



Global GMO and Non-GMO Cotton Production Experiences & Implications for the Future

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General Secretary

National Cotton Council of Turkey

Terminology

- Bt cotton (Basillus thuringiensis)
- Roundup Ready cotton
- IR cotton (Insect resistance)
- HR cotton (Herbicide resistance)
- GM cotton (Genetically Modified)
- **GMO cotton (Genetically Modified Organisms)**
- GE cotton (Genetically Engineered)
- Transgenic cotton)
- Bio-Technology >>>>> Biotech cotton (Generic Term)



Introduction

GMO Cotton production has rapidly developed worldwide, although it has relatively short background for the science of genetics.

Almost all of the major cotton producing countries were accepted and commercialised this technology easily.

Moreover, it's adoption has progressed quite fast in these countries, and by 2015, that is only twenty years after launching, 77 percent of the total area in the world were became covered with GMO Cotton.

On the other hand, in the last few years, rapid increase in GM Cotton production was stopped and displaced with slight decreasing due to some problems occurred in some countries.

This situation is caused to come up for discussing GMO Cotton again, and besides bring up the Non-GMO Cotton to the agenda.

Purpose

The purpose of this presentation is **not to compare GMO and Non-GMO cotton productions**, but to examine critical issues regarding sustainability of the cotton production with and without GM technology. **It will be focused on the negative aspects of GM technology in cotton production, aiming mainly to make people aware, and therefore more careful, rather than to diminish its positive aspects.**

This assessment is based entirely on **relevant literature findings** and not contain anecdotal information.

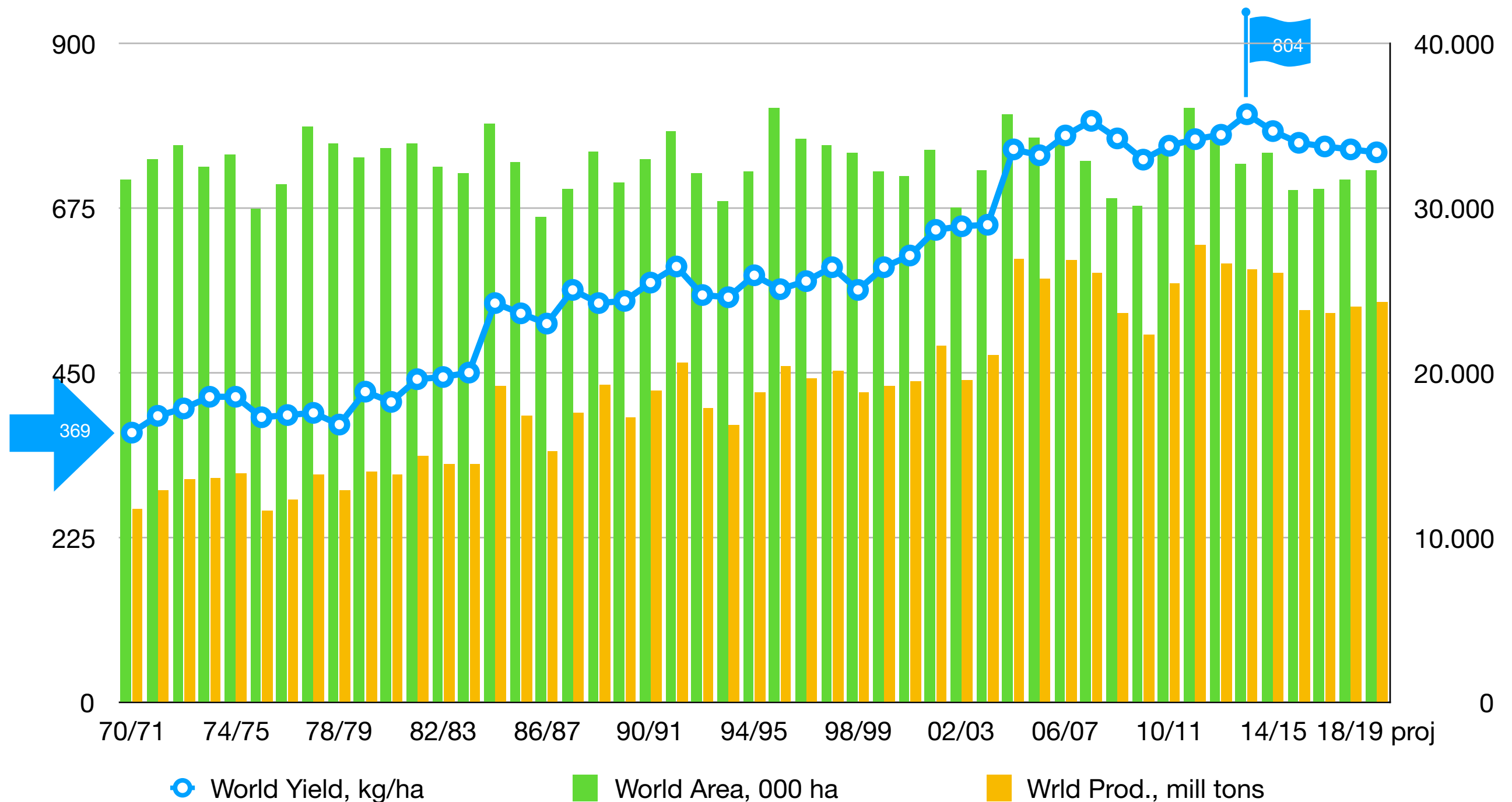
Moreover this approach does not meant that National Cotton Council of Turkey is opposed to GM technology, but would like to draw attention to importance of the Non-GMO cotton existence, as an alternative to GMO Cotton, for the future of the World Cotton.

