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Cotton Leaf Curl Virus Time Bomb

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The views expressed in this column are his own and not that of Cotton Association of India)

Introduction

Cotton leaf curl virus disease (CLCuD) is transmitted to cotton plants by the whitefly Bemisia tabaci (Genn.). Any host plant species of the whitefly, if infected by the leaf curl virus can serve as the source of inoculums for the insect to acquire and transmit the virus to cotton. The whitefly mediated disease transfer takes about 30 minutes for virus-acquisition and 10 minutes for transmission. The virus (CLCuV) along with two satellite DNA molecules infects plant cells and uses the cell DNA for its own survival and replication. The viral complex moves from cell to cell in the plants through the plasmodesmata thus spreading all through the plant. This process causes leaf curling and characteristic enations on the underside of the leaves. When the disease occurs during the early stages, the crop gets severely stunted resulting in very low yields and poor fibre quality. The virus can severely debilitate susceptible varieties thereby resulting in complete yield loss. The CLCuD pathogenic complex is not seed transmitted. The virus complex is transmitted from plant to plant only by the whitefly. The disease can be experimentally by grafting or agro-inoculation or biolistic particle bombardment.

EXPERT's Column

Dr K.R. Kranthi

Time Bomb: Why is the leaf curl virus like a time bomb for India?

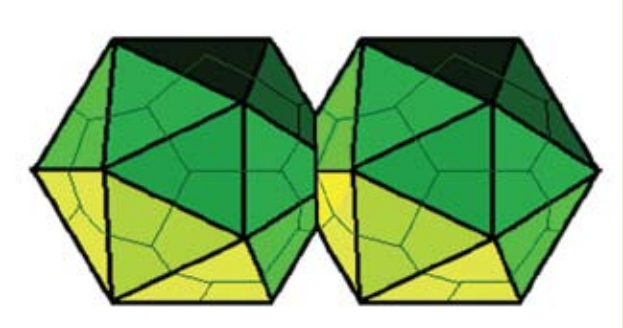
There is no cure for the leaf curl virus disease. For the first time in the country, almost all the cultivated cotton hybrids were found to harbour the virus in all the districts of North India. A new aggressively virulent recombinant virus called 'Burewala species' is prevalent all across North India and Pakistan. Sources of resistance have not been identified as yet. The situation is getting out of control with the approval of 250 new Bt cotton hybrids for cultivation in North India – with a majority of them being CLCuV susceptible. Further, new hybrids are being released every year without confirming their tolerance to the virus. Late sowing aggravates the disease. The late release of canal water leads to late sowing, thus making it ideal for the disease to spread and establish itself in North India.

Following are the details why the disease is a time bomb.

1. The cotton leaf curl virus can be severely debilitating resulting in complete yield loss
2. There is a new highly virulent species of recombinant virus called the 'Burewala species' which originated in Pakistan during 2001-02 and has now spread all across North India. This new species resulted from

the combination of two virulent species of Pakistan called 'Multan species' and Kokhran species'.

