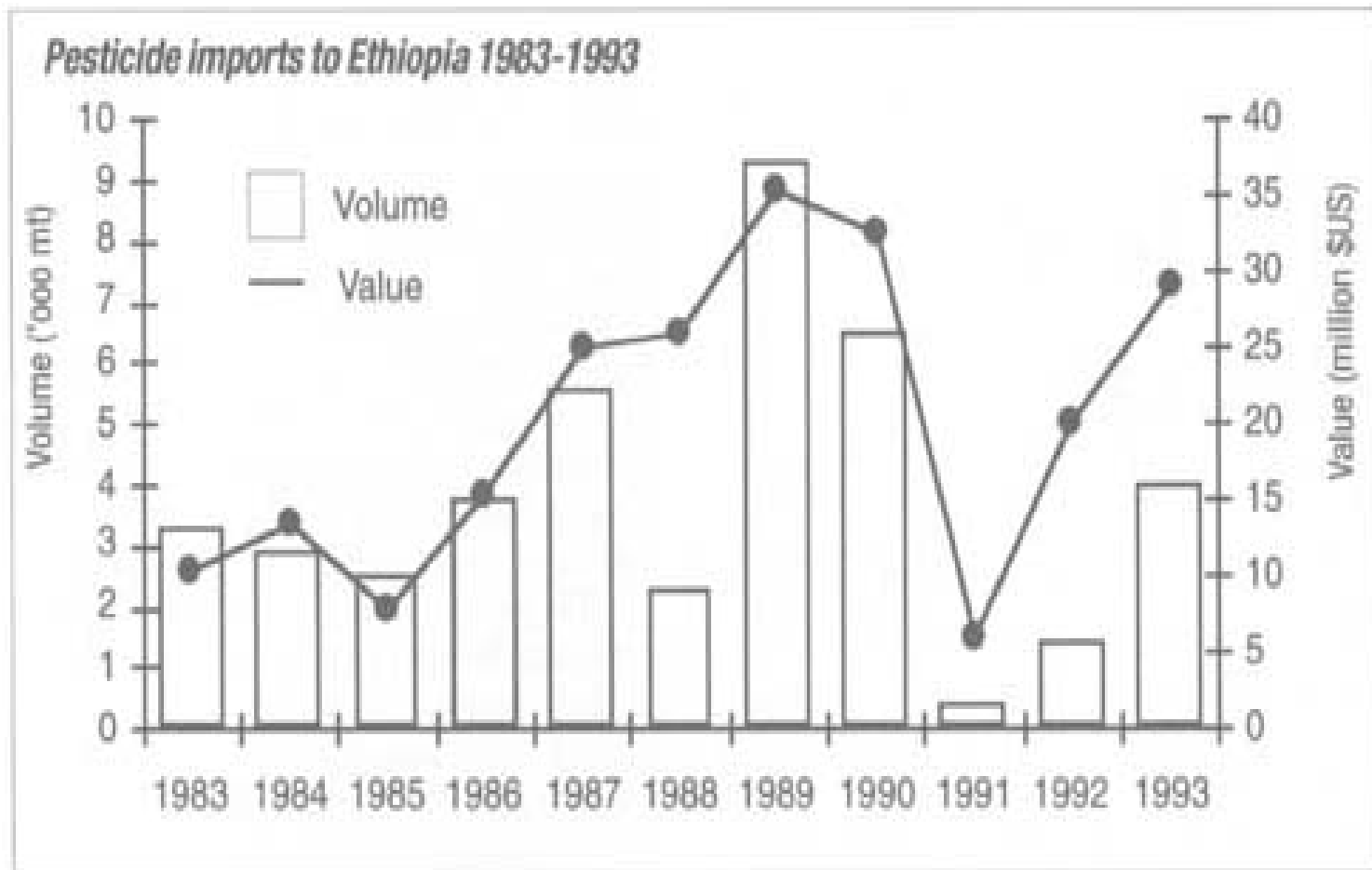
Pesticide regulation

- • There is a decree on pesticide on the importation, testing, and use of pesticides. The guidelines have not been enforced effectively.
- • About 16 chemicals are considered as persistent organic pesticides and their use is restricted.