Overview

- **Global Status of Cotton Production (with and w/o Biotechnology)**
- GMO and Non-GMO cotton production experiences
- **Why Turkey has preferred to continue Non-GMO cotton production only?**
- “GMO Free Cotton” labelling initiative and expectations
- **Implications for the future (sustainability of GMO and Non-GMO cotton production)**

Global Status of GMO&Non-GMO Cotton Production

Global Cotton Production Area & Yield



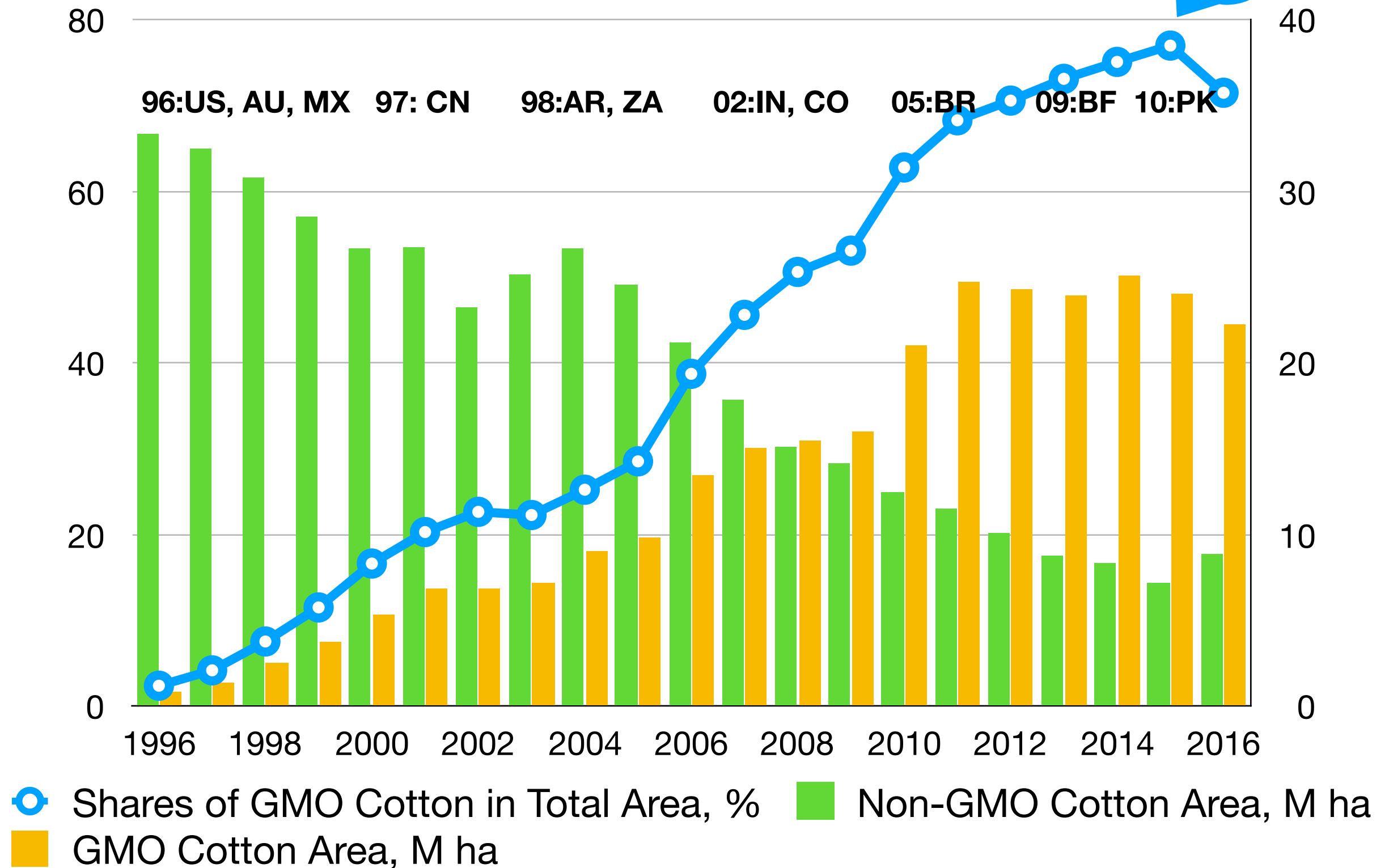
Average Yearly Increasing Rates in The World Yield by Periods