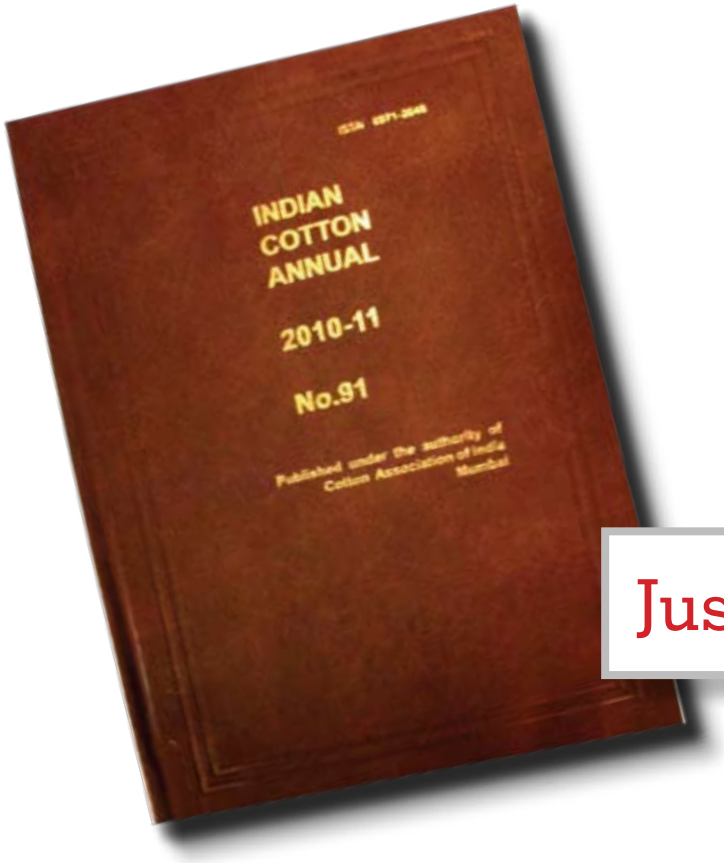
3. Evolution of new virulent species from recombination of leaf curl viruses of other crops is possible because of the common vector whitefly which infests many crops and weeds to acquire viruses from infected plants.
4. All the cotton varieties and hybrids tested in India against the 'Burewala species' have shown susceptibility to varying degrees.
5. Unfortunately all the Bt cotton hybrids which were partly tolerant 4-5 years ago are breaking down before the 'Burewala species' only to become more and more susceptible progressively every year.
6. There are no fool-proof remedial measures against the leaf curl virus, except combating the menace through development of resistant varieties. But, currently there is no source of resistance available anywhere that can be used to develop resistant varieties against the 'Burewala species'.
7. There are no chemical or physical interventions that can have a curative effect on the leaf curl virus.
8. Cultural practices such as early sowing and removal of weeds can reduce the disease-damage to some extent.
9. Attempts to develop GM cotton resistant to the leaf curl virus have also not shown any promising results, yet.
10. The highest level of leaf curl virus inoculum more than like ever before, has accumulated over the past 3-4 years in the ecosystems of North India because of extensive cultivation of CLCuD-susceptible Bt-cotton hybrids in Rajasthan, Haryana and Punjab. The area under new Bt cotton hybrids is more than 95% of the area in Haryana and Punjab and about 80% in Rajasthan.
11. Several weed species were found to harbour and sustain the 'Burewala species' inoculum all across North India. Notable amongst these are Althea rosea, Achyranthus aspera, Chenopodium album, Convolvulus arvensis, Croton sperciflorus, Clerodeadron eneansi, Corchorus acutangularis, Eclipta alba, Parthenium hysterophorus, Lantana camara, Sida spinosa, Trianthema monogyna and Tribulus terrestris.
12. It is interesting that though CLCuD was reported to occur in Pakistan since 1967, it was not a significant problem for cotton cultivation in Pakistan prior to 1988. The



Leaf Curl Virus (concept and drawing K. R. Kranthi)

introduction and cultivation of the highly susceptible varieties S12 and CIM-70 in 1988, is presumed to have triggered the change that led to the conversion of a hitherto insignificant disease into an epidemic. Clear lessons should be learnt from this incident by India, so as to prevent any further approval of susceptible varieties or hybrids.

