



Characteristics of Major Cropping Systems in Ethiopia

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Outline

1. Introduction
2. Major agro-ecological zones
3. Soils and their managements
4. Crop production practices (cycles)
5. Major crop pests and their managements
6. Inputs (especially pesticides)
7. Conclusions

1. INTRODUCTION

Information:

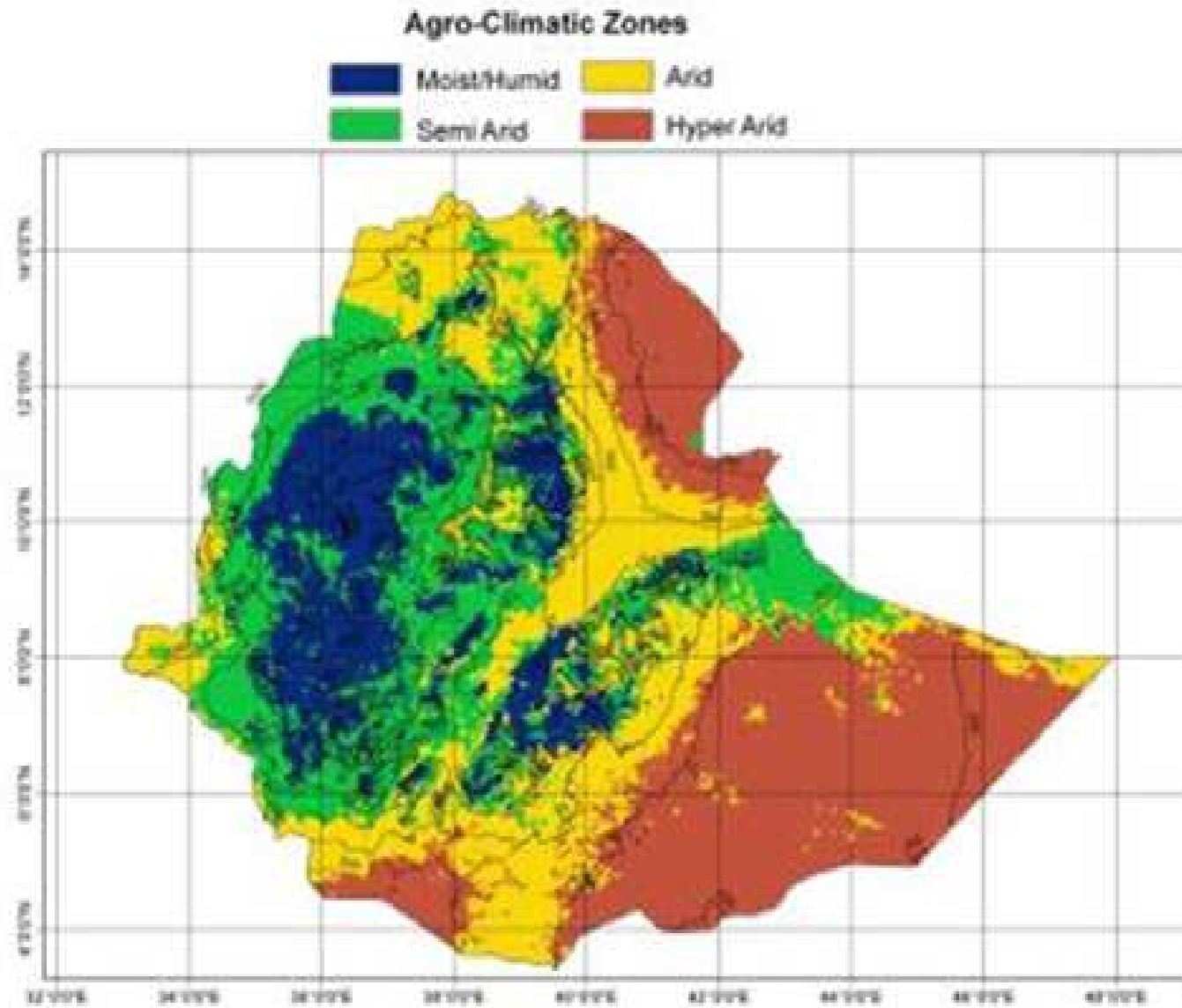
- Agro-ecological analyses (*fragmented*)
- Crop information (*enormous*)
- Management practices (*enough*)
- Pest problems (*enough*)
- Pesticide use (*inadequate*)
- No synthesized write-up available

Somehow, attempt was done to summarize

(i) Traditional zone:

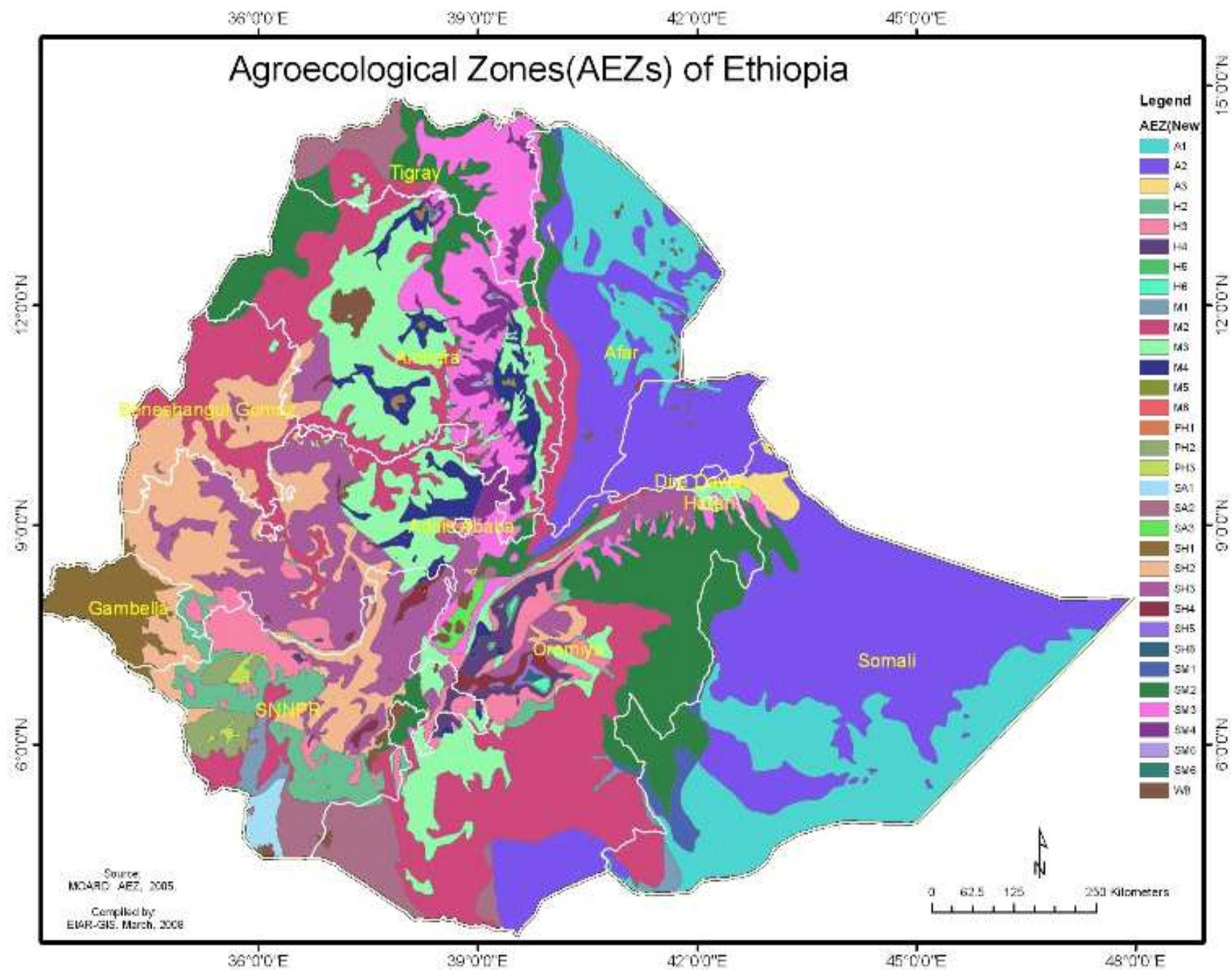
1. **Bereha** (hot lowlands, <500 meters, In the arid east, crop production is very limited , in the humid west root crops and maize are largely grown)
2. **Kolla** (lowlands, 500 - 1,500, sorghum, finger millet, sesame, cowpeas, groundnuts)
3. **Woina Dega** (midlands, 1,500 - 2,300, wheat, teff, barley, maize, sorghum, chickpeas , haricot beans)
4. **Dega** (highlands, 2,300 - 3,200, barley, wheat, highland oilseeds, highland pulses)
5. **Wurch** (highlands, 3,200 - 3,700, barley is common)
6. **Kur** (highland, >3,700, primarily for grazing).