Average Yearly Increasing Rates in the World Yield by Periods

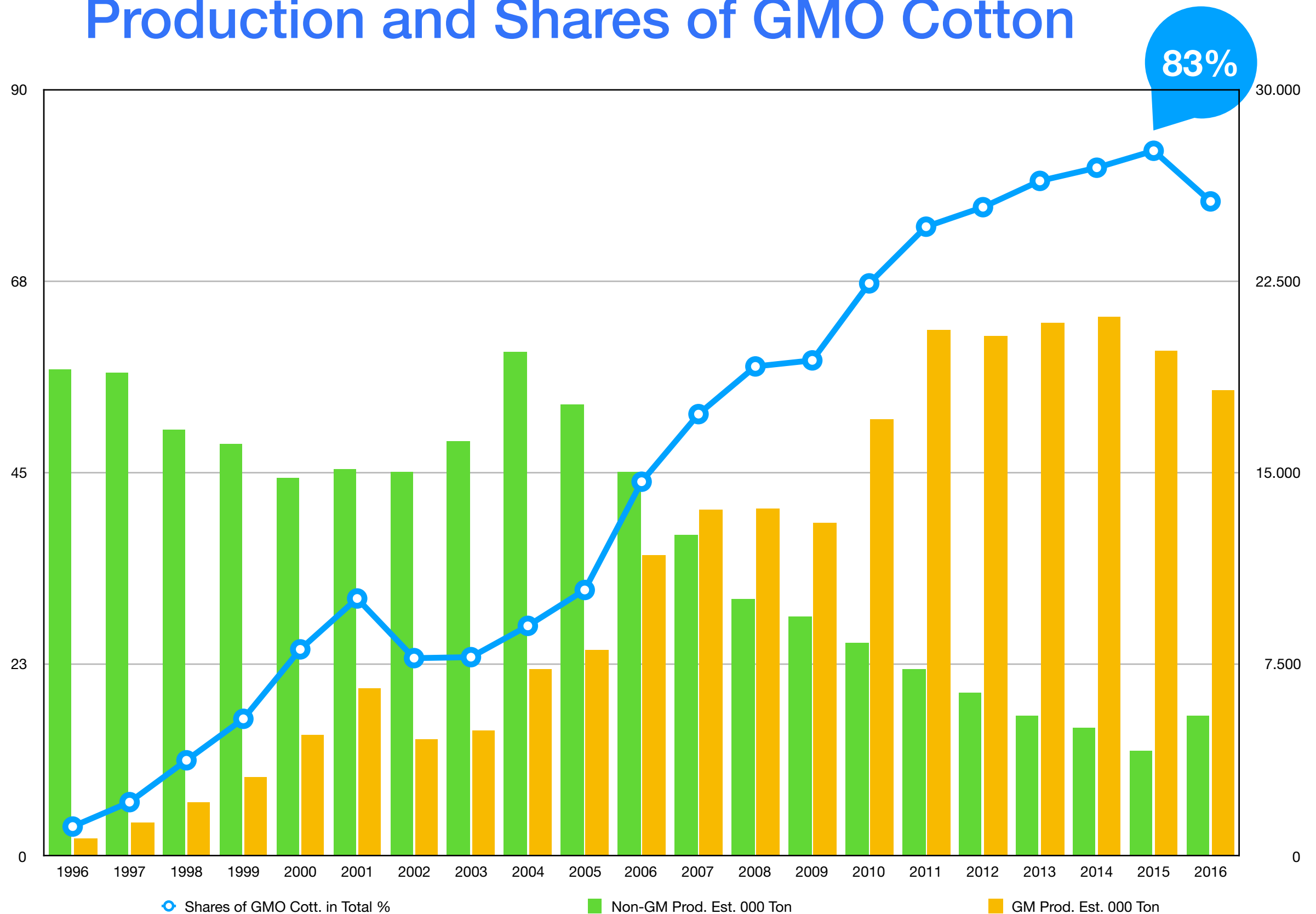
Period	Duration, years	Increase, %	Increase, kg/ha
1970-2013	43	1.82	6.74
1970-1995	25	1.85	6.80
1996-2013	18	1.79	10.5
2014-2017	4	-1.55	-12.46

Source: Calculated from the data of ICAC, World Cotton Statistics, Dec. 2015 (2016/17: forecast)

Global GMO&Non-GMO Cotton Areas and Shares of GMO Cotton



Global GMO&Non-GMO Cotton Production and Shares of GMO Cotton



Ü.Evcim: Global GMo and Non-GMO Cotton Production Experiences and Implications for the future. ICAC, 76th Plenary Meeting, Tashkent, Uzbekistan, 22-28, Oct. 2017

