

Evaluation of Chickpea Lines in the All India Coordinated Varietal Trials for Wilt and Root-Rots Resistance

M.V. Reddy, T.N. Raju, and Y.L. Nene
(ICRISAT Center)

Wilt (*Fusarium oxysporum* f.sp *ciceri*), dry root rot (*Rhizoctonia bataticola*), black root rot (*F. solani*), wet root rot (*R. solani*), and collar rot (*Sclerotium rolfsii*) are the major soilborne diseases of chickpea. Occurrence of these pathogens in the same field is common. Varieties possessing combined resistance/tolerance to these diseases will be very useful in minimizing the losses caused by them. Some wilt resistant/tolerant cultivars such as NP 10, S 26, G 24, C 214, GL 769, Pusa 212, and Avrodhi have been released for cultivation (Singh 1987).

In an effort to identify chickpea lines with resistance to wilt and root rots and with a high-yielding background, entries in different all India Coordinated Gram Varietal Trials (GCVT) were evaluated in the wilt and root-rot nursery at ICRISAT Center, Patancheru, India during the past four seasons (1985/86 to 1988/89). The source of seeds was Directorate of Pulses Research (DPR), Kanpur, India. Sowing in all the four seasons was done in early October. For each line, 50 seeds were sown in a 4-m row replication⁻¹. The number of replications were two and the experimental design followed was randomized block. The interrow spacing was 60 cm. After every two rows of test lines, a row of susceptible cultivar JG 62 was sown.

Final observations on mortality because of wilt and root rots were recorded at pod-filling stage. Isolations were made from the dead plants at flowering and podding stages to determine the frequency of wilt and root-rot fungi.

The mortality in the susceptible control cultivar JG 62, in all the four seasons was 100%. The percentage frequency (average of four seasons) of *F. oxysporum* f.sp *ciceri* was 77 (72-81), of *R. bataticola* was 10 (8-12), and of *F. solani* was 4 (1-9) isolated from dead plants. Mixture of *F. oxysporum* f.sp *ciceri* and *R. bataticola* was also isolated from 6% (0-6%) plants. One hundred and sixty eight (168) lines in 1985/86, 146 in 1986/87, 243 in 1987/88, and 259 in 1988/89 seasons were evaluated. The lines that showed less than 20% mortality in different seasons are listed below:

1985/86 : KPG 70, Avrodhi, ICCV 48, ICCV 42, ICCV 47, BG 246, ICCV 33, PDG 83-33, H 84-60, BG 313, H 82-2, GG 885, H 82-19, WB-32-4

1986/87 : Avrodhi, ICCV 37, PDG 84-10, AKG 26, BG 325, GCP 6, GCP 28, ICCV 10, ICCV 42, ICCV 48, JG 317, PDG 85-7, BG 313, PDG 83-33

1987/88 : GCP 28, ICCV 10, JG 317, GCP 6, ICCV 48, Avrodhi PDG 83-33, H 83-18

1988/89 : Avrodhi, GCP 6, GNG 426, ICCV 37, ICCV 48, H 83-55, H 83-60, H 86-21, H 86-92, KPG 142-1, KPG 143-1, H 86-73, H 86-72.

The lines Avrodhi and ICCV 48 were tested in all the four seasons and showed <20% mortality. The line GCP 6 was tested in three seasons (1986/87 to 1988/89) and showed <20% mortality. The lines GCP 28, JG 317, GNG 426, H 83-55, H 83-60, KPG 142-1, and H 81-73 were tested for two seasons and showed <20% mortality. The other lines were either not tested in the second season or were tested and found to show 20% mortality.

The wilt pathogen *F. oxysporum* f.sp *ciceri* was the most predominant fungus isolated from the dead plants followed by *R. bataticola*. Hence, the screening against these two fungi can be considered comparatively more rigorous than against others. The lines that showed <20% mortality were examined for the extent of root rotting and xylem discoloration. All of them were found to show extensive root rotting and different degrees of xylem discoloration.

Reference

Singh, K.B. 1987. Chickpea breeding. Pages 127-162 in *The Chickpea*. Saxena, M.C., and Singh, K.B. (eds.), Wallingford, Oxfordshire, UK: CAB International.

