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## Evaluation of groundnut genotypes against leaf spot diseases in Tripura

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Twenty four improved cultivars and one hundred ninety eight advanced breeding lines of groundnut (*Arachis hypogaea*) germplasms were evaluated against leaf spot diseases during *kharif* crop seasons of 2005 and 2006 at ICAR research farm in Tripura. Leaf spot, particularly early leaf spot (*Cercospora arachidicola*), was the major disease under natural infective condition. None of the genotypes was immune to the leaf spot disease. Among the 24 improved cultivars studied, the disease was least in CSMG-84-1 and M-13 with disease rating score range 3 to <5, suggesting them as moderately resistant in 1-9 scale, where 1 = no disease and 9 = 81-100% infection. The occurrence of late leaf spot (*Phaeoisariopsis personata*) was very less in all the varieties. Seven genotypes, viz., NRCG-813, NRCG-935, NRCG-945, NRCG-992, NRCG-996, NRCG-1001 and NRCG-11734, of advanced breeding lines were found as resistant (2-<3) against leaf spot disease, while 12 genotypes were moderately resistant (3-<5), 33 genotypes were moderately susceptible (5-<7) and 146 genotypes were susceptible (7-9). The resistant genotypes are being suggested to utilize in any future breeding programme of groundnut improvement.

**Key words :** *Arachis hypogaea*, host resistance, *Cercospora arachidicola*, *Phaeoisariopsis personata*

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### INTRODUCTION

Groundnut (*Arachis hypogaea* L.) crop is quite often affected by leaf spot diseases, like, early leaf spot (*Cercospora arachidicola* Hori) and late leaf spot [*Phaeoisariopsis personata* (Berk. and Curtis) V. Arx] all over the world including India (Jackson, 1983 ; Subrahmanyam *et al.*, 1984 ; Reddy *et al.*, 1995). The occurrence of these diseases is greatly influenced by the prevailing agro climatic conditions. These diseases cause significant reduction in crop yield at their respective places under favourable conditions (Ghunge *et al.*, 1981). Perusal of literature indicates that the combined application of fungicides and host resistance is quite effective in managing these diseases and as such several works have been done to identify the resistance against groundnut diseases (Chandra *et al.*, 1995; Dandnaik *et al.*, 1996). However, still the diseases are the major problem in adopting any cultivation method of groundnut in India. So there is a need to identify new sources of

resistance in groundnut for developing resistant cultivars. Moreover, due attention has not been given to understand the influence of host genotypes on the occurrence of leaf spot diseases in Tripura, although, groundnut is becoming popular now a days for cultivation in 'Tilla' land. Hence, this study was undertaken to evaluate groundnut genotypes of both breeding lines and improved cultivars against leaf spot diseases, prevailing during *kharif* crop season under agro climatic conditions of Tripura.

### MATERIALS AND METHODS

**Evaluation of improved cultivars :** In all, 24 improved cultivars, viz. SG-84, VRI-3, M-13, JSP-19, JL-24, TAG-24, TG-17, CSMG84-1, FeESG-8 FeESG-10-1, FeESG-10-3, NRCG-162, NRCG-1308, NRCG-2588, NRCG-3498, NRCG-4659, NRCG-5513, NRCG-6131, NRCG-6155, NRCG-6450, NRCG-6820, NRCG-7206, NRCG-7599 and PKVG-8, collecting from National Research Centre



for Groundnut, Junagadh, Gujarat were evaluated following Randomized Block Design with two replications during *kharif* crop seasons of 2005 and 2006 at ICAR Research farm in Tripura. Fertilizer schedule was maintained NPK @ 30 : 50 : 50 kg/ha along with cow dung manure 5 ton/ha. The natural infection of leaf diseases were scored in 1-9 point scale, where 1 = no disease, 2 = 1-5%, 3 = 6-10%, 4 = 11-20%, 5 = 21-30%, 6 = 31-40%, 7 = 41-60%, 8 = 61-80% and 9 = 81-100% incidence, following the method of Subrahmanyam *et al.* (1995) on 30, 60 and 90 days after sowing (DAS). Randomly plucked infected leaves were examined under microscope to distinguish the differential appearance of early (*C. arachidicola*) and late (*P. personata*) leaf spot diseases. The data of last observation were computed to evaluate the genotypic effect of host on disease occurrence.

**Evaluation of advanced breeding lines :** One hundred ninety eight (198) advanced breeding lines, collected from National Research Centre for Groundnut, Junagadh, Gujarat, were considered for this study during *kharif* crop season (2005 and 2006) in Tripura. The seeds were sown in row system of plantation at the middle of May in every year. Fertilizer schedule was maintained as mentioned earlier. The natural occurrences of leaf spot diseases were scored in 1-9 point scale on 30, 60 and 90 days after sowing (DAS) following the method as described earlier. Randomly plucked infected leaves were examined under microscope to distinguish the differential appearance of early (*C. arachidicola*) and late (*P. personata*) leaf spot diseases. The data of last observation were computed to evaluate the genotypic effect of host on disease occurrence.

