Global best practices for higher cotton productivity- Can India adopt and improve?

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Why India should increase cotton productivity

…to benefit farmers?

…to benefit Industry and other stakeholders?

…or to export raw cotton?

World cotton scenario

	Australia	Brazil	China	Egypt	India	Pakistan	United States	Uzbekistan	World
Area Harvested 1000 ha									
2000-01	510	853	4,058	223	8,576	2,928	5,282	1,425	32,012
2005-06	335	850	5,350	275	8,873	3,101	5,586	1,432	34,503
2010-11	580	1,400	5,250	157	11,140	2,800	4,330	1,350	33,730
2017-18	450	1,000	3,125	110	12,000	2,800	4,473	1,180	32,453
Production 1000 bales of 480 lb									
2000-01	3,700	4,312	20,300	965	10,931	8,379	17,188	4,400	89,111
2005-06	2,750	4,700	28,400	938	19,050	9,850	23,890	5,550	116,333
2010-11	4,200	9,000	30,500	550	27,200	8,640	18,102	4,200	117,640
2017-18	4,800	7,000	24,500	350	29,000	9,150	20,545	3,700	117,308
Lint Yield kg/ha									
2000-01	1580	1101	1089	942	278	623	708	672	606
2005-06	1787	1204	1156	743	467	692	931	844	734
2010-11	1577	1400	1265	763	532	672	910	677	759
2017-18	2322	1524	1707	693	526	711	1000	683	787

Source: USDA as on 19th August 2017

No doubt, Indian cotton productivity is very low, but…

are we deficit to meet domestic industries demand?

are we importing large scale raw cotton from abroad to meet industries demand?

Australia – best practice

- Just **1094 cotton farms** in Australia and average size of each farm is 495 ha.
- **100% Biotech cotton adoption.**
- Yield gain is attributed to **seed technology**
- Breeding **more lint/boll**
- Morphological change In plant-okra leaf

Australia – best practice

- Soil and leaf testing used to optimize and reduce fertilizer use
- Plant breeding responsible for 50% of the yield increase and rest 50% attributed to better water management
- 93% of farmers use IPM.

1998-2003	2008-2013
5.12 kg a.i. per ha	0.55 kg a.i. per ha
89% of insecticide reduction	

Australia – best R & D

- **R&D program support by cotton growers by paying levy of $2.25 per bale they produce and equally matched by the Australian Government.**

Farming systems
(soils, water, environment, pests)