13. More than 250 new Bt-cotton hybrids were approved during the past five years for cultivation in North India. Further, more and more new hybrids are being approved for cultivation in North India each year, thus providing new susceptible sources and also possibilities of enhancing the viral inoculum.
14. Bt cotton hybrids that are approved for Central and South India but not approved for cultivation in North India are also being sold in the North. Many non-descript Bt hybrids are sold illegally in North India, thus making the situation still more vulnerable.
15. The Desi species Gossypium arboreum and Gossypium herbaceum are immune to all the species of leaf curl viruses. Unfortunately the area under Desi cotton declined from 25% to a negligible presence over the past 6-7 years.
16. The whitefly species Bemisia tabaci in North India has been recently showing high level of resistance to the recommended insecticides, thus enhancing insect survival and thereby increased vulnerability to the transmission of virus.
17. CLCuD was recorded in Sindh province of Pakistan for the first time in 2004. Providentially, the 'Burewala species' is less prevalent in this region, but can reach there over a period of time. This can be disastrous for both Pakistan and India, but more so for India because of the proximity of Gujarat, which now contributes the highest cotton production in India.
18. Recently, the African CLCuD-associated begomovirus, CLCuGeV (Cotton Leaf Curl Gezira Virus) of African origin was first reported in 2011 from cotton in southern



Just published...

INDIAN COTTON ANNUAL No.91 (2010-11)

The Indian Cotton Annual (2010-11) has just been published by the Cotton Association of India (CAI). It is a compendium of all matters relating to every branch of the Indian Cotton trade, containing exhaustive information and statistical data on Cotton Crop, Exports, Imports, Prices, Stocks, Consumption, Government Notifications, etc. This is an extremely valuable publication for reference by all interested in the production, distribution and consumption of Indian and Foreign cottons, yarns and cloth.

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Leaf Curl infected plant (photo: Dr Arup Mukherjee)

Pakistan in the Sindh Province. This poses a new threat for possibilities of direct damage and also for the evolution of new recombinant viruses that can play havoc if they reach Gujarat.

19. Thus far Central and South India have been free of the cotton leaf curl virus. An isolated report in 1996 of the occurrence of cotton leaf curl virus in Bangalore was an exception. Recent survey reports of the cotton leaf curl virus from Aligarh in UP are disturbing. It can be dangerous for the future if proper care is not exercised now to prevent any possible spread to Central and South India.
20. Recent reports of leaf curl virus in Guangdong and Guangxi provinces of China in 2010 point out to the worrying possibility of long range accidental spread.
21. The cotton-wheat system does not easily permit any alteration in the crop-season window in India, which may have otherwise created opportunities for pest and disease escape due to changes in sowing time.
22. Late sowing due to late release of canal water is creating congenial conditions for the disease to get aggravated and thus creating more inoculums in the farm ecosystems.

All these factors together can result in an unprecedented damage and thus represent a time bomb ticking constantly waiting to explode under situations ideal for the insect and the virus.

The disease causal agents

The cotton leaf curl virus disease in India and Pakistan is recently dominated by a pathogen complex comprising of

1. The Cotton leaf curl Burewala virus (CLCuBuV) accompanied with
2. Cotton leaf curl Multan beta-satellite (CLCuMuB) and
3. Alpha-satellite

The CLCuBuV and other viruses that cause the leaf curl virus disease in the Indian sub-continent are single stranded monopartite DNA begomoviruses (genus Begomovirus: family, Geminiviridae) encapsulated in twin quasi-icosahedral capsid geminate particles. The virus acts as a helper to assist the alpha and beta-satellites. The beta satellite CLCuMuB plays a role in disease transmission through replication, systemic movement in plants and transmission between plants, presumably by trans-encapsidation in the helper virus' coat protein. The alpha-satellite replicates independently and also regulates the CLCuBuV and the beta-satellite CLCuMuB, possibly to sustain their presence in the host plants for a longer time to enable a continued transmission by the vector whitefly. The two satellite non-viral single stranded DNA molecules are necessary for the disease expression. The two satellites suppress the host defense systems thus leading to increased virulence and severe disease symptoms.

