

SERVICES

Cultivar Development :

Since 1950, four *G. herbaceum*, one *G. arboreum*, 11 *G. hirsutum* varieties have been released, apart from three interspecific tetraploid hybrid (DCH-32 type) and one intrahirsutum hybrid (DHH-11 type). There are several lines in pipeline to have continuity of breeding to vibrate with changing cotton scenario. The cultivar development has always aimed at location specific needs and different farming situation. Newly developed cultivars have brought into higher seed cotton yield, higher ginning out turn (GOT), higher lint yield, good boll weight, better fibre quality and tolerance to insect pests. Some of the varieties or hybrids that are spinning money in the market for their special features have been briefed below.

G. hirsutum varieties :

1. **Abadhita** : First bollworm tolerant *G. hirsutum* variety, well suited to rainfed ecology of transitional tract of Karnataka. This requires comparatively less insecticide spray, when compared to other Laxmi type varieties like LRA-5166.
2. **Sahana** : It is a multiple pest tolerant variety suited to both irrigated and rainfed situations. Now this has been a very popular variety among farmers. Even in summer irrigated situation this has got good spread.

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3. **RAMPBS-155** : A. G. hirsutum variety with adaptation to Eastern dry zone which covers Tungabhadra Project Area. A selection based on morpho-physiological traits has got sucking pest tolerance and higher boll weight and GOT.

All above varieties possess fibre well suited for spinning 30-40 counts and have GOT nearing to 40 per cent compared to LRA-5166 (35-36%) and Laxmi (35%). Other varieties called AH-107 (Gouri) and ACP-71, (Ganesh) have been released for cultivation in Ghataprabha Left Bank Canal Area in double cropping and mixed cropping systems respectively.

Hybrids :

A : Interspecific hybrid :

1. **Varalaxmi** : This is a first interspecific hybrid released by UAS, Dharwad which made a preamble in changing fibre quality scenario of Indian Cotton.
2. **DCH - 32** : This interspecific hybrid released from UAS Dharwad has characteristic fibre with extralong staple to suit needs of 60s to 80s counts of spinning even up to 100s. This has been a high priced cotton and still in cultivation in pockets Karnataka, Maharashtra, Madhya Pradesh and Tamil Nadu. This hybrid has enabled India to produce fibre suited higher spinning counts which otherwise was imported from other countries. The value of trade that is being generated by DCH-32 is still very high when compared to other varieties.
3. **DHB - 105** : This has been an improved versions of DCH-32, and possess resistance to leaf reddening. This is a bollworm tolerant hybrid as its female parent is tolerant to bollworm. The yield potential of this hybrid is higher

then DCH-32 to the tune of 20 per cent with good boll opening.

B. Intra hirsutum hybrid :

1. **DHH - 11 :** The time when interspecific, hirsutum-barbadense, hybrids exhibited sucking pest susceptibility, the intra-hirsutum hybrids peeped into farmers field. Among them first was NHH-44. The defects of NHH-44 were improved in DHH-11. This new hybrid possessed higher boll weight, good opening of bolls, higher kapas yield nearly four per cent increased GOT and tolerance to bollworms. This hybrid is early and known as king of boll opening. This hybrid is superior medium staple category suited to 40s to 50s count. Many private and public organization have organized the seed production programme of DHH-11.

Apart from these, there are lines/hybrid either under advanced testing or in Farm Trials. To quote some of those are RAH-100, CPD-431, DHH-543, RAHH-1, DHB-290.

Desi Cotton Development :

1. **DDhC-11 :** A new G. herbaceum variety which possess higher yield potential, GOT and resistance to alternaria blight when compared to Jayadhar.
2. **RAhS-14 :** This is also a G. herbaceum variety exhibiting more seed cotton yield potential than DB-3-12 and suited to Eastern dry zones of Karnataka.
3. **DLSa-17 :** This is a long linted (27-29 mm) G. arboreum variety an improvement over AK-235. A medium staple variety suited for regular

sowing in Karnataka.

PLANT PROTECTION :

Cotton has been a agricultural crop which consumes more than 50 per cent of all crop pesticides used in India. To reduce pesticide used and bring about sustainability in the cotton ecosystem, location specific need based Integrated Pest Management (IPM) modules have been developed and demonstrated at both Raichur and Dharwad. Pest management being the main component of cotton cultivation farmers spend a lion share of money for this purpose. The IPM modules advocated by UAS, Dharwad are cost effective, userfriendly and ecofriendly.

