Seed yield was observed to be positively and significantly associated with days to flower and days to maturity at both genotypic as well as phenotypic levels indicating late flowering and late maturing genotypes of chickpea would give more seed yield. However, Mishra *et al.* (1988) reported no correlation of days to flower and days to maturity with seed yield.

A positive association at both genotypic as well as phenotypic levels among the characters branches/plant, pod weight/plant, pods/plant and their positiveness with seed yield indicated that these are the major yield contributing characters in chickpea. The same opinion was expressed by Mishra *et al.*(1988). Thus, finally it can be con cluded that the selection criteria based on branches/ plant, pod weight/plant and pods/plant can give the better results for yield improvement of chickpea.

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SCREENING *Gossypium hirsutum* GENOTYPES FOR DROUGHT TOLERANCE

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ABSTRACT

Twenty *G.hirsutum* genotypes were evaluated for their drought tolerance in rainy seasons of 1987 and 1988 under stress and per cent non-stress conditions. The crop under non-stress condition was irrigated at 25 percent available soil moisture at 30 cm depth. The present study revealed that genotype TKH679 registered the maximum seed cotton yield under stress condition and with yield potential as good as under non-stress condition though it produced lesser fruiting forms per plant.

Cotton is grown during the rainy season in vertisol area of the southern districts of Tamil Nadu during North East Monsoon which come in spells often results through depression and storms in Bay

Table 1. Rainfall distribution, irrigation and soil moisture details.

Crop Stage	Rainfall (mm)		No. of irrigations		Available soil mositure at 30 cm depth			
	'87-88	'88-89	'87-88	'88-89	'87-88		'88-89	
					Stress	Non stress	Stress	Non Stress
Vegetative Phase : sowing to 45 days	485.2 (20)	71.6 (7)	Nil	Nil	Moisture does not	Estimate arise	39.5	44.5
Flowering Phase : 46 to 75 days	73.8 (5)	63.4 (4)	Nil	2	60.5 to 75.5	87.0 to 94.0	2.5 to 16.5	18.0 to 29.5
Bolling period : 76 to 105 days	84.2 (1)	41.8 (4)	2	1	14.0 to 43.0	31.0 to 38.5	1.6 to 5.0	26.0 to 81.1
Boll bursting period : 106 to 135 days	49.6 (3)	35.6 (3)	2	1	9.0	18.0 to 26.0	Not taken	20.6 to 29.4
Total	642.8 (29)	212.4 (18)	4	4				

Figures in parenthesis are number of rainy days

Table 2. Dates of rainfall and irrigation from sowing.

1987 - 88			1988 -89		
	Dates of			Dates of	
* Rainfall	(mm)	Irrigation	* Rainfall	(mm)	Irrigation
Sowing		6.10.87	Sowing :		27.10.87
08.10.87	4.2	07.01.88	30.10.88	30.2	14.12.88
09.10.87	2.7	28.01.88	31:10.88	3.0	26.12.88
11.10.87	21.0	08.02.88	01.11.88	7.8	19.01.89
13.10.87	5.2	20.02.88	02:11.88	18.6	07.02.89
14.10.87	92.0		07.11.88	9.1	
17.10.87	49.0		08.11.88	25.0	
20.10.87	3.6		04.12.88	4.2	
22.10.87	14.0		05.12.88	3.6	
23.10.87	4.0		07.12.88	22.0	
24.10.87	6.0		14.12.88	12.0	
25.10.87	14.6		11.03.89	3.4	
26.10.87	18.5		12.03.89	27.8	
27.10.87	68.0		13.03.89	4.4	
28.10.87	58.8		30.03.89	3.2	
29.10.87	4.0				
30.10.87	52.0				
01.11.87	15.4				
09.11.87	4.2				
18.11.87	3.5				
24.11.87	3.0				
06.12.87	17.2				
08.12.87	30.8				
10.12.87	6.5				
14.12.87	9.2				
24.12.87	23.8				
27.02.88	10.2				
13.03.88	19.4				
16.03.88	18.2				
17.03.88	22.8				
24.03.88	8.2				
28.03.88	4.3				

* Rainy Days only

of Bengal with long breaks between the spells. It was not dependable and had frequently failed. Hence, moisture stress will occur at one or more stages of cotton crop growth. Water stress is the most limiting factor for successful cotton cultivation under rainfed condition. Several parameters appear to be related to drought tolerance. Blum, (1974), Asana (1976), and Seetharama and Bidinger (1977) have suggested that proportional reduction in yield under stress compared to yield under well watered condition, called drought index, is more useful as a selection criteria than mere absolute yield estimate under stress. Hence, an attempt was made in the present study to identify a drought tolerance genotype in upland cotton.

MATERIALS AND METHODS

Field experiments were conducted with 20 promising *Gossypium hirsutum* genotypes at Agricultural Research Station, Kovilpatti in black soil area in rainy season of 1987 and 1988, both under stress (rainfed) and non-stress (irrigated) conditions. The experiment was conducted in randomised block design replicated four times. Each genotype was tested in one row of three metre length. The field capacity and wilting point of the soil was 35 per cent and 15 per cent respectively. The non-stress crop was irrigated at 25 per cent available soil moisture which was estimated at weekly interval at 30 cm depth. Sufficient guard rows were provided on all sides of non-stress crop. The guard rows and non- stress crops were simultaneously irrigated to avoid the influence of moisture from the surrounding areas. In the first year, stress and non-stress crops were sown on 5-10-87 and 6-10-87 while in the second year the corresponding crops were sown on 26-10-88 and 27-10-88 respectively.

