

## Effect of Drought on Yield and Yield Attributes of Groundnut\*

Groundnut (*Arachis hypogaea* L) is a major cash crop in the semiarid tropics where it is mainly grown under rainfed condition. Because of low, erratic and unassured rainfall, the crop usually suffers from drought at any stage of the crop growth. Earlier workers reported the effect of drought on different phenophases and identified the phenophases most sensitive to moisture stress. Using the genotype 28-206, Billaz and Ochs (1961) found that drought during pod setting caused more yield loss than drought during seed filling. However, Pallas *et al.* (1979) found that seed filling phase was more sensitive to drought than was the pod initiation phase. Pathak *et al.* (1988) reported the highest reduction in shelling percentage during stress at pod development stage and 100 kernel weight during stress at flowering period. But these results were controversial. The purpose of this experiment was to study the effect of mid-season drought and end season drought on yield and yield attributes of groundnut.

Twenty genotypes of groundnut which included 11 advanced breeding lines and 9 released varieties were tested at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad during Rabi/Summer season of 1999-2000 (Dec-April). The experiment was laid out in a strip plot design with three drought treatments and 20 genotypes. Each treatment was replicated thrice. The experiment was sown on 4<sup>th</sup> December 1999 with spacing of 30 cm x 10 cm. The plot size was 4 m x 1.2 m. A buffer area of 3.6m was left between the drought treatments to minimize the seepage across the treatments. Recommended package of practices were followed to raise a healthy crop. The treatment control (No drought) received full irrigation during the whole crop duration through the line source sprinkler irrigation system. The

mid season drought (MSD) and end season drought (ESD) treatments were imposed by withholding irrigations between 50-100 DAS and 100 DAS - final harvest respectively. Observations like number of mature pods per plant, pod yield percentage 100 kernel weight, sound mature kernel percentage, oil percentage and, harvest index were made. Analysis was carried out according to strip plot design in Genstat package at ICRISAT. Per cent reduction in mean under mid season and end season drought was calculated for all the characters as

$$\text{Per cent reduction in mean of character under MSD/ESD} = \frac{\text{Mean of character under MSD/ESD} \times 100}{\text{Mean of character under No drought}}$$

From analysis of variance (Table 1), it is clear that significant differences for drought treatment were observed for all the characters studied. Similar result was reported by Vanangamudi (1987) for 100 kernel weight due to six moisture stress treatments. Genotypes included in the present study had significant differences for all the characters studied. Presence of significant genotypic variations allows a breeder to select suitable diverse material for use in breeding programme. The results were in confirmation with the findings of Chavan *et al.* (1992) and Nageswara Rao *et al.* (1989) for pod yield and Vanangamudi (1987) for 100 kernel weight. Highly significant G x D interaction was observed for pod yield, shelling percentage and harvest index. So a detailed scrutiny of genotypes for these three characters across drought treatments may give a better picture of their response. Similar results were reported by Nageswara Rao *et al.* (1989) for pod yield and Vanangamudi (1987) for 100 kernel weight.

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Table 1. Analysis of variance for yield and yield attributes

Source of variance	Degrees of freedom	No. of mature pods	Pod yield	Shelling (%)	100 kernel weight	Suond weight	Oil (%) mature kernal (%)	Harveat index(%)
Replication	2	47.429	108114	9.328	10.55	314.32	15.26	42.40
Drought	2*	301.821*	1778556**	529.39**	686.39**	1672.35*	258.237*	640.98
Error	4	17.518	29918	4.574	2.54	219.22	15.957	66.49
Genotype	19	26.447**	80.604**	150.257**	194.48**	131.58**	39.493*	474.61**
Error	38	4.709	13955	6.424	7.13	44.38	2.788	47.97
G x D Interaction	38	10.402	23968**	17.825**	27.39	64.61	3.634	107.78**
Error	76	9.791	9389	6.336	10.07	46.75	2.639	44.36
Total	179							

\* and \*\* significant at 5% and 1% level respectively

For all the characters, mean was reduced under both the stress conditions (Table 2). Similar findings were reported by Patel and Golakiya (1988), Chavan *et al.* (1992), Vanangamudi (1987), Pallas *et al.* (1979), Padma and Subbarao (1982). But significant reduction in mean under both the stress conditions was observed for number. of mature pods, pod yield, shelling percentage, 100 kernel weight and harvest index indicating that these characters were significantly affected by mid-season drought and end-season drought. Mean sound mature kernel percentage and oil percentage were reduced significantly only under end season drought. End season drought

coincides with the seed maturation and oil formation, these two characters were more sensitive to end season drought.

When per cent reduction was considered, among all the characters (Table 2), it was high for number. of mature pods (46.67%) under mid season drought followed by pod yield (29.74%) and under end- season drought for pod yield (41.31 %) followed by number of mature pods (33.25%), which indicates that number of mature pods was most sensitive to mid season and pod yield to end season drought. This may be due to recovery of genotypes after relieve of mid season drought for pod yield.

Table 2. Mean yield and yield attributes of groundnut under mid season and end season drought

Drought	Number of mature pods	Pod yield	Shelling(%)	100 Kernel weight	Sound mature kernel(%)	Oil(%)	Harvest index(%)
Mid season drought	4.977* (46.67)	531* (29.74)	64.85* (8.26)	30.13* (18.06)	72.63 (7.22)	44.03 (0.05)	47.20* (9.25)
End season drought	6.230* (33.25)	443.6* (41.31)	68.74* (2.76)	32.33* (12.08)	67.73* (13.48)	40.45* (8.17)	45.70* (12.13)
C.D.	2.122	87.68	1.084	0.808	7.505	2.025	4.133

\* Significantly reduced from normal condition

Figures in parenthesis are per cent reduction in mean of yield and yield attributes of groundnut under respective drought condition

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