

# Challenge of improving Cotton competitiveness in a distorted market

Analysing the role of crop protection in Francophone Africa

Michel FOK (Agronomist & Economist)  
Maurice VAISSAYRE (Entomologist)  
Alain RENOUE (Entomologist)

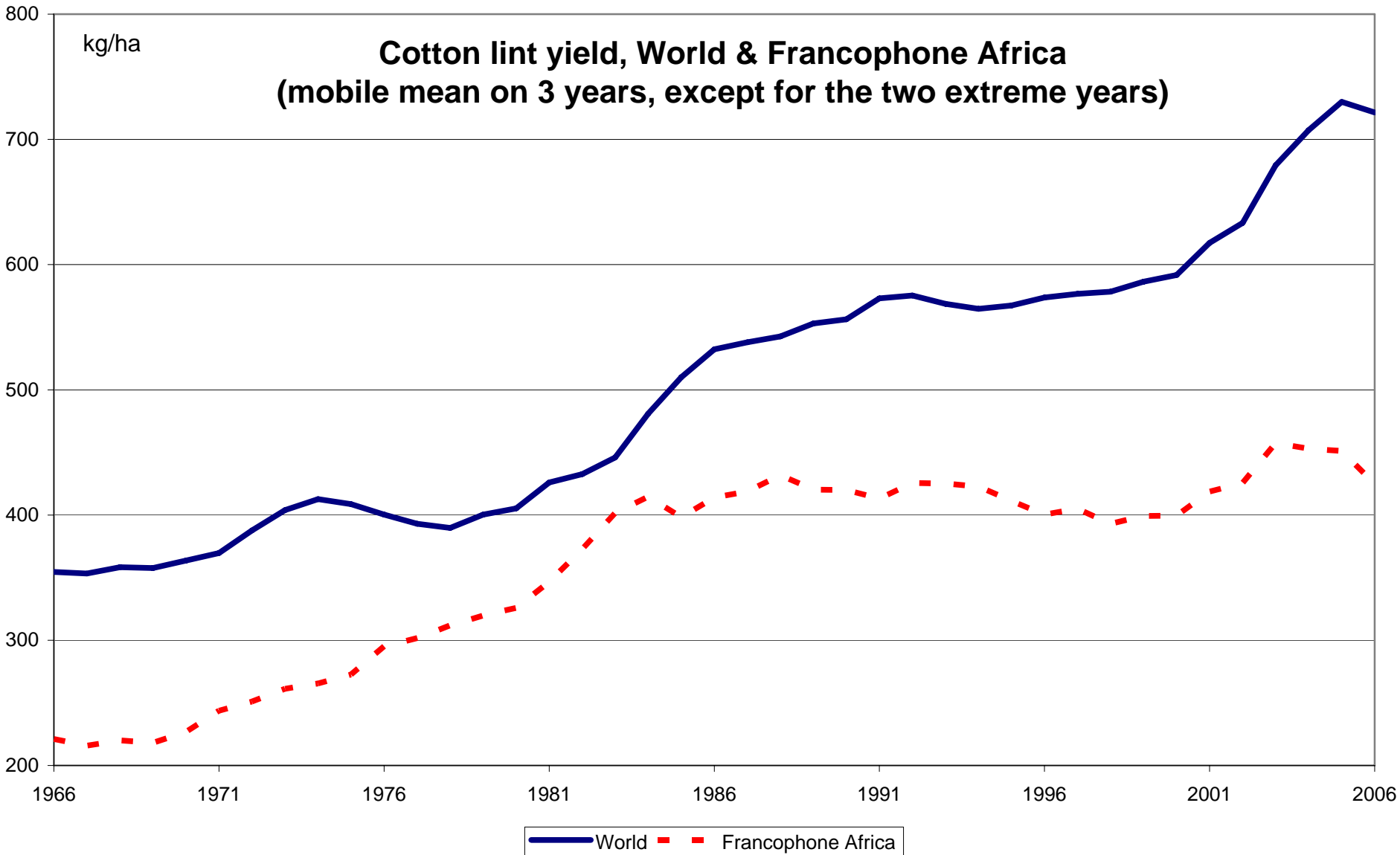
# Outline

- Francophone Africa's cotton and the issue of crop protection improvement
- Constraints, limitations and opportunities for cotton crop protection improvement
- Possible actions for cotton crop protection improvement

