The Challenges in 2015

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What is in store for cotton in 2015? The cotton acreage in India was 38% of the global cotton area (33.4 million hectares) in 2014. Reports predicted that India would replace China as the world's largest cotton producer. This did not come as a surprise. India's cotton area was increasing during the past 12 years to reach a record 12.9 million hectares in 2014. In stark contrast, cotton area was shrinking progressively every year in major cotton growing countries such as China and US. The area decline across the globe could probably be due to the following reasons. Australia has been experiencing drought on and off; Brazilian farmers realised that the profits were shrinking; China continued to pile huge stocks through imports mainly from India; production costs in Africa were increasing and cotton exports from US declined. Market prices in 2015 are not likely to surge upwards due to the Chinese slowdown of cotton imports, though imports by other countries are expected to reach 5.9 million tonnes. Production costs are increasing in India and elsewhere in the world. Despite the increased cost of cultivation in India, the seven year period from 2007 to 2013 was good for cotton producers primarily because of the good market prices, thanks to the imports by China, Bangladesh, Turkey, Vietnam and Indonesia. But, will the cotton story continue to be as rosy this year, as it has been in the recent immediate past?

EXPERT's Column

Dr K.R. Kranthi

Cotton is likely to encounter the following challenges this year:

Challenge No. 1: Cotton, cotton everywhere

The year 2014-15, was characterised by uncertainties for the cotton farmer in India. The onset of monsoon was delayed by a month. Drought was predicted. Nevertheless, cotton area touched an all-time record of 12.9 million hectares. Why did the area under cotton increase to a record level? Why did farmers prefer cotton over other Kharif crops despite the drought predictions? The CACP (Commission for Agricultural Costs and Prices, Ministry of Agriculture) 'Price policy for Kharif crops -2014' states that out of the 14 Kharif crops (paddy, maize, jowar, bajra, ragi, tur, moong, urad, groundnut, soyabean, sunflower, sesame, nigerseed and cotton) cotton has the maximum absolute profit at Rs. 31,790/ha, followed by tur at Rs. 19,260/ha and paddy at Rs.15,679/ha. Therefore, it is not surprising that farmers prefer cotton over other Kharif crops, especially in the wake of weather concerns. It must be mentioned here that, cotton is basically a drought resistant crop and adapts itself to moisture-stress conditions, if seedlings survive the initial stress. Under moisture stress, young seedlings develop deep roots that help them to overcome drought stress. Nevertheless, drought stress pulls down yields significantly, depending on the stage of the crop which suffers the stress. Moisture stress during boll formation stage causes maximum yield losses.

The monsoon predictions for 2015 are almost similar to that of last year for the cotton rain-fed regions in India. The ICAC predicted that the cotton acreage in India could decrease to 11.6 million hectares in 2015. On the face of it, this appears to be a fairly good estimate, considering the fact that the record Indian cotton acreage in 2014 was also influenced by the good market prices in 2013. However, in my view, the acreage in 2015 would depend on the arrival of monsoon. With predictions of late arrival and erratic distribution of rainfall, it is only likely that Indian farmers may prefer cotton over other Kharif crops and area might easily reach 12.0 million hectares.

The greatest challenge would be in rain-fed states such as Maharashtra and Telangana where the production costs are high and yields are low. With stagnant yields, high production costs, low exports and low market prices, the large acreage in India will be a big challenge to contend with.

Challenge No. 2: Late arrival of monsoon and deficit rainfall

For the 2015 Kharif season, monsoon arrival is predicted to be delayed by 8-10 days. The IMD predicted an overall -12% deficit monsoon in India. El-Nino effects are likely to cause uncertain monsoon deficits and erratic rainfall distribution in central India. Cotton sowings in north India were delayed by a fortnight. In Maharashtra and Telangana more than 90% of cotton is grown under rain-fed conditions. The two states account for 50% of India's cotton area. Sowing in rain-fed area depends on the onset of monsoon. Farmers wait for a good rain to start sowing. It is generally recommended that sowing in rain-fed regions should be taken up only after receiving at least 80 mm rainfall. This leads to delay in sowing when monsoon arrives late. Many a

times, erratic rainfall leads to poor germination and the need for re-sowing. The cost of Bt-cotton hybrid seed ranges at Rs. 4000 to 5000 per hectare. Moreover under conditions of erratic monsoon, higher seed rates are recommended. This escalates economic stress early in the season itself and influences the subsequent expenditure on inputs. Moreover, cotton crop sown between mid-July to late-July in rain-fed regions such as Maharashtra, Telangana and MP would invariably suffer moisture stress during the peak boll formation stage, more so in long duration varieties/hybrids, especially if the rains recede before mid-September. Thus, late sown cotton is a big challenge, especially for late maturing varieties and hybrid cotton. Majority of the Bt-cotton hybrids available in the market are of late duration. Late arrival of monsoon and deficit rainfall, are challenges that are likely to have a strong impact on how the season shapes. Under the current circumstances, the best way forward would be to choose early maturing varieties/hybrids and take up early sowing, just after the onset of monsoon.

