

Screening Chickpea for Resistance to Wilt Disease in Gujarat, India

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Of the many diseases that chickpea crop suffers from, Fusarium wilt (*Fusarium oxysporum* f. sp. *ciceri*) is the most destructive, resulting in considerable crop loss every year in Gujarat. Several chickpea lines were screened in a wilt-sick plot to identify wilt-resistant lines at Junagadh. More than 60 diverse chickpea lines developed at Pulses Research Station, Junagadh were tested in a wilt-sick plot for 3 years (1994–96). Each genotype was sown in a 2 m-long plot with interrow spacing of 30 cm and plant-to-plant spacing of 10 cm. There were two replications. JG 62 was used as the susceptible control. The resistance screening technique described by Nene et al. (1981) was used. Observations on seedling emergence were recorded 2 weeks after sowing. Wilt incidence was recorded at monthly intervals till crop maturity.

In all three seasons, average wilt incidence was less than 30% in GCP 9302, GCP 9310, and GCP 9313 (Table 1). The popular varieties Chaffa and Dahod yellow showed 98.3 and 53.2% wilt incidence, respectively. Other varieties developed more than 30% average wilt incidence in all the years. The susceptible check, JG 62 showed 100% wilt in all the 3 years. One of the promising genotypes, GCP 9313, is a desi-type with reddish to brown seeds. Its 100-seed mass is 18.2 g, which is higher than Chaffa

Table 1. Wilt incidence in selected desi chickpea genotypes in a wilt-sick plot at Junagadh, Gujarat, 1994–96.

Entry	Mean wilt incidence ¹ (Percentage mortality)			Mean
	1994	1995	1996	
GCP 9302	26.0	26.4	32.2	28.2
GCP 9310	25.7	28.8	29.2	27.9
GCP 9313	26.1	28.1	28.1	27.4
Chaffa	100.0	100.0	94.9	98.3
Dahod yellow	57.8	50.7	51.2	53.2
JG 62	100.0	100.0	100.0	100.0

1. Average of two replications.

(12.8 g) and Dahod yellow (15.9 g). This cultivar has been recommended for cultivation in Gujarat state during 1998 by the Research Council of the Gujarat Agricultural University.

References

Nene, Y.L., Haware, M.P., and Reddy, M.V. 1981. Chickpea diseases: resistance screening techniques. Information Bulletin no. 10. Patancheru 502 324. Andhra Pradesh, India: International Crop Research Institute for the Semi-Arid Tropics. 12 pp.

Sources of Resistance to Root-knot Nematodes in Chickpea Germplasm

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The root-knot nematodes (*Meloidogyne incognita* and *M. javanica*) are key nematode pests of chickpea in the Indian subcontinent (Sharma and McDonald 1990). Upadhyay and Dwivedi (1987) reported a 40% yield loss in chickpea due to *M. incognita* in India, while 32.6% yield losses were estimated due to *M. incognita* and *M. javanica* in Gujarat (Anonymous 1997). A cost-effective approach for the management of root-knot nematodes is cultivation of nematode-resistant chickpea cultivars. However, such cultivars have not yet been developed as good sources of resistance to root-knot nematodes have not been identified.

During the 1996/97 postrainy season, 1000 chickpea genotypes received from ICRISAT were screened for resistance to root-knot nematodes (mixed population of *M. incognita* and *M. javanica* pathotype 1) in a nematode-sick field (1 juvenile g⁻¹ soil) at the Department of Nematology, Gujarat Agricultural University, Anand. Of 1000 genotypes, 85 genotypes exhibited resistance or moderate resistance (rating of 5 for gall index on a 1–9 scale) and were selected for further testing against *M. incognita* (approximately 2.5 juveniles g⁻¹ soil) and *M. javanica* (2.5 juveniles g⁻¹ soil) separately in 2 m × 1 m × 0.5 m (depth) micro-plots. The chickpea cultivar Dahod yellow was used as a nematode-susceptible control after every

Table 1. Reaction of chickpea germplasm lines to root-knot nematodes at the Gujarat Agricultural University research farm, Anand, Gujarat, India.

Reaction ¹	Germplasm line response to	
	<i>Meloidogyne incognita</i>	<i>Meloidogyne javanica</i>
Moderately resistant	ICC ² 4007, 4237	ICC 4254, 4331
Susceptible	ICC 4059, 4060, 4105, 4120, 4121, 4122, 4141, 4169, 4181, 4187, 4191, 4192, 4204, 4210, 4212, 4214, 4229, 4231, 4232, 4233, 4234, 4249, 4251, 4252, 4254, 4259, 4269, 4283, 4348, 4352, 4418, 4419, 4434, 4649, 4653, 4770, 4844, 4862, 4959	ICC 4007, 4141, 4154, 4187, 4190, 4191, 4204, 4212, 4229, 4249, 4259, 4261, 4262, 4264, 4269, 4274, 4418, 4649
Highly susceptible	ICC 4005, 4006, 4008, 4123, 4125, 4133, 4134, 4140, 4142, 4151, 4153, 4154, 4155, 4172, 4173, 4175, 4182, 4185, 4186, 4188, 4189, 4190, 4201, 4203, 4208, 4216, 4221, 4231, 4261, 4262, 4264, 4266, 4270, 4271, 4273, 4274, 4275, 4292, 4293, 4339, 4473, 4537, 4586, 4834, Dahod yellow (Control)	ICC 4005, 4006, 4008, 4059, 4060, 4105, 4120, 4121, 4122, 4123, 4125, 4133, 4134, 4140, 4142, 4151, 4153, 4155, 4169, 4172, 4173, 4175, 4181, 4182, 4185, 4186, 4188, 4189, 4192, 4201, 4203, 4208, 4210, 4214, 4216, 4221, 4231, 4232, 4233, 4234, 4237, 4251, 4252, 4266, 4270, 4271, 4273, 4275, 4283, 4292, 4293, 4339, 4348, 4352, 4419, 4434, 4473, 4537, 4586, 4653, 4770, 4834, 4844, 4862, 4959, Dahod yellow (Control)

1. Resistance was measured on a scale of 1–9 where 1 = 0 galls, highly resistant; 9 = 100 galls per plant, highly susceptible.

2. ICC = ICRISAT chickpea germplasm accession number.

10 entries in 1997–98. Data were recorded on the number of galls on roots of five randomly selected plants of each genotype at 60 days after sowing. The gall number was rated on a 1–9 scale (1 = no galls on roots and 9 = more than 100 galls root⁻¹). The 85 lines were also tested against an *M. javanica* Race 1 population at Aziz Nagar village, Ranga Reddy district, Andhra Pradesh.

None of the tested lines were highly resistant or resistant to the root-knot nematodes. Two lines, ICC 4007 and ICC 4237, were identified as moderately resistant to *M. incognita*, and ICC 4254 and ICC 4331 as moderately resistant to *M. javanica* (Table 1). However, these genotypes were found to be susceptible to an *M. javanica* Race 1 population in a farmer's field at Aziz Nagar. The results indicate that resistance to root-knot nematode populations in the four genotypes is probably specific to a limited nematode population. We propose further

screening of chickpea germplasm lines to identify sources that are highly resistant to the root-knot nematodes.

References

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