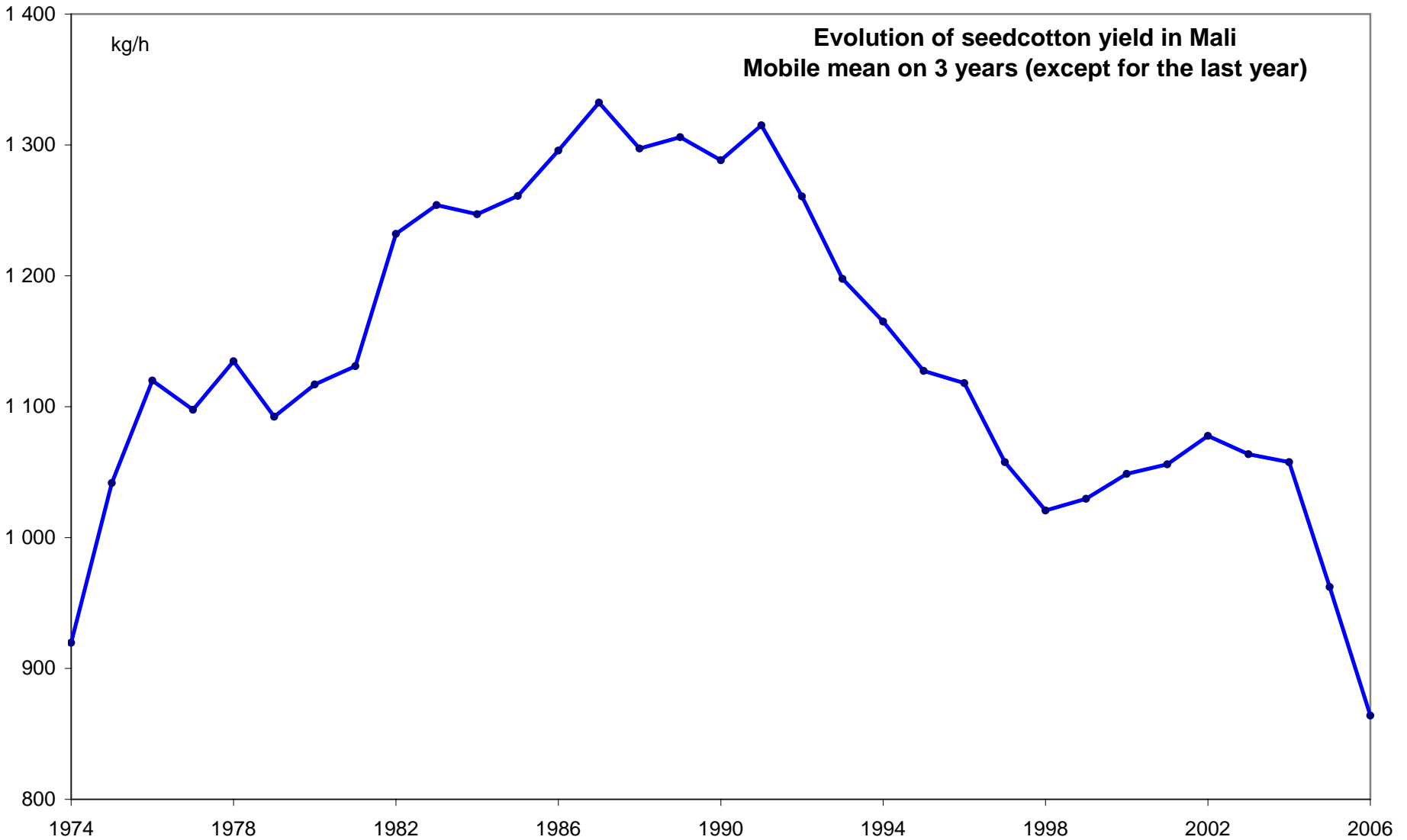
# Francophone cotton Africa: indicators of variable performance

