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The Impacts of Stagnant Cotton Yields: They Affect More Than Just Farmers

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GUEST COLUMN

In round numbers, the world cotton yield rose from 200 kilograms of lint per hectare in the 1950s when almost all production was still organic, to 400 kilograms of lint per hectare in the 1980s to 600 kilograms in the 1990s and to nearly 800 kilograms by 2007/08. However, the world yield has trended lower since 2007/08 and is estimated at only 770 kilograms per hectare in 2013/14. Agriculture, including cotton, seems to have entered an era of technology consolidation during which new, breakthrough technologies are being developed but have not yet reached the stage of commercial application. This period of technology consolidation and stagnation in yields is expected to last through the rest of the current decade.

Farmers are responding to this challenge by shifting from production strategies aimed at maximizing yields tostrategies aimed at cost minimization. Farmer's objectives are shifting from maximizing gross returns through intensive input applications to achievehigher yields to maximizing net returns by maintaining yields while reducing costs through lower input applications.

In developed countries with capital-intensive production systems, farmers are adopting precision input application systems to eliminate or reduce the overuse of fertilizer, herbicide, insecticide and seed. They are installing irrigation systems that minimize water use, and buying larger, more powerful and more complex equipment to reduce labor use. In smallholderagriculturalsystems,farmersarereducing insecticide applications and perhaps also fertilizer use, and even in developing countries, farmers are experimenting with mechanical harvesting to reduce labor requirements. The mechanical harvesting aids range from one and two-row cotton pickers to pull-behind cotton strippers to hand-held cotton vacuum machines that pick bolls off plants.

Other stakeholders in the cotton value chain are also being affected by the stagnation in cotton yields, including input suppliers, gins and warehouses, and cotton merchants and spinners. The cotton industry as a whole is being affected by the loss of market share to polyester caused by slow growth in cotton production and yields. A likely result of the stagnation in cotton yields will be continuing consolidation among gins, merchants and textile mills.

Using the United States as an example of consolidation among gins, since 1990, the number of operating gins in the United States has fallen from about 1,500 to approximately 700, meaning that the average volume per gin has increased from 2,240 tons of lint per year to 4,900 tons.

There are currently 10 international merchants with annual volumes of more than 200,000 tons. This group together traded an estimated 6.3 million tons, or 25% of world production in 2012; the average volume of each of the 10 merchants was 635,000 tons. In 1994, there were 19 companies with annual volumes of more than200,000 tons, and the 19 companies together accounted for 6.8 million tons, or 36% of world production. The average volume handled by each of the 19 companies was 360,000 tons.

Consolidation among gins and merchants is likely to continue. Economies of scale in ginning areleading to reduced overhead, labor and energy use per ton of lint produced, and economies of scale create advantages in access to information and capital and the ability to handle logistics efficiently. These economies of scale will push gins and merchants to increase their sizes. Some merchants will exit cotton trading.

Competitive pressures may force some cotton marketing cooperatives to expand their memberships to include farmers in other countries. Cotton marketing cooperatives may also start merging with grain and oilseed marketing cooperatives to spread risk across commodity groups and to achieve economies of scale to compete with international merchants who already operate worldwide in multiple commodities.

Weak economic growth and continued high unemployment this decade in the United States, Europe and Japan are promptingsimulative economic polices that are resulting in continued low real interest rates. Low interest rates will encourage farmers to emphasize capital-intensive agronomic practices at the expense of labor-intensive practices. Accordingly, investments in everything from automatic irrigation systems to larger and more automated machinery will reduce employment in the cotton sector worldwide during this decade.

Because of competitive pressures in the cotton value chain from farmer to consumer, inefficiencies in cotton processing and handling will be squeezed. More cotton producing countries will be adopting instrument-testing systems, and 100% HVI testing of ginned cotton will become the norm around the world.

Merchants will advocate for harmonization of phytosanitary certificates required for trade in cotton and for universal acceptance of electronic documents for clearing cargoes. Currently, various importing countries require at least 35 different phytosanitary certificates for cotton, and port officials in many countries still require hard copies of documents. These inefficiencies will slowly be reduced.

As a result of pressures to reduce costs there will be a tendency to harmonize the rules for trade in cotton, and by the end of this decade only the rules issued by the International Cotton Association (ICA) in Liverpool and the China Cotton Association (CCA) in Beijing are likely to be in wide use for international trade.