## RESULTS AND DISCUSSION

Groundnut (*Arachis hypogaea*) crop was found to be affected by leaf spot [early leaf spot (*Cercospora arachidicola*) and late leaf spot (*Phaeoisariopsis personata*)] diseases during *kharif* crop season of 2005 and 2006 at ICAR research farm in Tripura (Table 1). Of the diseases, early leaf spot was the major disease under natural infection. The differential studies of the two major leaf spot diseases, early leaf spot (*C. arachidicola*) and late leaf spot (*P. personata*),

**Table 1 :** Intensity of leaf spot diseases in improved groundnut cultivars during *kharif* crop seasons in Tripura.

Variety	Leaf spot (1-9 scale)		
	2005	2006	Mean
SG-84	7.60	8.20	7.90
VRI-3	6.60	8.00	7.30
M-13	3.50	4.00	3.75
JSP-19	5.40	5.50	5.45
JL-24	7.30	8.00	7.65
TAG-24	8.30	7.90	8.10
TG-17	6.80	8.40	7.60
CSMG-84-1	3.70	4.10	3.90
FeESG-8	8.60	7.60	8.10
FeESG-10-1	7.60	7.40	7.50
FeESG-10-3	8.10	8.20	8.15
NRCG-162	7.80	7.80	7.80
NRCG-1308	7.30	8.40	7.85
NRCG-2588	8.20	8.20	8.20
NRCG-3498	8.70	8.20	8.45
NRCG-4659	8.20	7.80	8.00
NRCG-5513	7.60	8.10	7.85
NRCG-6131	6.40	7.50	6.95
NRCG-6155	7.40	7.70	7.55
NRCG-6450	6.80	7.90	7.35
NRCG-6820	7.80	8.20	8.00
NRCG-7206	7.90	7.80	7.85
NRCG-7599	7.60	8.10	7.85
PKVG-8	7.30	8.20	7.75
CD at 5%	1.34	0.70	

revealed that all the spots on 30 DAS and 60 DAS were of early leaf spot disease and on 90 DAS, while examined 7598 spots, 94.79% spots were due to the effect of *C. arachidicola* and 5.21% spots were of *P. personata*. The present study is in conformity of our earlier findings (Biswas and Singh, 2005). As regards the varietal influence on the leaf spot disease incidence, it was found that none of the genotypes was immune to the disease. However, of the 24 improved cultivars, only 2 (CSMG-84-1 and M-13) were found moderately resistant with disease rating score range 3 - <5, while, JSP-19 and NRCG-6131 were moderately susceptible (5 - <7) and the rest 20 were susceptible (7-9). The present findings are in accordance with the reports of Ghewande *et al.* (2002) in respect of the resistance of CSMG-84-1, but in contrast in respect of TAG-24, which was reported earlier as resistant/tolerant and did not show resistance in the present investigation. However, this contrasting result is not unnatural, since resistance in some plants is controlled by certain genes which are strongly influenced by several

