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NITROGEN REQUIREMENT OF COTTON NIAB-78 AND NIAB-86 AFTER EXCESSIVE FLOWER AND BOLL SHEDDING

A. Hamid and M. Ahmad
Nuclear Institute for Agriculture and Biology, Faisalabad

A field experiment was conducted on cotton varieties NIAB-78 and NIAB-86 for exploring the possibilities of ameliorating the adverse effect of flower and boll shedding on yield of seed cotton through supplemental N application. Complete flower shedding was simulated by removing all the flowers and bolls manually on August 28 and September 12. Additional N @ 25 kg/ha was applied immediately after deflowering.

The results indicated that supplemental N had no beneficial effect on yield of seed cotton. The recovery of seed cotton after deflowering in August (28th) was 77.5 and 72.4% in NIAB-78 and NIAB-86 under control, respectively. With 100 kg N/ha application, the recovery of seed cotton was 84.8 and 77.1% of that under normal standard treatments in NIAB-78 and NIAB-86, respectively. Deflowering in September (12th) drastically reduced the yield of seed cotton; NIAB-78 produced 48% and NIAB-86 produced 55% seed cotton as compared to their respective standards.

INTRODUCTION

The flower and boll shedding in cotton is a normal and natural phenomenon, perhaps, desirable and certainly unavoidable. Frequently, 25 to 50% of all the flower buds (squares) formed by the plant abscise before blossoming (Hall, 1958). Though there is evidence that in some locations square abscission may not affect yield potential (Gutierrez *et al.*, 1977) while at other locations 25% square shedding may be sufficient to reduce yield or delay maturity. Guinn and Mauney (1984) found boll retention to decrease with increased boll load and suggested increased competition for nutrients by the plants.

It may be difficult to assign reasons for the abscissions and thus to develop strategies to correct it. Guinn (1982) listed 13 causes of square and boll abscission. These may be grouped in two categories: 1) Internal, physiological stresses brought about by shortage or excess of moisture, light or nutrients; and 2) external damage to the organs due to attack by insects or micro-organisms.

The purpose of this study was to explore the possibilities of ameliorating the adverse effect of excessive flower and boll shedding on the yield of cotton varieties NIAB-78 and NIAB-86 by applying supplemental nitrogen after lower shedding.

MATERIALS AND METHODS

A field experiment was conducted on sandy loam soil with pH 8.2, total N 0.03% and 8 ppm $NaHCO_3$ extractable P. Cotton varieties NIAB-78 and NIAB-86 were grown

at 75 cm row to row and 30 cm plant to plant distance. The crop was fertilized with 100 kg N/ha in the form of urea (half applied at seeding and other half at flowering stage). Each of the P_2O_5 and K_2O were applied @ 60 kg/ha as basal dose at seeding time. The treatments were arranged in a split plot design with four replicates with 3 x 10 m plots.

A complete flower and boll shedding was simulated by plucking all the flowers and bolls manually on Augusr 28 and September 12 during the year 1989. Supplemental N @ 25 kg/ha was applied to three N fertilized treatments immediately after deflowering. The yield data were subjected to analysis of variance technique.

RESULTS AND DISCUSSION

Cotton NIAB-78 and NIAB-86 produced 3126 and 4063 kg/ha seed cotton, respectively without the application of nitrogen fertilizer. With 100 kg N/ha application, the yield of NIAB-78 was 3614 kg/ha and that of NIAB-86 was 4506 kg/ha (Table 1). This indicated that yield potential of NIAB-86 was 30% higher under natural fertility and 25% higher when 100 kg N/ha was applied, half at seeding and half at flowering.

After complete flower and boll shedding on 28th August, NIAB-78 produced 2423 kg/ha seed cotton under control, being 77.5% of that from without deflowering control treatment while NIAB-86 yielded 72.4% of its normal control.

With 100 kg N/ha application, deflowered treatments of NIAB-78 and NIAB-86 produced 3078 and 3478 kg/ha seed cotton, respectively. This showed that the recovery of seed cotton from the fertilized deflowered treatment was 84.8% and 77.1% of that under normal standard treatments of NIAB-78 and NIAB-86, respectively.

Deflowering in September (12th) drastically reduced the yield of seed cotton in both the cotton varieties. Under control the deflowered treatments of NIAB-78 and NIAB-86 produced 1518 kg/ha and 2345 kg/ha seed cotton corresponding to 48.5 and 52.4% recovery compared to non-deflowered treatments, respectively. With 100 kg N/ha application yield of deflowered treatments of NIAB-78 and NIAB-86 was 1746 kg/ha and 2567 kg/ha which corresponded to 48 and 57% of the respective standards, respectively. The application of supplemental nitrogen after deflowering in September did not benefit the production of seed cotton in NIAB-78 and NIAB-86.

Our experience in growing cotton varieties NIAB-78 and NIAB-86 showed that the supplemental N applied after 100% deflowering had no beneficial effect on yield of seed cotton indicating that N was not a limiting factor or the cotton plants had absorbed and stored enough N (provided the crop was fertilized with recommended dose of N) to bear the new flush of bolls and hence produced satisfactory yield after deflowering in August. The effect of additional N would be to extend the fruiting period and prolong the setting of bolls (Wadleigh, 1944; Tucker and Tucker, 1968; Hearn, 1975).

On the basis of results, it can be concluded that cotton varieties NIAB-78 and NIAB-86 have a good potential to give 77-84% yield of seed cotton without supplemental N application after flower and boll shedding in August. Flower shedding in September is detrimental for seed cotton yield possibly because of the short season left after flower shedding for maturity of the new flush of bolls. Nitrogen applied after flower shedding would delay the maturity of the new flush of bolls and reduce the yield. However, nitrogen and water ratio for opti-

Table 1. Effect of N-applied after flower and boll shedding on seed cotton yield of cotton varieties NIAB-78 and NIAB-86

N kg/ha	Time of deflowering	Additional N after deflowering (kg/ha)	Yield of seed cotton (kg/ha)		Increased yield of NIAB-86 over NIAB-78 %	Recovery of seed cotton after flower shedding (%)	
			NIAB-78	NIAB-86		NIAB-78	NIAB-86
0	-	-	3126	4063	29.9	-	-
100	-	-	3614	4506	24.6	-	-
100	-	25	3350	4392	31.1	-	-
0	August (28th)	-	2423	3264	34.7	77.5	72.4
100	August (28th)	-	3078	3478	13.0	84.8	77.1
100	August (28th)	25	3038	3509	15.5	84.0	77.8
0	September (12th)	-	1518	2345	54.4	48.5	52.4
100	September (12th)	-	1746	2567	47.5	48.1	56.9
100	September (12th)	25	1681	2510	49.1	46.5	55.7
LSD	(P = 0.05)	-	927.98		-	-	-
	(P = 0.01)	-	1244.50		-	-	-

mum yield of cotton needs to be worked out for Pakistan conditions.

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