

**Potential Cotton Hybrids for Irrigated Production System**

**Introduction**  
 Potential for Cotton Production  
 Demand and Supply of Lint Cotton  
 Challenges and opportunities of cotton production  
 Potential Cotton Hybrids  
 Conclusion and Recommendations  
 ECPGEA

*Presented To*  
**11<sup>th</sup> Meeting of the Southern and Eastern African Cotton Forum**  
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**Introduction**

Cotton (*Gossypium spp. L.*) has been cultivated in tropical and sub tropical climates of the world.

- world's most important textile fiber crop
- Important oil seed crop after soybean
- As a multi-purpose crop it has many more uses

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**The Cotton Textile Value Chain**

Cotton Farming  
 Spinning  
 Kitting  
 Cotton Ginning  
 Transport  
 Finishing  
 Garment Manufacturing  
 Transport & Shipping

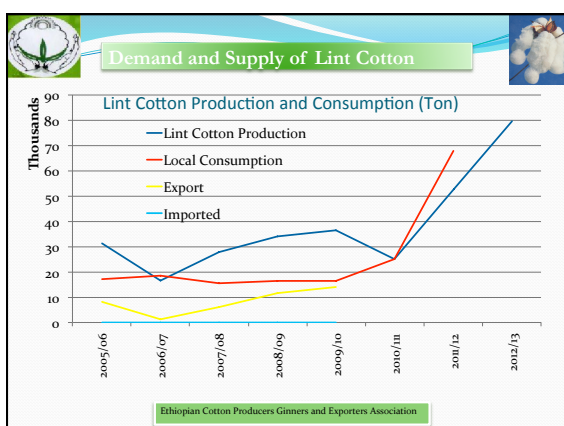
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**Ethiopia Geography**

**Land area:** 432,310 sq mi (1,119,683 sq km);  
**Total area:** 435,186 sq mi (1,127,127 sq km)  
**Population (2010 est.):** 88,013,491  
**Capital City:** Addis Ababa, 2,716,200  
**Monetary unit:** Birr

**Potential for Cotton Cultivation**  
 Land : 3.0 million Ha Suitable for Cotton  
 Water Resources:  
 12 River Basins, 10 Lakes  
 Surface Water 123 billion m<sup>3</sup>  
 Ground water over 90 billion m<sup>3</sup>  
 Manual and Trained Manpower: Abundant  
 Finance : Limited Project Financing Available from DBE  
 Market : Sizeable Internal market of 80 Million People and Proximity to major world Markets

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**Spinning Textile and Garment Factories in the Country**

Major Textile Factories	Level of Value Addition				Ownership	
	Yarn	Grey Fabric	Dyed Fabric	Garment		
Arba minch Textile	✓	✓			Private	Ethiopian
Awasa Textile	✓	✓			Private	Ethiopian
Adel Ababa Textile	✓	✓	✓	✓	Private	Ethiopian
Bahir Dar Textile	✓	✓	✓		Public	Ethiopian
Dire Dawa Textile	✓	✓	✓		Private	Ethiopian
Kombolcha Textile	✓	✓	✓		Public	Ethiopian
Alemeda Textile	✓	✓	✓	✓	Private	Ethiopian
Ayka Textile	✓	✓	✓		Foreign	Turkey
Adama Spinning	✓				Private	Ethiopian
Edget Textile (Sewing Trade)	✓	✓	✓		Private	Ethiopian
Eise Textile	✓	✓	✓		Foreign	Turkey
Saygin Dima	✓	✓	✓		Foreign	Turkey
MAA Textile & Garment	✓	✓	✓	✓	Private	Ethiopian
<b>Project Stage</b>						
Selendawa	✓				Joint Venture	Ethio-Turkey
Garment factories (38)						

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### Projected Five year Targets

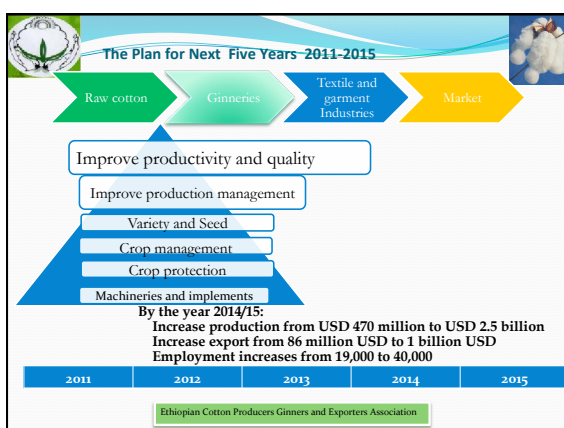
- **Productivity:** Current Average Productivity 17 Qt/ha to 25 Qt / ha a growth of 47%
- **Production: Seed Cotton** 129 ,000 MT to grow to 660,000 MT five fold growth
- **Production: Lint Cotton** 40,000 Ton to 241,000 MT a five fold growth
- **Area Currently** 110,000 Ha to 543,000 Ha a five fold increase
- **Ginning Capacity:** 30000 MT to 660,000MT

