

Evaluating ICRISAT Breeding Material for Groundnut Rosette and Late Leaf spot Diseases in Uganda

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Introduction

In Uganda, average on-farm yields are 600-1000 kg ha⁻¹, while the potential for many of the cultivars in the country is over 3.0 tons ha⁻¹. The low yields are attributed to various factors, many of which are characteristic of farming systems in sub-Saharan African countries. Diseases of groundnuts are among the greatest challenge to farmers in Uganda due to limited management options. In addition to reducing yields, diseases also reduce quality of the crop and increase the cost of production.

Objectives

1. Evaluate 75 ICRISAT introductions comprising of accessions from three botanical groups namely: Spanish, Valencia and Virginia for resistance to groundnut rosette virus and late leaf spot diseases under natural infestations in Uganda, and

2. Examine their potential for management of the two diseases in the region

Materials and Methods

• Three field studies were conducted during 2008 and 2009 growing seasons at Serere, located in eastern Uganda.

• Seventy five accessions were established in a randomized complete block design with two replicates during each of the three growing seasons.

• Each entry consisted of six row plots measuring 5 m each.

• The plant density was 15 cm interplant spacing with inter row spacing of 45 cm and each botanical group was separated by a 1 m border.

• Groundnut rosette disease incidences were scored at harvest as count of symptomatic plants per plot and expressed as percentage of all plants in the plot.

• Severities of Groundnut rosette and late leaf spot diseases were scored at harvest using 1 to 9 scale adapted from Subramanyam et al., 1995.

Conclusion

The release and adoption of disease-resistant groundnut cultivars in Uganda is expected to increase the productivity and therefore production of groundnuts, ultimately improving incomes and food security among rural households in the country, and east and central African countries that have in the past obtained and cultivated improved groundnut cultivars from Uganda.

Resistant line ICGV-SM 2501



Susceptible line JL 24



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Table 1. Severity of groundnut late leaf spot and rosette diseases on Spanish bunch groundnut lines at Serere during 2008 and 2009 growing seasons.

Entry #	Groundnut late leaf spot severity at harvest (0-9 scale)				Groundnut rosette incident and severity							
	2008		2009		2008 rainy		2008 summer		2009 rainy		Mean	
	Rainy season	Summer	Rainy season	Mean	Incident (%)	Incident (%)	Severity (0-9 scale)	Incident (%)	Severity (0-9 scale)	Incident (%)	Severity (0-9 scale)	Mean
86-87175-3	5.5	2	3.5	3.7	26.3	10.8	2.5	44.4	3.5	27.2	3	
ICGV 12991	7	4	6.5	5.8	10.9	6	2.5	2.9	1	6.6	1.8	
ICGV 87003	7	4	6	5.7	25.8	8.5	2	28.2	4.5	20.8	3.3	
ICGV 93437	7	3	6	6	6.6	13.7	3	3.2	1.5	9.8	2.3	
ICGV 94139	6	3	5	4.7	16.4	19.2	3.5	5.8	1	13.8	2.3	
ICGV-SM 01501	7	5.5	7	6.5	15.7	7.3	3	8.4	1	10.5	2	
ICGV-SM 01502	7	3.5	6.5	5.7	8.6	2.4	2	16.6	1.5	6	1.8	
ICGV-SM 01504	7	5	6.5	6.2	17.4	9.6	3	4.4	1	10.5	2	
ICGV-SM 01510	6.5	4	6	5.5	0.7	5.8	2	5.2	1	3.9	1.5	
ICGV-SM 01513	6.5	3.5	4	4.7	5.5	11.1	2.5	33.5	4	16.7	3.3	
ICGV-SM 01514	4	3	4.5	3.8	4.7	0.8	2	1.9	1	2.5	1.5	
ICGV-SM 01515	6.5	4	6	5.5	1.4	3.7	2	7.7	1	4.3	1.5	
ICGV-SM 02501	4	3.5	3	3.5	4.4	2.1	2	5.8	1.5	4.1	1.8	
ICGV-SM 03581	5.5	3.5	4.5	4.5	19.2	8.1	2	16.8	2	14.7	2	
ICGV-SM 03586	3.5	3	3.7	3.5	4.7	2	2	3.5	1	7	1.5	
ICGV-SM 05514	5.5	3	4	4.2	22.6	12.7	3	24.7	3.5	20	3.3	
ICGV-SM 05543	5.5	4	5	4.8	22.1	4.7	2	12.8	2.5	13.2	2.3	
ICGV-SM 86021	6	3	4	4.3	9.1	17	2.5	38.2	3.5	21.4	4	
ICGV-SM 99529	6.5	3.5	5.5	5.2	6.6	6.4	2.5	15.1	1.5	9.4	2	
ICGV-SM 99537	7	3.5	6	5.5	9.5	4.6	2	10.5	1.5	8.2	1.8	
ICGV-SM 99555	4	4	6	5.7	11	4.3	2	9	1	8.1	1.5	
ICGV-SM 99556	6	3.5	6	5.2	4.7	7.8	2	6.6	1	7	1.5	
ICGV-SM 99568	7	3	5.5	5.2	6.3	6.2	2	5.2	1	5.9	1.5	
JL 24	6.5	4	6	5.5	22.4	20.3	3.5	38.4	4	27	3.8	
Mean	6.1	3.6	5.2	5	12.6	8.7	2.4	16	2.1	12.4	2.2	
CV %	6.5	6.1	7.7	7.7	38.3	42.6	16.9	28.5	21.1	33.8	18.9	
F-prob	<0.001	<0.001	<0.001	<0.001	0.004	0.341	0.639	<0.001	<0.001	<0.001	<0.001	

