

Search for Multiple Disease Resistance in Groundnut

SNEH MATHUR AND ANILA DOSHI

마투르 S. · 도쉬 A : 땅콩의 복합병 저항성 탐색

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ABSTRACT One thirty one varieties of Groundnut were screened for search of multiple disease resistance against rust caused by *Puccinia arachidis* spg. and leaf spots caused by *Cercospora arachidis* Hori and *Phaeoisariopsis personata*. Out of these, 7 were resistant, and 11 were moderately resistant. Percent disease severity and its' effect on yield was assessed.

INTRODUCTION

Groundnut (*Arachis hypogea* L.) is the most important oil seed crop of India. Rust caused by *Puccinia arachidis* spg. and leaf spots caused by *Cercospora arachidicola* Hori and *Phaeoisariopsis personata* are most common and destructive diseases of groundnut. Screening for resistance to rust and leaf spots has been done by Mehta and Mandal (1980), Kolte *et al.* (1978), Jayaramaiah *et al.* (1979), Bromfield (1974) and Kono (1977). In this study some exotic material including Botanical groups spanish bunch and valencia were screened against rust and leaf spots of groundnut in search of multiple disease resistance. Varieties were observed for disease severity and its effect on yield.

MATERIALS AND METHODS

One thirty one varieties were sown at Agronomy farm of Rajasthan College of Agriculture, Udaipur, Rajasthan, in two rows, each 5 meter long. After every 5 rows, one row of susceptible check, AK-12-24 was sown. The experiment was done

for 3 seasons, i.e. 1983, 1984 and 1985. Percent disease severity and its' effect on yield was assessed. Observations for both the diseases were taken after appearance of the disease under natural conditions. Foliar disease incidence was calculated using modified formula suggested by Horsfall and Hensberger (1942). For rust and leaf spots rating 0~4 was used and varieties were categorized as follows:

Grade	Category value	Description
1	0	Healthy green leaves
2	1	1~10 spots, scattered, coalescing, leaf yellowing pronounced.
3	2	1~10 spots, scattered, coalescing covering 25.50 per cent area of leaf lamina.
4	3	11~20 spots, scattered, coalescing on entire leaf, leaf yellowing and marginal drying.
5	4	More than 20 spots, coalescing total yellowing of leaves and drying

Foliar disease incidence was calculated according to following formulae:

Foliar disease incidence

$$= \frac{\text{Sum of category value}}{\text{Number of leaves assessed}} \times \frac{100}{4}$$

The resistant reaction was categorized according to F.D.I as follows:

Department of Plant Pathology, Rajasthan College of Agriculture Sukhadia University, Udaipur-313001(Rajasthan)

Table 1. Varieties showing resistance to rust and leaf spots diseases of groundnut individually.

For Rust:	E C-21014	E C-21024	E C-21064	E C-21074	
	E C-21074	E C-21075	E C-21078	E C-21079	
	E C-21080	E C-21081	E C-21082	E C-21118	
	E C-21124	E C-21125	E C-21126	E C-21127	
	E C-21128	E C-21130	E C-21132	E C-21138	
	E C-21134	E C-21141	E C-21142	E C-21144	
	E C-21145	E C-24374	E C-24395	E C-24397	
	E C-24412	E C-24419	E C-27482	E C-60876	
	E C-117433	E C-117485	E C-117861	E C-24398	
	For Leaf spots:	E C-21130	E C-21132	E C-21134	E C-21141
		E C-21142	E C-21147	E C-22451	E C-24374
		E C-24398	E C-24377	E C-21081	E C-117861
		E C-24405	E C-24419	E C-24421	E C-24429
E C-24425		E C-126394			

Table 2. Combinative performance of varieties of groundnut against rust and leaf spots diseases and their effect on yield.

S. No.	Variety	Category	Foliar disease Index*		Kernel yield quintal/hectare
			Rust	Leaf spots	
1.	E C-21081	R	12.5	13.38	4.80
2.	E C-21130	R	12.5	13.38	6.93
3.	E C-21132	R	14.66	12.25	12.48
4.	E C-21134	R	14.58	13.75	7.71
5.	E C-24374	R	8.53	13.66	6.00
6.	E C-24398	R	8.33	12.83	5.40
7.	E C-117861	R	8.33	15.0	6.57
8.	E C-21043	MR	8.33	20.83	4.53
9.	E C-21046	MR	20.83	16.66	4.20
10.	E C-21127	MR	16.66	20.80	3.21
11.	E C-21135	MR	20.83	22.99	5.82
12.	E C-21141	MR	20.83	20.83	6.00
13.	E C-21142	MR	16.66	20.80	6.71
14.	E C-22414	MR	18.33	16.16	4.80
15.	E C-24405	MR	20.80	16.50	7.23
16.	E C-24419	MR	16.60	20.50	6.63
17.	E C-24426	MR	25.0	22.91	5.7
18.	E C-21037	MS	25.83	33.33	5.85
19.	E C-21139	MS	20.80	30.00	3.90
20.	E C-24396	MS	20.50	29.00	7.20
21.	E C-24421	MS	33.33	20.83	3.00
22.	E C-24425	MS	39.58	18.75	7.40
23.	E C-211158	MS	29.16	31.25	3.74
24.	E C-16154	MS	37.50	14.59	4.83
25.	A K-12-24	S	70.83	75.00	5.63

Coefficient of Correlation(rxy)—For rust=—0.14

For leaf spots=—0.1846

* Average of 100 compound leaves.

<i>Disease rating</i>	<i>Description</i>
Highly resistant	0
Resistant	1~15 FDI
Moderately resistant	16~25 FDI
Moderately susceptible	26~40 FDI
Susceptible	41~60 FDI
Highly susceptible	61 and above FDI

Yield data recorded after harvesting and were correlated with the disease severity and co-efficient of correlation was calculated using the formula given by Gupta and Saini(1980).

RESULTS AND DISCUSSION

Of 131 varieties, 34 were found resistant for rust only and 18 for leaf spots only. There were 7 varieties resistant and 11 were moderately resistant for both the diseases (Table 1). Rest of the varieties were susceptible and highly susceptible for both the diseases. Since rust and leaf spots are almost equal devastating diseases of groundnut and when both appear in combined form cause high defoliation and yield losses, such varieties will be useful which are resistant for both the diseases. Table 2 shows foliar disease incidence and yield of varieties. Correlation coefficient was calculated out and was found non-significant for both rust and leaf spots.

This paper suggests that varieties showing multiple disease resistance against groundnut diseases can be used as donars in plant breeding programme because they are high yielding also.

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적 요

131개 땅콩품종을 공시하여 녹병, 검은무늬병, *Phaeoisariopsis* 점무늬병에 대한 복합저항성을 조사한 결과 7개 품종이 저항성이었고 11개 품종은 중도저항성이었다. 각 품종들의 발병 정도와 수량에 대한 효과가 논의되었다.

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