Pesticide imports

- • At present, almost all agricultural pesticides used in Ethiopia are imported. However, a pesticide formulation plant is formulating few pesticides in the town of Adami Tulu.

Tsedeke Abate .2005. Ethiopian experience with pesticides
—no foundation for food security www.pan-uk.org/pestnews/pn33/pn33p12.htm



Insecticides and fungicides applied during the cultivation of green beans

Trade name	Active ingredient	Pest/disease	Quantity	Harvest interval
<p><i>Insecticides</i></p> <p>Cymbush</p> <p>Karate</p> <p>Decis</p> <p><i>Fungicides</i></p> <p>Bayleton</p> <p>Mancozeb</p> <p>Kocide</p> <p>Tilt</p>	<p>Cypermethrin</p> <p>Lamda-cyhalortin</p> <p>Deltamethrin</p> <p>Triadimefon</p> <p>Mancozeb</p> <p>Copper-hydroxide</p> <p>Propiconazole</p>	<p>Aphids, cutworms</p> <p>Aphids, cutworms</p> <p>African bollworm</p> <p>Hollow blight, antracnose</p> <p>Hollow blight, antracnose</p> <p>Rust</p> <p>Rust</p>	<p>1-1.5 l/ha</p> <p>0.4 l/ha</p> <p>0.6-1.0 l/ha</p> <p>0.5 kg/ha</p> <p>0.5 l/ha</p> <p>2.5-3.0kg/ha</p> <p>3kg/ha</p>	<p>7-8 days</p> <p>7-8 days</p> <p>7-8 days</p> <p>?</p> <p>30 days</p> <p>21 days</p> <p>?</p>

Commodity**Ethiopian exports**

Q = quantity (in thous. of metric tons)

V= value (in million USD)

1998

1999

2000

Q

V

Q

V

Q

V

Coffee	115.0	375.4	109.1	263.2	118	254.9
Hides and skins	6.6	0	6.2	29.8	11.4	47.5
Oil seeds	53.8	40.3	39.6	30.8	42.5	28.6
Pulses	24.1	33.2	32.8	14.3	27.7	10.3
Chat	6.6	10.2	12.3	57.7	14.0	68.9
Spices	2.7	49.8	3.2	2.6	2.8	3.2
Fruit, vegetables and flowers	17.8	3.5	13.5	3.3	12.2	3.6
Cereals	4.4	4.7	3.3	2.4	4.5	3.5
Cotton	1.2	2.5	5.0	4.8	7.7	5.8
Meat and meat products	2.5	1.5	1.9	3.8	1.2	2.4
Sugar	-	5.1	1.3	0.3	64.7	10.3
Gold				2.7		27.6
Others	6.8	6.7	14.8	16.0	16.7	14.4
		17.9				
Total Exports	241.5	550.8	243.0	431.7	323.4	481.0

*Other export products include textiles, natural gum and marble.

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Obsolete pesticide stocks

- One of the major problems associated with pesticides is their disposal. Developing countries are often handicapped by the lack of trained personnel, facilities and funds to get rid of obsolete pesticides.
- 1 500 tones of banned, decomposed or unwanted pesticides have been dumped across the country.
- For the clean up of these pesticides the FAO Collaborative Programme on the Disposal Of Obsolete Pesticides of the Plant Protection Service coordinates the project

- Economic and environmental concerns about pesticides make pesticide use very limited in smallholder agriculture and therefore pest management and related research in food crops should rely on an Integrated Pest Management (IPM) approach.

Future Outlooks ...

- Improve knowledge in pesticides use possible hazards to the ecosystem.
- Develop pest management systems that integrates all possible control measures,
- Improve the level of integration of pest management practices in the animal and crop production systems.
- Strengthen the implementation of pesticide regulations.