- Exclusively rainfed production
- 2<sup>nd</sup> rank in exporting cotton
- Many people involved
  - >10 millions, about 1.3 million producers
- Significant players in claiming for subsidy abolition
  - The African Cotton Sectoral Initiative introduced at the WTO Ministerial Meeting in Cancùn, Sept. 2003
- But yield is decreasing
  - and the gap is widening with the rest of the cotton world

# Enlarging yield gap



# Yield regression in Mali



# The Issue addressed

- could the improvement of crop protection help?
  - Under which conditions?
  - What would be the extent of this improvement to gain competitiveness?
  - What are the actions to undergo?

# Precautionary principle applies to the International conditions

- Pessimism regarding the effects of subsidy abolition
  - The process is stuck at the WTO level
  - Very diverging results on the effects on the world price
  - Price Effect will be short term one
- Consequences
  - Price trend would continue with its decreasing trend and volatility

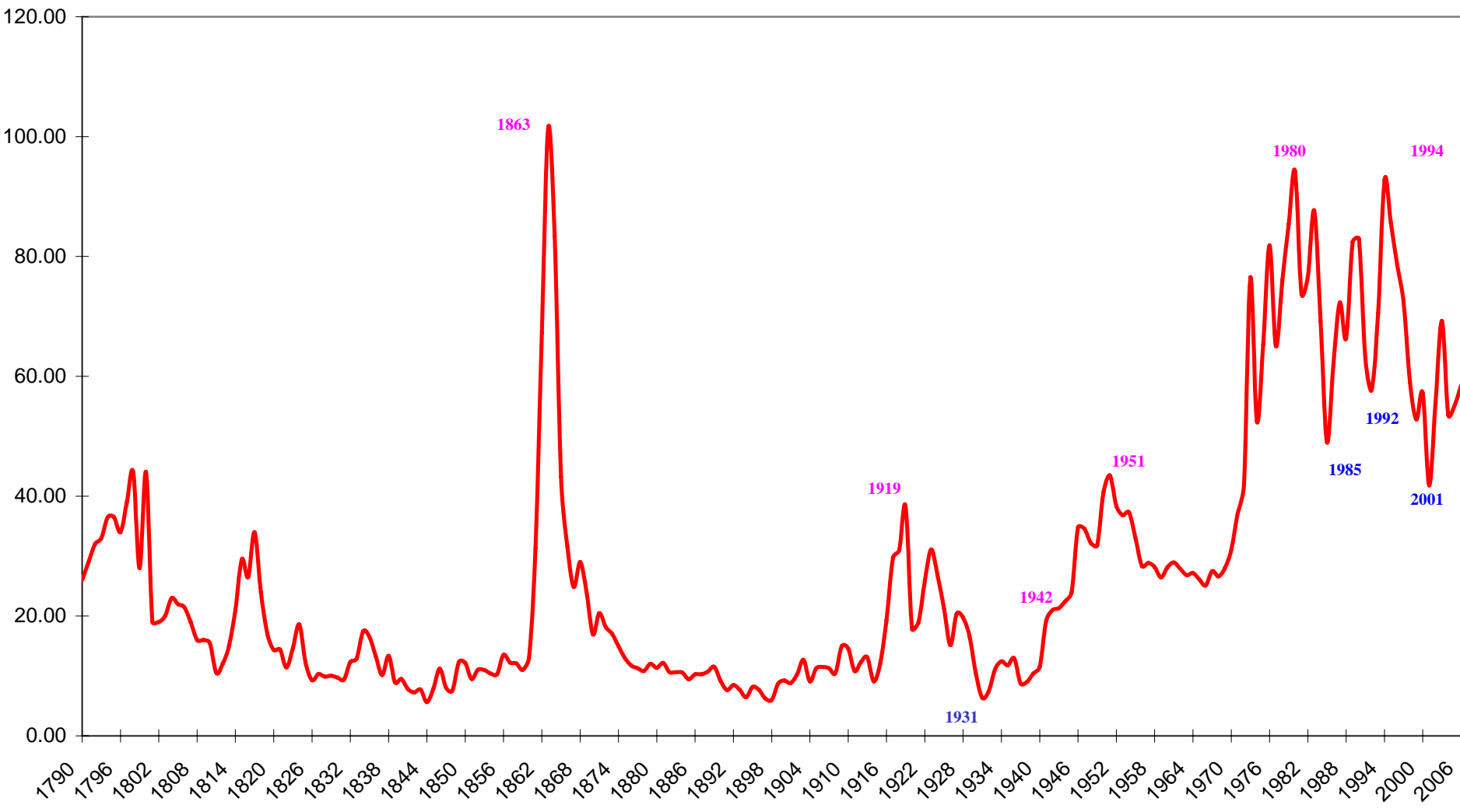
# Very diverging results of price effect estimation