In such an environment of intense cost pressures, collaboration and transparency will become ever more crucial in determining the success of the cotton industry. I very much appreciate the role of the Cotton Association of India and its flagship publication, Cotton Statistics and News, in helping to raise awareness and provide information about the Indian cotton sector.

Frequently Asked Questions About Biotech Cotton II

(ICAC Recorder)

(Continued from issue No.16....)

What Are the Expected Benefits of Biotech Cotton?

The primary objective of insect-resistant biotech cotton is guaranteed control of target insects and, in the case of herbicide-tolerant biotech cotton, protection of the plant against damage when herbicide is sprayed over the crop. Furthermore, better insect control through biotoxins has the potential to bring additional advantages in the form of lower production costs (due to reduced insecticide use), higher yields (due to better insect/weed control), better grade/quality (due to less bollworm damage resulting in less spotty cotton), better biological control and other benefits under specific growing conditions. The only common benefit, which in the long run is more significant than all the others, is the reduction of the environmental impact.

- **Cost of Production**

Back in 1994/95, the ICAC Survey on the cost of production of cotton showed that, on the basis of world averages, of the 93 cents it cost then to produce a kilogram of lint, 21 cents (i.e., 23%) were spent on insecticides. Twenty-one cents on insecticides was almost as much as the harvesting costs and greater than the cost of any other single input or operation needed to produce a kilogram of cotton. The ICAC survey is undertaken every three years, and the latest data for 2009/10 showed that only 14 cents (12%) out of US$1.22 were spent on insecticides to produce a kilogram of lint. Insecticides are expensive and biotech cotton, along with other components of IPM, definitely contributed to lower insect control costs in the world. Herbicide-tolerant biotech cotton is grown on a much smaller area than insect-resistant biotech cotton, and the cost of weeding has increased by almost three fold during the same period mentioned above. The current cost of weed control and fertilizers stands at 23% each, thus making it imperative to find ways to lower the cost of weeding and fertilizing. Rising production costs per kg has become a major concern in the last few years because cotton yields have stopped increasing. The world average yield in 2007/08 was 793 kg/ha and since then it has fallen. ICAC estimates for the next few years also indicate that the average world yield will not be greater than 765 kg/ha. Pest pressure and the number of sprays needed per season to control target pests, plus the cost of pesticides, weighed against the cost of technology fees, will determine the extent of savings on the cost of production. However, if the target bollworms do not become a major threat in a particular country or in a given season, and a grower has already paid the technology fee, savings on the cost of production might even be negative.

• Higher yield

The yield issue has been discussed in detail before. Biotech cotton should not be planted exclusively to improve yields. The overriding consideration and the primary objective must continue to be pest control.

• Improved biological control

The biotech toxin in insect-resistant cotton is harmful to insects having mid-gut receptors. The toxin is not harmful to natural predators and parasites, and a reduced use of disruptive pesticides will facilitate the development of populations of beneficial insects in the fields. IPM involves a multidisciplinary approach that minimizes the use of dangerous chemicals allowing them to be applied over long periods of time. According to one of the first definitions of IPM, "The IPM program ... [gives] farmers the tools to make their own informed decisions, so they do not waste their resources, risk their health, harm their crops, or damage the environment." Biotech cotton fits in the system perfectly as a strong component of IPM.

• Better grade

Color grade is determined by the degree of reflectance (Rd) and yellowness (+b). Reflectance indicates brightness and the yellowness of cotton depends on the degree of color pigmentation. Many factors can affect the color of cotton, including rainfall (particularly after boll opening), frost, fungi and contamination with trash, but the most important factor affecting yellowness is spotting due to bollworm damage. Production of spotted cotton is directly proportional to bollworm damage in the field. Biotech cotton is reported to yield a better grade due to lower bollworm damage.

• Environmental safety

Global warming and environmental pollution are detrimental to the environment. The use of chemicals for plant protection, measured in terms of dollars spent, has been on the decline for many years. Cotton's share of plant protection chemicals has declined at a faster rate than that of other crops, but in absolute terms, cotton still consumes more pesticides than other field crops.

What About Targeted Insects Developing Resistance to Biotech Cotton?