Very simplified (*only 4 sections*)



(ii) The Elaborated AEZs:

- 1. Temperature**
- 2. Elevation**
- 3. Length of growing period**



Major soils of Ethiopia:

Seven major soil groups

- Leptosols
- Nitosols
- Vertisols
- Cambisols
- Calcisols
- Luvisols
- Gypsisols

Major crops :

- Cereals
- Pulses
- Oilseeds
- Vegetables
- Root and tubers
- Fruits
- Fibers
- Stimulants and
- Others

Major pest problems:

- Aphids, thrips, whitefly, scale insects,
- Mealy bugs (new status)
- ABW, cutworms, leaf minors, stem borer
- Weevils, bruchids
- Spider mites
- Fungi (blight, downy and powdery mildew, rusts, molds)
- Weeds (broad leaf and grasses) and
- Others (birds, locust)

Pesticides most used	Against pests of economic importance
Endosulfan	African boll worms
Dimethoate	Aphids, thrips, whitefly
Deltamethrin	African boll worms
L-cyhalothrin	African boll worms
Malathion	Butterfly, storage pests
Dicofol	Spider mites
Abamectin	Spider mites
Mancozeb	Several fungal diseases
Metalaxyl + Mancozeb	Blights (including late blight)
Glyphosate	Weeds (all kinds)
2,4-D	Broadleaf weeds
Atrazin	Complex weeds

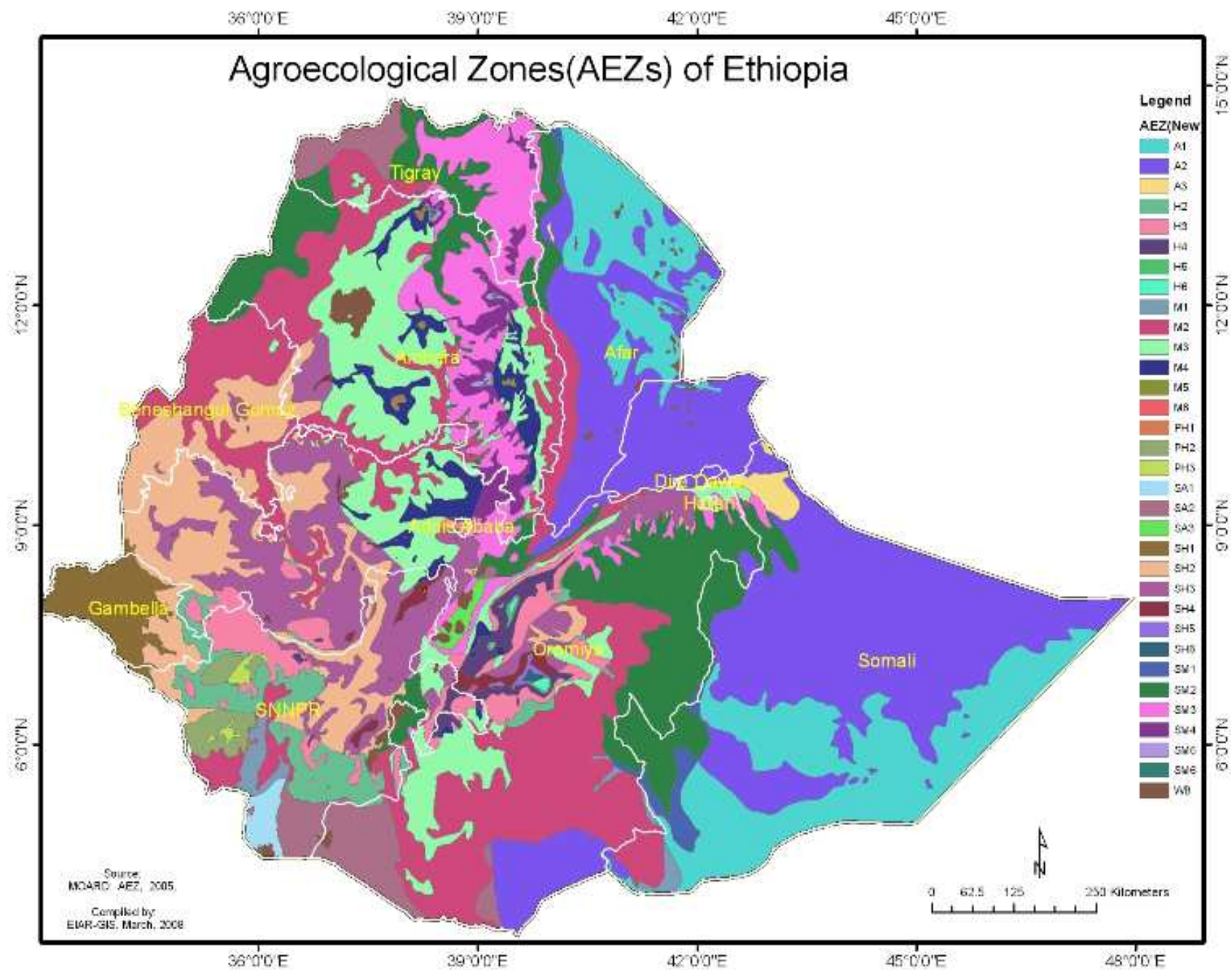
Generally, Ethiopian agriculture:

- A complex setup,
- Difficult to summarize,
- Needs a demanding work,

However, some attempts are made to

- Show the complexity,
- Give only major divisions in each case
- Possible details for PRRP purposes basing ALTERA's hint

2. AGRO-ECOLOGICAL ZONES OF ETHIOPIA



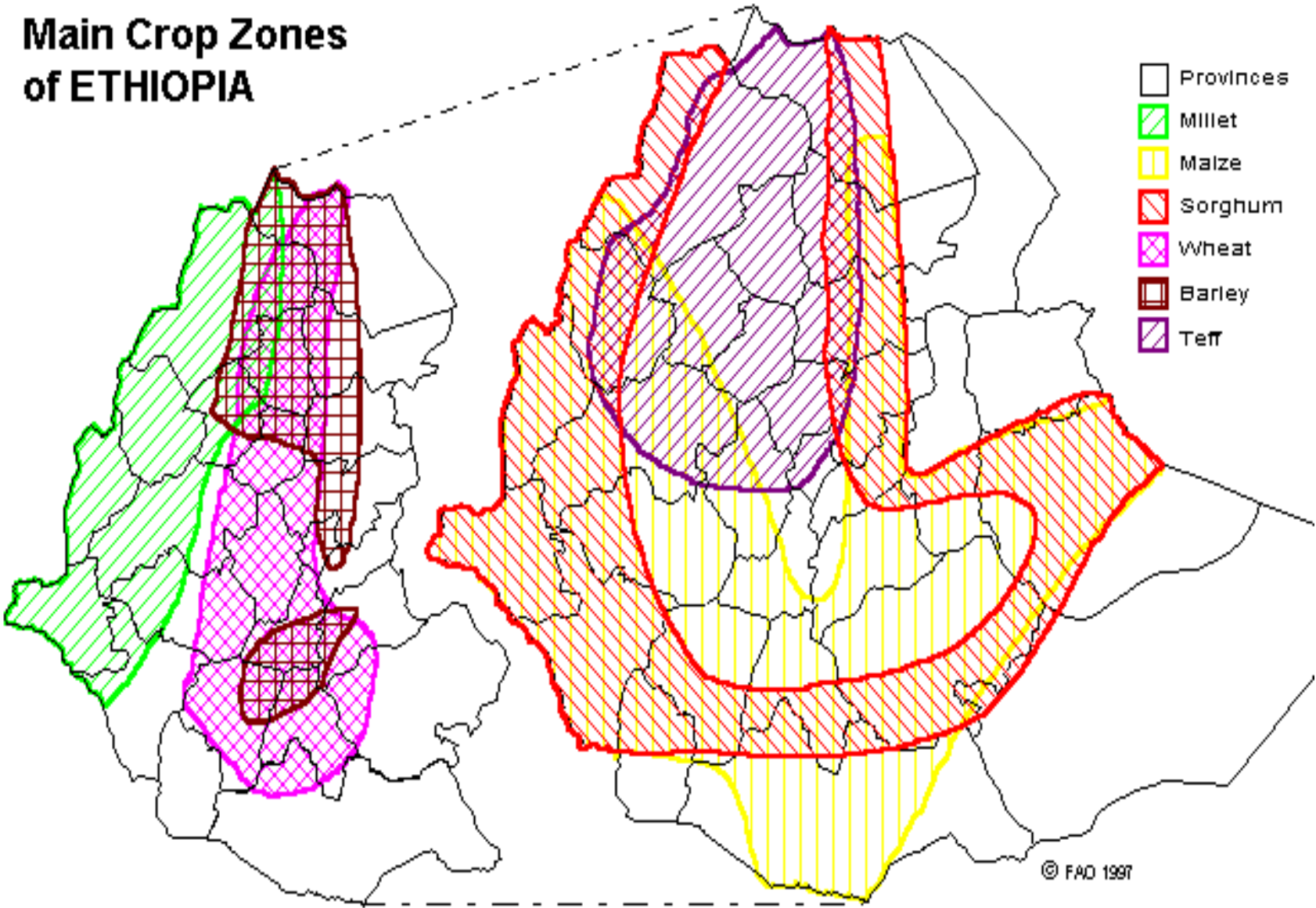