Different species of the virus

The infected plants in the recent CLCuD epidemics in India and Pakistan were found to contain one or more of six of the following species of begomo-viruses:

1. Cotton leaf curl Burewala virus (CLCuBuV),
2. Cotton leaf curl Alabad virus (CLCuAlV),
3. Cotton leaf curl Kokhran virus (CLCuKoV),
4. Cotton leaf curl Multan virus (CLCuMuV),
5. Cotton leaf curl Rajasthan virus (CLCuRaV) and
6. Papaya leaf curl virus (PaLCuV)

The 'Burewala CLCuBuV' species which is the main virus associated with recent wide-spread occurrence of the disease in Pakistan and India was found to have evolved through recombination

Upward curling of leaf with enation (Photo: Dr Monga)

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Whitefly nymph and adult (photo: Dr Nagrare)

of two virus species, the Cotton leaf curl Kokhran virus (CLCuKoV) and the Cotton leaf curl Multan virus (CLCuMuV). The tomato leaf curl Bangalore virus (ToLCBaV) prevalent in India is yet another threat that can cause the disease and serve as a source for the evolution of new highly virulent recombinant viruses.

A brief history

CLCuD has been a persistent problem for about a century in various parts of Africa after it was first reported from Nigeria as outbreaks in 1912 and 1924 and in Tanzania in 1926. The disease has been prevalent at a low level on the Egyptian species Gossypium barbadense in Egypt and Sudan. CLCuD caused an estimated yield loss of 30-40% in Gezira, Sudan during 1950s.

Though known to cause damage to cotton in Africa, the disease was not of any consequence in Asia or the Indian sub continent until 25 years ago. CLCuD was first reported in 1967 near Multan, but the symptoms started appearing only from 1973 in popular cotton varieties such as 149-F and B-557. One of the reasons was replacement of smooth varieties that were susceptible to leaf hoppers with the hairy varieties many of which were tolerant to leaf hoppers, but susceptible to the whiteflies. During the subsequent years, there were intermittent reports of increase in disease spread mostly around Multan, Khanewal and Vehari which reached an epidemic proportion in 1993 with 8.9 lakh hectares that comprised about one-third of Pakistan's cotton area under the severe grip of the virus. The production was 128 lakh bales in 1991-92 but declined to 79 lakh bales during the epidemic years in 1994-95 indicating 30-40% losses due to the disease. This epidemic was caused by the 'Multan species CLCuMuV'. The disease caused an estimated loss of Rs 27,500 crores between 1992 and 1997. Efforts were intensified in Pakistan and India to develop resistant varieties using the CICR variety LRA 5166 as a resistant donor and cultivate the resistant varieties especially in hot-spot districts. Though sporadically prevalent, the disease declined until the year 2000. However there was a second outbreak in the Burewala area of Punjab province during the 2001-02 season and reduced the production to 100 lakh bales in the years 2002 and 2003. A new 'Burewala CLCuBuV species' had infected all the varieties that were resistant to the 'Multan CLCuMuV species'.

In India, CLCuD was first reported during 1989 at IARI, New Delhi on the Egyptian cotton species, Gossypium barbadense. The first reports of the disease on the American species Gossypium hirsutum appeared in 1993 from Sriganganagar and Ferozepur along the border of Pakistan. The disease gradually spread to other districts over the subsequent few years and reached an epidemic form to affect 2.0 lakh hectares, especially in North Rajasthan and adjoining regions of Punjab and Haryana in 1996 and 1997. Surprisingly, India experienced the leaf curl virus outbreaks in 1993 and 1996 just concurrent to the occurrence of epidemics in Pakistan during 1992 and 1995. Studies showed that the 'Multan CLCuMuV' and the 'Rajasthan CLCuRaV' caused the disease until 2003. Subsequently the 'Burewala CLCuBuV' became the main dominant species because it could infect all the varieties that were resistant to other strains of the virus, mainly the 'Multan species'. In a significant move to combat the disease, the All India Coordinated Cotton Improvement Program (AICCIP) made it mandatory that only varieties or hybrids resistant to the CLCuD would be approved for identification, notification and cultivation in North India. The resistant varieties RST9, RS875, RS810, RS2013, F1861, LH2076, H117, H1126 and resistant hybrids LHH144, CSH198, CSHH238 and CSHH243 were cultivated until 2007 to reduce the disease quite significantly. The leaf curl virus damage in India during the years 1998 to 2006 declined due to the cultivation of resistant varieties and intensive measures to control the whitefly and weeds. However, the complete replacement of varieties with new Bt cotton hybrids after 2007 changed the scenario. By 2008, the disease starting showing up in Punjab and parts of Haryana when the area under Bt cotton hybrids reached 50%. During the 2009 and 2012, the disease was very severe in the districts of Ferozepur, Muktsar, Faridkot, Abohar