Helicoverpa armigera, Pectinophora gossypiella and Helicoverpa zea are the three major bollworms affecting cotton and they are known by different names in different regions and circumstances. For example, H. zea is also common on other crops where it is known by different names: corn earworm, on corn; sorghum headworm, on sorghum; soybean podworm, on soybean; tomato fruitworm, on tomato, and others. This wide range of hosts, together with the sequence of crops on which the biotech toxins are used to target insects over a single growing season, have a meaningful influence on possible development of resistance to the biotech toxins expressed in Bollgard and Bollgard II cottons, and in other biotech crops. This polyphagy creates seasonal developmental scenarios where a limited number of generations may not be exposed to the transgenic toxins. The use of similar Bt toxins in biotech corn, soybean and cotton subjected target pest populations to multiple selection exposures within any given year. Commercialization of more biotech crops carrying the same Bt genes is only going to increase the risk of developing resistance to the toxins. In 2005, an alternate dual-gene technology known as WideStrike™ became available from Dow AgroSciences. While varieties with Bollgard II® or WideStrike™ technology provide very good control of caterpillar pests, they do not offer 100% control of bollworms. If dual gene technologies such as Bollgard II® or WideStrike™ had not been introduced, most of the targeted insects would have developed resistance to the single Cry 1Ac gene. In the beginning, refuge requirements were strictly recommended and generally followed in most countries. Since then, refuge requirements have been relaxed, in some cases, and amended in others, based exclusively on field experience. Whatever measures may be undertaken, the target bollworms still have the potential to develop resistance to the toxins in biotech insect-resistant cotton. Refuge requirements, stacked genes and various other strategies will be necessary to delay the development of resistance.

What About Weeds Developing Resistance to Herbicides?

Herbicide-tolerant biotech cotton has gone through four important developmental stages.

• The first herbicide-tolerant biotech cotton was approved for commercial production in the USA as BXN™ in Mayof 1995; that was even before the insect-resistant biotech cotton. The BXN™ gene that conferred resistance to the herbicide Buctril (bromoxynil) was "nitrilase" from Klebsiella pneumoniae subsp. ozaenae. Buctril™ 4EC (Bromoxynil) herbicide and the patented BXN™ cotton system allowed growers to effectively control commonly occurring broadleaf weeds in cotton from emergence until 75 days before harvest. Nitrilase gives cotton the ability to metabolize the bromoxynil herbicide while the weeds will normally be killed in 2-3 days. BXN™ could be sprayed together with Buctril compounds a maximum of three times from emergence up until 75 days before harvest.

• The second stage came with Roundup Ready® biotech cotton, approved for commercial cultivation in the USA in 1997/98. The mode of action of glyphosate lay in the inhibition of an enzyme (5-enolpyruvylshikimate-3 phosphate (EPSP) synthase), which is a key catalyst in the production of aromatic amino acids. The use of Roundup on Roundup Ready® cotton increased broad-spectrum weed control, minimized competition from hard-to control annual and perennial weeds, and simplified weed management.

• The third stage was Liberty Link® herbicide-tolerant cotton from Bayer Crop Science, approved for commercial cultivation in 2004. Liberty Link varieties were resistant to Ignite herbicide also called Liberty®, Finale® and Rely®. The chemical name for Ignite is glufosinate ammonium, so any chemicals containing glufosinate ammonium may be sprayed over the top of the cotton plant until 70 days prior to harvesting.

• Roundup Ready® Flex biotech cotton, approved in 2006/07, is the fourth and latest stage in herbicide tolerant biotech cotton.

The first report on the development of resistance to herbicides by weeds was published over half a century ago, so the fact that a weed developed resistance to a herbicide (in biotech cotton) was no surprise to researchers. There are many reports on the inception of resistance but the development of resistance by Palmer amaranth to glyphosate has been confirmed. As a post emergence chemical herbicide, glyphosate controls only emerged weeds and does not stop new weeds from emerging. This means that multiple applications of chemicals are required to have season-long weed control. Initially, Roundup Ready biotech cotton limited the use of glyphosate products to only the four-leaf stage, which means that only a limited number of applications could be made in a single season. A much wider window, in the form of Roundup Ready Flex, paved the way for multiple applications of glyphosate, which meant more frequent use of the same chemicals in a single season and the ensuing likelihood of faster development of resistance. A number of other weeds have already developed resistance to glyphosate and a few more are on the verge of reaching the resistance stage. Thus the risk of resistance is very serious and must be dealt with through an alternation of chemicals with different modes of action.

(To be continued....)

