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Screening of Rosette-resistant Short-duration Groundnut Breeding Lines for Yield and Other Characteristics

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Rosette virus disease causes considerable losses on groundnut in southern and eastern Africa. In association with drought (much of the region is drought-prone), the virus can cause yield losses of up to 100%. Host-plant resistance is the most cost-effective control measure against rosette, and the identification and utilization of stable resistance is a high priority for ICRISAT's groundnut research team based at the Chitedze Research Station in Malawi. The long-term objective of these efforts is to develop groundnut genotypes with multiple disease resistance.

Since 1990/91 the Southern Africa Development Community (SADC)/ICRISAT Groundnut Project has worked in collaboration with the Genetic Resources Division, ICRISAT-Patancheru, India, on an intensive program to screen global germplasm for resistance to rosette. Over 100 resistant accessions of African, Indian, and South American origin have been identified, including several short-duration spanish accessions (Subrahmanyam et al. 1996). Short-duration varieties are particularly important for southern and eastern Africa. However, the lack of such varieties, and the low yield of available rosette-resistant varieties, has been an obstacle to progress.

Three yield trials (at low, medium, and high rosette disease pressure) were sown at Chitedze Research Station during the 1996/97 season. A randomized block design with three replications was used. Eight short-duration breeding lines and five control varieties were tested. High and medium disease pressures were simulated using the infector row techniques described by

Table 1. Performance of 13 short-duration groundnut varieties at three levels of rosette disease pressure, Chitedze Research Station, Malawi, 1996/97.

Variety	Seed yield (kg ha^{-1}) under			Average seed yield (kg ha^{-1})	Yield as % of JL 24	Average haulm yield (kg ha^{-1})	Shelling (%)	100-seed mass (g)	Rosette incidence (%) under HDP
	LDP	MDP	HDP						
ICGV-SM 93524	1775	654	599	1009	114	2489	64	36	4
ICGV-SM93530	1514	478	503	832	94	2510	58	32	3
ICGV-SM 93535	1815	707	633	1051	120	2613	58	40	0
ICGV-SM 93557	1915	404	344	888	100	2742	60	38	4
ICGV-SM 93561	1943	315	355	871	98	2654	64	44	3
ICGV-SM 94584	1589	485	546	873	99	2794	62	31	1
ICG 12988	2799	966	966	1577	178	3329	76	33	1
ICG 12991	3080	1062	923	1688	190	3004	76	32	1
Resistant control									
KH 241 D	1226	40	62	443	50	2588	53	30	2
Susceptible controls									
JL 24	2419	130	105	885	100	2016	62	38	45
Malimba	2148	37	25	737	83	2682	55	27	40
Sellie	2072	99	52	741	84	2675	60	30	35
ICGMS 5	2190	46	46	761	86	2910	52	38	37
Average	1672	417	397	829	94	2693	62	35	14
SED	187	93	61	69		450	3.1	1.4	4.7
CV%	13.7	31.9	21.0	21.0		34	11	9	79

1. LDP, MDP, HDP = low, medium, high disease pressure.

Nigam and Bock (1990). To simulate medium disease pressure, heavily infected spreader plants were raised in the greenhouse and transplanted to the infector rows. For high disease pressure the same procedure was followed but more viruliferous aphids reared in the greenhouse were transferred to the infector rows. Early leaf spot disease was observed in the high and medium disease pressure trials, while both rosette and early leaf spot were insignificant at low disease pressure. All trials were sown under rainfed conditions. The trials were harvested 119 days (high disease pressure), 120 days (medium), and 131 days (low disease pressure) after sowing.

Results are presented in Table 1. The short-duration varieties gave an average seed yield of 1672 kg ha^{-1} under low disease pressure, 417 kg ha^{-1} under medium disease pressure, and 397 kg ha^{-1} under high disease pressure. In the low disease pressure trials, because of the near absence of diseases the growth period was 12 days longer than for the high disease pressure trial. Yield differences between the low and high disease pressure trials were because of the difference in rosette disease incidence combined with growth period.

Two lines (ICG 12988, ICG 12991) performed well in all three trials. Under low disease pressure, they significantly outyielded the other varieties including the widely adapted JL 24. They were similarly outstanding under medium and high disease pressures with yields of over 900 kg ha^{-1} compared with only 130 and 105 kg ha^{-1} for JL 24. The highly significant yield superiority under medium and high disease pressures may be ascribed to resistance of ICG 12988 and ICG 12991 to rosette virus disease. Only 1% rosette disease was observed on these two lines at high disease pressure, compared with 45% incidence on JL 24.

ICG 12988 and ICG 12991 are landraces that were identified at ICRISAT-Malawi during the global screening program. They are spanish types with small, two-seeded pods and a tan seed testa. Seed of these two genotypes will be produced during the 1997 off-season, and will be available for breeding programs and on-farm trials by end 1997. For further information, and for small quantities of seed, contact:

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Performance of ICRISAT Short-duration Groundnut Varieties on Sandy Regosols in Eastern Sri Lanka

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Groundnut, an economically important valuable oilseed and cash crop, is now cultivated on a large scale in several countries. In Sri Lanka it was cultivated on 10 394 ha in 1994 with a total production of 5730 t. It has potential for improvement in eastern Sri Lanka where it occupied 1087 ha in 1994 with pod yield of 1 t ha^{-1} which is rather low. The primary reason for low yield in this region is the nonavailability of suitable varieties for cultivation. In view of this fact, the Eastern University at Chenkalady, located in eastern Sri Lanka has been testing groundnut varieties through a collaborative program with ICRISAT. This paper describes the performance of 15 groundnut varieties (ICGVs) of ICRISAT origin (Table 1) and a local control variety MI-1.

The varieties were sown on sandy Regosols, in a randomized complete block design, at the Agronomy farm of the Eastern University on 25 Apr 1996. The crop was managed using recommended practices (Sri Lanka 1990). Until 15 Aug 1996, during the experimental period, 134.2 mm rainfall was recorded; supplementary irrigation was provided as needed. The mean temperature during experimentation was 30–31°C. All the varieties were harvested in 100–102 days after sowing (DAS) for yield estimation. Biomass and leaf area were observed at 75 DAS on five plants in each replication.