The Future of **Organic** cotton, **GM** Cotton and **Hybrid** Cotton

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Organic Cotton

No GMO seed, No Synthetic fertilizers, No pesticide, No hormones (IFOAM-2016)

• Non-certified – Conventional cotton *(pre-industrial era)*
• Post Industrial – Conventional cotton- *(high inputs)*
• Better Cotton Initiative *(BCI)*
• Certified Organic cotton
• “In-Conversion “ cotton farmers

• **Main Players:** Cotton Connect (CC), Fair Trade, Cotton Exchange (CE), Laudes Foundation, Organic Cotton Accelator (OCA)
Present Status- Certified Organic Cotton

• Only 1 % of global cotton production-249,153 tons*
  (* Textile Exchange 2021-OC Market Report)
• OC Farms-229,280 ; Land- 588,425 Ha; Countries: 21
• Main Players: India, China, Kyrgyzstan, Turkey, Tanzania, Tajikistan, USA
• New Entrants: African Union, Pakistan
• EU countries promoting OC in developing countries
• “In-Conversion” Farmers are rising
Challenges - Organic Cotton

- Supply of Non-GMO seed
- Availability & Quality of Bio pesticides
- Availability of Quality Bio fertilizers
- Higher Certification Cost of Third Audit Party (Control Union,
- Issue of Premium (8-9% globally) to the farmers
- Linkage of industrial sector with farmers - (contract farming/Buy back guarantee)
- National government policy framework lacking
GM cotton

• Genetically engineered, Biotech, GMO, LMOs, GM, Bt cotton
• Land- 24 M Ha; Production 23.5 M tonnes; Countries-15
• Main Players: USA, Australia, India, China, Brazil, Pakistan
• New Entrants: Sudan, Nigeria, Kenya
• Technology developers: Private + Public Sectors
• Monsanto, Bayer Crop Sciences, Dupont, Poineer Hi-Bred, Syngenta, Mahyco, CAAS, Novartis
• Bollgard (I, II,III...), Roundup Ready (RR), Flex, Ingard, Wide strike
• 67 Events for Insect resistance, Herbicide tolerance, drought tolerance, fiber quality, oil quality (= no gossypol)
Challenges of GM Cotton

- Restricted Gene transformation technologies/monopolies
- Genotype dependent (Coker, Acala..)
- Less understanding of complex traits of fiber production, higher productivity
- Long & tedious Process of Approval and commercialization
- Concerns about Human, Animal and Environment health
- Unintended gene flow to non-GM plants (biodiversity)
- Development of Secondary pest, pest resistance, herbicide tolerance
- Potential Allergenicity
GM Approval & Commercialization in Kenya

• First Global Approval of GM cotton= 1996 (USA)
• Submission of Application in Kenya=2001
• Trials Completed= 2010
• Cabinet Approval= Dec 19, 2019
• Full Commercial Roll out= April 2020

Messages:

- Capacity building of HR, Infrastructure
- Adopt Gene Editing (NBTs, CRISPR-Cas9 etc.)
- *Political Will /Commitments-* (More investments in R &D)
- Adopt uniform and consistent guidelines for commercialization
- Awareness among farmers, policy makers, general public (consumers)
Hybrid Cotton

• Developed in India in 1970- Hybrid-4 (H-4)
• Based on *Heterosis*
• Slow adoption by farmers: 2002 < 50% ; 2011 >95%
• Productivity: base line of 122 Kg lint/ha to 290 (1992) to 500 Kg lint/ha (2011)
• (*Unlike of Corn and Rice----mega shift*)
• Highly labor intensive-25 M workers (mostly women) to get hybrid
• Mostly suitable for rain-fed areas (AP, MP, Karnataka)
• No prominent productivity edge in irrigated areas
Challenges of Hybrid Cotton

- Sole survival of hybrid cotton - **India**
  - 1128 hybrid cotton varieties (2012)
- China, Pakistan, USA quit - *Zero area under HC*
- Tall and bushy plants
- Can not be planted in large densities
- Low densities and prolong season
- Low harvest index
- Lack of modern technologies for hybrid seed development
- With eviction/ expiry of patents — Hybrid cotton on exit path in India
- Bleak future of hybrid cotton
Way Forward

• Sole/ combination choice depends on prevailing situation
• Prime task- Higher & Sustainable lint productivity (NF facing tough competition from MMF)
• 3Ps- Profitability for People and Planet (Nature plus)
• More investment in R &D by all governments
• Uniform and efficient approval system of GM cotton
• Adoption of NBTs for better productivity
• 2050- 9.6 billion people; double food production
• Cotton – Food, Feed & Fiber ‘a crop with multiple benefits and well placed in SDGs- global agenda