Weekly Percent Departures of Rainfall - Monsoon 2013

LEG: EXCESS | NORMAL | DEFICIENT | SCANTY | NO RAIN

S. No.	WEEKS ENDING ON ---> MET. SUBDIVISIONS	19 JUN 2013	26 JUN 2013	03 JUL 2013	10 JUL 2013	17 JUL 2013
1.	ORISSA	79%	53%	-63%	-42%	-8%
2.	HAR. CHD & DELHI	434%	-89%	-64%	-7%	-67%
3.	PUNJAB	854%	-67%	-14%	4%	-73%
4.	WEST RAJASTHAN	332%	-90%	-78%	-19%	-53%
	EAST RAJASTHAN	196%	-31%	1%	60%	13%
5.	WEST MADHYA PRADESH	268%	50%	107%	40%	58%
	EAST MADHYA PRADESH	166%	58%	185%	-42%	30%
6.	GUJARAT REGION	282%	-73%	-78%	37%	85%
7.	MADHYA MAHARASHTRA	136%	-9%	-46%	-18%	44%
	MARATHWADA	25%	27%	-27%	18%	119%
	VIDARBHA	314%	122%	-40%	-12%	116%
8.	COASTAL ANDHRA PRADESH	-42%	-7%	-77%	43%	78%
	TELANGANA	73%	5%	-59%	8%	116%
	RAYALASEEMA	-89%	-33%	-69%	56%	29%
9.	TAMILNADU & PONDICHERRY	-6%	56%	38%	-21%	-30%
10.	COASTAL KARNATAKA	38%	3%	21%	32%	-10%
	N. I. KARNATAKA	-43%	-11%	-51%	-10%	62%
	S. I. KARNATAKA	22%	32%	0%	21%	0%

Note: Rainfall Statistics given above is based on real time data receipt and is subject to be updated
(Source: India Meteorological Department)

Data of registration of contract for export of cotton yarn

Month	Quantity in Million Kgs.
Apr'2011	71.36
May 2011	63.19
Jun'2011	54.079
Jul'2011	57.212
Aug'2011	97.734
Sep'2011	77.157
Oct'2011	43.69
Nov'2011	76.362
Dec'2011	83.005
Jan'2012	79.148
Feb'2012	60.518
Mar'2012 (Provisional)	64.227
Apr'2012(Provisional)	62.811
May 2012(Provisional)	74.455

Month	Quantity in Million Kgs.
Jun'2012 (Provisional)	82.419
Jul'2012 (Provisional)	94.507
Aug'2012 (Provisional)	83.055
Sep'2012(Provisional)	64.269
Oct'2012 (Provisional)	94.462
Nov'2012 (Provisional)	100.769
Dec'2012 (Provisional)	100.778
Jan'2013 (Provisional)	117.143
Feb'2013 (Provisional)	103.955
Mar'2013 (Provisional)	88.685
Apr'2013 (Provisional)	115.960
May 2013(Provisional)	90.152
June 2013(Provisional)	142.297

(Source: Directorate General of Foreign Trade)

Update on Cotton Acreage (as on 18.07.2013)

Sl. No	States	Normal of Year*	Normal on Week**	Area Sown (During the corresponding week in)	
				2013	2012
1	2	3	4	5	6
1	Andhra Pradesh	20.09	13.39	15.2	13.65
2	Gujarat	26.97	18.41	24.57	13.39
3	Haryana	5.82	5.19	5.56	5.15
4	Karnataka	5.28	2.48	3.37	1.83
5	Madhya Pradesh	6.55	5.83	6.16	5.73
6	Maharashtra	40.71	35.27	36.34	34.74
7	Orissa	0.98	0.78	1.05	0.93
8	Punjab	5.24	5.5	5.05	5.16
9	Rajasthan	4.18	3.2	2.89	2.8
10	Tamil Nadu	1.28	0.1	0.03	0.06
11	Uttar Pradesh	0	0.25	0.23	0.3
12	West Bengal	0	0	0	0
13	Others	0.43	0	0.1	0
	Total	**117.53**	**90.41**	**100.55**	**83.74**

** Normal area mentioned above is average of last three years ** It is average of last three years*
(Source: Directorate of Cotton Development, Mumbai)

UPCOUNTRY SPOT RATES

(Rs./Qtl)