and Fazilka in Punjab. In Haryana, the disease was widespread after 2010 with Jind, Fatehabad, Hisar and Sirsa being affected. Interestingly, unlike Punjab and Haryana, Rajasthan did not adopt the new Bt cotton hybrids so readily. The area under Bt cotton hybrids in Punjab and Haryana reached 50% in 2007 and 70% by 2008, whereas in Rajasthan, the area under Bt cotton hybrids was only 10% in 2007 and 25% in 2008. By 2011, the area under Bt cotton hybrids reached more than 90% in Punjab and Haryana but was less than 70% in Rajasthan. It is probable that the slow rate of adoption of the new Bt-hybrids in Rajasthan resulted in low to moderate levels of disease incidence in the state. The data suggest that indiscriminate introduction and cultivation of new hybrids can aggravate the problem.

Management strategies

1. Strict enforcement to ban CLCuD susceptible varieties and CLCuD susceptible Bt-hybrids in North India and ensure that only tolerant/ resistant genotypes are cultivated
2. Promote the cultivation of Desi species Gossypium arboreum and Gossypium herbaceum especially in the districts bordering Pakistan
3. Identify resistant sources on priority and attempts must be made to pyramid resistance genes
4. Destroy infected plants, especially after harvest
5. Crop rotation with crops that are not host plants for whiteflies
6. Early sowing to escape pest and disease infestation
7. Destruction of off-season weeds and clean cultivation during the season to minimise sources of virus inoculum
8. Develop and implement effective strategies for whitefly management
9. Avoid cultivation of malvaceous crops such as okra (bhendi) or tomato especially in disease prone areas.
10. Avoid cultivation of American cotton, Gossypium hirsutum in orchards.

Cotton Consumption - Cotton Year-wise (Oct-Feb)

(In Lakh Bales)

Month	2006-07	2007-08	2008-09	2009-2010	2010-11	2011-12	2012-13 (P)	2013-14 (P)
October	17.33	18.32	16.54	18.13	22.09	17.77	21.84	23.95
November	17.81	16.94	16.94	18.47	21.09	18.34	21.09	22.74
December	18.49	18.86	17.98	19.49	22.57	20.13	22.63	24.84
January	18.22	18.54	16.93	19.54	22.1	20.33	23.30	24.80
February	17.11	18.14	16.23	18.81	20.23	20.31	22.24	24.17
March	18.39	18.45	17.51	20.01	21.77	20.38	23.61	
April	18.06	17.98	17.12	20.53	20.17	20.31	23.22	
May	17.89	18.95	17.83	20.93	18.64	21.27	22.85	
June	17.85	18.55	18.01	20.71	18.23	21.17	22.51	
July	18.42	18.50	18.98	22.11	19	22.14	24.11	
August	18.58	17.62	18.59	21.73	18.64	22.08	24.23	
September	18.03	16.90	18.29	21.42	21.71	21.46	23.70	
Total	**216.18**	**217.75**	**210.96**	**241.88**	**246.23**	**245.47**	**275.34**	**120.50**

(Source: Office of the Textile Commissioner)

Negative Impact Expected from Chinese Policy and Polyester

During March 2014, the difference between the Cotlook A Index and the price of polyester in China has further widened. In 2013/14, the Cotlook A Index has averaged approximately 90 cents per pound while polyester in China has averaged about 73 cents during the same period. However, in March 2014, the price of polyester in China dropped below 70 cents per pound, to about 66 cents, while the Cotlook A Index has averaged about 97 cents. The price for polyester has declined due to the fall in the prices of polyester inputs over the last few months and surplus stocks. Given the substantial cost difference, cotton's share of the market is expected to continue its decline this season.