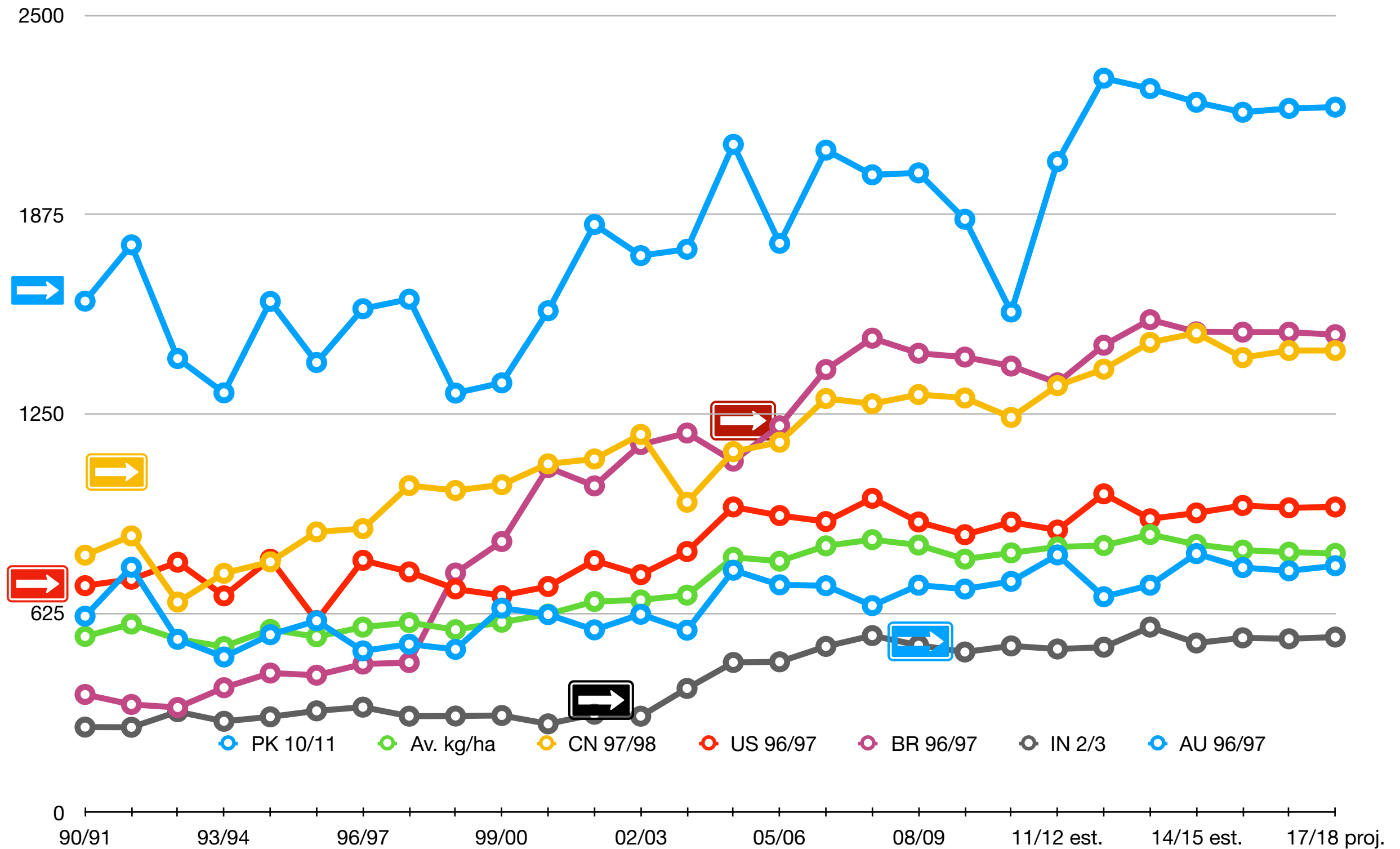
Global GMO&Non-GMO Cotton Production Experiences

Issues should be examined:

- **Yield & Lint Quality**
- Pesticide use/Insect Management
- Weed Management
- Economics (costs & private sector dominance)
- Human Health, Environment & Biosafety Regulations
- Gene Flow & Biodiversity
- Consumer Rights & Labeling
- Public awareness and participation