Authors	Model	Sectors concerned	Data Sources used	Campaign	Price change (%)
ICAC	ICAC/FAO	cotton	ICAC	2000/01	21.0
ICAC	ICAC/FAO	cotton	ICAC	2001/02	72.4
Sumner	IFPRI	cotton	ICAC	2000/01	12.6
IFPRI	IFPRI	all Ag.	ICAC + IFPRI	2000/01	11.4
Tokarick	Tokarick	all Ag.	ICAC + others	2000/01	2.8
FAO	CNUCED/FAO	cotton	WTO	2000/01	2.3-5.0
Reeves et al.	Reeves et al.	Cotton/textile	ICAC	2000/01	10.7
Gillson et al.	ODI	cotton	ICAC	2000/01	18.0-28.0
Goreux	Variante ICAC/FAO	cotton	ICAC	2000/01	2.9-13.4



# Cotton Price more volatile

Current Cotton lint price, US cents/pound



# Precautionary principle applies to the International conditions

- Implications
  - Productivity and competitiveness gain should not be obtained at any additional cost and risk for resource-poor and risk-adverse smallholders
- Crop protection improvement would mainly mean efficiency gain
  - Identical effectiveness at lower cost
  - Or improved effectiveness without change in cost

# Price differentiation: threat and opportunity

- A reality totally missed in the WTO negotiations
- Price differentiation according to
  - Measurable and controllable features
  - Less/not Measurable and controllable features ("image")
- 2 opposed influences on price differentiations with regard to producing countries
  - : Exacerbated concentration on the international cotton trade
  - + : crop protection implementation has more impact on the image of one's cotton

# Price differentiation: threat and opportunity

- Consequence: 2 possible impacts of the improvement of cotton crop protection
  - Reduction of unit cost of crop protection (through the improvement of effectiveness and/or efficiency)
  - Increase of the value of the cotton produced
- Implications
  - Challenge = combine the 2 possible impacts
  - Make know = requisite to gain in image

# Francophone Africa: wrong in communication

- No communication on many achievements conducive to positive perception (with variation between countries)
  - Farmers actively participating to the management of cotton sectors
  - Farmers involved in price setting for outputs and inputs
  - Farmers implementing the marketing of their own cotton
- Commendable achievements in crop protection
  - General access to chemical control
  - Chemical control at limited extent (3-6 sprays, 4 on average)
  - Rare example of implementation of threshold control by developing countries

# Cost in crop protection remains reasonable

Cost in crop protection remains reasonable, US\$/ha, in absolute terms...

