Improving Field Screening of Groundnut Genotypes for Resistance to Foliar Fungal Diseases

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At ICRISAT Center, Patancheru, India, two foliar fungal diseases commonly cause severe damage to groundnut: rust, caused by *Puccinia arachidis*, and late leaf spot, caused by *Phaeoisariopsis personata*.

When field-screening groundnut germplasm and breeding lines for resistance to these diseases, we have often experienced problems in accurately rating a genotype for resistance to one disease because of the damage caused by the other disease. The problem is not so important when genotypes with resistance to both diseases are tested, but a genotype with resistance to rust may be scored higher or lower for resistance to late leaf spot than another genotype that has actually the same level of resistance to late leaf spot but is susceptible to rust. Also, the defoliation caused by late leaf spot on a susceptible genotype can influence the disease scoring for rust.

To get round this problem of interference, we have tried a modification of our field-screening process, by which each genotype is tested for reaction to rust and to late leaf spot in separate trials.

Two sets of potted plants of cv TMV 2 are raised in isolation from one another; one set is inoculated with rust and the other with late leaf spot. Identical sets of test genotypes are sown in two replicated field trials, preferably in different fields some distance apart. Each test plot consists of two 4-m rows, 60 cm wide, of the test material; one "infector row" of cv TMV 2, susceptible to both rust and leaf spot, is sown between test plots.

At 30-35 days after sowing (DAS) one potted plant infected with rust is placed in the center of each infector row in the rust screening trial and one potted plant infected with late leaf spot is placed in the center of each infector row in the late leaf spot screening trial. A few days later (35-40 DAS), the infector rows in each trial are sprayed with a spore suspension of the appropriate pathogen to enhance the effects of the potted spreader plants. Five days later, selective fungicides are applied to these trials; bavistin 50% WP (500 g a.i. in 500 L water ha^{-1}) to the rust resistance screening trial to prevent the establishment of leaf spot, and calixin 80% solution (150 mL a.i. in 500 L of water ha^{-1}) to the late leaf spot screening trial to prevent establishment of rust disease. Further sprays are applied at 15-day intervals until 30 days before harvest (the number of sprays may be reduced if weather conditions do not favor disease buildup).

The establishment of separate rust and late leaf spot epidemics enables accurate rating of genotypes for resistance to each disease and satisfactory comparisons of specific disease resistance between genotypes with multiple disease resistances (Table 1). We appreciate that at some stage genotypes must be evaluated under

Table 1. Reaction of eight groundnut genotypes to rust and late leaf spot in field-screening trials, ICRISAT Center, India.[1]

Genotype	Disease reaction[2]			
	Sprayed with			
	Calixin (controls rust)	Bavistin (controls leaf spot)	No spray	
	Late leaf spot	Rust	Late leaf spot	Rust
PI 414332	9.0	5.0	8.3	3.0
C.No. 45-23	8.3	6.3	8.0	4.0
PI 298115	8.3	6.3	8.0	3.0
PI 259747	3.6	4.0	4.0	3.3
PI 390595	3.0	4.0	3.0	3.3
PI 393641	7.0	5.3	7.3	3.6
PI 405132	5.0	2.6	3.0	2.6
TMV 2 (susceptible)	9.0	9.0	9.0	5.3
SE	±0.192	±0.272	±0.329	±0.262
CV (%)	5.2	10.4	9.3	12.0

1. For accurate ratings, screening is done separately for each disease; fungicidal sprays control the other disease to prevent interference.
2. Based on a scale of 1-9 where 1 = no symptoms and 9 = 50-100% foliage destroyed.

multiple disease conditions; however, we believe that their reactions to such evaluation can be better understood if there are accurate data on reaction to individual diseases.