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Desi Cotton - Returns?

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Last month, an interesting research paper on Indian Desi cotton was published by a team of researchers from Oxford University UK in the journal 'NATURE plants'. The paper titled 'Asiatic cotton can generate similar economic benefits to Bt cotton under rain-fed conditions' URL <http://www.nature.com/articles/nplants201572> written by Carla-Romeu-Dalmau and three other authors has some brilliant insights on the strengths of Desi (Asiatic cotton) with reference to India. I am tempted to ask 'why is it that we Indians are unable to see and accept something so obvious, which foreign researchers are able to see clearly and point out -the brilliance of Desi cotton?'

Desi cotton can be as profitable as Bt-cotton in rainfed Maharashtra: American cotton belongs to the species *Gossypium hirsutum* and Desi cotton or Asiatic cotton belongs to *Gossypium arboreum*. The Oxford authors visited Maharashtra and conducted their survey in Vidarbha. The authors concluded that "Taken together, these data suggest that the main reasons why farmers adopt Bt *G. hirsutum* instead of *G. arboreum* is the expectation of higher yields and more resistance to bollworms, but also because *G. arboreum* seed is hardly available. In contrast, farmers choose to grow *G. arboreum* instead of Bt *G. hirsutum* because with *G. arboreum* cultivation they expect lower expenditure and better performance under rainfed

conditions. We found evidence demonstrating that under rainfed conditions, *G. arboreum* cultivation can generate similar economic benefits for farmers as Bt *G. hirsutum* cultivation in Maharashtra. Although farmers growing Bt *G. hirsutum* have more stable net revenue, they also need to spend more to obtain similar net revenue than farmers growing *G. arboreum*. This indicates that under rainfed conditions, the economic benefits associated with Bt *G. hirsutum* cultivation are not necessarily realized. In these conditions, other cotton varieties such as the Asiatic cotton *G. arboreum* may offer an alternative for cotton farmers in Maharashtra and perhaps in other cotton cultivating areas. When farmers growing Bt *G. hirsutum* use irrigation, they obtain higher yields than under rainfed conditions, but our data demonstrate that without effective management of the expenditure, higher yields do not translate into higher net revenue. We conclude that our study provides insights into how the potential of Bt *G. hirsutum* cultivation is constrained under rainfed conditions in India, and how even though Bt *G. hirsutum* yields increase with irrigation, this does not necessary translate into an increase in the economic benefits received by Indian smallholder farmers".

EXPERT'S Column



Dr K.R. Kranthi

Why Desi cotton? The research paper cited my article 'Long live SwaDesi Cotton' that was published on 13th August, 2013 in the Cotton Statistics and News, CAI-Vol 20, Published by Cotton Association of India, Mumbai. I am recollecting here a passage from my article "It may not be easy to accept the opinion instantaneously, but with some good thinking, it would not be difficult either, to propose that India's cotton future lies in Desi

cotton. The recent challenges of ever-increasing cost of chemical inputs and labour scarcity have been pushing cotton cultivation towards unsustainability and marginalized profits. The current American cotton hybrid systems that predominate more than 95.0% of the cotton area in India do not fall in the category of sustainable approaches. These hybrids are expensive to cultivate; input intensive and run the constant risks of collapsing under high sensitivity to biotic and abiotic stresses. What is imminently needed for India is a vision based policy to plan towards sustainable profits. Desi cotton provides the answers for sustainability. But good thinking and planning are necessary. Two aspects strengthen Desi cotton. One is improvement of fibre traits. The second aspect relates to the exploitation of the existing traits for specialized purposes such as absorbent cotton and ancillary uses, for which Desi cotton is the best and other species cannot serve the purpose." It is noteworthy that the researchers from Oxford University arrived at the same conclusions independently.