Major GMO Cotton Countries

Lint yields



***Which are the factors behind
these increases in the lint
yield?***

Or

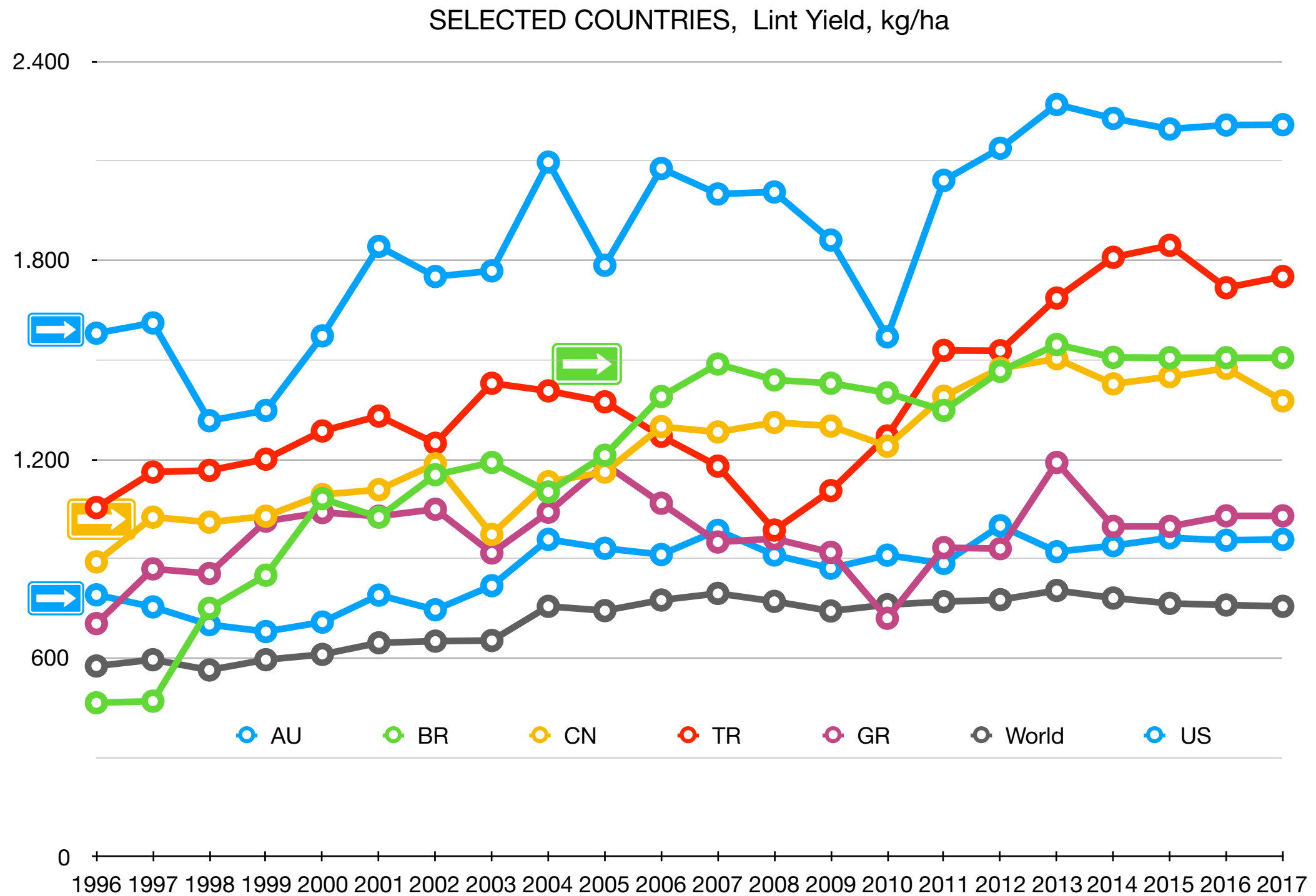
***Can these yield increases be
explained only by genetic
reasons?***

Role of GMO's on the yield increases:

- Acc. to **Meredith, 2006**:
 - no positive effect on basic yield and fiber quality
 - increased yields by reducing yield losses caused by the worm complex
 - back crossing method; the best expected performance same as they recurrent parents
- Acc. to **Bourland, 2005** and **Verhalen ,et al.2003**:
- expecting some transgenics to have some negative physiological effects on yield and fiber traits

If the yield performances of the GMO cottons are limited to those of the parents ones, why the it is preferred in the countries have no worm and/or weed complex ?

Lint yields of the selected countries & the World Average



Reasons for yield increase for record holder countries:

AUSTRALIA

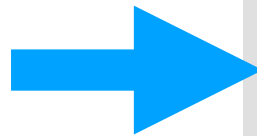
REASONS FOR YIELD INCREASE

Technologies for the 21st Century



K. R. Kranthi

Head Technical Information Section, ICAC



Precision Mechanization
New high yielding varieties
Optimization of plant density
Precision Technologies of IRM, IPM and INM
Outstanding application of science on the field

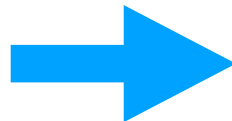
Reasons for yield increase for record holder countries:

Technologies for the 21st Century



K. R. Kranthi

Head Technical Information Section, ICAC



TURKEY

REASONS FOR YIELD INCREASE

Mechanization
New high yielding varieties
Technologies of IPM and INM
Availability of irrigation all through season ★
Increase in usage of good quality certified seeds



**IT IS ONLY VALID FOR SOUTH-
EAST ANATOLIA REGION!**

If it is possible to improve yield and product quality with high-yielding Non-GMO cotton varieties supported by new technologies such as IPM, INM, IWM; why will the high risks of GMO cotton be taken into consideration?

Fibre Quality

Transgenic Cotton and Fiber Quality

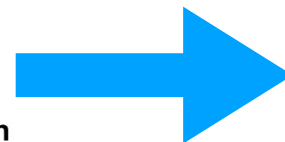
Part 1. Effect of Transgenic Technology

Andrew G. Jordan
Director, Cotton Foundation
National Cotton Council

Phillip J. Wakelyn
Senior Scientist
National Cotton Council

O. Lloyd May
Cotton Geneticist
University of Georgia

16th Annual EFS[®] Conference
9-11 June, 2003
Greenville, SC



No evidence was found in the public literature or in our analysis to support the notion that genetically engineering cotton has had a practical effect on lint quality. On the contrary, some experts point out the existence of the risk that the gm technology may adversely affect the quality of the fibre.

Fibre Quality

Burkinabè officials noticed declines in both staple length and ginning ratios during the first years of commercial release (31).

