Evaluation of Chickpea Lines for Resistance to Dry Root Rot Caused by *Rhizoctonia bataticola*

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Dry root rot, caused by *Rhizoctonia bataticola*, is one of the most important and widespread soilborne diseases of chickpea (*Cicer arietinum*) grown between latitudes 20° N and 20° S, where the climate is relatively dry and warm. Dry root rot generally appears during late flowering and podding stages and the infected plants appear completely dried. The root system of diseased plant shows extensive rotting with most of the lateral roots destroyed. The rotten roots are brittle and minute sclerotial bodies appear in the pith cavity and on the outer surface of the tap root.

Chemical control of dry root rot is not effective as *R. bataticola* has a broad host range and survives in soil for longer periods in the form of sclerotia. The sclerotia can survive up to 10 months even in the absence of host plants and under prevailing dry soil conditions. Use of host plant resistance is the most economical approach for management of dry root rot in chickpea. A few chickpea lines with field tolerance to dry root rot have been identified, but high levels of resistance are scarce in cultivated genotypes. Wilt caused by *Fusarium oxysporum* f sp *ciceris* is another important soilborne disease of chickpea, and combined resistance to dry root rot and wilt is desirable. Combined resistance to fusarium wilt and dry root rot has been identified in wild *Cicer* spp (Reddy et al. 1991).

In this study, 29 chickpea germplasm accessions and 10 cultivars received from the Genetic Resources Unit of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India were screened

Table 1. Reaction of chickpea accessions to dry root rot infection in screening by paper towel technique at ICRISAT, Patancheru, India, 2003.

Accession	Origin	Disease score			Disease reaction[1]
		Experiment 1	Experiment 2	Mean	
ICC 1376	India	4.3	5.0	4.7	M
ICC 3782	India	7.0	6.3	6.7	S
ICC 4963	India	7.0	7.0	7.0	S
ICC 5003	India	5.0	5.0	5.0	M
ICC 6679	Iran	7.0	7.0	7.0	S
ICC 6743	Iran	7.0	7.0	7.0	S
ICC 10803	India	8.3	9.0	8.7	HS
ICC 10894	India	5.0	4.3	4.7	M
ICC 11323	ICRISAT, India	7.0	7.0	7.0	S
ICC 12247	ICRISAT, India	6.3	7.0	6.7	S
ICC 12249	ICRISAT, India	5.0	5.0	5.0	M
ICC 12263	India	5.0	5.0	5.0	M
ICC 12428	ICRISAT, India	9.0	9.0	9.0	HS
ICC 12451	ICRISAT, India	5.0	5.0	5.0	M
ICC 14375	ICRISAT, India	7.0	6.3	6.7	S
ICC 14380	ICRISAT, India	5.0	4.3	4.7	M
ICC 14390	ICRISAT, India	9.0	9.0	9.0	HS
ICC 14393	ICRISAT, India	7.0	7.0	7.0	S
ICC 14395	ICRISAT, India	3.0	3.0	3.0	R
ICC 14396	ICRISAT, India	7.0	6.3	6.7	S
ICC 14397	ICRISAT, India	5.0	4.3	4.7	M
ICC 14401	ICRISAT, India	6.3	7.0	6.7	S
ICC 14431	ICRISAT, India	5.0	5.0	5.0	M
ICC 14432	ICRISAT, India	5.0	5.0	5.0	M

continued

Table 1. *continued*

Accession	Origin	Disease score			Disease reaction[1]
		Experiment 1	Experiment 2	Mean	
ICC 14441	Italy	5.0	5.0	5.0	M
ICC 14443	Italy	4.3	5.7	5.0	M
ICC 14447	Italy	5.0	4.3	4.7	M
ICC 14449	USA	7.0	7.0	7.0	S
ICC 15167	India	5.0	5.0	5.0	M
ICCC 42	ICRISAT, India	5.0	5.0	5.0	M
ICCL 80001	ICRISAT, India	5.0	5.0	5.0	M
ICCL 80003	ICRISAT, India	5.0	7.0	6.0	S
ICCL 81015	ICRISAT, India	5.0	5.0	5.0	M
ICCL 83003	ICRISAT, India	7.0	7.0	7.0	S
ICCL 83110	ICRISAT, India	7.0	7.0	7.0	S
ICCL 85105	ICRISAT, India	7.0	6.3	6.7	S
ICCL 89220	ICRISAT, India	6.3	7.0	6.7	S
ICCV 2	ICRISAT, India	3.0	3.0	3.0	R
ICCV 5	ICRISAT, India	5.7	4.3	5.0	M
ICCX830203-BH-BH-10H	ICRISAT, India	7.0	7.0	7.0	S
ICCX830203-BH-BH-11H	ICRISAT, India	3.0	3.0	3.0	R
ICCX830203-BH-BH-13H-BH	ICRISAT, India	7.0	6.3	6.7	S
ICCX830235-BH-BH-5H	ICRISAT, India	5.0	5.0	5.0	M
ICCX830263-BH-BH-13H-BH	ICRISAT, India	5.0	5.0	5.0	M
ICCX840496-BP-19H-BH	ICRISAT, India	5.0	3.7	4.4	M
ICCX850496-BP-7H-BH	ICRISAT, India	5.0	5.0	5.0	M
ICCX850636-BH-26H-BH	ICRISAT, India	5.7	6.3	6.0	S
ICC 11088 (control)	India	9.0	9.0	9.0	HS
ICC 12267 (control)	ICRISAT, India	9.0	9.0	9.0	HS

1. R = resistant; M = moderately resistant; S = susceptible; HS = highly susceptible.

for their resistance to dry root rot using paper towel technique (Nene et al. 1981). In addition, 8 advanced breeding lines that were identified to have field resistance (<20% plants infected) either to wilt, dry root rot or collar rot (*Sclerotium rolfsii*) in multiple disease sick plot at ICRISAT were also evaluated to confirm their resistance to dry root rot. Eight-day-old seedlings were used for artificial inoculation and the inoculated seedlings were incubated at 35°C with 12 h photoperiod. The dry root rot severity was scored on a 1–9 rating scale on the 8th day after inoculation. Fifteen seedlings of each accession were considered as one replication, and the experiment consisted of three replications and was repeated once.

Based on the disease score the accessions were grouped as immune (disease score = 1), resistant (disease score >1 and ≤3), moderately resistant (disease score >3 and ≤5), susceptible (disease score >5 and ≤7) and highly susceptible (disease score >7). Of the 47 lines tested, none were immune to dry root rot. One germplasm accession (ICC 14395), a cultivar (ICCV 2) and an advanced breeding line (ICCX830203-BH-BH-11H) were resistant to dry root rot. Of the remaining lines, 22 were moderately resistant, 19 susceptible and 3 highly susceptible (Table 1). The disease severity in the two susceptible lines BG 212 and ICC 12267 used as control was rated 9. The identified genotypes can be used as additional sources of resistance to dry root rot.

References

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