Technologies for Future Use :

Cotton research group is also vibrating with timely changing demands of both farmers and industry.

1. Bt cotton :

The biotechnological developments in other parts of the world has culminated into a bollworm resistant genotype, impregnated with crystal protein gene (Cry/AC) from *Bacillus thuringiensis*. Similarly UAS, Dharwad is conduction genetic transformation using crystal protein gene (Cry/AC). Many putative transformants have been generated. This technology is expected to provide a stable resistance against bollworms. Apart from that tansgenics has tremendous opportunities in cotton in the days to come. First public transgenic Bt cotton is expected shortly which will stand as check to the monopoly of multi national companies (MNC's). Thus competition in the market may help in reduction of seed cost.

2. Long Linted Desi Cotton :

Desi cottons belonging to *G. herbaceum* and *G. arboreum* possess characteristics of short staple and coarse fibre. Cotton breeding work involving introgression has resulted into long linted (27-29 mm) desi cotton especially *G. arboreum*. These being resistant to biotic stresses especially sucking pests and abiotic stresses. Hence, these genotype serve as a good candidate for producing cheaper cotton. The genotype DLSa-17 has been considered as best genotype for genetic transformation. Long linted *G. arboreum*s with Bt reduce cost of cultivation to bear minimum.

3. Naturally Coloured Cotton :

The concept of total natural fibre has been achieved through breeding naturally coloured cotton with respect to increased spinnability of the fibre, colour stability etc. The available shades of brown green have been utilized.

Naturally coloured cotton has huge domestic and export market and Indians can meet that at cheaper rate than any other country. To this respect and almond colour *G. arboreum* DDCC-1 genotype has been identified for cultivation. Presently all technologies related to Naturally Coloured Cotton has been transferred to Karnataka. Rajya Khadi Gramodyoga Mandali for trial run and commercial production. The guide to process Naturally Coloured Cotton has also been prepared using expertise of Textile Engineering students of Hulakoti College. This commodity will hit both Indians and oversease market in near future.

4. Male Sterile Based Hybrids :

Conventional hybrid cotton seed production has been a labour intensive

process and major cost is towards labour. The cost of labour has been reduced by inducing male sterility, in cotton genotypes using cytoplasmic genetic male sterility and genetic male sterility. Hybrids based of CGMS are in pipeline and have performed well in All India Co-ordinated Trials. DMSHH-53, 54 and 73 are three cultivars showing higher seed cotton yield (superior medium quality) fibre properties, boll weight (5.4) GOI (39%) in comparison with conventional hybrid DHH-11. This technology has been proved to reduce dependence on labour along with providing 100 per cent genetically pure seed.

5. Compact Cotton for Machine Picking :

The shortage of manpower during the time of picking makes harvesting of cotton very difficult. Further, 3-4 pickings are common, but if cultivars with synchronous flowering and fruiting with compact nature has provided an opportunity to breed cultivars of compact cotton. This type of cotton also suited to different cropping system, vibrate with agronomic manipulation and plant protection measures.

6. Increasing Extralong Staple Cotton Production in Karnataka :

The declining productivity of DCH-32 due to changed cotton ecosystem has forced cotton breeders to produce extralong staple cotton with sucking pest tolerance. A two way approach is being practiced now in UAS, Dharwad to tackle this problem on priority. One breeding intra-hirsutum hybrid with extralong staple fibre which also automatically takes care of micronaire and GOT. Second is to breed sucking pest tolerant interspecific hybrid with high heterosis.

7. Development of Efficient Farming Techniques for Higher Productivity in cotton:

Higher returns can be achieved either with increased productivity or

integrated crop management strategies. Under limited water available conditions drip system of irrigation saves water up to 50 per cent or even more in which the area under irrigation can easily increased. Double cropping system with cotton naturally increased the total returns and thus helps to boost up for early pay back of investment made in drip irrigation.

Fertigation studies from Israel indicated to increase cotton yields by increasing split application of nutrients. Studies conducted at ARS, Dharwad also reveals that split application of N.P. and K nutrients from 30 to 120 days after sowing at 5 days interval boosted the yield to 1.5 times. So the concept of fertigation, double cropping, IPM, IWM were blended to increase the total returns. Study is under investigation for revaling the concepts.
