R&D in Traditional Color-lint Cottons of Andhra Pradesh, India

K. Ravindranath[1*] and Pocha Brahmananda Reddy[2]
[1]ANGRAU, Andhra Pradesh, India
[2]Bharathi Seeds, Nandyal, Andhra Pradesh, India

Article History

Manuscript No. 84
Received 30th October, 2010
Received in revised form 2nd November, 2010
Accepted in final form 5th November, 2010

Correspondence to
E-mail: ravijnan@yahoo.co.in

Keywords
Colored cottons, Coconadas-1, Coconadas-2, eco-friendly, garments

Abstract

Colored cottons Coconadas-1 and Coconadas-2 of *G. arboreum* group (desi) were grown on a commercial scale in Guntur and Nandyal areas of Andhra Pradesh. These are eco-friendly and free from health hazards. These colored cottons were replaced with white linted types due to their poor yielding ability, poor fiber quality and non-stability of the natural color. Further the introduction of artificial dyes of different colors, the colored cottons lost its importance to white linted types. Further research on improvement of colored cottons initiated at Regional Agricultural Research Station, Nandyal has resulted in isolation of few varieties NDL HC-1, HC-2 and BS 1000 at Bharathi Seeds R&D unit, Nandyal belonged to *Hirsutum* group and NDL AC-1 and AC-2 in *G. arboreum* (desi) group. Among these, BS-1000 (*G. hirsutum*) has recorded 28% increase in yield over white linted cotton variety Narasimha (check). This denotes the possibility of developing a superior colored type with higher yield and better fiber characters which facilitate the manufacture of eco-friendly garments to catch up foreign markets, and thereby improve country's economy benefiting the farmers.

1. Introduction

Andhra Pradesh was once the citadel of naturally colored lint cotton cultivation along hand-spinning and weaving of such cottons into nice attractive fabrics by skilled artisans especially womenfolk as rural cottage industry. Traditionally the color-lint cottons such as Coconadas-1(C-1), Coconadas-2 (C-2) and Red Northerns belonging to desi (Asiatic) cotton group were grown on a commercial scale over an area of more than 25000 ha. Red Northerns were under commercial cultivation mostly in Kurnool district of the state in black soils under rainfed conditions. Later on, the white lint cotton varieties have virtually replaced the color lint cottons in such areas due to their inherent higher yield potential and better fiber quality.

In the coastal districts of Andhra Pradesh, brown-lint cotton varieties like C-1 and C-2 were grown during first half of 20th century. Systematic research work was done at Research Station at Lam Farm, Guntur and Cotton Research Station, Nandyal on color-lint cottons. These belonged to *Gossypium arboreum* L. (desi cottons) and were grown under rain-fed conditions. The cultivation and demand for colored cottons declined during the second half of 20th century due to various reasons like poor yielding ability, poor fiber quality, non-uniformity and non-stability of the natural color and yielding place to the white lint cottons. Due to introduction of artificial dyes, the colored cotton lost its importance to white linted types. But chemical dyeing of fabrics not only created environmental pollution, but also health hazards to the users of such fabrics manufactured by using harmful chemical dyes. Even though, the use of naturally colored lint cottons avoids the degradation of environmental and health hazards, the white lint cottons reigned supreme for various practical and economic reasons.

2. Early Research Efforts

The expression of naturally colored lint is governed by dominant gene over white (Sikka and Joshi, 1960) besides action of few to several intensifiers and modifiers, especially in old world cottons. Similarly wide ranging fuzz color variations had been reported by several workers in mutant stocks and also in tetraploid commercial hybrid cottons. In order to develop superior genotypes with naturally colored lint of varying stable and attractive colors, considerable research efforts were made at Regional Research Station, Nandyal (India) during the decade of 1990s. Several naturally colored lint genotypes were studied in comparison with white lint commercial variety Narasimha of *G. hirsutum* and Srisailam of *G. arboreum* as standard checks. The studies brought out that all the color-lint genotypes tested from genetic stocks were poor yielding than the white-lint checks in both the species.

3. Varietal Improvement

Varietal improvement program had been taken up using the procedures like pure line selection and pedigree breeding.

3.1. Pure line selection

In Andhra Pradesh, C-1 color-lint cotton was grown on commercial scale in Narasaraopet area of Guntur district, Nellore, Cumbum and Markapur area of Prakasam district and parts

Table 1: Economic characters of color linted cottons-*Gossypium hirsutum*								
S. No.	Selection	Lint color	Yield of Seed Cotton (kg ha^{-1})	% of control	Boll Wt. (g)	Duration (days)	GOT (%)	MHL (mm)
I Regional Agricultural Research Station, Nandyal								
1	NDL HC1	Dark brown	715.0	55	3.0	165	35	20.8
2	NDL HC2	Green	635.0	49	3.0	160	34	18.4
II Bharathi Seeds R & D, Nandyal								
3	BS1000	Dark Brown	1664	128	3.8	155	34	24.5
4	Narasimha (check)	White	1300	100	4.0	155	36	25.0
GOT: Grow Out Test, MHL= Mean Halo Length								

of Kurnool district. Though these cottons were grown in such areas, their yield potential was low. Hence pure line selection was followed in the bulk plant population of C-1 commercial cotton and one single plant with very dark brown cotton lint was identified and released as C-2 for further cultivation which gave 20% higher yield of seed cotton than C-1. However, this variety could not make any breakthrough in competition with white-lint cotton varieties.