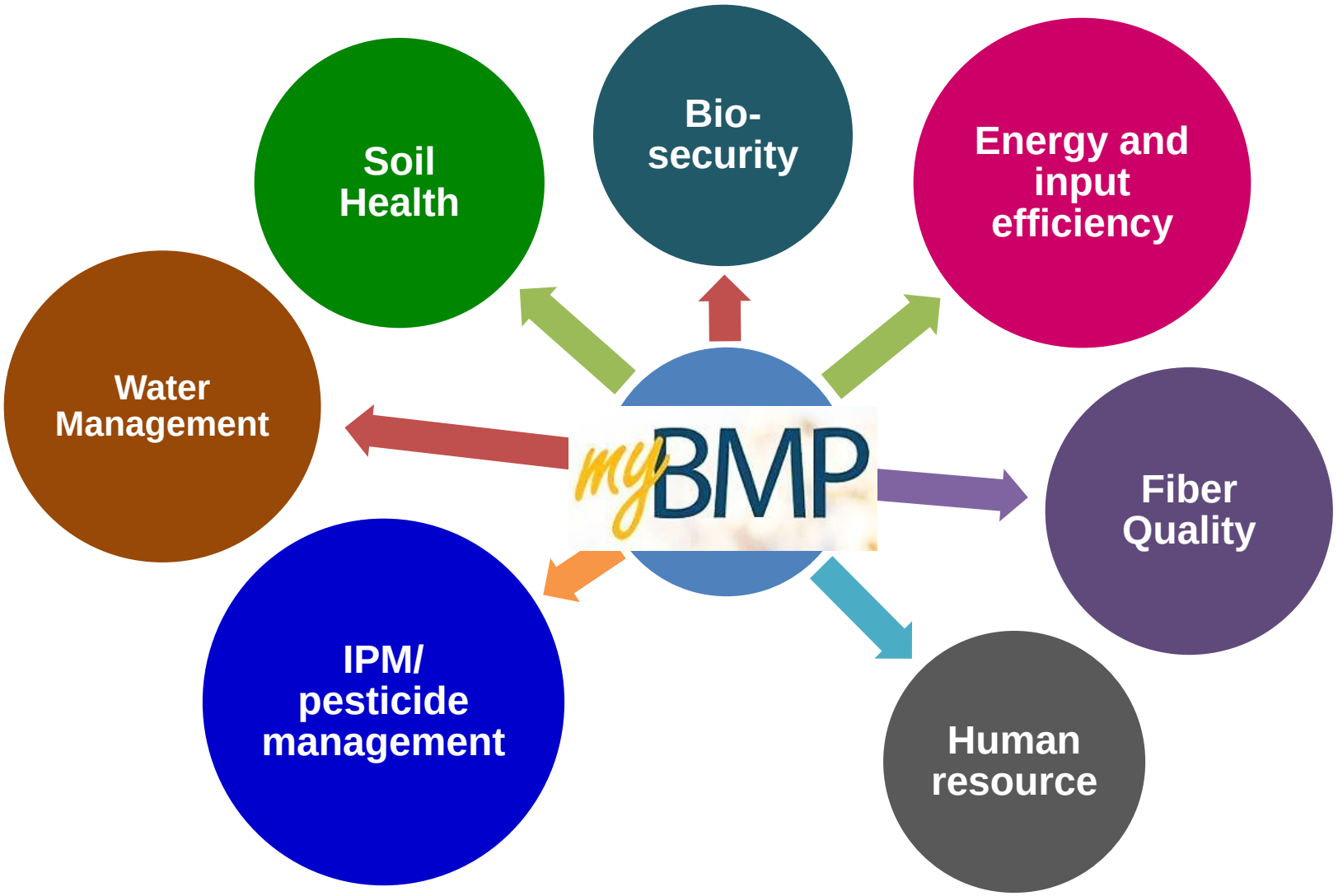
Human capacity
(retaining a strong workforce)

Research fund

Value chain
(ginning, processing, spinning, retail)

Biosecurity
(reducing the threat of pests and diseases)

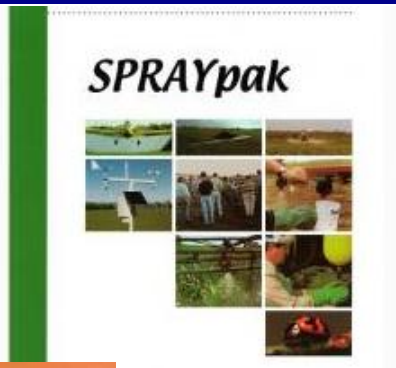
Australia – best extension practice

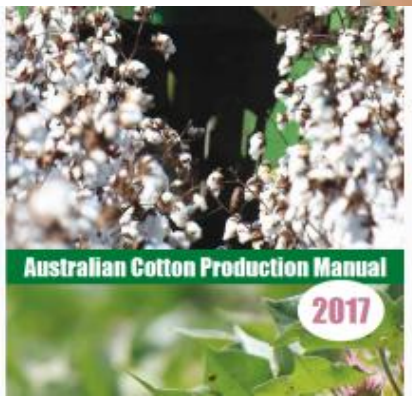


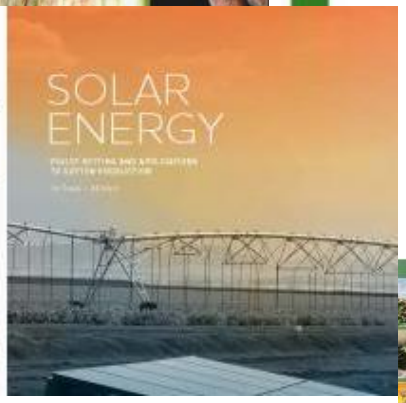
Australia – Connecting growers with research

