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Temperature Sensitivity of Sclerotium Stem Rot Resistance in Groundnut

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Three hundred and fifty groundnut accessions originating from different geographic regions were evaluated in pots in a greenhouse for resistance to stem rot caused by *Sclerotium rolfsii*. Seven-day old potted seedlings were inoculated with 15-day old mycelial propagules. These propagules were covered with dried groundnut leaf debris (Pande et al. 1994). The ambient temperatures in the greenhouse during the period of the experiment (Jan 1993) ranged from 16–18°C (minimum) to 28–31°C (maximum). The number of dead plants was recorded every fourth day after the appearance of the first dead plant (killed by stem rot). The final mortality was recorded 30 days after inoculation, by which time the susceptible control cultivar showed 90–100% mortality. Eleven accessions (7 cultivated, 3 wild *Arachis* spp, and 1 interspecific derivative) showed less than 20% stem rot incidence, compared to 100% incidence in the susceptible control, Robut 33-1 (Table 1).

The 11 genotypes were retested in the same greenhouse during May 1993 using the same inoculation technique. The ambient temperatures during this experiment ranged from 23–26°C (minimum) to 27–36°C (maximum). All the test entries developed 100% disease incidence within 30 days after inoculation, indicating that sclerotium stem rot resistance in groundnut could be temperature sensitive.

The 11 genotypes were again tested in the greenhouse in Jan 1994, when temperatures ranged from 15–17°C (min) to 27–32°C (max). Nine entries showed less than 20% mortality, compared to 100% in the susceptible control.

Table 1. Reactions of 12 groundnut genotypes to stem rot (*Sclerotium rolfsii*) in pot screening in three greenhouse tests, ICRISAT Asia Center, 1993–94.

Genotype	Percentage mortality due to stem rot[1]		
	Jan 1993[2]	May 1993[2]	Jan 1994[2]
ICG 407	13	100	40
ICG 494	7	100	8
ICG 500	0	100	0
ICG 563	13	100	0
ICG 605	7	100	12
ICG 2279	7	100	12
ICG 2837	13	100	0
ICG 4983	0	100	0
ICG 13172	0	100	0
ICG 13177	0	100	0
ID no. 2256 (*A. hypogaea* × *A. cardenasii*)	0	67	60
Robut 33-1	100	100	100
SE	±4.9	±1.9	±4.7
CV (%)	64.0	3.4	58.3

1. Average of 3 replications (5 plants per replication in one 15 cm plastic pot).
2. Temperature range: Test 1, minimum 16–18°C, maximum 28–31°C. Test 2, min 23–26°C, max 27–36°C. Test 3, min 15–17°C, max 27–32°C).

A laboratory experiment was also conducted in Mar 1994 with three resistant and three susceptible genotypes, using incubators. The temperature regimes tested in this experiment were; 15–30°C (15° night, 30° day), 20–30°C (20° night, 30° day), 25–30°C (25° night, 30° day), and 30°C (30° night, 30° day). The three resistant lines were resistant only at 15–30°C (15° night, 30° day) and susceptible at higher temperatures, confirming the temperature sensitivity of sclerotium stem rot resistance in these genotypes (Table 2).

The fact that some genotypes are resistant at low temperatures but susceptible at high temperatures suggests either changes in the physiology of the groundnut plant that alter the plant's reaction to *S. rolfsii*, or changes in the pathogenicity of *S. rolfsii* as a result of increased oxalic acid production; oxalic acid levels play an important role in pathogenesis, as has been reported in carrot and sugar beet (Punja et al. 1985).

Table 2. Reactions of six groundnut genotypes to stem rot (*Sclerotium rolfsii*) under different temperature regimes in incubators, ICRISAT Asia Center, Mar 1994.

Genotype	Percentage mortality due to stem rot[1]			
	Temperature in incubators (°C)			
	Min 15 max 30	Min 20 max 30	Min 25 max 30	Min 30 max 30
Resistant				
ICG 494	7	87	100	100
ICG 500	15	100	93	100
ICG 2837	7	100	100	100
Susceptible				
ICGS 76	100	100	93	100
TMV 2	100	100	100	100
Robut 33-1	100	100	100	100
SE	±5.3	±2.7	±4.0	0.0
CV (%)	16.8	4.8	7.2	0.0

1. Average of three replications

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Resistance to Rust and Leaf Spots in ICRISAT Groundnut Lines in Eastern Sri Lanka

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In the eastern region of Sri Lanka, groundnut crops often suffer from leaf spots caused by *Cercospora arachidicola* and *Phaeoisariopsis personata*, and rust caused by *Puccinia arachidis*. Control measures against these diseases have not been effective in Sri Lanka. In order to identify resistant genotypes, short- to medium-duration lines, received from ICRISAT, were screened during in 1994 (mid April to late Aug) under field conditions in eastern Sri Lanka. The lines were sown at 30 × 10 cm spacing and managed in accordance with recommended practices (Anonymous 1990). No fungicides were sprayed. All lines were randomly sown in rows of 6 m length; every fifth row was an infector row of a local susceptible genotype (unnamed). Ten randomly selected plants in each line were scored for disease reactions on a 1–9 scale (Subrahmanyam et al. 1995).

The crop received a total rainfall of 91.5 mm during growth and development. Conditions during the experimental period (mean relative humidity 73%, mean temperature 29°C) were conducive to the proliferation of leaf spot and rust fungi, resulting in effective disease evaluation. Table 1 gives a summary of the results.

Severity of leaf spots ranged between 0 and 26.5%. Four groundnut lines, ICGVs 86928, 87883, 88248, and 87387, did not show leaf spot symptoms and were identified as resistant. Rust severity ranged between 0 and 41.8%. Six genotypes with 0–0.5% severity were considered as resistant—ICGVs 87391, 87817, 87281, 87282, 87334, and 88330. Groundnut lines with resistance to leaf spots and rust have great potential for cultivation in the eastern region of Sri Lanka. They can also be used as resistant parental materials in breeding programs to develop disease-resistant cultivars adapted to local conditions.

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