Although cotton's market share is declining, consumption in absolute terms is expected to rise by 1% to 23.6 million tons this season as a result of the recovery of the world economy and growth in world population. Consumption is expected to rise further by 3% in 2014/15 to 24.3 million tons. While cotton mill use in China is expected to decline this season to 7.9 million tons from 8.3 million tons in 2012/13, it will still be the largest consumer. In 2013/14 growth in consumption is expected to occur in the rest of Asia, notably India and Pakistan, where consumption is forecast to reach 5 million and 2.5 million tons respectively.

Cotton planting has started in the northern hemisphere for 2014/15 with world area expected to remain stable at 33 million hectares. China's area is expected to decline by 9% to 4.2 million hectares. However, area is expected to increase by 9% in the United States to 3.4 million hectares and by 3% in Uzbekistan to 1.3 million hectares. World production is forecast to be 25.3 million tons in 2014/15, a decrease of 2% from 2013/14 due to the expected negative impact that El Niño weather may have on yields in some countries.

World trade is expected to decline in 2014/15 by 7% to 8.1 million tons. China's imports are expected to decline by 30% to 2.2 million tons in 2014/15 as it tries to sell off its reserve in the next few seasons. The United States, is expected to export around 2.3 million tons in 2014/15, the same volume as is expected for 2013/14, while India is expected to be the second largest exporter in 2014/15 with 1.1 million tons, down from the expected 1.4 million tons 2013/14.

Earlier this year, the Chinese government announced that it would end its reserve policy, and test a target price policy in Xinjiang. In 2013/14, the government bought approximately 6.3 million tons of cotton, 42% of which came from Xinjiang, and sold about 930,000 tons. However, sales are expected to increase as Beijing Cotlook reports that the Chinese government will lower the starting auction price from 18,000 Yuan per ton to 17250 yuan and will allow spinners to purchase one bale of import reserve for every 3 bales purchased from Xinjiang warehouses. Some market participants indicate that the 3-to-1 policy was already in place since 2012/13. However, the Secretariat does not anticipate that total reserve sales will exceed sales in 2012/13 when the Chinese government sold approximately 3.7 million tons. The Secretariat estimates that the Chinese government currently holds 12.8 million tons in the reserve and, assuming it sells slightly less than last year, it will hold around 10.5 million tons by the end of the season. Total ending stocks for China (including private sector holdings) are expected to be 11.5 million in 2013/14, which account for 58% of world ending stocks. Additionally, while the government has been holding discussions on the new target price policy it has not provided any further details. The uncertainty on how China will handle its large reserves in the coming season and the significant gap between polyester and cotton prices does not bode well for cotton consumption in China and, by extension, countries that have heavily exported cotton to China in recent seasons.

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
Jun'2012 (Provisional)	82.419
Jul'2012 (Provisional)	94.507
Aug'2012 (Provisional)	83.055
Sep'2012(Provisional)	64.269

Month	Quantity in Million Kgs.
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
Jun'2013 (Provisional)	142.297
Jul'2013 (Provisional)	139.745
Aug'2013 (provisional)	104.913
Sep'2013 (provisional)	109.640
Oct'2013 (provisional)	125.885
Nov'2013 (provisional)	108.520
Dec'2013 (Provisional)	118.736
Jan'2014 (provisional)	143.813
Feb'2014 (provisional)	103.124
Mar'2014 (provisional)	111.738

(Source: Directorate General of Foreign Trade)