Though it might sound repetitive, it is important to point out that India needs to move towards sustainable cotton cropping systems which are much easier with Desi cotton. In my previous article on Agrarian Crisis Part - 3, published in the 13th May 2015 issue of Cotton Statistics and News, I pointed out that "Clearly, agrarian stress is related to the declining net returns in agriculture and cannot be related to cotton cultivation alone. But, there are long term sustainable solutions that can lower down the cost of production and increase yields." Net returns depend on the cost of cultivation and market price. Cultivating Desi cotton varieties is easy with low production costs. These are highly tolerant to drought, insects and diseases and give high yields with low inputs. Then why is it that India is still reluctant to move towards Desi cotton, at least in the 60% area under rain-fed farming?

Interestingly, Indian farmers were historically reluctant to move away from Desi cotton. At the time of Independence India had 97.5% of its area under Desi cotton. The area under Desi was 25% before Bt-cotton made its entry into India 13 years ago. By the year 2011, the area shrunk to less than 2.0%. It is important to understand why Indian farmers preferred Desi cotton over times immemorial until the invasion by Bt-hybrids. There are Desi varieties of *Gossypium herbaceum* and *Gossypium arboreum* which can grow in any kind of conditions such as saline soils, sodic soils, desert soils, light soils etc.,

under dry conditions. There are hardly any varieties of the American cotton species *Gossypium hirsutum* that can survive such conditions. Desi varieties are highly tolerant to drought, salinity, diseases and a range of insect pests including the bollworms. It is this resilience to tough biotic and abiotic conditions that makes Desi cotton species the right choice for sustainable farming.

Indian cotton production systems have become costly and unsustainable. The shifting away from Desi cotton and the change from a mere 40% hybrid area in 2001 to 92% area under Bt-cotton in 2011 influenced a lot of changes in the cotton economics in India. As per the data available with the Ministry of Agriculture, the average cost of cultivation was Rs. 15,961 per hectare in 2002, which increased to an average of Rs. 71,115 per hectare in 2011. The yields may have increased, but fertilizer usage per hectare increased by 3.6 times from an average of 74.1 kg per hectare in 2002 to 267 kg per hectare in 2011. With the increase in fertilizer usage, predominantly urea on hybrid cotton, insect pest infestation increased. The average expenditure on insecticides was Rs. 1073 per hectare in 2001, which increased to Rs. 2925 per hectare in 2011. Thus, India's cotton is now characterised with a constant increase in chemical fertilizers and insecticide usage, to move away from sustainability. This shift towards unsustainable cotton production systems makes farmers highly vulnerable to economic risks.



Desi cotton offers the most resilient options. It is important for India to break away from the current imbroglio mired in chemical matrices. We need to move towards robust and sturdy climate resilient cotton production methods that are in consonance with natural ecosystems. Desi cotton provides exciting prospects towards sustainability. Unfortunately research on Desi cotton was grossly neglected in India, as a result of which there was a slow progress in varietal development. Despite the neglect, a few scientists have developed outstanding Desi cotton varieties which can bring in a 'soft revolution' in the country.

Desi cotton for spinnable and non-spinnable fibres. Two categories of Desi cotton varieties can make a huge difference especially in the rain-fed tracts that comprise 60% of the cotton area of India. One type is the short and coarse fibre varieties that are suitable for absorbent cotton, surgical, denims, mattresses, technical textiles etc., whose demand is growing and the market price is very high. There are several varieties in this category. Desi cotton