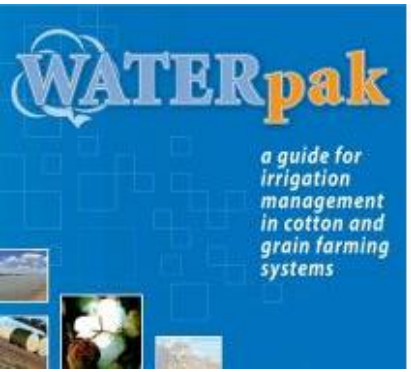
CottonInfo

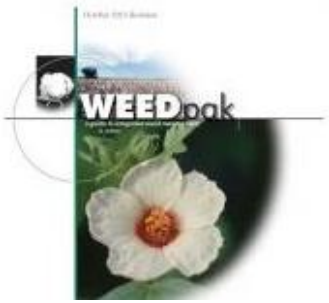
myBMP





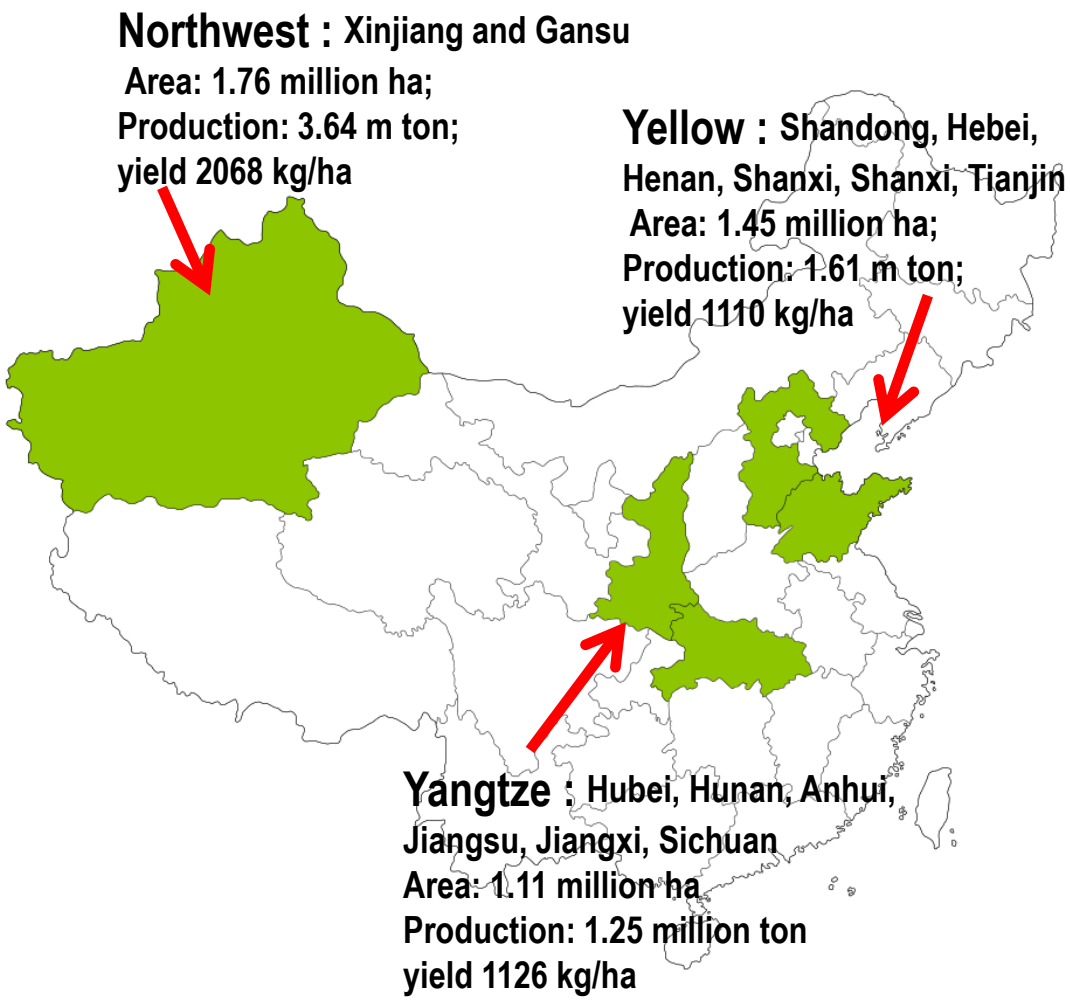






China – best policy practices

- Cotton production concentrated in the areas more favorable for cotton growth
- Average cotton crop area <0.5 ha per farmer and Farming activities are manual
- From 2008, the approved varieties were released in ideal production zones, rather than by province.



China – best cultivation practices

Intensive farming technologies and cultural practices.