RESULTS AND DISCUSSION

In the present study, it is seen that the distribution of rainfall was not uniform in both the seasons (Table 1 and 2). There was heavy rainfall in the first season during vegetative phase resulting in poor plant growth as judged by plant height (Table 3). The drought duration was longer in the second season. This affected the production of fruiting forms retained per plant in the second season (Table 3). It indicated that irrigating at 25 percent available moisture may not found to be sufficient for full expression to produce more fruiting forms under prolonged drought situation.

Table 3. Data on plant height and fruiting forms produced.

Genotype	Plant height (cm)				Fruiting forms per plant			
	Stress		Non-Stress		Stress		Non-Stress	
	87-88	88-89	87-88	88-89	87-88	88-89	87-88	88-89
LRA.5166	19	23	19	28	25	8	19	15
TKH.680	17	26	18	29	30	17	18	12
TKH.679	17	25	21	26	25	15	16	15
TKH.4-4-3	19	25	16	29	23	15	22	16
TKH.538	18	26	18	25	19	8	14	11
TKH.595	15	22	20	28	25	12	15	17
TKH.5-2	20	23	20	24	22	13	22	9
TKH.497	18	23	18	25	30	14	22	12
TKH.541	18	24	17	26	18	12	16	9
TKH.26A	18	25	17	23	20	9	16	9
TKH.4-3-1	18	23	19	25	27	13	17	14
TKH.618	18	24	18	27	21	10	15	9
MCU.10	19	26	18	27	23	12	13	10
TKH.640	20	26	21	31	25	17	21	15
TKH.635	13	21	17	27	20	14	14	15
TKH.8-2-1	25	23	17	25	23	10	20	12
TKH.549	19	21	20	27	16	7	9	11
TKH.594	16	24	15	27	19	13	18	15
TKH.596	19	20	17	27	19	13	19	13
TKH.761	18	25	18	27	23	8	17	11

Table 4. Yield performance of genotypes

Genotypes	Mean Plot Yield in grams					
	1987-88			1988-89		
	Stress	Non-Stress	D.R.I.	Stress	Non-Stress	D.R.I.
LRA.5166	348	446	0.78	54	55	0.99
TKH.680	343	250	1.31	68	72	0.94
TKH.679	341	325	1.05	75	81	0.93
TKH4-4-3	320	484	0.66	71	85	0.84
TKH.533	303	428	0.71	47	80	0.58
TKH.595	301	335	0.90	50	57	0.87
TKH.5-2	300	196	1.53	53	62	0.85
TKH.497	298	340	0.88	64	66	0.98
TKH.541	293	268	1.09	68	68	1.00
TKH.26A	283	343	0.82	44	46	0.95
TKH.4-3-1	281	381	0.74	68	85	0.81
TKH.618	275	222	1.24	67	74	0.90
MCU.10	269	251	1.07	56	59	0.96
TKH.640	263	314	0.84	73	80	0.91
TKH.635	254	344	0.74	58	77	0.76
TKH.8-2-1	253	255	0.99	53	54	0.98
TKH.549	251	340	0.74	40	87	0.46
TKH.594	249	350	0.71	49	63	0.77
TKH.596	238	406	0.59	51	55	0.93
TKH.761	228	288	0.79	48	55	0.87
Sig.by 'F' Test	No	Yes		No	No	
SE: P = 0.05	41	43		8	11	
CD:	--	121		--	--	
CV%	28.5	26.0				

The differences in seed cotton yield due to genotypes were significant under stress condition in the first season only (Table - 4). The first season yield was higher than the second season. The differences in yield between genotypes in stress and non-stress condition is more in the first season than in the second season because of severe drought. Genotypes LRA.5166, TKH.680, TKH.679 and TKH.4-4-3 in the descending order had recorded more than 320 grams of seed cotton per plot under stress condition. Of these, TKH.680 and TKH.679 had registered higher yield under stress than under non-stress condition, with drought index of 1.37 and 1.05 respectively. It indicated that the yield potential of TKH.679 under stress was as good as under non-stress condition. In the second season TKH.679had recorded the highest yield of 75 gram per plot under stress condition with drought index of 0.93. Here also the first season performance of TKH.679 was repeated though TKH.679 was associated with fewer number of fruiting forms per plant than TKH.680and TKH.640. Seetharama *at al* (1983) observed that high yield potential culture always takes advantages of physiological mechanisms (mostly limited by water supply.) This may be responsible for TKH,679 giving higher yield under stress condition in both the seasons.

It can be concluded from the present study that TKH.679 was the most drought tolerant genotype as it recorded the maximum seed cotton yield under drought (1988) with yield potential under stress as good as under non-stress condition (1987). The average drought index was 0.99.

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GENETIC VARIABILITY, CORRELATION AND PATH ANALYSIS OF YIELD COMPONENTS IN RICE

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ABSTRACT

The present study revealed a wide range of genotypic and phenotypic variation in the traits studied. High estimates of genetic coefficient of variation, heritability and genetic advance were exhibited by total number of spikelets and grain yield per plant. Grain yield per plant was found positively and significantly associated with panicle weight, number of ear bearing tillers and plant height. The number of ear bearing tillers exerted maximum direct effect followed by plant height and 100-grain weight.

Grain yield in rice (*Oryza sativa* L.) is a complex trait and is the ultimate expression of its components. In any breeding programme, it is essential to know the variability, relationship of the yield components among themselves and with grain yield.

The direct and indirect effects towards grain yield can not be measured by correlations, which measure only mutual association. Path coefficient, which is a standardized partial regression coefficient permits the separation of correlation coefficients into measures of direct and indirect effects. The present study was carried out with the objectives (i) to study the variability, (ii) to study the association of yield traits among themselves and with grain yield, and (iii) to study the direct