Table 2. Severity of groundnut leaf spot and rosette diseases on Valencia groundnut lines at Serere during 2008 and 2009 growing seasons.

Entry #	Groundnut leaf spot severity at harvest (0-9 scale)				Groundnut rosette incident and severity							
	2008		2009		2008 rainy		2008 summer		2009 rainy		Mean	
	Rainy season	Summer	Rainy season	Mean	Incident (%)	Incident (%)	Severity (0-9 scale)	Incident (%)	Severity (0-9 scale)	Incident (%)	Severity (0-9 scale)	Mean
ICGV-SM 95526	5	4	5	4.7	9.1	4.4	2	30.8	3.5	14.8	2.8	
ICGV-SM 95527	6	6	5	5.7	3.7	11.9	3.5	44.1	4.5	19.5	4	
ICGV-SM 93541	6	4	6	5.3	13	4.7	2	54.9	5	24.2	3.5	
ICGV-SM 95508	5	4	4.5	4.5	5.8	16.6	3.5	48	3.5	23.4	3.5	
ICGV-SM 95506	6	5	5.5	5.5	17	10.5	3	46.1	4.5	25.2	3.8	
ICGV-SM 95533	5	4	4	4.3	32.2	15.9	4	41.2	4.5	29.7	4.3	
ICGV-SM 95713	6.5	5	5	5.5	16	9.7	3	74.9	5	33.5	4	
ICGV-SM 95714	6	3.5	4	4.5	8.4	6.9	4	18.3	2.5	15.8	2.8	
ICGV-SM 95722	5	4	4.5	4.5	14.4	7.9	3	33.5	3.5	18.6	3.3	
ICGV-SM 95731	5.5	4	5	4.8	25.4	5.6	2	33.3	4.5	21.4	3.3	
ICGV-SM 96741	5.5	3	4.5	4.2	15.5	8.1	2.5	34.4	3	16.4	2.8	
ICGV-SM 96777	6	4	4	4.7	12.9	7.1	3	43.4	3.5	34.5	3.3	
ICGV-SM 99541	5.5	4	4	4.5	5	6.8	2.5	14.5	2.5	8.2	2.5	
ICGV-SM 99543	5.5	4	4.5	4.5	4.3	4.5	2	33.7	4	14.2	3	
ICGV-SM 99571	5.5	4	4.5	4.7	11.6	14.6	4.5	35.5	4.5	20.6	4.5	
Valencia R2	6	4	5	5	13.5	5.9	2.5	41.3	4	20.2	3.3	
Mean	5.5	4.3	4.8	4.9	13.5	8.7	2.8	31.7	3.5	17.9	3.1	
CV %	12.3	8.3	7.8	10.1	32	33.8	26.6	18.9	14.5	32.4	20	
F-prob	0.819	<0.001	<0.001	<0.001	<0.001	0.034	0.384	<0.001	<0.001	<0.001	<0.001	

Table 3. Severity of groundnut late leaf spot and rosette diseases on Virginia groundnut lines at Serere during 2008 and 2009 growing seasons.