Seedling nursery in the bed


Transplanting seedlings

- **Seedling transplanting**

Yield enhancement 20-30%; reduction in seed, irrigation, fertiliser, pest and disease.


Manual thinning of seedlings


Drip irrigation under plastic film

- **Plastic mulching**

Plastic mulching-drip irrigation-seedling transplanting : promote early maturity and increased lint yield.

Removal of film residual

If plastic mulching is used continuously for next 20 years at this rate, the residues will be 430 kg/ha.

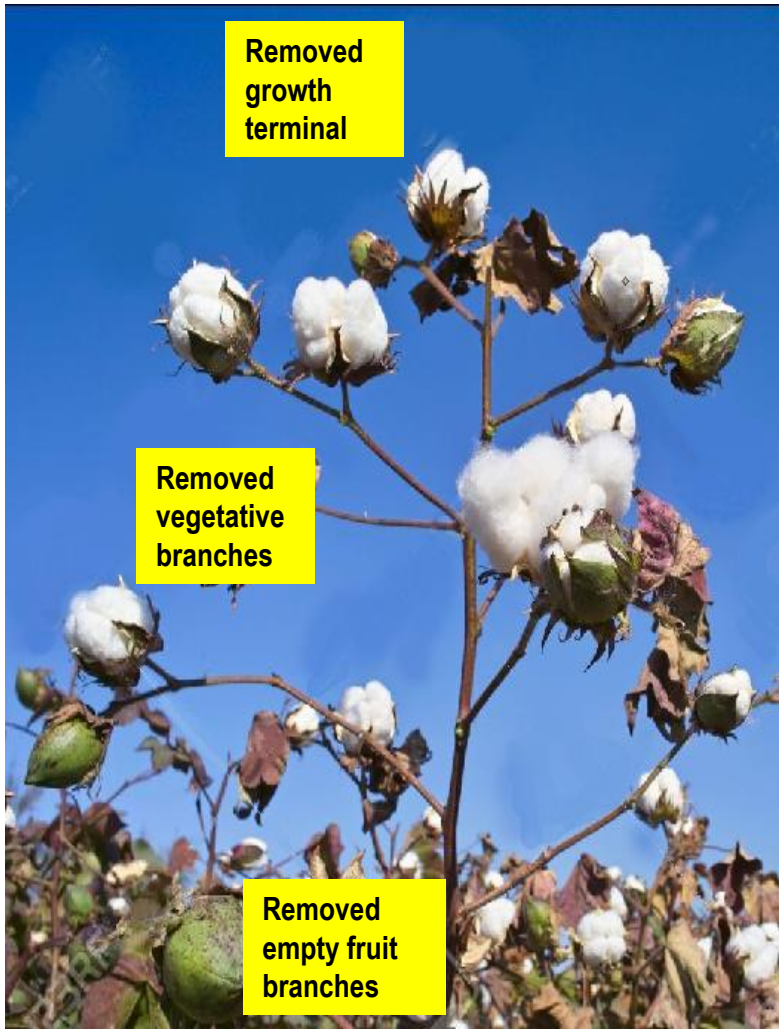
?