Standard Descriptions with Basic Grade & Staple in Millimetres based on Upper Half Mean Length [By law 66 (A) (a) (4)]							Spot Rate (Upcountry) 2012-13 Crop JULY 2013					
Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Strength /GPT	15th	16th	17th	18th	19th	20th
1	P/H/R	ICS-101	Fine	Below 22mm	5.0 – 7.0	15	11079 (39400)	11220 (39900)	11220 (39900)	11220 (39900)	11079 (39400)	11079 (39400)
2	P/H/R	ICS-201	Fine	Below 22mm	5.0 – 7.0	15	11360 (40400)	11501 (40900)	11501 (40900)	11501 (40900)	11360 (40400)	11360 (40400)
3	GUJ	ICS-102	Fine	22mm	4.0 – 6.0	20	8323 (29600)	8239 (29300)	8183 (29100)	8183 (29100)	8183 (29100)	8183 (29100)
4	KAR	ICS-103	Fine	23mm	4.0 – 5.5	21	9308 (33100)	9223 (32800)	9223 (32800)	9223 (32800)	9251 (32900)	9251 (32900)
5	M/M	ICS-104	Fine	24mm	4.0 – 5.5	23	10601 (37700)	10742 (38200)	10742 (38200)	10742 (38200)	10798 (38400)	10798 (38400)
6	P/H/R	ICS-202	Fine	26mm	3.5 – 4.9	26	11726 (41700)	11698 (41600)	11642 (41400)	11642 (41400)	11642 (41400)	11670 (41500)
7	M/M/A	ICS-105	Fine	26mm	3.0 – 3.4	25	10854 (38600)	10854 (38600)	10854 (38600)	10854 (38600)	10882 (38700)	10882 (38700)
8	M/M/A	ICS-105	Fine	26mm	3.5 – 4.9	25	11164 (39700)	11164 (39700)	11164 (39700)	11164 (39700)	11192 (39800)	11192 (39800)
9	P/H/R	ICS-105	Fine	27mm	3.5 – 4.9	26	11867 (42200)	11838 (42100)	11782 (41900)	11782 (41900)	11782 (41900)	11867 (42200)
10	M/M/A	ICS-105	Fine	27mm	3.0 – 3.4	26	11304 (40200)	11304 (40200)	11304 (40200)	11304 (40200)	11332 (40300)	11332 (40300)
11	M/M/A	ICS-105	Fine	27mm	3.5 – 4.9	26	11585 (41200)	11585 (41200)	11585 (41200)	11585 (41200)	11614 (41300)	11614 (41300)
12	P/H/R	ICS-105	Fine	28mm	3.5 – 4.9	27	11979 (42600)	11951 (42500)	11895 (42300)	11895 (42300)	11923 (42400)	11979 (42600)
13	M/M/A	ICS-105	Fine	28mm	3.5 – 4.9	27	12007 (42700)	11838 (42100)	11754 (41800)	11754 (41800)	11782 (41900)	11782 (41900)
14	GUJ	ICS-105	Fine	28mm	3.5 – 4.9	27	11923 (42400)	11838 (42100)	11782 (41900)	11782 (41900)	11810 (42000)	11810 (42000)
15	M/M/A/K	ICS-105	Fine	29mm	3.5 – 4.9	28	12092 (43000)	11951 (42500)	11895 (42300)	11895 (42300)	11923 (42400)	11923 (42400)
16	GUJ	ICS-105	Fine	29mm	3.5 – 4.9	28	12064 (42900)	11979 (42600)	11923 (42400)	11923 (42400)	11951 (42500)	11951 (42500)
17	M/M/A/K	ICS-105	Fine	30mm	3.5 – 4.9	29	12204 (43400)	12091 (43000)	12035 (42800)	12035 (42800)	12063 (42900)	12063 (42900)
18	M/M/A/K/T/O	ICS-105	Fine	31mm	3.5 – 4.9	30	12288 (43700)	12148 (43200)	12092 (43000)	12092 (43000)	12120 (43100)	12120 (43100)
19	K/A/ T/O	ICS-106	Fine	32mm	3.5 – 4.9	31	12457 (44300)	12457 (44300)	12457 (44300)	12457 (44300)	12485 (44400)	12485 (44400)
20	M(P)/ K/T	ICS-107	Fine	34mm	3.0 - 3.8	33	14679 (52200)	14679 (52200)	14679 (52200)	14679 (52200)	14679 (52200)	14679 (52200)

(Note: Figures in bracket indicate prices in Rs./Candy)