Monsanto officials were sceptical, suggesting that these initial declines in staple length and ginning ratios were due to exceptional water stress and other climatological variations(32).

But this deterioration in ginning ratios and staple length persisted over time.

African Affairs, 115/458, 161–172
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Advance Access Publication 4 January 2016

BRIEFING

BURKINA FASO'S REVERSAL ON GENETICALLY MODIFIED COTTON AND THE IMPLICATIONS FOR AFRICA

BRIAN DOWD-URIBE* AND MATTHEW A. SCHNURR

CAN GENETICALLY MODIFIED (GM) CROPS help smallholder farmers in sub-Saharan Africa? To date, only two GM crops – insect-resistant forms of cotton and maize – have made it into the hands of African farmers. Of these, GM cotton has the longest empirical track record, having been the first GM crop ever introduced in Africa, and the only one that has been grown in multiple countries – first South Africa, then Burkina Faso.¹ The performance of this crop has received intense scrutiny, as it offers the best indication of how the suite of other GM crops slated for commercial ap-

Fibre Quality

As a result;

Burkina Faso has begun a complete phaseout of GM cotton, citing the inferior lint quality of the GM cultivars as the reason for abandoning its cultivation.

Burkina Faso's phaseout could stall or even end negotiations to adopt GM cotton in other Francophone African countries with similar concerns over cotton quality.

***If GMO cotton cultivars do not
have any scientifically
approved positive effect on
lint quality yet,
would it be a right decision to
put existing quality at risk?***

Issues should be examined:

- Yield & Lint Quality
- **Pesticide use/Insect Management**
- Weed Management
- Economics (costs & private sector dominance)
- Human Health, Environment & Biosafety Regulations
- Gene Flow & Biodiversity
- Consumer Rights & labelling
- Public awareness and participation

Reduced Pesticide Use

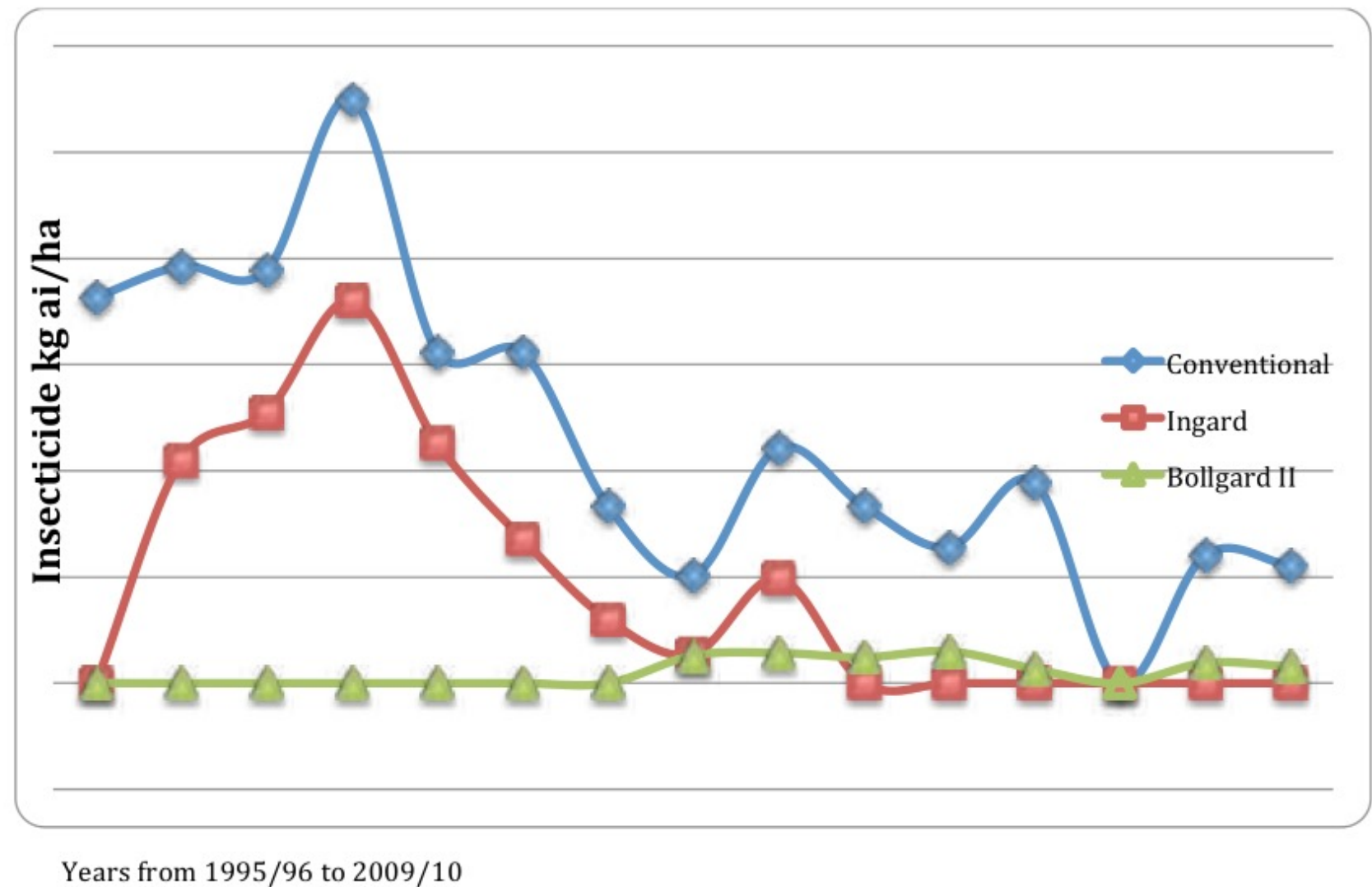
Figure 1. Insecticide use on conventional, Ingard® and Bollgard II® biotech cotton in Australia for 15 years from 1995/96 to 2009/10. Data from Knox *et al.* (2004), updated with recent industry surveys.