offers hygroscopic short fibre with high micronaire, which makes it an ideal choice for a wide range of applications. Yields are high with high density planting because of the compact nature of many varieties. For example, Phule Dhanwantary from MPKV Rahuri is one outstanding Desi variety which gives high yields of 25-30 q/ha or more under high density planting in rain-fed conditions with less than half of the production cost compared to any Bt-cotton hybrid. Ginning out-turn is very high. Other category pertains to Desi varieties that produce good quality spinnable fibres. There are some newly improved varieties with very good fibre traits that are equivalent to American cotton varieties. In a succinct study published in 2011 in the Indian Journal of Fibre and Textile Research, Chandra and Srinivasan (ex-Director CIRCOT, Mumbai) compared four improved new Desi cotton *Gossypium arboreum* varieties (PA-255, DLSA-17, MDL-2463 and Jawahar Tapti) with two American cotton *Gossypium hirsutum* varieties (Bikaneri Narma and LRA-5166) for their spinning potential at 16, 30 and 40 counts. They found that "...at medium count (30s), in general, all the improved *G. arboreum* strains perform better than the *G. hirsutum* strain LRA-5166 but the strain PA-255 shows most promising results. This may be attributed to the fact that almost all the improved *G. arboreum* strains evaluated, PA-255 possesses best fibre quality traits, especially fibre length and fineness. For 40s count the improved *G. arboreum* strain PA-255 shows significantly better results for U%, thick and thin places in comparison to the *G. hirsutum* strain LRA-5166." The authors concluded that "The fabric produced from improved *G. arboreum* cotton shows comparatively higher toughness and appears to possess optimum rigidity. The improved *G. arboreum* cotton fabric records markedly higher values for dye uptake and air permeability as compared to *G. hirsutum* cotton fabric. These fabrics are suitable for the designated end use i.e. men's winter wear with THV rating around '3'. ..The improved *G. arboreum* can be a viable and suitable alternative to the medium long staple *G. hirsutum* cotton particularly with regard to the yarn count range 8-25s and for specific end uses like denim and twills. Also, the *G. arboreum* genotypes are well known for their inherent resistance to biotic and abiotic stresses and widely considered as a potential source for organic cotton."

Thus, there is immense potential for Desi cotton varieties to make a huge positive difference to India's cotton sustainable future. Unfortunately some of the best research results with Desi cotton were achieved at a time when the country was under the Bt-cotton hybrid wave. All the new improved varieties were released mostly coinciding with the Bt-cotton wave. The improvements made in Desi cotton are important because they provide viable

sustainable alternatives for high yields with low cost of production. This assumes significance in light of the significant increase in cost of cotton production over the past 10 years, when the yields also became stagnant.

Also, over the past 2-3 years there is a growing demand for Desi cotton all across the country, especially in North India. But, seeds of many Desi varieties are not available in the local market. Public sector institutions such as State Agricultural Universities, state seed corporations and CICR have been producing limited quantities that are adequate for just a few thousand acres. In view of the increasing demand, it is possible that these institutions will upscale seed production programmes of the Desi varieties in the next few years. The renewed demand for Desi cotton did not come as a surprise for those who deal with cotton. The main reasons for the preference are 1. Desi cotton varieties are deep rooted and overcome drought with ease 2. Whiteflies have been causing immense damage to almost all the Bt cotton hybrids in north India, whereas almost all the Desi cotton varieties are resistant to whiteflies and leaf hoppers. 3. Desi cotton species are immune to the dreaded 'cotton leaf curl virus disease CLCuD' which is a major menace in North India and not in other parts of the country 4. The market price of Desi Kapas (seed-cotton) was 15-20% more than the kapas of Bt-cotton hybrids 5. Desi varieties hardly need any chemical inputs such as fertilizers or insecticides for higher yields, thus the cost of production is less than half of Bt-cotton hybrids 6. Even with moderate care, the yields of Desi cotton varieties can easily exceed the yields of Bt cotton in rain-fed and irrigated regions.

Conclusion. It is important for the cotton scientific fraternity to renew their focus on the strengths of the native cotton and build on them to develop robust climate resilient Desi varieties that produce premium quality fibre with least dependence on chemical inputs. This is eminently possible. As Robert Goddard said "It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow". Strange, that we transformed Desi cotton which was a wonderful reality of yesterday into a dream for tomorrow.

It occurs to me sometimes that Desi cotton is just like what Indians are "deep rooted in civilization, rich in heritage, strong in conviction, open to exploitation, unaware of their strengths, philosophically lost in wilderness and happily resigned to fate". It is time to wake up and help Desi cotton get back its lost kingdom, and through it so shall our own brethren regain back our roots to reach the sky.

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