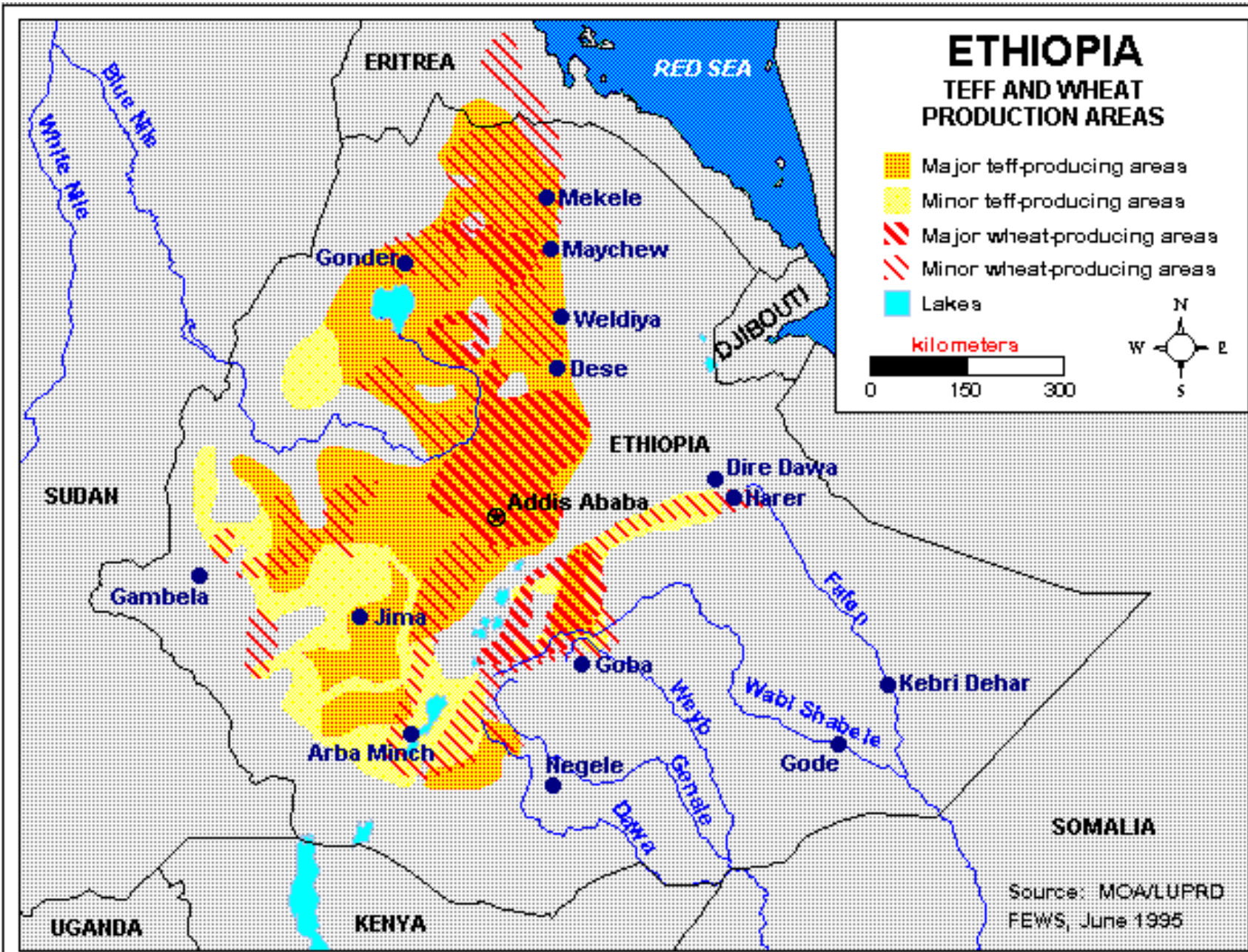


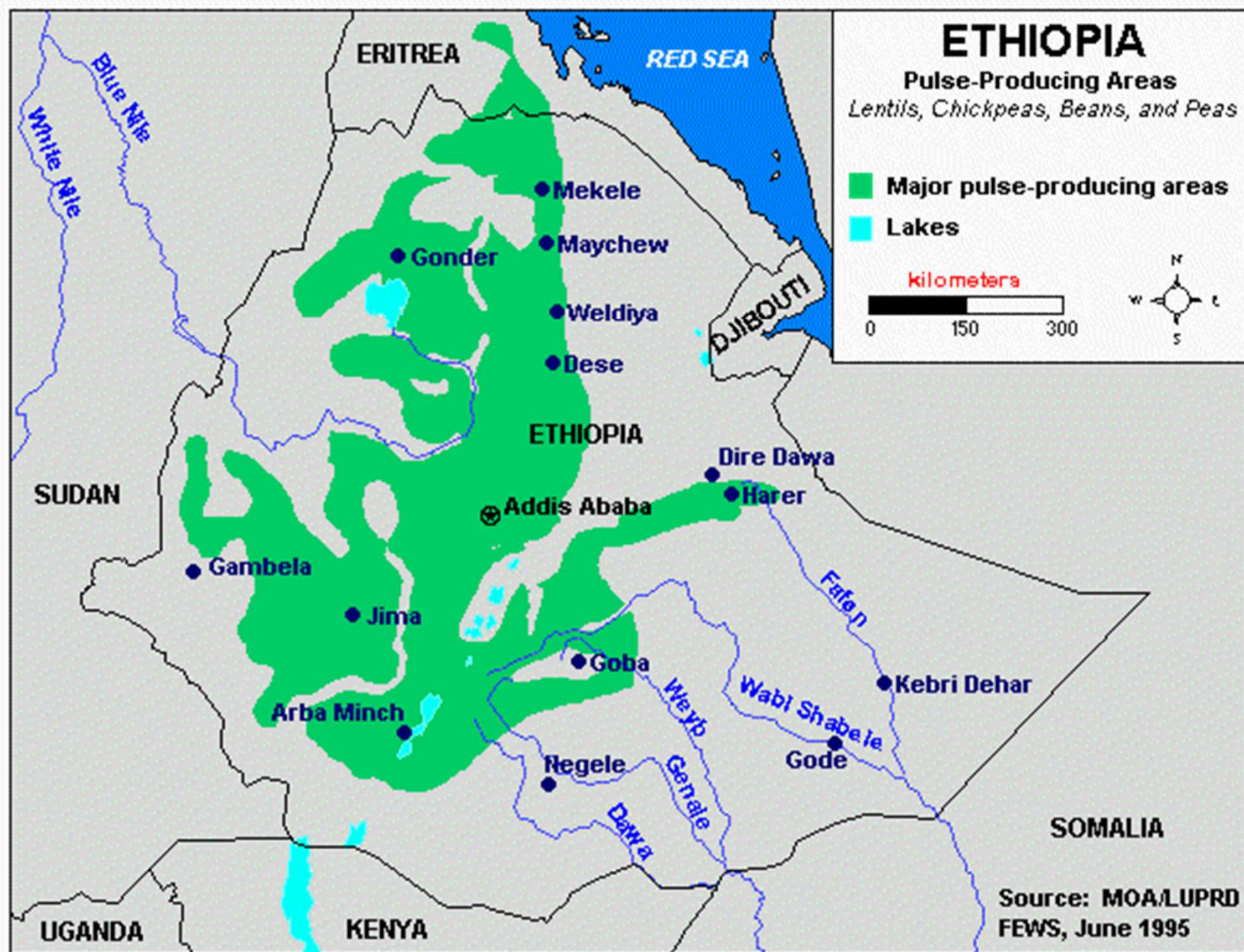




Main Crop Zones of ETHIOPIA















3. SOILS AND MANAGEMENT

Major soils of Ethiopia:

- Leptosols 29.8%
- Nitosols 12.5% (acidity)
- Vertisols 10.0% (water-logging)
- Cambisols 9.4%
- Calcisols 9.3%
- Luvisols 7.8%
- Gypsisols 7.6%

Major soil managements:

- Leptosols Shallow depth
- Nitosols Repeated plowing
- Vertisols Drainage (Furrow, BBF)
- Cambisols Workable
- Calcisols -
- Luvisols -
- Gypsisols -

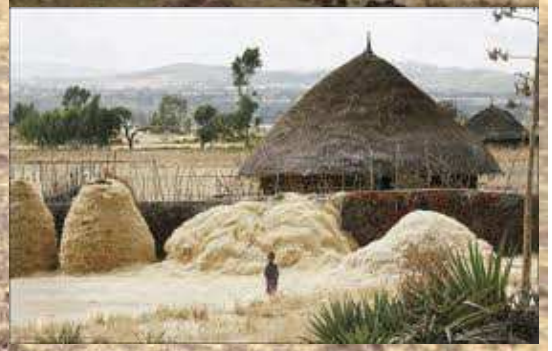












4. GROWING CYCLES OF CROPS

Major crops grown:

- Cereals (wheat, barley, tef, maize, sorghum)
- Pulses (faba bean, field pea, French bean, chickpea)
- Oilseeds (sesame, linseed, noug)
- Vegetables (tomato, onion, pepper)
- Root and tubers (potato, s-potato, ensete)
- Fibers (cotton)
- Fruits (citrus, mango, avocado, banana)
- Stimulants (coffee, tea, chat) and
- Others (sugarcane, tobacco, flowers/roses)

Wheat cycle: mainly rainfed

- Planting (June, July, August, September, Nov)
- Drainage (June, July, August, September, Nov)
Close Furrow, Broad Bed Furrow
- Weeding (July, August, Sept, Oct, Dec)
Herbicides, hand weeding
- Pest control (July, August, Sept, Oct, Nov, Dec)
Pesticides
- Harvesting (November, Dec, Jan, Feb)
- Threshing (Dec, Jan, Feb, March)
- Feed collection (Jan, Feb, March, April)

Barley cycle: mainly rainfall (Main & Belg)

- Planting (June, July, August, March, April, Aug)
- Drainage (June, July, August, March, April, Aug)
Close Furrow
- Weeding (July, August, Sept, April, Aug, Sept)
Hand weeding
- Aphid control (August, Sept, Oct, Nov, Dec, Jan)
Pesticides
- Harvesting (November, Dec, Feb, March, April)
- Threshing (Dec, Feb, March, April, May)
- Feed collection (Jan - July)

Teff cycle: mainly rainfall

- Seed bed & planting (July, August, Oct)
- Drainage (July, August, Oct)
Furrows (broadly spaced beds)
- Weeding (August, Sept, Nov)
Herbicides, Hand weeding
- Pest control (August, Sept, Oct, Nov, Dec)
Pesticides
- Harvesting (November, Dec, Feb, March, April)
- Threshing (Dec, Feb, March, April, May, June)
- Feed collection (Jan - June)

Maize cycle: rainfall and irrigation

- Planting (mainly March - June, **Every month**)
- Cultivation (May - July, **Every month**)
Some furrow
- Weeding (June - August, **Every month**)
Herbicides, Hand weeding
- Pest control (May - August, **Every month**)
Pesticides
- Harvesting (Green and dry, **Every month**)
- Feed collection (**Every month**)

French bean: mainly rainfall

- Planting (June, July)
- Drainage (June, July)
 - Furrow (broad beds)
- Weeding (July, August)
 - Hand weeding
- Pest control (July, August, Sept)
 - Pesticides
- Harvesting (Oct, November, Dec)
- Threshing (Nov, Dec, Jan)

Field pea: mainly rainfall (3 seasons)

- Planting (June, July, September, March)
- Weeding (No weeding)
- Pest control (around 90 DAP)

Pesticides

- Harvesting (Oct, Nov, Dec, May, Jun)
- Threshing (Nov, Dec, June, July)
- Feed collection (Nov, Dec, June, July)

Tomato, onion, pepper:

- Seedling raising (always)
- Transplanting (always)
- Irrigation (Sept - May, not in small rain period)
Mainly furrow irrigation (but some greenhouse)
- Cultivation and hilling (always)
- Pest control (it is a must, always)
Pesticides
- Harvesting (always)

Potato: main and off-season

- Planting (June, July, Nov, Dec)
- Cultivation and hilling (30 DAP)
- Irrigation (Nov - March)
Furrow irrigation
- Pest control (Aug, Sept, Dec-Feb)
Pesticides
- Harvesting (always by storing in the soil)
- Stubble collection (always)

Cotton: irrigation and rainfall

- Planting (April, May, June)
- Drainage (June, furrow)
- Irrigation (April - Sept)
- Weeding (May - July)
Herbicides, hand weeding, mechanical
- Pest control (May - Oct, it is a must)
Pesticides
- Harvesting (Oct - Dec)

Coffee: rainfall

- Seedling raising (about a year before)
Handling (especial care, package)
- Transplanting (March, April, June, July)
- Weeding (March - August)
Herbicides, hand weeding, mechanical
- Pest control (March - August)
Some pesticides
- Harvesting (Sept - Dec)

Roses: under greenhouse

- Planting (any time in the year)
- Weeding (always)

Hand weeding

- Pest control (always)

Pesticides and biological agents

- Harvesting (always)

5. PESTS AND THEIR MANAGEMENT

Major pest problems: (except fungi and weeds)