REPORT OF THE ROUND TABLE FOR BIOTECHNOLOGY IN COTTON

International
Cotton
Advisory
Committee

September 2013



Reduced Pesticide Use

All biotech cotton producing countries have reported some unintended consequences. **The most common problem is the development of secondary pests.**



As pesticide applications for lepidopteran species declines, secondary pests, which had previously been inadvertently controlled by these applications, have increased in numbers to become primary pests.

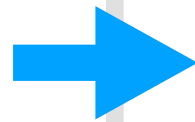
Problem of the rise in importance of secondary pest

Technologies for the 21st Century

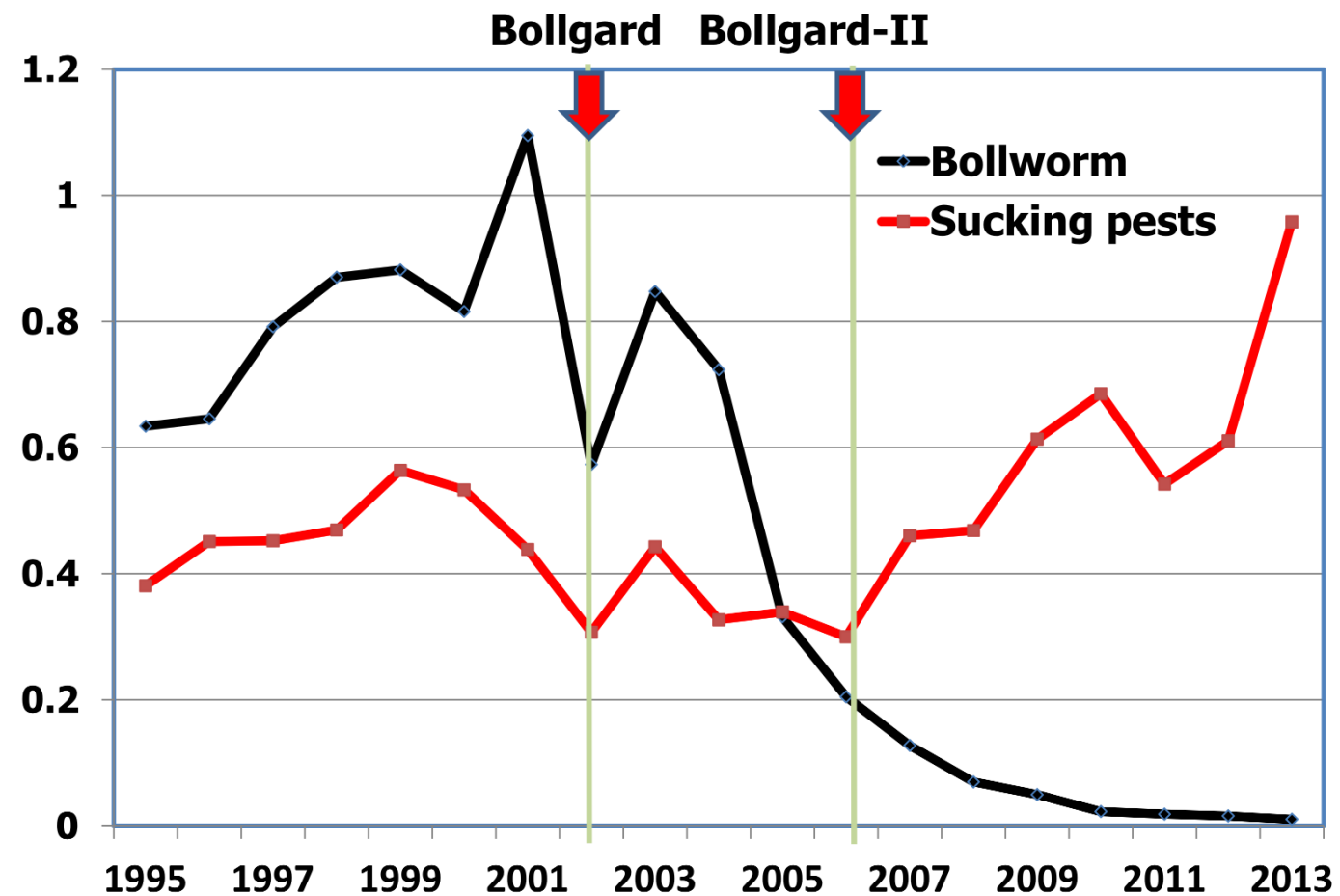


K. R. Kranthi

Head Technical Information Section, ICAC



Insecticides Kg/ha



Kranthi, CAI statistics and News 2014

*How accurate is it to undertake
the risk of the pest control
becoming more complicated in
a country*