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### Requirements to Fulfill Projected Five year Targets

- **Finance:** An injection of 4 Billion USD
- **Seed:** 17,984 MT of Improved seeds
- **Land for Seed Production:** 29,973 HA
- **Additional Gineries:** 13 Saw Gin and 8 roller Gin (With annual capacity of 30,000MT or Equivalent)

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### Challenges

- **Market Constraints:**
- **Limited Contractual Production and marketing arrangement:**
- **Inadequacy of Support through Service Co-operatives:**
- **Input Price Escalation:**
- **Subsidy to Developed Country Cotton Farmers:**
- **Lack of Finance**
- **Environmental Issues:**
- **Inadequate infrastructure in cotton growing areas**

**BT Cotton:** Genetically modified Bt Cotton has reached more than half of the cotton plantation in the world. Ethiopia cannot afford to ignore the genetically modified cotton for cost and productivity and environmental reasons.

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### According to the estimates of International Cotton Advisory Committee (ICAC)

Trends for the year (2010/11) are supportive of cotton producers.

- Increase in Mill usage and low ending stocks of lint cotton worldwide are pushing prices to record high. It was encouraging and created a situation where cotton producers were benefited greatly.
- After a significant decline in international cotton prices during 2011/12 the forecast for 2012/13 world cotton may go down by 9% (24.7 million tons)

### The Ethiopian condition

- The establishment of new factories in the textile, garment and apparel sector in Ethiopia has created a huge demand for lint cotton, considered as the most important development affecting the sector.
- The textile garment and apparel sector in the country is growing at much faster pace than cotton production.
- **Urgent investment and support steps are expected to boost cotton production.**

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Although the country has a great potential to produce the cotton product the sector is currently besieged by various interrelated challenges.

- In general the production and productivity of cotton has been constrained by lack of pure seed of high yielding and widely adaptable varieties
- Lack of proper management
- Quality conscious demanded and market

Increased pressure is being placed on cotton breeders to develop cultivars that meet

- the requirements of growers for high yield potential and
- the demands of the textile industry for improved fiber quality.

Cotton breeders continue to explore ways to develop new genotypes to satisfy the present day needs of spinners.

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**Hybrid Cotton**

- The improvement of crop plants through the production of hybrid varieties is one of the major goals of breeding.
- Hybrid varieties have proved equally rewarding in pearl millet, sorghum, sunflower and several other field and vegetable crops.
- The potential benefits which accrue to farmers from the use of good quality seed of improved varieties include
  - ✓ Enhanced productivity, better adaptation, tolerance to environmental stress, higher harvest index, reduced risks from pest and disease pressure, improved product quality and higher profits.
- Eco-friendly technology
  - ✓ much of the recent productivity gains have come from vertical rather than horizontal expansion in crops

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**Previous Results**

- Intra-specific (*G. hirsutum* x *G.hirsutum*) hybrids gave yield advantage of 30% over the best check parent.
- 6.2 mm (21.8%) and 7.0 g/tex (39.1%) fiber length and strength advantage respectively without sacrificing current yield status of commercial cultivars (Zerihun et al, 2004).
- Indian intra-specific (*G. hirsutum* x *G.hirsutum*) hybrids under Ethiopian condition showed up to 50% yield advantage over the best check variety with equal performance of fiber quality parameters (Progress report 2005)
- None of the above mentioned advantages were transferred to commercial level under Ethiopian condition

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**Recent developments**

- Introduced seven inter-specific commercial cotton hybrids from Hazera Genetics Israel
- Their level performance under Israeli conditions ranges from 20 to 23 q/ha lint yield, 33 to 34 mm length and 33 to 37 g/tex fiber strength
- These levels of performance may boost simultaneous improvement of productivity and quality

**Objective:**

To test the adaptability, register the improved technology and improve the availability of cotton seed towards the improvement of cotton productivity, production, quality and supply of cotton and its products.