3.2. Pedigree breeding

During 1993-1994 at Regional Agricultural Research Station (RARS), Nandyal pedigree method was adopted to identify a better genotype both in *G. hirsutum* and *G. arboreum* crosses. Due to continuous effort and selection four genotypes NDL HC-1 and HC-2 (*G. hirsutum*) and NDL AC-1 and AC-2 (*G. arboreum*) were identified and tested with white linted types as checks (Ravindranath and Basha Mohiddin, 1996). These new genotypes however could not stand the test of time in comparison with commercial white-lint cottons. In the R&D unit of Bharathi Seeds, Nandyal, a selection BS 1000 (*G. hirsutum*) was found to be promising among the various genotypes tested. The results on economic characters of color linted cottons are presented in Table 1. It was observed that colored genotypes have recorded lower yield of seed cotton as compared to white linted cotton varieties Narasimha and Srisailam at RARS, Nandyal. But in *Hirsutum* cottons at Bharathi Seeds R&D unit, Nandyal, the selection BS 1000 (AC-135 x Brymer brown) (color cotton)) belonging to *G. hirsutum* group has recorded 1664 kg ha^{-1} as against 1300 kg ha^{-1} of Narasimha local check white-lint type, thus recording 28% increase in yield over Narasimha (check). This shows the possibility of developing a high yielding colored types by crossing with better agronomic genotypes using back crossing method keeping not only the yield, but also fiber quality by selecting desired lines (Table 2).

Table 2: Economic characters of color linted cottons-*Gossypium arboreum*								
S. No.	Selection	Lint color	Yield of Seed Cotton (kg ha^{-1})	% of control	Boll Wt. (g)	Duration (days)	GOT (%)	MHL (mm)
I Regional Agricultural Research Station, Nandyal								
1	NDL AC-1	Dark brown	720	76	2	165	35	18
2	NDL AC-2	Light brown	620	65	2.5	160	34	22
3	Cocanadas-2	Dark Brown	665	70	2.5	165	34	22
4	Srisailam (check)	White	950	100	2.8	170	36	23.5

Efforts are under progress to develop a high yielding quality type color-lint cotton variety suitable for organic cultivation with tolerance to pests and diseases in isolation from white-lint cottons. The research work at Bharathi Seeds, Nandyal

BS-1000 dark brown colored cotton crop

resulted in two types BS 1000 and BS 1036 which are the crosses of white linted high yielding germplasm lines using pedigree breeding.

The easy dying ability of white cotton to take up various dyes prompted a shift in the research priorities to white cottons thus hastened the decline of color cottons. In recent years due to environmental awareness in USA, Europe, and other western countries there is a good demand for organically grown colored cottons wherein India can exploit the market of color-lint cottons (Khadi, 2004) without affecting white-lint commercial cottons.

The naturally colored cotton had been in use in some parts of coastal districts of Andhra Pradesh, Visakhapatnam and Srikakulam, where Ponduru colored cotton was hand woven with Cocanadas cotton (C-2). This is also used in manufacture

Hon'ble Prime Minister late Sri. P.V. Narasimha Rao observing keenly the coloured cottons at Nandyal(A.P)

of curtains, mats, carpets, bedspreads, etc. With better quality of color cotton available now, they can be used for production of wide variety of fabrics like shirtings, denims, single or double knitted fabrics, etc. The late Prime Minister of India P. V. Narasimha Rao, during his visit to Nandyal enquired about the position of Ponduru color-lint cottons and desired organically natural colored cottons to be developed, which fetches good foreign exchange. Sufficient attention is required to grow colored cottons without detrimental to commercial white-lint cottons.

4. Problems

The earlier varieties C-1 and C-2 were low yielders than the white linted varieties.

The fiber quality of naturally color-lint cottons has to be improved.

The color of fiber is not stable and effort is necessary to develop new colors and shades to meet present textile demand.

There is fear of contamination of white linted cotton varieties and thus restricted the spread of color cottons.

The marketing problems of color cottons have to be tackled properly.

Effort is to be made to evolve proper production technology suitable for colored cotton.

5. Future Thrust

Development of color cottons with stable high yielding capacity with better fiber characters.

Development of color cottons resistant to abiotic and biotic stresses suitable for organic cultivation.

Improving the intensity, uniformity and stability of color.

Growing in sizeable area by establishing contract/cooperative farming to avoid contamination with white linted types.

6. Conclusion

Hence proper genotype with improved production technologies, assured market facility with adequate safeguards are essential to realize benefits of the eco-friendly color-lint cottons, which facilitate the manufacture of suitable garments to catch up foreign markets which will help in improving the country's economy and marginal farmers' incomes.

7. Acknowledgement

The authors gratefully acknowledge with thanks the valuable suggestions given by Dr. S. S. Narayanan former Director, Central Institute for Cotton Research, Nagpur, India.

8. References

Khadi, B.M., 2004. Revival of Eco-Friendly, Chemical and Processing Free Natural Colored Cotton. Souvenir International Cotton Genome Initiative, 54-60.

Mandloi, K.C., Khadi, B.M., 1999. Natural Colored Cotton Hand Book of Cotton in India. Indian Society for Cotton Improvement, 397-412.

Ravindranath, K., Basha Mohiddin, S., 1996. Development of Colored Cottons and Priorities. Indian Society for Cotton Improvement 21, 177-179.

Sikka, S.M., Joshi, A.B., 1960. Breeding in cotton in India Monograph Vol. I. Indian Central Cotton Committee, Mumbai, 137-335.

Sikka, S.M., Joshi, A.B., 1960. Genetics in cotton in India Monograph Vol. I. Indian Central Cotton Committee, Mumbai, 403-446.