

SHORT NOTE

Comparative quality studies on breeder, foundation, registered and certified cotton seeds of the commercial variety Barakat-90 in the Gezira Scheme

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Agriculture is the backbone of Sudan economy after petroleum. Cotton was the most important cash crop. During the forties of the 19th century, cotton used to earn about 70% of the country's foreign exchange (Afzal, 1949) and provides 13% of total labour force (Ali, 2004). In 1918 Sudan Agricultural Research started research on cotton problems in order to avail suitable cotton varieties and technical package for different cotton areas in the country. Seed multiplication is accomplished through successive generations of increasing the amount of seed, generally called breeder, foundation, registered and certified seeds (Lewis, 1970). The Cotton Research Program of the Agricultural Research Corporation (ARC) is responsible for the production of the breeder's seed and supervision of the production of the foundation seed, in cooperation with the irrigated schemes (Babiker, 2007).

Current changes in spinning technology and the global nature of the cotton market have necessitated the production of high quality fibre. Thus, more recently, fibre quality has become one of the most important issues facing the whole industry from cotton breeding to fabric finishing (Phillip, 2005). Accordingly, breeder, grower, buyer, seller or spinner need to know the parameters of the cotton quality.

The objective of this study was to examine cotton quality of breeder, foundation, registered and certified cotton seeds of the commercial cotton variety Barakat-90 (*Gossypium barbadense*) at different stages of cotton seed multiplication in Gezira Scheme.

Technological package recommended for cotton seed multiplication by the ARC was adopted. The experiment was carried out in the Gezira scheme during 2003/04 and 2004/05. Random samples of seed cotton were taken for two consecutive seasons 2003/04 and 2004/05, viz, first and second seasons, respectively. The samples represented early and late stages of multiplication. Both high and low cotton grade were sampled. Early stages of this variety were obtained from Gezira Research Station (GRS) and Wad Sulfab while late stages were obtained from Gezira Scheme propagation fields.

Measurements made on seed cotton were seed index (S.I) which was determined by taking the weight of 100 sound seeds in grams and lint index (L.I) which was determined by taking the weight of lint borne on 100 seeds in grams (Hegab *et al.*, 1985). Measurements made on lint cotton were fibre length, fibre bundle strength and micronaire value, using the High Volume Instrument (HVI).

Effect of cotton seed source on seed index (S.I), lint index (L.I), ginning out turn (G.O.T%) and fibre characteristics of the commercial cotton cultivar Barakat-90 was obtained from Gezira Scheme propagation farms compared with cotton obtained from Gezira Research Station in seasons 2003/04 and 2004/05 as shown in Table 1. Mean seed index (S.I), ginning out-turn (G.O.T%), micronaire value

and fibre strength of Barakat-90 high grade cotton ginned from late stages were significantly different from those produced at early stages of multiplication. In the first season, certified seeds gave the highest seed index value (12.67 g) followed by registered seeds (12.23 g), breeder and foundation seeds recorded 11.83 g and 11.77 g, respectively.

The highest value of ginning out turn (G.O.T%) of Barakat-90, high grade cotton in the first season was recorded by the breeder seeds (33%), foundation and certified seeds came next with 32% each. On the one hand, the breeder seeds (early stages) and the registered seeds (late stages) of Barakat-90, high grade cotton obtained the highest and lowest micronaire value respectively. On the other hand, the highest value of fibre strength was obtained by foundation seeds (early stages) for the same cultivar high grade cotton (Table 1). Lint index (L.I) and lint length (L.L) of cultivar Barakat-90 high grade cotton produced at different stages of multiplication

of the first season were not significantly different. However, the highest values of lint index were recorded by certified and breeder seeds, respectively. Mukundan *et al.* (1990) revealed that nitrogen had a beneficial effect on fibre length, but neither nitrogen nor phosphorus had any effects on fibre strength, micronaire value or fibre maturity. Quality parameters for Barakat-90, low grade cotton of late stages of multiplication in the first and second seasons were significantly ($P < 0.05$) different from that obtained at early stages of multiplication. The highest seed index (S.I) was recorded by the breeder seeds (11.83 g and 12.13 g), next came certified seeds (11.67 g and 12.13 g). The lowest value obtained by registered seeds with (9.31 g and 11.87 g) for the first and second seasons, respectively (Table 1).

Significant differences were observed for lint index of Barakat-90 low grade cotton obtained by different cotton seed sources in both seasons. The highest values of lint index (L.I) (6.47g and 6.57g) were obtained by certified and registered seeds (late stages) in the first and second seasons, respectively. Breeder seeds and certified seeds came second in the first and second seasons, respectively (Table 1). Ginning out-turn% of Barakat-90 low grade cotton was significantly different between the seed sources in the first season only. Certified seeds showed the highest G.O.T. (34%) and the lowest G.O.T (32%) was recorded by registered seeds. Lint length of this cultivar showed significant differences between seed sources in the second season. Breeder and foundation seeds recorded 34.1 mm and 33.8 mm, respectively. Micronaire value of Barakat-90 low grade cotton was not significantly different between the different multiplication seed sources in the second season. However, in the first season, the breeder seeds showed the highest micronaire value of 4.20. The lowest value (3.50) was obtained by registered seeds (Table 1). Fibre strength (g/tex) showed significant differences between the seed sources of Barakat-90 low grade cotton in both seasons. The greatest value of strength was recorded by breeder seeds (39.1 g/tex) and foundation seeds (38.8 g/tex) in the first and second seasons, respectively (Table 1).

