seen in *Thaladi* seasons also. Increase in the grain yield of rice due to *Azolla* inoculation has been very well established (Kannaiyan, 1995).

Since *Azolla* is usually trampled on 30 DAT which coincides with the second top dressing of N and there is more of ammonical N released at that time, the second top dressing becomes an extra dose and it shall be skipped. Further, skipping a top dressing saves fertilizer and labour. The study clearly indicated the possibility of reducing N when *Azolla* is raised as dual crop and this reduction could be effected by skipping of second top dressing of fertilizer N instead of uniformly reducing the N at all stages.

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PHYSIOLOGICAL ANALYSIS OF GROWTH PARAMETERS AND YIELD ATTRIBUTES IN RAINFED HIRSUTUM COTTONS

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ABSTRACT

Fourteen cotton genotypes were evaluated during 1990-91 for physiological parameters and yield attributes for higher productivity under rainfed condition. Productivity of high yielding genotypes was associated with low leaf area, high total dry matter, higher leaf efficiency, higher harvest index and boll number per plant. Among the high leaf area genotypes, Allepox Rex was identified as the best performer.

KEY WORDS : Cotton ; Growth parameters ; yield attributes ; productivity

INTRODUCTION

Seed cotton yield in cotton is a complex character which is influenced by several physiological parameters, yield attributes, genotypes and environmental factors and hence, the selection made for one character generally brings about simultaneous change in others. Therefore, the information on the interrelationship of various characters are useful for effective selection of one character without sacrificing much in others. Since this information is scanty in rainfed hirsutum cotton, the present study was undertaken to investigate the extent of the contribution of physiological parameters and yield attributes for higher productivity in high leaf area cotton genotypes under rainfed conditions.

MATERIALS AND METHODS

The field experiment was conducted during 1990-91 in medium black soil at Agricultural Research Station, Dharwad. Fourteen cotton (G.hisutum. L) genotypes including two locals Sharada and Abadhita as checks were raised in randomized block design, replicated thrice. The genotypes were grown in 3 row plots of 6.0 m length spaced at 20 cm. The fertilizers were applied

@ 40 kg N/ha, 20 kg P/ha and 20 kg K/ha. Five plants at random were sampled in duplicate for maximum leaf area measurement and total biomass at 90 DAS and at harvest respectively. The plant samples drawn from each plot were first air dried and leaf area per plant (LA) was worked out following the leaf length-width, product method using a constant factor 0.707 (Ashley *et al.*, 1963). Seed cotton yield and its components (such as mean boll weight and number of good bolls per plant) and the Harvest Index (HI) were recorded at harvest. The productivity (seed cotton yield produced per day) was worked out based on the 80 per cent of total seed cotton yield harvested per plant and the duration taken for 80 percent of the total seed cotton yield.

RESULTS AND DISCUSSION

Genotypic differences were significant for all the physiological parameters, yield and its attributes, indicating the presence of genetic variability in the material (Table 1). All the genotypes were high LA types when compared with the low LA Abadhita and Sharada. Among the genotypes Alleppox Rex registered significantly low LA and low LA/TDM ratio. The LA/TDM ratio represents, the mean assimilation rate for the entire growth period of the genotypes. The observed differences might be due to variation in mean carbon exchange rate (CER) and dark respiration rates among the genotypes (Annon, 1986). Therefore, the genotype AlleppoxRex with lower LA/TDM ratio could still be considered as high CER type. AlleppoxRex had produced higher biomass with lower LA and it also possessed higher seed cotton yield. The higher productivity in AlleppoxRex may be attributed to production of higher TDM per unit functional LA and higher partitioning efficiency as evident from higher HI value and the positive significant association between TDM and yield (r=0.843)**. This relationship between TDM and higher seed cotton yield is well eatablished (Singh and Bharadwaj, 1983). Similarly the importance of total biomass, LA and their relationship with seed cotton yield has been documented in hirsutum cotton genotypes and these characters were considered as important physiological parameters for breeding for higher

Table 1. Genotypic differences in leaf area, total Biomass, seed cotton yield, LA/TDM ratio, seed cotton yield/LA ratio, productivity, mean boll weight, number of good balls per plant and harvest index in hisutum cotton