ICCV 6 (ICCV 32) - A Kabuli Chickpea, Resistant to Fusarium Wilt and Root Rots

A.M. Ghanekar¹, S.C. Sethi¹, B.L. Jalali², and Y.L. Nene³ (1. ICRISAT Cooperative Research Station, Hisar, India; 2. Department of Plant Pathology, Haryana Agricultural University, Hisar 125 004, India; 3. ICRISAT Center)

Chickpea kabuli cultivar ICCV 6 (ICCV 32) was identified for release in the Central Zone of India by the All India Coordinated Pulses Improvement Project (AICPIP) in its Rabi Pulses Workshop held at Junagadh, Gujarat

state, India from 17 to 20 Sep 1984. This variety was recommended because of its good performance (20% more seed yield over cv L 550) during 1981/82, 1982/83, and 1983/84 in the Central Zone and wilt resistance which was earlier not available in kabuli types (ICRISAT 1988).

Many minikit trials were conducted in the ensuing years and ICCV 6 was found virtually free from wilt and root rots under field conditions. Simultaneously, it was also used in AICPIP kabuli trials as a control cultivar. It was further crosschecked for its wilt and root-rots reactions in disease-sick plots along with other materials at locations identified by AICPIP. In the four seasons, 1985/86 to 1988/89, the mortality of ICCV 6 in the disease-sick plot of Haryana Agricultural University (HAU), Hisar ranged from 3.2% to 87.9% because of fusarium wilt and 0.0-12.1% because of root rots (Table 1). Since the mortality records for wilt and root rots in ICCV 6 at Hisar were quite divergent (AICPIP 1990) and not supported by data from minikit and other multilocal trials, it was decided to check its reaction to these two diseases again more critically, in HAU/ICRISAT collaborative work at Hisar.

For this purpose, ICCV 6 seed obtained from ICRI-SAT breeders was sown at two places in the disease sick



Figure 1. Two test rows of ICCV 6 in the disease nursery at HAU, Hisar, India, postrainy season 1989/90; control rows of cv JG 62 sown on both sides of ICCV 6 (ICCV 32) were killed.

plot at Hisar in the 1989/90 postrainy season. The test rows of ICCV 6 were flanked by the susceptible control cv JG 62. Sowing was done in the 1st week of November. The JG 62 plants were killed within 40 days after sowing, whereas ICCV 6 grew normally till maturity at both places (Fig. 1) with only 9.1% and 0.0% fusarium wilt and 13.6% and 9.7% root rots (Table 1).

The 5 years' data presented in Table 1 show an average incidence of 23.4% fusarium wilt and 7.8% root rots. However, a very high wilt incidence (87.9%) in 1985/86 is difficult to explain. However, taking into account the number of testing seasons, the average mortality cannot be considered as high. Therefore, from these data and those from several other locations, it is concluded that ICCV 6 has resistance to fusarium wilt and root rots which makes it unique when compared with all released kabuli cultivars in India.

Table 1. Fusarium and root rots incidence of ICCV 6 in the disease-screening nursery at Hisar over the 5 year period 1985/86 to 1989/90.

Year	Disease incidence	
	Fusarium wilt ¹ (%)	Root rots (%)
1985/86	87.9	12.1
1986/87	3.2	3.2
1987/88 ²	5.8	0.0
	22.2	7.4
1988/89	35.6	8.3
1989/90 ²	9.1	13.6
	0.0	9.7
Mean	23.4	7.8

1. Susceptible control cv JG 62 sown on both sides of the test rows, showed 100% mortality in all the years.

2. Tested at two places in the nursery.

References

AICPIP. 1990. All India Coordinated Pulses Improvement Project (AICPIP) Report on Rabi Pulses - Hisar Centre - Pathology. Hisar, India: Haryana Agricultural University (1986 to 1990).

ICRISAT. 1988. Chickpea kabuli variety ICCV 6. Plant Material Description no. 12. Patancheru, A.P. 502 324, India: ICRISAT. 4 pp.