SUPPLY AND DISTRIBUTION OF COTTON

April 1, 2014

Seasons begin on August 1 — Million Metric Tons

	2009/10	2010/11	2011/12	2012/13 Est.	2013/14 Proj.	2014/15 Proj.
BEGINNING STOCKS						
WORLD TOTAL	11.755	8.569	9.464	14.611	17.87	20.04
CHINA	3.585	2.688	2.087	6.181	9.61	11.51
USA	1.380	0.642	0.566	0.729	0.85	0.61
PRODUCTION						
WORLD TOTAL	22.334	25.409	28.041	26.829	25.73	25.33
CHINA	6.925	6.400	7.400	7.300	6.70	6.15
INDIA	5.185	5.865	6.354	6.095	6.34	6.23
USA	2.654	3.942	3.391	3.770	2.87	3.15
PAKISTAN	2.158	1.948	2.311	2.204	2.07	2.06
BRAZIL	1.194	1.960	1.877	1.261	1.64	1.65
UZBEKISTAN	0.850	0.910	0.880	1.000	0.92	1.00
OTHERS	3.369	4.385	5.828	5.199	5.19	5.09
CONSUMPTION						
WORLD TOTAL	25.529	24.502	22.796	23.340	23.55	24.33
CHINA	10.192	9.580	8.635	8.290	7.88	7.80
INDIA	4.300	4.509	4.340	4.845	5.02	5.37
PAKISTAN	2.402	2.100	2.217	2.416	2.49	2.56
EAST ASIA & AUSTRALIA	1.892	1.796	1.646	1.858	2.04	2.22
EUROPE & TURKEY	1.600	1.549	1.495	1.532	1.58	1.71
BRAZIL	1.024	0.958	0.888	0.887	0.93	0.93
USA	0.773	0.849	0.718	0.751	0.78	0.82
CIS	0.604	0.577	0.550	0.561	0.58	0.59
OTHERS	2.743	2.583	2.306	2.201	2.27	2.33
EXPORTS						
WORLD TOTAL	7.798	7.717	9.870	10.057	8.72	8.14
USA	2.621	3.130	2.526	2.902	2.33	2.29
INDIA	1.420	1.085	2.159	1.685	1.39	1.12
AUSTRALIA	0.460	0.545	1.010	1.345	1.03	0.78
BRAZIL	0.433	0.435	1.043	0.938	0.76	0.81
CFA ZONE	-	0.476	0.597	0.796	0.88	0.93
UZBEKISTAN	0.820	0.600	0.550	0.653	0.68	0.59
IMPORTS						
WORLD TOTAL	7.928	7.756	9.759	9.827	8.72	8.14
CHINA	2.374	2.609	5.342	4.426	3.09	2.17
EAST ASIA & AUSTRALIA	1.989	1.825	1.998	2.383	2.51	2.49
EUROPE & TURKEY	1.170	1.003	0.724	1.015	0.81	1.01
BANGLADESH	0.887	0.843	0.680	0.593	0.86	0.89
CIS	0.209	0.132	0.098	0.062	0.07	0.07
TRADE IMBALANCE 1/	0.130	0.039	(0.111)	(0.230)	-	-
STOCKS ADJUSTMENT 2/	(0.122)	(0.051)	0.013	-	-	-
ENDING STOCKS						
WORLD TOTAL	8.569	9.464	14.611	17.869	20.04	21.04
CHINA	2.688	2.087	6.181	9.607	11.51	12.03
USA	0.642	0.566	0.729	0.848	0.61	0.64
ENDING STOCKS/MILL USE (%)						
WORLD-LESS-CHINA 3/	38	49	60	55	54	54
CHINA 4/	26	22	72	116	146	154
COTLOOK A INDEX 5/	78	164	100	88		