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**Material and Methods**

- **Test Materials:-** Seven introduced inter-specific cotton hybrids
  - Two upland (*hirsutum*) check varieties (Deltapine 90 and Stam-59A)
  - One potential long staple (*barbadense*) variety (HTO# 052)
- **Experimental Site:** Seven trial sites of three irrigated cotton growing regions of the country, Afar (Werer, Amibara and Gewane) Oromiya, (Upper Awash) and Sothern Nations and Nationalities (Arbaminch, Sille and South Omo Valley)
- **Design:** randomized complete block with three replications.
- **Data collection and observations:** Appropriate agronomic, crop protection practices, field evaluation and data collection and analysis were also implemented as per the schedule.

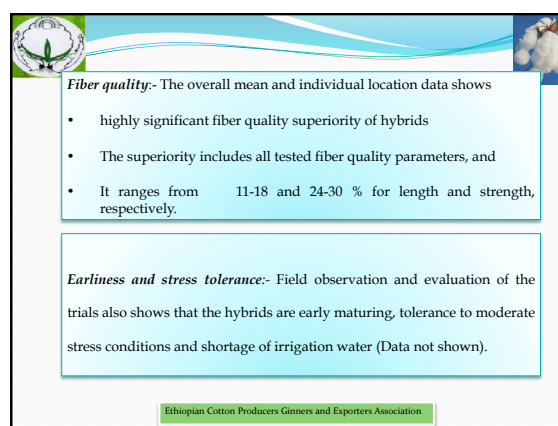
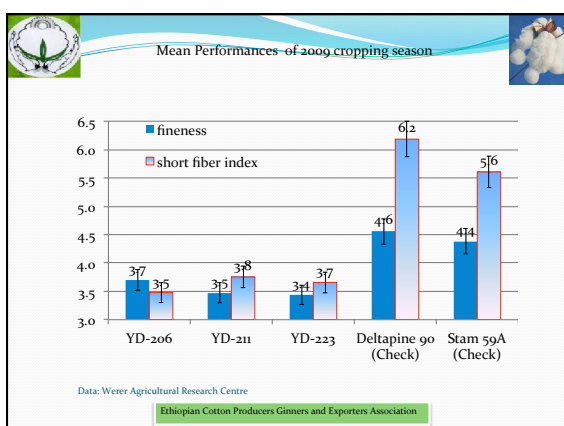
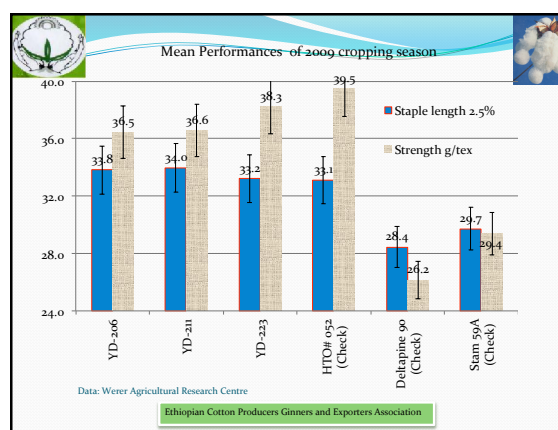
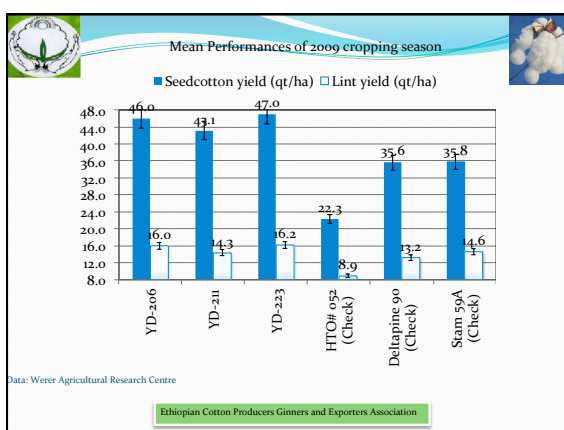
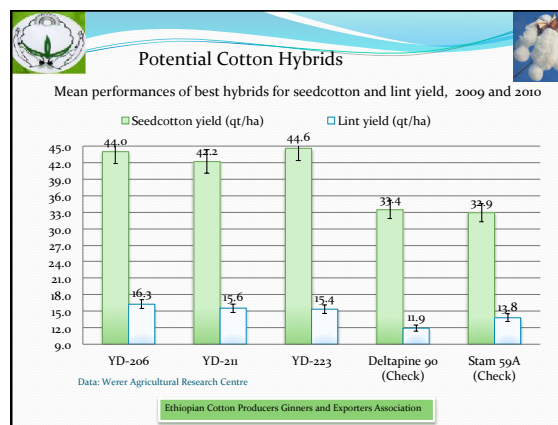
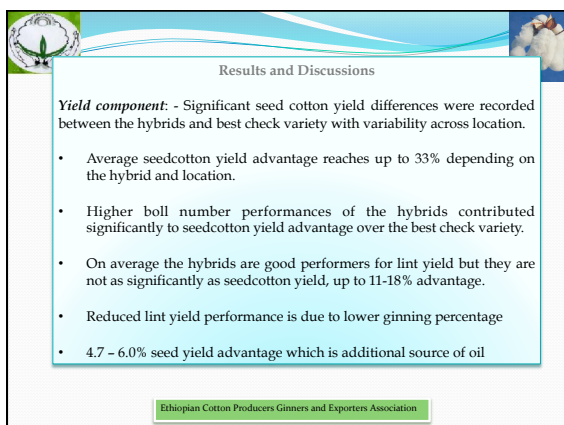
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**F1 Hybrid**