- Cereals (aphids, ABW, shoot fly, borers, weevils)
- Pulses (aphids, ABW, spider mites, bruchids)
- Oilseeds (aphids, bugs, aphids, cutworms)
- Vegetables (Aphids, thrips, ABW, whitefly, cutw.)
- Root and tubers (moths, butterfly, aphids)
- Fruits (scale insects, mealy bugs)
- Fibers (ABW, aphids, thrips, mealy bugs)
- Stimulants (leaf minors, aphids, whitefly) and
- Others (spider mites, molds, mildews)

6. MAJOR INPUTS IN CROP PRODUCTION

Major inputs: (external = Irrigation and Pesticides)

- **Irrigation** (Small scale = no agro-eco based)
(Large scale = semi-arid and arid)
(Rivers are major sources)
(Little crop and operation specific)
- **Pesticides** (Pest based distribution)
(aphids in all crops managed by a pesticide)
(Often below recommended rate)
(Field crops = spot application)
(Vegetables and flowers = as recommended)

Irrigation:

- **Small scale** (Estimated at 7,000 ha)
 - (Rivers are major sources)
 - (Increasing at present)
 - (Mostly for high value crops: Veggies)
- **Large scale** (Estimated at 22,000 ha)
 - (Rivers are major sources)
 - (Increasing for vegetables, flowers)
 - (All crops but sugarcane, cotton, veggies)

Pesticide	Pest	Major crop	Other crops	Crop (Codex MRLs)
Endosulfan	ABW	Cotton	maize, sorghum, tobacco	Cotton (0.03) Maize (0.05)
Dimethoate	Aphids	Barley	tomato, cabbage, potato, bean, field pea	Potato (0.05) Bean (1.0)
Deltamethrin	ABW	Sweet potato	cabbage, maize	
L-cyhalothrin	ABW	Maize	bean, cotton, vegetables	Maize (0.02)
Malathion	Butterfly	Sweet potato	maize, pasture, storage pests	Maize (0.05) Stored grain (1.0)
Dicofol	Spider mites	Cotton	vegetables	
Abamectin	Spider mites	Flowers	strawberry	
Mancozeb	Fungi	Tomato	potato, onion, flower	
Metalaxyl +	Blight	Tomato	potato, onion, pepper, orange, apple,	Potato (0.05) Tomato (0.5) Pepper (1.0) Onion (2.0)
Glyphosate	Weeds	Coffee	citrus,	
2,4-D	BL Weeds	Cereals	tef, wheat, maize, sorghum, sugarcane	Maize (0.05) Wheat (2.0)
Atrazin	Weeds	Maize	Sorghum, sugarcane	

Item	2006	2007	2008	2009	2010
2,4D	1588	1422	1310	2618	2533
Glyphosate	125	116	156	278	427
Endosulfan	159	183	251	37	0
Metaxyl +	108	93	73	148	157
Dimethoate	48	48	36	60	0
L-cyhalothrin	26	143	41	46	60
Malathion	17	30	0	0	132

Item	When	Dosage	How often
2,4D	30-40 DAP	1-2 L/ha	1 time
Glyphosate	On need	3-4 L/ha	1 time
Endosulfan	Pest occurrence	2 l/ha	1-3 times
Metalaxyl +	Disease onset	2-3 kg/ha	Max 2 times
Dimethoate	Pest occurrence	1-2 L/ha	1-3 times
L-cyhalothrin	Pest occurrence	ULV = 2 L/ha	Max 2 times
	Pest occurrence	EC = 250-400 ml/ha	Max 2 times
Malathion	On need	25-50 g/100kg	1 when storing
	On need	2 L/ha	3-4 times













7. CONCLUSIONS

1. Many crops are grown in Ethiopia , 16.5 million hectares of land, grains occupying about 86% percent
2. Six traditional or 33 elaborated agro-ecological zones exist in Ethiopia (land use not well developed, 4 AEZ)
3. Agro-ecologies are not specific to crops or management
4. Irrigation is increasing (furrow method dominates)
5. Furrow drainage is exercised everywhere (NF, BBF)
6. Sheet erosion is the major characteristics in HLA
7. Poor establishment in the protected agriculture
8. Sub optimal rate/coverage of application pesticides
9. Less awareness on environmental hazard

10. Many crops overlap in agro-ecology, difficult to generalize
11. Crop cycle also overlap in many places, rain/water determines the crop cycle (sp. in arid areas)
12. Soils are broadly classified (suitable)
13. Pesticide application differs in commercial and small holder farmers (but residue management)
14. Limited use of protective devices in both cases
15. Spot application, lower rates, fewer than recommended for small holders
16. H&A are highly exposed to pesticide contaminations
17. Commercial farms highly differ from small farms
18. Develop a simple AEZ classes for PRA

against or for us?