Entry #	Groundnut late leaf spot severity at harvest (0-9 scale)				Groundnut rosette incident and severity							
	2008		2009		2008 rainy		2008 summer		2009 rainy		Mean	
	Rainy season	Summer	Rainy season	Mean	Incident (%)	Incident (%)	Severity (0-9 scale)	Incident (%)	Severity (0-9 scale)	Incident (%)	Severity (0-9 scale)	Mean
CG 7	3.5	3.5	3.5	3.7	10.3	9.6	2.5	7.1	2	9	2.3	
Challabana	4	3.5	4	3.8	1.4	14.5	2.5	7.4	2	7.8	2.3	
ICGV-SM 01703	4	3	5.5	4.2	3.8	8.2	2.5	4.4	1.5	5.4	2	
ICGV-SM 01705	4	3	6	4.3	3.4	4.6	2	1.1	1	3	1.5	
ICGV-SM 01708	4	3	4.5	3.5	3.3	5.9	2	1.3	1	3.6	1.5	
ICGV-SM 01711	4	3	4.5	3.8	3.7	4.1	2	1.9	1	3.8	1.5	
ICGV-SM 01721	4	3.5	4	3.8	14.2	23.8	3.5	23.3	4.5	20.4	4	
ICGV-SM 01731	3.5	3.5	3.5	3.5	4.9	3.8	2	5.4	1.5	4	1.8	
ICGV-SM 02512	4	3	4.5	3.8	26.5	18.4	3.5	21.5	4	22.1	3.8	
ICGV-SM 02702	4	3.5	5	4.2	13.9	13.4	3	8.3	2.5	12.2	2.5	
ICGV-SM 02709	3.5	3	4	3.5	7.9	12.1	2.5	17.8	3.5	12.6	3	
ICGV-SM 02710	3.5	4	4.5	4	21.3	13.4	3.5	10.6	2.5	15.1	3	
ICGV-SM 02715	3.5	3	4	3.5	37.5	10	2.5	8.3	2.5	18.6	2.5	
ICGV-SM 03701	4	3.5	6	4.5	4	4.7	1.5	1.3	1	3.7	1.3	
ICGV-SM 03702	5	3	6	4.7	2.8	5.7	2	1.2	1	3.2	1.5	
ICGV-SM 03703	3.5	2.5	4	3.3	3.8	7	2	5.7	1.5	5.5	1.8	
ICGV-SM 88710	4	3	4	3.7	4.2	5.3	2	2.2	1	3.9	1.5	
ICGV-SM 88782	4	3.5	4	3.8	2.3	9.9	1.5	3.1	1.5	7.4	1.5	
ICGV-SM 90082	3.5	3.5	4	3.7	33.2	37.7	5.5	43.1	5.5	38	5.5	
ICGV-SM 90092	5	3.5	4.5	4.3	25.8	25.2	4.5	30.4	4.5	27.1	4.5	
ICGV-SM 90704	4	3	5	4	5.2	8.1	2	2.9	1	5.4	1.5	
ICGV-SM 91706	4	3.5	4	3.8	18	4.8	2	4.3	1	6	1.5	
ICGV-SM 95385	4.5	3	5.5	4.3	18	40	2.5	8.2	2.5	20.7	2.5	
ICGV-SM 95380	5	3.5	6	4.8	17	7.6	2.5	10	2	11.9	2.3	
RO 1	4	3	4	3.7	0	1	2	1.4	1	0.8	1.5	
Mean	4	3.2	4.8	4	10.8	11.6	2.6	9.3	2.1	10.5	2.3	
CV %	11.8	10.2	25.5	9.3	34.3	43.5	16.5	38.5	28.3	38.1	22.2	
F-prob	0.789	0.846	<0.001	0.001	<0.001	0.023	0.005	<0.001	0.006	<0.001	<0.001	