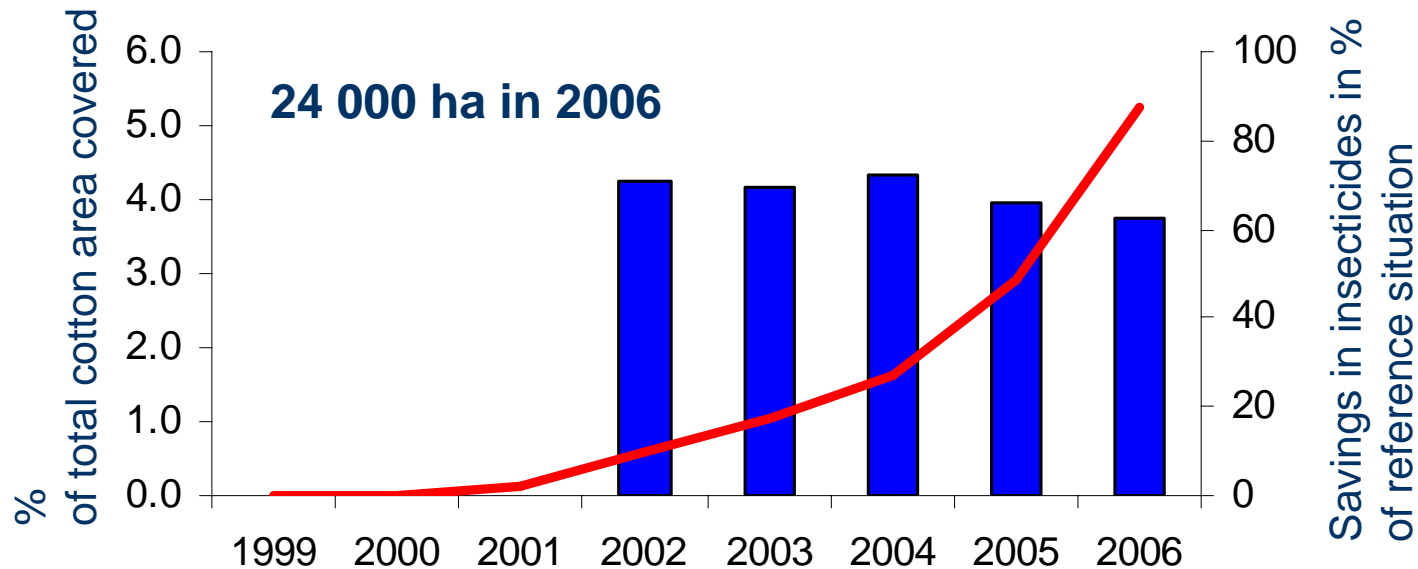
	China 2003	USA 2004	Mali 2003	Brazil, MT direct sowing 2003	Brazil, Parana Conventional 2003
Fertilizers	93	89	67	295	137
Pesticides	54	138	47	624	172
Pesticides & fertilizers	147	227	115	919	309
Seeds	51	116	0	62	62
Other inputs	69				
All physical inputs	267	343	115	981	371

and in relative terms...

	China 2003	USA 2004	Mali 2003	Brazil, MT direct sowing 2003	Brazil, Parana Conventional 2003
Pesticides, US\$/ha	54	138	43	624	172
% cost of Chemicals	37.0%	60.9%	41.3%	67.9%	55.6%
% cost of physical inputs	20.2%	40.3%	41.3%	63.7%	46.3%