Challenge No. 3: Cotton leaf curl virus disease in north

Late sown cotton crop is more prone to severe infestation by whiteflies and the most dreaded CLCuD (Cotton leaf curl virus disease) that is transmitted by the whiteflies. Cotton sowing in north India is generally completed by 20th May. But, this season, sowing in north India was delayed by about 15 days due to the delayed wheat harvest. Estimates show that about 20-25% of the area may have been under late sown crop. Such late sown crop serves as a reservoir of whiteflies and the virus, thereby escalating the possibilities of the insect and the disease. The Ministry of Agriculture, Government of India did a commendable job in issuing guidelines to the State Agricultural Departments not to permit Bt-cotton hybrids that were declared by CICR as susceptible to the leaf curl virus. The State departments did their best to regulate the hybrids. If such steps were not taken, yields could have plummeted in north India. However, despite these initiatives, the 2015 cotton yields in north India could be 5-10% less than 2014. Cotton in north India needs the support of all stakeholders to contain the dreaded leaf curl virus disease. Though research institutions and Government agencies are trying their best to restrict the cultivation of susceptible hybrids, the responsibility of seed companies is paramount, because only they can ensure that their 'CLCuD-susceptible' Bt-cotton hybrids are voluntarily pulled out of the market.

Challenge No. 4: Leaf reddening and sudden wilt

Rain-fed cotton is more prone to environmental stress factors such as high temperatures, soil moisture and nutrient deficit at critical times and cloudy weather. These factors negatively affect photosynthesis and thereby result in nutrient deficit to the developing bolls. Bt-cotton hybrid plants need more nutrients when they retain a fairly large number of bolls due to efficient protection from bollworms. Moisture and nutrient stress at this stage generally results in leaf reddening and sudden wilt.

Lead reddening is a problem, more frequently reported in late-sown long-duration cotton hybrids. Varieties are less vulnerable to leaf reddening. Studies showed that leaf reddening can be caused by a combination of factors such as nutrient stress, moisture stress at the critical stage of peak boll-formation, when plants need these inputs the most. The problem becomes acute during boll formation stage if the crop has suffered leaf hopper damage in the preceding vegetative stage. Other factors such as, salinity, UV-B radiation and high temperature were also reported to cause leaf reddening. Studies have shown that nitrogen deficiency in north India, low night temperatures and strong winds in central and south India contributed to leaf reddening. The problem has been more frequently reported in Bt-cotton hybrids during the past 10 years in India. High yielding cultivars, especially hybrids developed by crossing American cotton species x Egyptian cotton species were found to be more prone to leaf reddening. Economic losses are caused if the crop is affected with leaf reddening in the vegetative phase and peak boll-formation stage of the crop. This season, leaf reddening is likely to be high in Telangana and Maharashtra during October, in view of the late sowing and erratic rainfall, that leads to nutrient and moisture stress at the peak-boll formation stage. It was observed that older leaves were most affected. The red leaves were found to have nitrogen and magnesium deficiency. Therefore, foliar sprays of 1% DAP and 1% Urea plus Magnesium were found to slow-down the process of further aggravation in reddening. Foliar sprays of nutrients in late September and mid-October can help reduce the reddening problem.

Para-wilt or sudden wilt can also cause problems this season. Prolonged dry spell with high temperature and sunlight followed by high rainfall especially in black cotton soils results in sudden-wilting. The problem is generally isolated to a few plants in the fields. A combination of factors such as high sunshine, high temperature and soil moisture saturation causes wilt, more so in plants which bear a larger number of bolls. The leaves are shed after they dry due to reddening or desiccation. Plants generally do not recover and die if proper care is not taken in time. Plants at flowering and early boll development stages are more susceptible to para-wilt than younger plants. The problem generally occurs in late sown crop under conditions of drought followed by rainfall during the boll-formation stage. Remedial measures such as proper drainage

of fields, enhancing soil structure and texture with green manures can be helpful. Excessive nitrogenous fertilizers should be avoided, especially in black cotton soils where high nitrogen can aggravate wilt under erratic rainfall conditions. Spraying of cobalt chloride at 10 mg/ litre at the initial stages of wilting helps and drenching the root zone of plants with a mixture of Copper Oxychloride 25 g and 200 g of Urea in 10 litres of water or Carbendazim 1g/litre of water to avoid secondary infections from soil borne pathogens helps the plants to revive.

This season, both the problems of lead reddening and para-wilt can be expected in rainfed regions of MP and Gujarat and majority of the regions in Maharashtra and Telangana.

Challenge No. 5: Bollworm returns?

