

Response of Groundnut Genotypes to Drought Stress During Post Rainy Season

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Groundnut is a major cash crop in the semi-arid tropics, where it is grown mainly under rainfed conditions. As rainfed condition is characterized by low, erratic and unassured rainfall, creates drought condition at any stage of the crop growth. The occurrence of drought is considered as a major factor for limiting the yield of groundnut in semi-arid tropics¹. Maximum pod yield was reported in DVR 50 and CGC 4018 under stress condition among spreading and bunch groups, respectively². Response of different genotypes to different drought patterns helps in selection of better genotypes for drought tolerance. Therefore an attempt was made to study the drought tolerance ability of twenty genotypes of groundnut under mid season and end season drought conditions.

The experiment with 20 genotypes which includes released cultivars and advanced breeding lines was conducted at the International Crops Research Institute for the Semi-arid Tropics (ICRISAT), Patancheru, Hyderabad during the post rainy season of 1999-2000. The experiment was laid out in a strip plot design with three drought treatments and 20 genotypes. Each treatment was replicated thrice. Sowing was carried on 4th December 1999 with a spacing of 30x10 cm. The plot size was 4 m x 1.2 m, a buffer area of 3.6 m 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 'No drought' received full irrigation during the whole crop duration through the line source sprinkler irrigation system. The 'Mid season drought' and the 'End season drought' treatments were imposed by withholding the irrigation between 50-100 DAS and 100 DAS -final harvest respectively. A net plot area of 2m x 1.2m (2.4 m²) was harvested and pod yield was expressed in kg/ha. The percent yield reduction was calculated by the formula

$$\text{Percent yield reduction under stress condition} = \frac{\text{Pod yield under stress condition}}{\text{Pod yield under No drought condition}} \times 100$$

Analysis was carried out for pod yield according to the strip plot design through Genstat package. Analysis of variance indicated highly significant drought (D), genotype (G) and GxD interaction for pod yield. Significant GxD interaction for pod yield indicated differential response of genotypes to different drought situation. Significant genotypic differences^{3,2} and significant GxD interaction was reported³.

Mean pod yield was reduced significantly under Mid-season drought (2212.6 kg/ha) and end-season drought (1848.45 kg/ha) from no drought condition, but both the stress conditions were on par with each other. Pod yield was reduced under water stress condition than normal condition^{4,2}. Reduction in pod yield was the highest under end-season drought (42.82%), indicating genotypes were more sensitive to end-season drought and were mostly recovered from mid-season drought.

The genotype ICGV 86031 recorded highest yield under all the three conditions. Other genotypes ICGV 93260, S 206, and KRG 1 under MSD and R 8803, TMV 2, ICGV 92120 under ESD and R 9214, ICGV 93261, ICGV 93269, ICGV 93277 under both MSD and ESD were also performed at par with ICGV 86031 for pod yield.

When percent yield reduction was considered, it was more under end-season drought (42.82) than mid-season drought (31.55). All genotypes exhibited this trend of percent reduction expect JL 24, TMV 2 and TAG 24, which showed higher reduction under mid-season drought. It may be due to their earliness in maturity as compared to other genotypes.

Among the genotypes KRG 1, S 206, R 9251, R 9214, K 134, D 39d, ICGV 92113, 93261, 93269, 93277 were showed less percent yield reduction than the mean under mid-season drought. But under end-season drought, the genotypes like JL 24, TMV 2, R 9251, TAG 24, K 134, ICGV 92113, 92120, 93261, 93269, and 93277 showed less percent yield reduction than the mean, indicating the drought tolerance ability of these genotypes. The genotypes, which were less sensitive to both the stress conditions, were KRG 1, R 9251, K 134, ICGV 93261, 93269, and 93277.

But when both percent yield reduction and pod yield were considered together the genotypes with less percent yield reduction and high yield under mid- season drought were ICGV 96031, R 9214, ICGV 93261, 93269, 93277, KRG 1, S 206, and ICGV 93260 and under end season drought were ICGV 86031, R 9214, ICGV 93261, 93269, 93277, TMV 2, R 8808, and ICGV 92120. These were the better genotypes for respective drought conditions. And genotypes with less percent yield reduction and high yield under both stress conditions were ICGV 86031, R 9214, and ICGV 93261, 93269, and 93277.

Mean pod yield (Kg/ha) and per cent yield reduction of 20 groundnut genotypes under three drought regimes

Genotype	No drought	Mid-season drought	Per cent reduction	End-season drought	Per cent reduction
JL 24	2462	1143	53.56	1822	25.99
TMV 2	3044	1441	52.66	2031	33.26
KRG 1	2852	2367	17.06	2009	29.57
R 8808	3744	2260	39.63	2114	43.55
S 206	2689	2381	11.47	1494	44.45
R 9251	2285	1822	20.24	1792	21.56
R 9214	3735	2813	24.67	2032	45.59
TAG 24	2772	1785	35.62	1890	31.84
R 9227	4502	2635	41.48	1625	63.91
K 134	2587	1971	23.82	1569	39.35
D 39d	2560	2090	18.37	1429	44.18
ICGV 92118	3980	2230	43.95	1469	63.09
ICGV 86031	4720	2973	37.03	2595	45.02
ICGV 86635	3174	2128	32.95	1366	56.97
ICGV 92113	2718	2189	19.47	1593	41.41
ICGV 92120	3257	2185	32.90	2180	33.07
ICGV 93260	3908	2654	32.09	1878	51.94
ICGV 93261	3298	2353	28.65	2041	38.11
ICGV 93269	3280	2438	25.68	2052	37.43
ICGV 93277	3080	2394	22.28	1988	35.47
Mean	3232	2213	32	1848	42.82

Pod yield	SEm±	CD (P=0.05)	CV(%)
Drought (D)	93.04	365.33	6.6
Genotype (G)	164.08	469.75	11.7
GxD interaction	262.83	488.38	16.6
G at the same level of T	251.29	705.29	
D at the same level of G	245.50	692.92	

References

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