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SHORT NOTE

Enhancement of Cotton Boll Retention by GA_3 Treatment

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Cotton (*Gossypium spp*.) is number one cash crop in the Sudan and is widely grown in irrigated and rainfed areas. It occupied a total area of about one million acres producing about one million bales of lint (Mursal, 1988), and there is a great potentiality to rank on the top of exports.

Cotton quantity and quality improvement could be achieved by hybridization. Intraspecific and interspecific crossing is one of the ways to transfer desirable gene(s) combinations for crop improvement. One of the limitations that face the cotton crossing process is the high flowers and bolls shedding after pollination particularly in interspecific hybridization. During the course of an ongoing program to transfer resistance too bacterial blight from diploids to tetraploids cotton, we experienced excessive boll shedding after pollination. Therefore, the present study was conducted to investigate the effect of GA_3 on flower and boll retention after pollination.

The study was conducted at the Gezira Research Station (GRS),Wad Medani, Sudan, during the seasons 2001/02 and 2003/04. Two cultivars, Barakat-90 (*G. barbadense*) and Barac(67)B (*G. hirsutum*) were sown on es 80cm apart and 50cm between holes and the usual cultural practices were followed. GA_3 was used at a concentration of 100mg/L (Baisakh *et al*., 1998). Flowers were emasculated in the afternoon to evening and covered with paper bags to be pollinated in the next day morning. The emasculated flowers were sprayed once by the hormone using a small sprayer and bagged

again. Four treatments for the application of GA_3 were used: GA_3 applied before pollination, GA_3 applied with pollination, GA_3 applied one day after pollination and the
control. Each treatment was applied on10-12 flowers for each cultivar. The four treatments and the two cultivars were tested in a randomized complete block design with two replications. Shedded flowers were counted after 10 days. Each season data was subjected to arcsine transformation. Analysis of variance was performed for each season and combined data.

The results revealed that the two cultivars differed significantly in mean percent flower shedding during the first season only (Table l). Barac (67)B showed the highest (43.8%) while Barakat-90 showed the lowest (21 .9%) percent flower shedding.

Table l. Means of percent flower shedding of two commercial cotton cultivars treated with GA_3 and grown at GRS in 2001/02 and 2003/04 season.

	2001/02			2003/04		
GA_3 treatments	Barakat-90	Barac(67)B	Mean	Barakat-90	Barac(67)B	Mean
Control	50.0 b	87.5a	68.7A	45.0ab	50.0a	47.5A
GA3 beföre Pollination	1 6.5cd	0.0d	8.2D	20.0ab	I 0.0b	15.0B
GA3 with Pollination	4.0cd	25.0c	14. 5C	20.0ab	25.0ab	22.5B
GA3 after Pollination	1 7.0cd	62.5b	39.8B	30.0ab	25.0ab	27.5B
Mean	21.9B	43.8A		28.8A	27.5A	

Means followed by the same letter(s) do not differ significantly at the probability level of 0.01according to Duncan's Multiple Range Test.

In both seasons, the control treatment showed the highest mean percent flower shedding which significantly exceeded all other treatments indicating clearly the effectiveness of GA_3 application on boll retention in cotton. Within the GA_3 treatments, the application of the hormone before pollination was the most effective method of reducing flower shedding with 8.2% and 15.0% in the two seasons,

respectively. The variation in mean percent flower shedding was large (varying from 8.2 to 68.7%) in the first season compared to that of the second season (varying from15 .0 to 47.5%) This could be attributed to environmental variation between the two seasons.

The interaction of cultivars X GA_3 treatments was significant in both seasons (Table1). The lowest interaction effect was shown by Barac(67) B X GA_3 before pollination, in the two seasons. It reached full boll retention (00.0% flower shedding) in the first season. The application of GA_3 after pollination was the least effective method of controlling flower shedding, for both cultivars and seasons.

The combined analysis of variance mean squares for cultivars, GA_3 treatments and their interactions were significant (Table 2). This is a clear indication of the fact that flower shedding is greatly affected by seasonal variation and cultivar differences as well as the time of GA_3 application in relation to pollination.

Table 2. Mean squares for seasons, GA_3 treatments, cultivars d their interactions on cotton flower shedding at GRS.

Source	DF	MS
Seasons(S)	1	0.042
GA3(CA)	3	0.456 **
S X GA	3	0.065*
Cultivar(C)	1	0.141 **
SX C	1	0.161**
GA XC	3	0.074**
S X GA X C	3	O. 042

* **Significant at 0.05 and 0.01 probability levels, respectively.

The results that the use of GA_3 at a concentration of 100mg/1 gave significantly higher percent of boll retention, in comparison with the control is accordance with the results obtained by Baisakh *et al* (1998) Liang *et al*. (1978) who reported that GA_3 led to boll set of over 90% and a high seed set. Also, Gill and Bajaj (1987) showed that early aboration of the embryo was prevented by repeated treatment of the flowers after pollination with GA_3 solution. Application of GA_3 before pollination gave the lowest percent of flower shedding in comparison

with other treatments. This treatment also has an advantage in preventing flower breakage due to the process of bagging and rebagging which is practiced in other treatments.

In conclusion, the use of GA_3 improves boll setting and embryo development. Our results suggest that the application of the hormone before pollination is the best time for preventing flower shedding. The use of GA_3 reduces the cost of crossing since the process of crossing is very expensive and requires a large number of laborers. Also, this hormone may gain importance in hybrid seed production which is practiced in some countries to increase cotton production.

REFERENCES

Baisakh, B., V. K. Khanna and B. Raj. 1998. Influence of application of growth regulators on boll retention and seed set of upland cotton (*G. hirsutum*) and tree cotton (*G. arboreum*) crosses. Indian Journal of Agricultural Sciences 68(5): 264-267.

Gill, M.S. and Y.P.S. Bajaj. 1987. Hybridization between diploid (*G. arboreum*) and upland tetraploid (*G. hirsulum*) cotton through ovule culture. Euphytica 36(2):625-630.

Liang, C.L., C.W. Sun, T.L. Lin and J.C. Chiang. 1978. Studies on interspecific hybridization in cotton. Scientia Sinica 21(4):545-555.

Mursal, I. E. 1988. Country statement of the Sudan delegation to the 48th Plenary Meeting of the International Cotton Advisory Meeting (ICAC). Peru, Lima.