Threat

China – best cultural practices

- **Plant training**

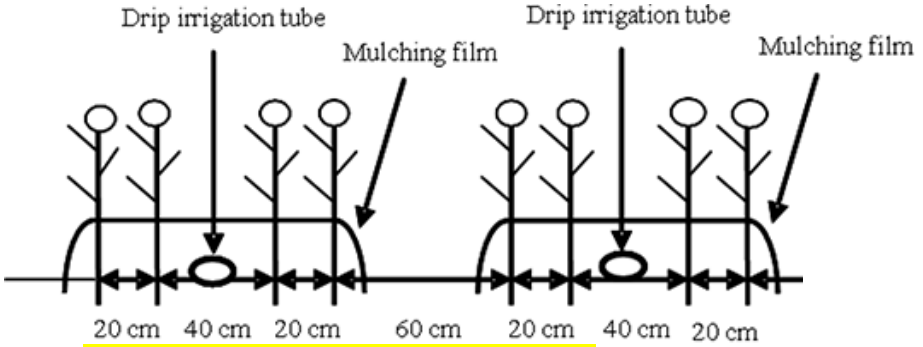
removal of vegetative branches, plant topping, removing old leaves and empty fruit branches



China – best technology practices

Super-high plant density technique – "short-dense-early (SDE)"

plant density :	200,000 to 300,000 plants
plant height :	60–75 cm
Plant type:	Early-maturity variety
Sowing :	Early planting
Early maturity:	Drip under plastic film mulching