*G. hirsutum*      *G. barbadense*

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**Conclusions and Recommendations**

The results of the present study clearly indicated that the tested hybrids have significant advantage over the best check varieties

- The average level of fiber length and strength advantage reach 15.6% (4.5 mm) and 29 % (8.9 gm/tex), respectively.
- The yield component advantage also reaches up to 4.7, 18.0 and 33% (9.0, 2.5 and 11.2 qt/ha for seed, lint and seedcotton yield, respectively).
- Many more significant advantages for fiber fineness, short fiber index, earliness and stress tolerance.

**Challenges**

- Low seed yield with high costs of seed production.
- few roller ginneries in the country

Both conditions are an important policy improvement and potential investment opportunity areas.

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**Recommended for verification during 2009/10 and Registered on March 25, 2011.**

Advantages including quick development, vigorous seedlings, water use efficiency and higher tolerance to various types of stresses the hybrids registered for irrigated production system of rift valley.

- Due to the tendency of inter-specific cotton hybrids to grow at a higher pace and their efficiency in water use, adjustments in crop management should be made mainly to restrain vegetative growth when necessary
- Particularly, avoid excess watering and maintain the right balance between vegetative and reproductive development.

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- According to this study, cotton hybrids produced by crossing parent lines from the different species *G. hirsutum* and *G. barbadense* are the most promising in their potential for combined advantages of yield and quality.
- The great variation in traits between the two species increases the possibilities for heterotic effects in more traits bringing the following (already proven) desired advantages:
  - Strong vigor at early growing stages
  - High water use efficiency
    - Require less water (or tolerate large intervals between irrigations) High tolerance to drought and salinity
    - Efficient physiologic processes (Heterosis) and strong plant with deep root system.
    - Higher potential for yield under marginal growing conditions.
    - Superior fiber characteristics than usually found in the best Upland varieties.

Increased flexibility and probabilities for success under various growing conditions.

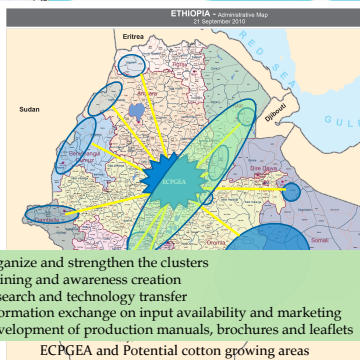
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Such information could be used to evaluate the economic feasibility of various methods of hybrid seed production.

The time has ripe to produce the first commercial long staple hybrid cotton under Ethiopian condition, expected to bring sustainability and satisfaction to the cotton grower and the textile industries.

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ETHIOPIA • Association Year 21 September 2010



Today, ECPGEA's has more than 52 members and 10 clusters.

The Membership is growing significantly and many companies in the Cotton and Ginning value chain are joining the Association, motivated by the basic commitment to serve all in the Industry.

ECPGEA members currently contribute more than 85% of the nation cotton lint and oilseed output.

Organize and strengthen the clusters  
Training and awareness creation  
Research and technology transfer  
Information exchange on input availability and marketing  
Development of production manuals, brochures and leaflets

ECPGEA and Potential cotton growing areas

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