# Commendable achievements through threshold program in Mali

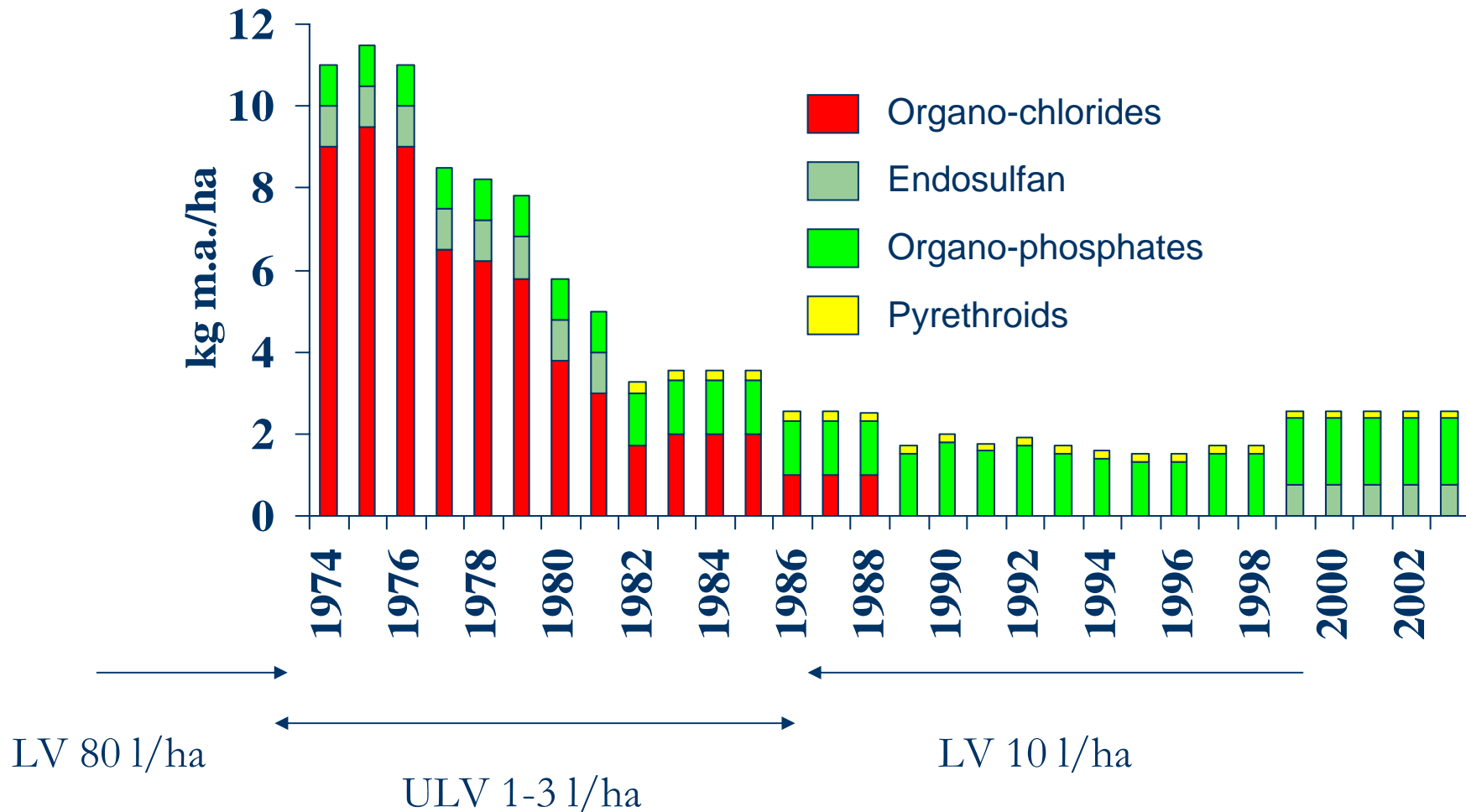
Savings in insecticides up to 60% as compared to calendar program with 4 sprays



Source: Renou et al., 2007

**■ Insecticide savings ; — % area concerned**

# Evolution of the amounts of a.i. on cotton (g/hectare) in Côte d'Ivoire 1974 to 2005





# Further contribution of crop protection to competitiveness?

- Two opposed trends
  - : gain mitigated by the structural constraints of developing countries
  - + : crop protection improvement should provide a lever effect through yield gain

# Limited impact of the reduction of crop protection cost

Specificity of large gap between the production cost at farmers' level and at the export position

Unit cost, from ginnery to export position, US cent/pound

	Australie	USA	Mali	Burkina Faso	Cameroun
1993	2.33	4.94	6.72		
2002			3.82	4.24	4.35
2003			5.14	6.22	5.33
2004			5.42	6.63	5.99

The reduction of the Crop protection cost would not have enough impact as compared to other cost items

# Potential lever effect of better crop protection to exploit

- Current practices are not optimal to recover yield loss due to pest damages
  - The practices in implementing chemical control is mainly guided by the concern of cost reduction
  - The increase of the price of chemicals has led farmers to reduce excessively the number of sprays
  - Through this reduction, the first spray tends to be later and the last one tends to be earlier than required

# Situation has become less favorable

- Due to insufficiently-prepared institutional change
  - Cotton sector reform
  - Privatisation
  - Transfer of the management of the pesticide supply to farmers' organisations
- Consequences: former achievements have been hurt
  - Timely delivery of the needed products
  - Quality control
  - Training of farmers...