Drip irrigation under plastic mulching


200,000 – 300,00- plant


70-75 cm plant height

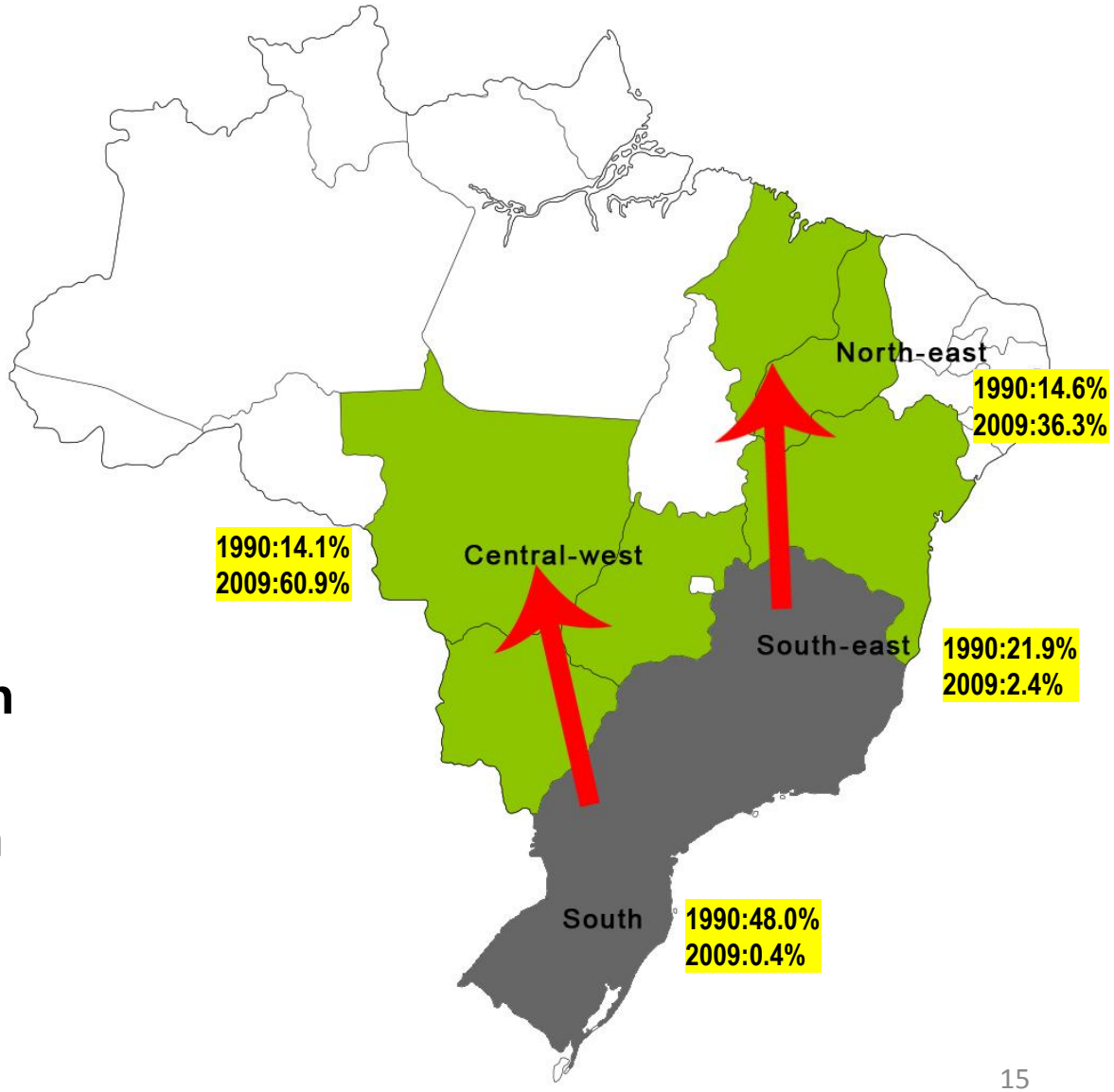

Drip irrigation under plastic film

Challenges

Plastic film, Chemicals	→	Soil pollution
Urbanization	→	Labor Shortage
Climate Change	→	Northward moving rainfall
Food crop area	→	Shrinking cotton area

Brazil – best policy practices

- **Cerrado (Central-west of Brazil) was regarded as unfit for farming "nobody thought these soils were ever going to be productive" *(Norman Borlaug, 2010).***
- **Poured huge quantities of lime**
- **no-till agriculture**
- **90% of the cotton production in Brazil, is in the Cerrado.**
- **GM Cotton introduced in 2006-07**



Brazil – best practices

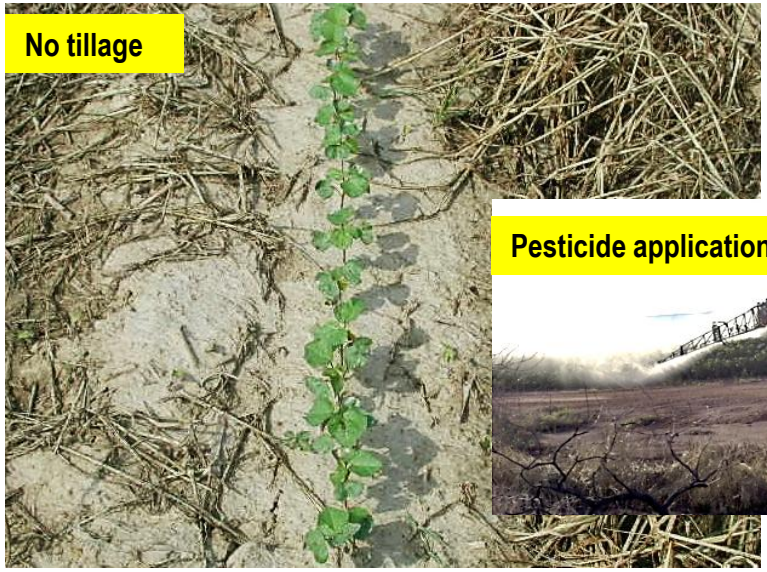
- **Compact genotypes- amenable to machine picking**
- **Cotton varieties (not hybrids) are cultivated**
- **Large scale farming**
- **Huge investment- large scale input management, high mechanization**

95% of cotton is produced on corporate farms in cerrado with average area around 1,000 hectares

- **45% of the cost of cultivation for chemicals and mechnisation**
- **80% of the cotton area, farming practices and harvesting are fully mechanized**

Brazil – best practices

- No tillage or minimum tillage
- Mechanization
- Management of plant growth and maturity
- Integrated pest management
- Fiber processing at the farm level



Brazil – best policy practices

Add value to produce

a cotton gin and fiber baling implements used to separating the lint from the seed at farm itself, and pack/sell it directly to the textile industry, increasing their income up to four times compared with conventional sales of cotton bolls.