Table 1. Effect of cotton seed source on seed index (S.I), lint index (L.I), ginning out-turn (G.O.T %) and fibre characteristics of the commercial cotton variety, Barakat-90, Gezira Scheme propagation farm (GS) compared to Gezira Research Station (GRS), 2003/04 and 2004/05 seasons.

Source	S.I (g)	L.I (g)	G.O.T (%)	Len. (mm)	Mic.	Str. (g/tex)
<u>First season</u>						
<u>High grade cotton</u>						
Breeder seeds (GRS)	11.83 b	6.23 a	33 a	33.2 a	4.20 a	39.1 ab
Foundation seeds (GRS)	11.77 b	6.07 a	32 a	33.6 a	3.83 ab	43.3 a
Registered seeds (GS)	12.23 ab	6.07 a	30 b	34.4 a	3.73 ab	39.6 ab
Certified seeds (GS)	12.67 a	6.30 a	32 a	33.9 a	4.17 a	39.0 ab
Mean	12.13	6.17	32	33.8	3.98	40.3
C.V%	2.74	2.28	0.91	2.51	5.86	4.61
S.E ±	0.19	0.08	0.17	0.49	0.13	1.07
<u>Low grade cotton</u>						
Breeder seeds (GRS)	11.83 a	6.23 a	33 b	33.20 a	4.20 a	39.1 a
Foundation seeds (GRS)	11.07 a	5.47 b	33 b	32.60 a	3.60 b	38.7 a
Registered seeds (GS)	9.31 b	5.27 b	32 c	32.63 a	3.50 b	32.1 b
Certified seeds (GS)	11.67 a	6.47 a	34 a	33.00 a	3.60 b	37.0 a
Mean	11.00	5.86	33	32.85	3.35	36.5
C.V %	4.14	4.60	0.00	2.17	3.95	3.42
S.E ±	0.26	0.15	0.01	0.41	0.08	0.72
<u>Second season</u>						
<u>Low grade cotton</u>						
Breeder seeds (GRS)	12.13 a	6.17 ab	34 a	34.1 a	3.83 a	37.9 ab
Foundation seeds (GRS)	11.87 a	6.07 b	33 a	33.8 a	4.00 a	38.8 a
Certified seeds (GS)	11.87 a	6.57 a	34 a	32.7 b	4.00 a	36.0 bc
Registered seeds (GS)	12.13 a	6.53 a	33 a	32.4 b	3.87 a	34.1 c
Mean	12.0	6.33	34.0	33.3	3.93	36.7
C.V%	2.95	3.29	1.74	0.86	4.07	3.36
S.E±	0.20	0.12	0.33	0.16	0.09	0.71

Means followed by the same letter(s) in the same column are not significantly different at 0.05 level of significance according to Duncan's Multiple Range Test (DMRT)

Len = fibre length, Mic. = micronaire value, Str. = fibre strength.

In conclusion, cotton seed and lint quality parameters were significantly affected by stages of multiplication. Early stages (breeder and foundation seeds) produced by GRS were mostly of better quality for cotton seed and lint quality parameters compared with late stages (registered and certified seed) obtained from the Gezira Scheme propagation farms. This may be attributed to the area grown with registered and certified cotton seeds (large areas) which needs more field management to cope with cotton quality produced in areas grown with breeder and foundation seeds (small areas).

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دراسة مقارنة لنوعية أقطان بذرة المربي، الأساس، المسجلة والمعتمدة للصنف بركات-90 في مشروع الجزيرة

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الخلاصة

أجريت دراسة مقارنة في موسمي 2003/04 و2004/05 لفحص نوعية القطن لبذرة المربي والأساس (المراحل المبكرة) أستجلبت أقطانها من حقول هيئة البحوث الزراعية وأقطان البذرة المسجلة والمعتمدة (مراحل متأخرة) أستجلبت أقطانها من حقول مشروع الجزيرة للصنف بركات-90 (قطن فائق الطول)، تم أخذ عينات عشوائية من القطن الزهرة للدرجات العليا والدرجات الدنيا. تم تحديد معامل البذرة، معامل الشعرة، صافي الحليج وقياسات للشعرة (الطول، النعومة والمتانة). أظهرت نتائج تحليل البيانات إحصائياً إن نوعية القطن تتأثر باختلاف مراحل إكثار البذرة. أظهرت الدراسة أن الأقطان التي تنتج من بذرة المربي والأساس في الغالب ذات نوعية أفضل من الأقطان التي تنتج من البذرة المسجلة والمعتمدة ويعزى ذلك لصغر المساحة التي تزرع ببذرة المربي والأساس والتي تسهل إدارتها مقارنة بالمساحة التي تزرع بالبذرة المسجلة والمعتمدة.