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An Overview and Current Status of Cotton Research Program in the Sudan

By
Abdelrahman H.Latif and Elfadil.A.Babiker

Agricultural Research Corporation
Cotton Research Program

Introduction:

Cotton "*Gossypium*" is the major natural textile fibre crop worldwide. In Sudan, cotton has been grown for centuries. The cotton plant is indigenous and a number of its wild relatives exist in various parts of the country, as well as, it is a way of life, reduced poverty and encouraged the settlement in rural areas.

Commercial growing of the crop, however, started in 1867. The big jump was in 1926, which marked the official start of functioning of the Gezira Scheme. Cotton in Sudan is grown under irrigation and rain-fed. The bulk of the production, nearly 90% , is exported as raw fibre, while the other 10% is locally consumed.

Likewise, large production has, since the beginning, been backed by a strong research program The Agricultural Research Corporation (ARC) has an intensive program to develop new varieties, increase yield and improve quality to meet the recent demand of consumers.

Major activities of the research program addressed the yield and fibre quality problems. In recent years, however, contamination issues started to acquire their fair share in the research strategies, of these stickiness contaminations.

Generally the framework of the cotton research is pillared mainly upon the following:-

1. Cotton variety improvement.
2. Cotton stickiness and testing technology
3. Agronomy .

Cotton Improvement:-

Generally the cotton variety Improvement Program, mainly addresses the following:-

- ✓ Higher yields, earliness, disease and insect resistance.
- ✓ Breeding new variants having different balances of fiber characteristics to meet the textile and spinning technology needs.
- ✓ Breeding for Vertical upgrading of productivity via the integrated crop management (ICM).
- ✓ Maintaining the existing cultivar.

As results, number of more than 50 varieties and improved lines being released, of these, only 7 varieties are currently grown either commercially or in limited propagation plots, covering wide range of fibre characteristics as indicated below:-

Varieties	Length(mm)	Micronaire	Strength	G.O.T
Barakat	33-35	3.7-4.1	36-41	33-34
Barakat-90	34-36	3.8-4.2	35-39	33-35
Shambat-B	30-32	3.7-3.9	32-35	30-33
Nour	29-31	4.6-4.9	29-32	35-36
Barac(67)B	27-28	3.9-4.2	27-31	36-38
Acrain	25-27	3.5-3.9	25-29	34-36
Albar (57)12	25-26	3.5-3.8	24-28	35-37

Encouraging research efforts have been exerted to replace the long grown current varieties; hence, hundreds of lines are in the pipe line, emerging from crossing and selection programs of the individual breeders.

Recently (2004/05 and 2005/06), nine varieties were released .However only 4 varieties are currently grown as commercially namely:-

Varieties	Length(mm)	Micronaire	Strength	G.O.T
Hamid	27-29	4.5-4.8	28-31	35-36
Abdin	29-33	4.3-4.4	30-34	34-35
Wager	27-29	4.4-4.5	29-31	35-36
Burhan	27-28	3.9-5.0	28-29	34-35

However, promising advanced lines superior in quality to traditional Barakat-90 , in length and having strength above 40 g/tex., were reported.

More over a release of Bt. cotton open pollinated, evaluated in different locations in the irrigated and rain-fed field trails, were commercially released recently, resulting in average increase of 54% and 87% in seed cotton yield over local checks Abdin–Hamid respectively, also having GOT ranging between 42-44% compared to 34-36 for the local checks.

2. Cotton Stickiness and Testing Technology

2.1. Fiber testing:

The work generally, aimed to test, study and monitoring the quality performance of the existing cultivars, as well as prospective genotypes and other selections.

Data were collected on samples from the followings

- ✓ Commercial samples submitted to ARC testing Lab
- ✓ National variety Trial (DVT).
- ✓ Selections, lines and cultivars grown at GRS.

- Samples were tested for fibre quality parameter, such as length, strength and fineness, using both High Volume Instrument (HVI) and Low Volume Instrument (LVI).
- Yarn test were also conducted for promising lines, using micro-ring spinning.

- Thermodection technique (SCT), for stickiness level.

2.2. Stickiness:

Stickiness was observed in Sudan since the early 1960's, but was sporadic at that time and of little importance. During the 1980's the phenomenon became worldwide .However national Intensive research was carried out regarding stickiness of cotton in Sudan. The programs included:

- Type of sugars causing cotton stickiness.
- Quick methods for grading cotton stickiness
- Ginning efficiency, and the spinning performance.
- Integrated pest management.(IPM)package
- Breeding of cotton varieties tolerant to whitefly infestation.

These research programs continued and in a very short time main results by researcher were revealed.(Gameel , Khalifa, Ali)
However, somewhat considerable success was achieved through research level. But unfortunately the problem was still there.

In turn Global Research Program (Sudan-France) during 1998-2000, financed mainly by the Common Fund for Commodities (CFC) was executed with the objectives of developing an objective methodology (rather than the current subjective methods in use) to separate sticky from non-sticky cotton in order that the non-sticky part could be sold at due price. The study revealed considerable variability in stickiness levels among the cotton production areas, and considerably low levels of stickiness were observed in some schemes. Research continued, as well as better practical knowledge on avoiding stickiness in-field practices were shared in Sudan.

According to International Textiles Manufacturers Federation Survey a better position for stickiness in Sudan was reported, it have been continuously decreasing since 2001 as a contaminated origin.

The following research efforts are in progress to alleviate this problem:-

2.2.1. Effect of soil moisture, sowing date and picking time on stickiness.
2.2.2. Testing facilities to detect stickiness levels (physical and chemical):
2.2.3. Research into methods likely to improve the spinning process and the quality of the yarn depending on the sticky potential of the cotton.
2.2.4. Future mapping of zones varying in stickiness indices.

3. Agronomy

The work mainly aims to development of agronomic practices that improve crop productivity and quality as well as reducing production costs. Activities usually including planting date, plant density, irrigation, plant physiology and crop modeling.
Hence, technical packages that fit both ecological different zones and variability in crop duration were generated. Despite of the successful technical packages being recommended, the implementation at the farm level is disappointing due to the non-committed farmers and lack of follow up .