"The goal was to teach them to live in a community and to walk with their own legs"
- Embrapa

Brazil – best cultures

Launched 2017

BRS 430 B2RF- 40%GOT; 4500 kg/ha;
BRS 432 B2RF- 42%GOT; 4500 kg/ha;
BRS 433 FL B2RF- 38%GOT; 4500 kg/ha; 32.5 mm SL; 34 g/tex strength

All GM cultures with Bollgaurd II Roundup Ready Flex. Introduction of BRS 433 FL B2RF will minimise import of long staple cotton from Egypt, US and Peru - Embrapa

Last decade: BRS 269; BRS 286; BRS 293; BRS 335; BRS 336

Varieties BRS 293 and BRS 286 well adopted in Cotton-4 countries of African - Mali, Benin, Burkina Faso, Chade

Variety BRS 335 well adopted in US- Georgia, Mississippi, Tennessee, Arkansas and Texas

Brazil – best cultures

Elite varieties of Brazil which made higher unit area production

Variety	SCY kg/ha	Lint percent	Lint yield kg/ha
BRS 286	4074	41.0	1670
BRS 293	4980	41.4	2060
BRS 335	4627	43.3	2008
BRS 336	3928	39.3	1549
BRS 369 RF	3852	42.6	1636
BRS 370 RF	3831	42.9	1639
BRS 430 B2RF	4500	40.0	1800
BRS 432 B2RF	4500	42.0	1890
BRS 433 FL B2RF	4500	38.0	1710

Brazil – best policy practices

Challenges

- **Boll weevil and cotton bollworm**
- **Escalating costs of production**
- **Fungal diseases**

No doubt, Indian cotton productivity is very low, but…

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Indian cotton scenario

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Total supply	36,899	40,549	39,119	42,795	40,959	39,886	37,944	41,594
Imports	200	600	1,187	675	1,226	1,072	2,700	1,300
Exports	5,000	11,080	7,761	9,261	4,199	5,764	4,550	4,300
Domestic Consumption	20,550	19,450	20,750	22,750	24,500	24,250	23,500	24,500
Ending Stocks	11,549	10,619	11,795	11,459	13,486	10,944	12,594	14,094
Yield (kg/ha)	532	518	517	577	500	483	560	526
Import to TS (%)	0.54	1.48	3.03	1.58	2.99	2.69	7.12	3.13
Export to TS (%)	13.55	27.32	19.84	21.64	10.25	14.45	11.99	10.34
Dom. Cons. to TS(%)	55.69	47.97	53.04	53.16	59.82	60.80	61.93	58.90
Ending stock to TS (%)	31.30	26.19	30.15	26.78	32.93	27.44	33.19	33.88

Quantity in 1000 bales of 480 lb

Source: USDA as on 19th August 2017

Concern on increasing the cotton productivity…

Pushing the farmers to increase the input use and equally degrading the environment?

More productivity led to less market price for farmers

Some benefits to industries not the farmers

Doubling farmers income…

Increase the productivity by decreasing the cost of cultivation

Producing good quality cotton to fetch premium price for farmers

Technologies – an analyses

- **Straight variety (not Hybrids) (Australia/Brazil/China)**
- **Releasing cultivars for the ideal agro-ecological zone (China)**
- **Compact genotype with in-built trait of early maturity under drip and along with destruction of terminals, topping, etc for HDPS (China/Brazil)**
- **Nutrient & Water Management (Australia - China)**
- **Mechanization – (Australia/Brazil)**

Technologies – an analyses

- **New and effective molecules for sucking pests (Australia/Brazil/China)**
- **Refinement of IPM to emerging pest scenario**
- **Value addition to produce at farm level (Brazil)**
- **Pockets should be identified for quality cotton cultivation**
- **Corporate farming – not feasible (Australia/ Brazil)**
- **Better extension tools (Australia/Brazil)**
- **Research support & International Collaboration (Australia/Brazil)**

No dearth of cotton production and protection technologies domestically or globally…

but not all the technologies will be viable for all socio-economic and environment conditions.

Cotton - yes, cash crop, yet not best return of cash to Indian Farmers…

Thank you…