Bt-cotton varieties/hybrids are genetically modified (GM) to conatin cry (crystal) genes derived from a soil bacterium, Bacillus thuringiensis (Bt). Bt-cotton hybrids produce Cry proteins that are highly toxic to the three cotton bollworms, (American bollworm, Pink bollworm and Spotted bollworm), when the insect larvae consume plant parts of Bt-cotton. The American bollworm is most damaging, followed by pink bollworm and the spotted bollworm.

Until 2008, Bt-cotton was very effective in controlling all the three bollworm species. However, resistance monitoring reports published by Monsanto and IARI (Indian Agricultural Research Institute, New Delhi) showed that the pink bollworm had started to evolve resistance to the Bt-toxin Cry1Ac in 2008 as was confirmed with insect populations collected from Amreli district in Gujarat. Data published in 2011 by Monsanto and IARI showed that resistance was significantly higher at 44-fold resistance for insects derived in 2008 from Amreli than for any of the other field populations tested from four locations in India. This was the first confirmed case of bollworm resistance to Bt cotton in India.

Recently, over the past 2-3 years, crop damage due to pink bollworm has been reported to be increasing even on Bollgard-II which contains a potent combination of two Bt genes, cry1Ac+cry2Ab. Surveys conducted by CICR during the past two years clearly showed that the pink bollworm was able to survive and cause damage to Bollgard-II which contains two genes (Cry1Ac + Cry2Ab) in some parts of Gujarat. All the plant samples of the crops from Gujarat were examined and found to be genuine Bollgard-II. Studies confirmed pink bollworm resistance to Bollgard-II. It is quite likely that the resistance problem can get aggravated during the ensuing seasons, especially if the crop is extended beyond the normal six-seven months duration. Pink bollworm samples collected from other states did not show resistance thus far.

Compounding the problem, resistance to Bollgard-II was observed more recently in a few field populations of the American bollworms collected from different parts of the country. But the levels of resistance in these two populations were low and not adequate to cause immediate economic damage. The American bollworm is a bigger menace and can cause immense concern with Bt-resistant larvae. It is likely that some parts of Gujarat may experience pink bollworm damage in Bollgard-II this year. Bollworm resistance will be the biggest challenge to Bt-cotton.

Resistance threat to Bt cotton is extremely acute in India because of the fact that 'refugia' strategy of cultivating the recommended 20% 'non-Bt-cotton' as five rows around Bt-cotton to dilute resistance, was not properly followed in India, coupled with the fact that India's cotton area got almost saturated with Bt cotton in the country with the overall area being above 90% under Bt cotton after 2009. In the absence of proactive resistance management strategies, it is imminent that bollworm resistance to Bt cotton would develop soon and can lead to economic damage and crop failures.

Elsewhere in the world, resistance in the cotton bollworm to Bt cotton was confirmed in field populations collected from mid-southern region of the United States. In China two populations of the cotton bollworm collected from north-western China in 2011 were found to have developed resistance to Bt cotton.

Challenge No. 6: Shrinking net profit

What drives profit margins? Not a very difficult question to answer. Production costs, market prices and yields determine the net returns. But, what drives the market prices? And, what influences the production costs? These questions can be tricky indeed. Analysis of the official data published by the Ministry of Agriculture showed that the 16 year period (1999 to 2014) in India can be divided into two distinctly different phases based on the net profit (net returns). From 1999 to 2006, during the eight year period, cotton farmers experienced 'economic stress' because of low net returns, followed by a 'comfort zone' in the next eight years from 2007 to 2014 mainly because of high market prices. During 1999 to 2006, the eight year period was characterised with low net returns. The first four years were more stressful due to rainfall deficit of -4.0 to -8.3% during 1999 to 2001 culminating in a severe drought of -19.2% deficit in rainfall in 2002. Except Rajasthan all other cotton growing states suffered from negative net returns in one or more years during the eight year period from 1999 to 2005. The national average production (seed-cotton) of 9.1 million tonnes during 1999-2006 almost doubled to an average of 17.9 million tonnes in 2007-2014 and the yields (productivity per hectare) increased by 52%. The national average

The Challenges in 2015 *(Contd. from page 7)*

production cost increased by 183%, but the gross returns increased by 263% due to the combined increase in yields and market prices. Net returns increased substantially. With the low cotton imports to China, the market prices could be low. Hope that this trend changes and the market prices increase so that farmers get high net returns.

Conclusion

It would be most important in 2015 to recognise the challenges that are likely to cause problems mainly to cotton farmers in India. Efforts should be made to bring down the cost of production especially by resorting to optimum use of balanced fertilizers, which would also help in reduction of sucking pest infestation and thereby fewer insecticide applications. Other remedial measures as suggested above, can help in tiding over the impending crisis of erratic monsoon, high cost of production and low market prices. It is gratifying to see that the Government is proactive and farmers are being assisted in every possible manner to ensure that they are least affected with the weather aberrations.

(The views expressed in this column are of the author and not that of Cotton Association of India)