# What to do

- In the institutional area
  - Find back a framework which could insure farmers getting timely what they need to properly implement cotton pest control

# What to do

- Technical challenges to address
- Adapt cotton crop protection to the dramatic shift from yearly discontinuous to continuous cropping
  - Consequence of the development of horticulture
  - Increasing place of polyphagous pests (Helicoverpa, Bemisia, Aphis)



Photos of Th. Martin, 2007

# Common pests to cotton and vegetable



*Bemisia tabaci* on tomato and transferring the Tomato Yellow Leaf Curl virus



*H. Armigera* on tomato



*Aphis* sp.



# Distinct pests on cotton and vegetables **but**



Photos of Th. Martin, 2007

controlled by the same insecticides at a very regular basis (every 3 days)...  
...implying serious threat for resistance emergence



# What to do

- Integrate a few ideas of biological control (from organic farming or local knowledge) to conventional cotton growing
  - Development of cultural practices for pest management (push-pull)

# What to do

- Adapt protection to important changes in cotton cultivation integrating finally growth regulation
  - Important increase of densities will modify canopy and pest/plant relationship
  - Topping to decrease the late season pest pressure

# Increased density is promising to yield gain

...through important increase in the number of plants to be harvested

...while the number of bolls per plant is little reduced

plant density	No. Plants/m <sup>2</sup>	No. Bolls/m <sup>2</sup>	No. Bolls/plan
D1	2.1	8.8	4.2
D2	4.2	16.9	4.0
D3	8.3	32.7	3.9
D4	16.7	61.9	3.7

Density experiment in Mali, 2006

**This yield prospect is nevertheless challenging in commanding quite different pest/plant relationship**

# What to do

- Not to rely on want-to-be miracle solution
  - There is no silver bullet
- Be conscious of the extent and limitations of Bt-cotton impacts

# Bt-Cotton: lessons from experiences

## With regard to anticipated impacts

<b>Positive impacts</b>	<b>Neutral impacts</b>	<b>Negative impacts</b>
Confirmed effectiveness against target pests	Nuisance not yet confirmed on non-target fauna	Frequent monopoly in the supply of GM seeds: hence high price
Reduction of 2-3 insecticide sprays	Nuisance not yet confirmed on predators of cotton pests	Collapse of existing seed production services
Reduction of the insecticide expenses, but only reduction	Not yet confirmation of appearance of pest resistance to Bt cotton	~Annual renewal of seeds made compulsory
Profitability frequently improved and at very various extent		Seldom reduction in the total cost of pest control

# Bt-Cotton: lessons from experiences

## With regard to non-anticipated impacts

<b>Positive impacts</b>	<b>Negative impacts</b>
Yield Gain, although at variable extent	Higher financial risk for farmers with GM seeds
'comfort' in implementing pest control	Undesired effects from farmers' opportunistic behaviours to escape high cost GM seeds
Less uncertainty related to insecticides (case of LD countries)	Various approaches to preserve biotech rent
Possibility to move back to a lower pest pressure context	Profitability variates a lot according to countries, years...between farmers and plots
Capability, although rare, to insert Bt cotton within an Integrated pest management	Economic and ecological threat associated with the approach of 100% GM cover
Room in negotiating conditions of Bt cotton use	Unfavorable shift of the pest complex

# Bt-Cotton: for Africa ?

- Yes, promising
- Costs are involved
  - In buying seeds
  - Seed system destructured
- Extent of Profitability gain under dependence
  - Matter of economic conditions for using Bt cotton seed
- 100% Bt-Cotton
  - Not optimal (tech. & ecology)
- Partial use
  - Preferable
  - Must be organized, but not easy

# Conclusion

- 3 potential impacts of crop protection improvement
  - Cost reduction, Value gain, Lever effect on yield
- Room for improvement
  - But institutional requirements to help expect promising technical achievement
  - Mid-term if not long term commitment
    - While struggling for short term survival
- Improvement
  - A valuable area to invest for the members of the international community which have claim their willingness to help African countries