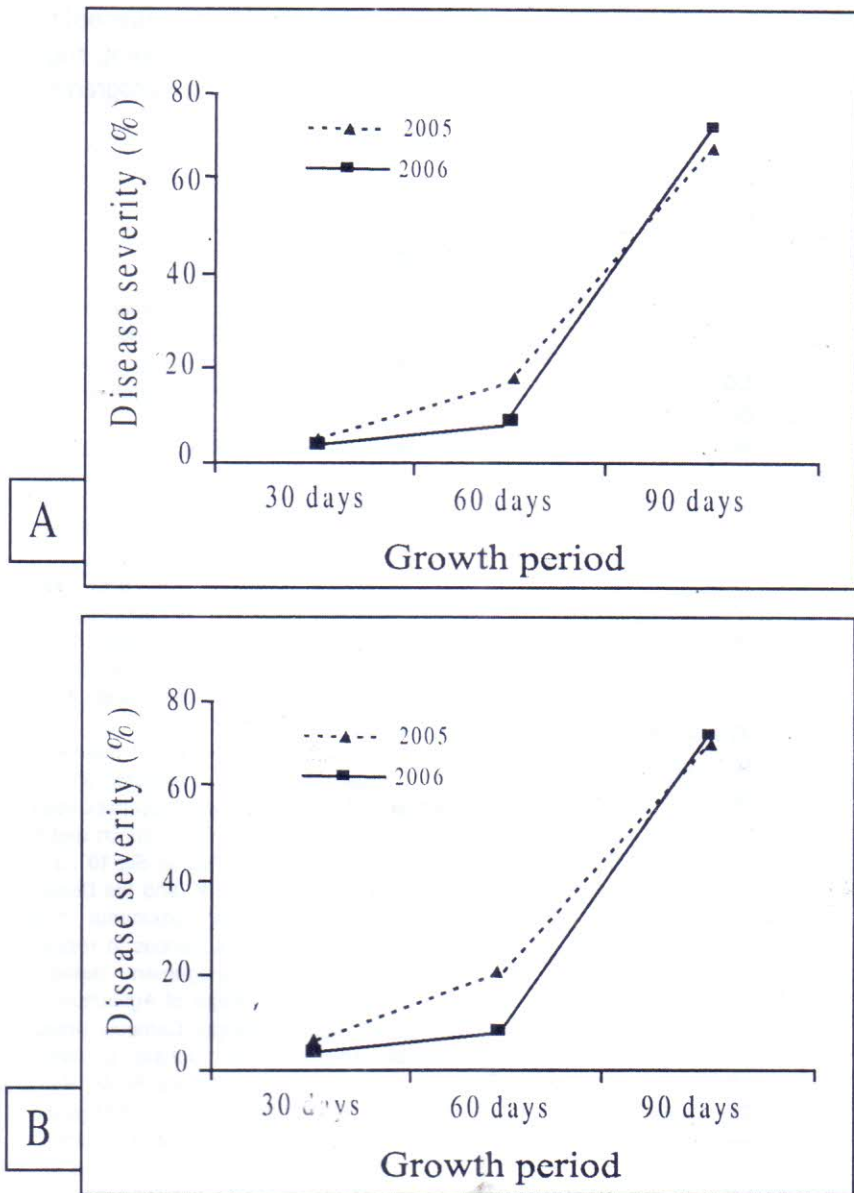


Fig. 1 : Development of leaf spot diseases in improved cultivars (A) and advanced breeding lines (B) of groundnut during different growth periods and years in kharif season of Tripura.

environmental factors, such as temperature; intensity, duration and quality of light ; moisture levels; nutrient levels and agricultural and industrial chemicals (Bell, 1981).

Most of the spots developed on groundnut leaves were of early leaf spot disease, which appeared on 30 days after sowing (DAS) and increased sharply in between 60 and 90 DAS (Fig. 1). Further, there was no significant difference on its occurrence among the genotypes at initial stage of infection i.e. on 30 DAS and the differences started on 60 DAS onwards that

became clearly visible on 90 DAS. The severity of other important foliar disease, such as, rust (*P. arachidis*) was very less and did not vary significantly among the genotypes. The low rust incidence in the groundnut cultivars might be attributed with the antagonistic effect of leaf spot disease, since, suppression of leaf spot disease with carbendazim increased rust incidence (Biswas and Singh, 2005).

Of the 198 advanced breeding line germplasms of National Research Centre for Groundnut (Junagadh,



Gujarat), only 7 genotypes, viz., NRCG-813, NRCG-935, NRCG-945, NRCG-992, NRCG-996, NRCG-

**Table 2 :** Influence of advanced breeding lines of groundnut on the incidence of leaf spot diseases during *Kharif* crop season in Tripura.

Reaction*	Genotypes
Immune (rating 1)	Nil
Resistant (rating 2 - <3)	NRCG-813, NRCG-935, NRCG-945, NRCG-992, NRCG-996, NRCG-1001, NRCG-11734
Moderately resistant (rating 3 - <5)	NRCG-1006, NRCG-1021, NRCG-1026, NRCG-1045, NRCG-1056, NRCG-1057, NRCG-1260, NRCG-4607, NRCG-12355, NRCG-12358, NRCG-12438, NRCG-12457.
Moderately susceptible (rating 5 - <7)	ICGV-8844, NRCG-162, NRCG-1048, NRCG-1062, NRCG-1403, NRCG-1440, NRCG-4513, NRCG-4589, NRCG-4594, NRCG-4636, NRCG-4654, NRCG-4680, NRCG-4706, NRCG-6234, NRCG-6473, NRCG-6491, NRCG-6989, NRCG-10327, NRCG-11954, NRCG-11959, NRCG-12311, NRCG-12483, NRCG-12503, NRCG-12554, NRCG-12648, NRCG-12652, NRCG-12701, NRCG-12799, NRCG-12800, NRCG-12803, NRCG-12819, NRCG-12922, PBS-13.
Susceptible (rating 7-9)	146 genotypes

\* Disease rating score 1 = 0%, 2 - <3 = 1-5%, 3 - <5 = 6-20%, 5 - <7 = 21 - 40% and 7 - 9 = 41 - 100% incidences.

1001 and NRCG-11734, were found as resistant to leaf spot diseases with disease rating score range 2 - <3 (Table 2). In addition, 12 genotypes were found moderately resistant (score range 3 - <5), 33 genotypes were moderately susceptible (5 - <7) and

146 genotypes were susceptible (7 - 9). The resistant genotypes are being suggested to utilize in any future breeding programme of groundnut improvement.

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