*Where there is no pest
problem large enough to be
dissolved with GMO cotton?*

Issues should be examined:

- Yield & Lint Quality
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Cost of GMO & Non-GMO Cotton Production

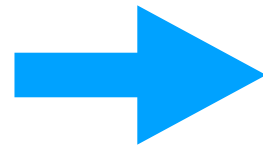
Pesticide Policy Project Publication Series
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Institute of Economics in Horticulture
Faculty of Business Administration and Economics
Universität Hannover, Germany

In cooperation with

Food and Agricultural Organization of the United Nations (FAO), Rome, Italy

**Comparative Analysis of the Economics of
Bt and Non-Bt Cotton Production**



This shows that the economic performance of a cotton crop is not only determined by genetic make-up but also the agro-ecological conditions under it is grown.

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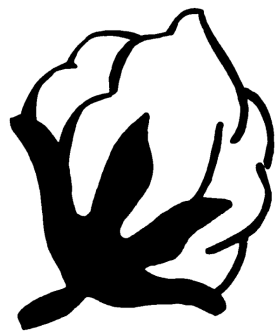
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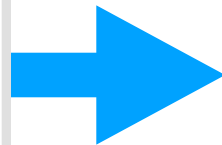
Cost of the Technology



REPORT OF THE ROUND TABLE FOR BIOTECHNOLOGY IN COTTON

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Most countries reported concerns about the cost of GM cotton seed, which is considerably more expensive than that of Non-GMO conventional planting seed.

Cost of the Technology

The private sector views biotechnology mainly as a source of income and a way to compete with other companies, and only secondly as a tool to solve problems.

COMMON FUND FOR COMMODITIES

Technical Paper No. 53



PROCEEDINGS OF THE

REGIONAL CONSULTATION ON GENETICALLY MODIFIED
COTTON FOR RISK ASSESSMENT AND OPPORTUNITIES
FOR SMALL-SCALE COTTON GROWERS
(CFC/ICAC/34FT)

National Institute for Biotechnology and Genetic Engineering
Faisalabad, Pakistan
March 6-8, 2007



The monetary intent is apparent from the technology fee, which varies from country to country for the same gene.

The fee is related not to the cost of development but to savings on insecticides used and the the financial conditions of farmers.

For this reason, the technology fee for the Bollgard gene is higher in AU than in the US. Also, the technology fee in AU has been changed more than once.”

Are yield increases and savings on insecticide chemicals large enough to offset the additional technology fee of the GMO seeds?

Issues should be examined:

- Yield & Lint Quality
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- **Gene Flow & Biodiversity**
- **Consumer Rights & Labeling**
- **Public awareness and participation**

Why Turkey has preferred to continue Non-GMO Cotton production only?

Main reasons:

- **Having satisfactory increasings in yield and crop quality**
- Not having serious and intricate pest complex including target pests of GM Technology
- **Weeds can be controlled mechanically with reasonable costs**
- The intention on developing National Institutional Capacity
- **Strategy to avoid foreign dependence on cotton,**
- Needs for public participation and protection against potential threats of the GM technologies
- **Loyalty to EU Biosafety legislation**

“GMO Free Cotton”

Labelling Initiative



GMO Free Cotton” Labelling Initiative

GMO FREE STANDARD

VERSİYON 1.1

EKİM 2011



Implications for the Future (Sustainability of the GMO & Non-GMO Cotton)

Recommendations:

- **All countries should be free to make their own decisions about GM cotton or other of modern biotechnology unconstrained by philosophical, ideological, political or economical pressures from outside.**
- For conservation and sustainable use of biodiversity,
 - **in a country that decides to produce GM cotton, it should not be recommended to continue producing non-GM cotton or organic cotton besides GM cotton.**
 - Similarly, in a country where non-GM or organic cotton production is decided, it is recommended that only these cotton varieties be produced, besides GM varieties not produced.
- **Voluntary labelling should be encouraged in cotton products made by GMO, Non-GMO and Organic cotton**

Recommendations:

- @ It is acknowledged that modern crop biotechnology involving complex systems have associated risks, in both technical and non-technical aspects.**
- @ The challenge is how to manage and minimize the risks so that the gains and benefits from the technology can be optimized.
- @ Broader public acceptance of biotechnology would require striking a balance between the risks and benefits associated with the application of the technology.**
- @ Communicating science-based information is necessary to build farmers' and consumers' confidence in biotechnology.
- @ Attention could be given to capacity building and sustaining investments in research and development, public and private sector partnership in research, and creation of policies and regulatory framework that optimize the use of biotechnology for increased and enhanced agricultural productivity.**

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THANK YOU FOR YOUR KIND ATTENTION

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