Sl. No.	Genotypes	LA (dm^2/ Plant)	TDM (g/Plant)	Seed cotton yield (g/Plant)	LA/TDM ratio	Seed cotton yield/LA ratio	Productivity (g/day)	Mean boll weight (g)	No.of good bolls per plant	Harvest index (%)
1.	NA-1269	38.23	78.67	36.00	0.486	0.942	0.163	5.23	6.88	45.76
2.	AlleppoxRex	38.37	99.60	43.60	0.385	1.136	0.194	3.86	11.62	43.77
3.	DRC-264	56.67	97.77	36.33	0.580	0.641	0.168	4.70	7.74	37.15
4.	MESR-9	55.19	90.08	17.00	0.613	0.308	0.082	5.23	3.31	18.87
5.	MESR-18	48.44	64.72	19.26	0.749	0.398	0.094	3.45	5.60	29.76
6.	L-147	36.87	87.01	16.80	0.424	0.456	0.080	4.45	3.83	19.30
7.	IC-441	58.38	87.82	20.53	0.665	0.352	0.097	4.00	5.13	23.37
8.	IC-675	44.16	84.65	23.33	0.522	0.528	0.107	5.33	4.53	27.56
9.	IC-150	41.75	82.06	23.73	0.503	0.575	0.119	4.25	5.63	28.91
10.	JK-419-1	49.61	99.66	25.67	0.498	0.517	0.121	4.66	5.50	25.76
11.	IC-179	45.59	90.45	30.86	0.504	0.677	0.142	4.80	6.43	34.12
12.	IC-359	52.74	94.13	26.07	0.560	0.494	0.107	4.60	5.65	27.70
13.	Abadhita (check)	23.23	68.24	17.80	0.340	0.766	0.113	5.43	4.00	26.10
14.	Sharada (check)	20.51	82.05	25.93	0.250	1.264	0.082	4.13	4.35	31.60
	Mean	47.12	88.05	26.60	0.541	0.585	0.123	4.54	5.99	30.17
	S.Em ±	1.11	2.42	1.32	0.021	0.030	0.004	0.28	0.50	1.58
	C.D. at 5%	3.25	7.12	3.89	0.062	0.087	0.013	0.82	1.48	4.63

Table 2. Correlation coefficients between different pair of characters in hirsutum cotton

Characters	TDM at harvest	Seed cotton yield	LA/TDM ratio	Seed cotton yield/LA ratio	HI	Mean boll weight	No.of of good bolls	Productivity per day
1. Leaf Area	0.817**	0.592*	0.806**	0.711**	0.380	-0.400	0.696**	0.217
2. TDM at harvest		0.843**	-0.224**	-0.927**	-0.075	0.730**	-0.920**	0.169
3. Seed cotton yield			-0.785**	-0.882**	-0.283	0.776**	-0.870**	0.428
4. LA/TDM ratio				0.953**	0.107	-0.692**	0.940**	-0.032
5. Seed cotton yield LA/ratio					-0.143	-0.847**	-0.136	-0.273
6. HI						0.587*	-0.838**	0.868**
7. Mean boll weight								0.660**
8. Number of good bolls								-0.283
9. Productivity per day								

** Significant at 1% probability level
* Significant at 5% probability level

productivity of seed cotton yield (Bharadwaj *et al.*, 1975). The results on seed cotton yield to leaf area ratio and HI also revealed that AlleppoxRex had recorded significantly higher yield/LA ratio and HI as compared to both the checks which led to the conclusion that AlleppoxRex was associated with lower functional LA with higher rate of photosynthesis and thus might have resulted in higher amount of total biomass production per unit LA as indicated by their low LA/TDM ratio. Further, the biomass produced might have been probably efficiently utilized towards the formation of reproductive plant parts resulting in higher number of bolls per plant and hence higher yield in the genotype AlleppoxRex as compared to checks Abadita and Sharada.

It was also observed that boll number per plant contributed directly to seed cotton yield in AlleppoxRex. Similar increase in yield through boll number has been reported by Manner *et al.*, (1971) and Singh and Bhardwaj (1983).

Thus, it may be concluded from the present study that among high LA types, higher productivity in AlleppoxRex under rainfed condition was associated with low LA, high amount of total dry matter production, higher leaf efficiency, higher HI and more number of good bolls per plant.

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