1/ The inclusion of linters and waste, changes in weight during transit, differences in reporting periods and measurement error account for differences between world imports and exports.
2/ Difference between calculated stocks and actual; amounts for forward seasons are anticipated.
3/ World-less-China's ending stocks divided by World-less-China's mill use, multiplied by 100.
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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) 2013-14 Crop APRIL 2014					
Sr. No.	Growth	Grade Standard	Grade	Staple	Micronaire	Strength /GPT	14th	15th	16th	17th	18th	19th
1	P/H/R	ICS-101	Fine	Below 22mm	5.0-7.0	15	10545 (37500)	10545 (37500)	10545 (37500)	10545 (37500)	10657 (37900)	10545 (37500)
2	P/H/R	ICS-201	Fine	Below 22mm	5.0-7.0	15	10686 (38000)	10686 (38000)	10686 (38000)	10686 (38000)	10798 (38400)	10686 (38000)
3	GUJ	ICS-102	Fine	22mm	4.0-6.0	20	6889 (24500)	6889 (24500)	6889 (24500)	6946 (24700)	6946 (24700)	6946 (24700)
4	KAR	ICS-103	Fine	23mm	4.0-5.5	21	8267 (29400)	8267 (29400)	8267 (29400)	8323 (29600)	8323 (29600)	8323 (29600)
5	M/M	ICS-104	Fine	24mm	4.0-5.0	23	10067 (35800)	10067 (35800)	10067 (35800)	10123 (36000)	10123 (36000)	10123 (36000)
6	P/H/R	ICS-202	Fine	26mm	3.5-4.9	26	11726 (41700)	11754 (41800)	11754 (41800)	11810 (42000)	11867 (42200)	11895 (42300)
7	M/M/A	ICS-105	Fine	26mm	3.0-3.4	25	10039 (35700)	10039 (35700)	10039 (35700)	10039 (35700)	9954 (35400)	9954 (35400)
8	M/M/A	ICS-105	Fine	26mm	3.5-4.9	25	10601 (37700)	10601 (37700)	10601 (37700)	10601 (37700)	10517 (37400)	10517 (37400)
9	P/H/R	ICS-105	Fine	27mm	3.5.4.9	26	11895 (42300)	11923 (42400)	11923 (42400)	11979 (42600)	12035 (42800)	12063 (42900)
10	M/M/A	ICS-105	Fine	27mm	3.0-3.4	26	10320 (36700)	10320 (36700)	10320 (36700)	10320 (36700)	10236 (36400)	10236 (36400)
11	M/M/A	ICS-105	Fine	27mm	3.5-4.9	26	10854 (38600)	10854 (38600)	10854 (38600)	10854 (38600)	10770 (38300)	10770 (38300)
12	P/H/R	ICS-105	Fine	28mm	3.5-4.9	27	12176 (43300)	12204 (43400)	12204 (43400)	12260 (43600)	12317 (43800)	12345 (43900)
13	M/M/A	ICS-105	Fine	28mm	3.5-4.9	27	11192 (39800)	11220 (39900)	11220 (39900)	11276 (40100)	11276 (40100)	11304 (40200)
14	GUJ	ICS-105	Fine	28mm	3.5-4.9	27	11501 (40900)	11529 (41000)	11529 (41000)	11585 (41200)	11585 (41200)	11614 (41300)
15	M/M/A/K	ICS-105	Fine	29mm	3.5-4.9	28	11473 (40800)	11501 (40900)	11501 (40900)	11557 (41100)	11557 (41100)	11585 (41200)
16	GUJ	ICS-105	Fine	29mm	3.5-4.9	28	11642 (41400)	11670 (41500)	11670 (41500)	11726 (41700)	11726 (41700)	11754 (41800)
17	M/M/A/K	ICS-105	Fine	30mm	3.5-4.9	29	11614 (41300)	11642 (41400)	11642 (41400)	11698 (41600)	11698 (41600)	11726 (41700)
18	M/M/A/K/T/O	ICS-105	Fine	31mm	3.5-4.9	30	11838 (42100)	11867 (42200)	11867 (42200)	11923 (42400)	11923 (42400)	11951 (42500)
19	A/K/T/O	ICS-106	Fine	32mm	3.5-4.9	31	12120 (43100)	12148 (43200)	12148 (43200)	12204 (43400)	12204 (43400)	12232 (43500)
20	M(P)/K/T	ICS-107	Fine	34mm	3.0-3.8	33	16310 (58000)	16310 (58000)	16310 (58000)	16450 (58500)	16450 (58500)	16450 (58500)

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