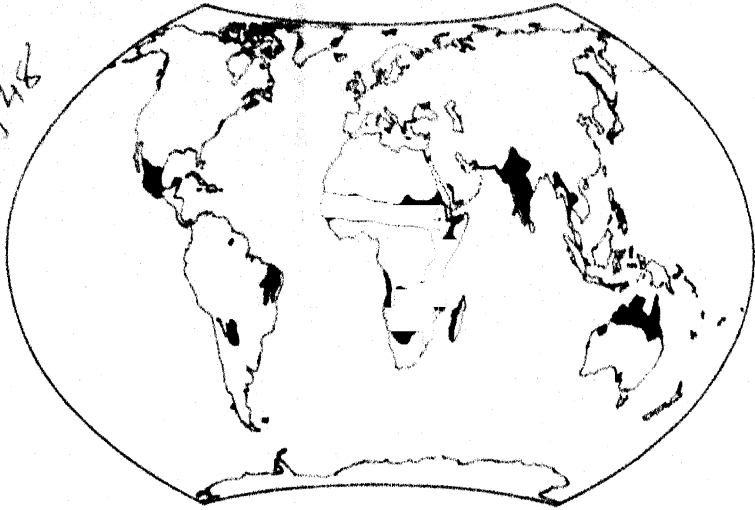


INTERNATIONAL CHICKPEA DISEASE RESISTANCE TESTING PROGRAM

RP 03157

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THE FOURTH INTERNATIONAL CHICKPEA ROOT ROTTS/WILT NURSERY
1979-80
REPORT



ICRISAT

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INTRODUCTION

In 1977-78 we initiated the International Chickpea Root Rots/Wilt Nursery (ICRRWN). The objectives of this nursery are to:

1. identify genetic sources with tolerance/resistance to various root rots and wilt,
2. develop improved varieties incorporating disease resistance,
3. provide a convenient medium for the exchange of genetic material and information among cooperators.

The report on the ICRRWN (1979-80) is presented below.

NURSERY COMPOSITION

Fifty-six entries (+ one susceptible check--ICC-4951) originating in 4 countries and from ICRISAT were included in the nursery. This list is given in Table 1.

NURSERY LOCATIONS

The nursery was sent to 35 locations in 19 countries. The data were received from 21 locations in 9 countries. Data from most locations within India were received. Summary of findings from all locations have been given in this report. The list of the locations and cooperators, from whom data were received, is given in Table 2.

Table 1. List of entries - ICRMN (1979-80)

S.No.	ICC No.	Pedigree	Origin
1.	102	P-79	India
2.	229	P-180-1	"
3.	267	P-212-1	"
4.	338	P-253	"
5.	434	P-319	"
6.	516	P-392	"
7.	519	P-394	"
8.	554	P-436-2	"
9.	867	P-690	"
10.	1891	P-1514	"
11.	1910	P-1542	Unknown
12.	1913	P-1546	"
13.	2072	P-1670	India
14.	2083	P-1679-2	Mexico
15.	2086	P-1683	"
16.	2089	P-1684	"
17.	2104	P-1696-1	"
18.	2461	P-2249	Iran
19.	2566	P-2559	"
20.	2660	P-2686-2	"
21.	2812	P-3036	"
22.	2835	P-3107-1	Unknown
23.	2883	P-3251	Iran
24.	3099	P-3614	Iran
25.	3103	P-3617	Unknown
26.	3396	P-4083	Iran
27.	3439	P-4116-1	"
28.	3539	P-4237	India
29.	3684	P-4321-2	Iran
30.	4519	P-6067	India

contd.

S.No.	ICC No.	Pedigree	Origin
31.	5864	T-3 (Owalior)	India
32.	5901	T-32	"
33.	6081	JG-57	"
34.	6098	JG-74	"
35.	6366	NEC-312	Iran
36.	6385	NEC-348	"
37.	6455	NEC-460	"
38.	6494	NEC-529	"
39.	6880	NEC-1089	"
40.	6926	NEC-1166	"
41.	7111	NEC-1470	"
42.	7248	NEC-1621	India
43.	7254	NEC-1627	Pakistan
44.	7681	P-1179	India
45.	8933	WR-315	"
46.	8982	NEC-346	Iran
47.	9001	NEC-426	"
48.	9117	NEC-847	"
49.	10104	P-6131	India
50.	10394	Coll.No.129	"
51.	-	ICCC-10	ICRISAT
52.	-	G-543	India
53.	-	GG-588	"
54.	-	GG-663	"
55.	-	GG-669	"
56.	-	GG-688	"
57.	4951*	JG-62	"

*Susceptible check for the wilt (*Fusarium oxysporum* f. sp. *ciceri*).

Entry nos. 1-51 were entered by ICRISAT, and 52-56 were from Gurdaspur (India).

Table 2. List of the locations and cooperators from whom data were received.

S.No.	Cooperator(s)	Location	Country
1.	Mr. Said A. Omar	Field Crops Institute Agricultural Res. Center Giza, Ormen, Cairo	Egypt
2.	Mr. Alemu Mengistu	Agricultural Expt. Station Addis Ababa University Debre Zeit	Ethiopia
3.	Dr. K. Sengupta, and Mr. N.R. Parni	Pulses and Oilseeds Research Station Berhampore, West Bengal	India
4.	Dr. R.V. Hiremath	Agricultural Research Station, Bijapur	India
5.	Dr. R.N.S. Tyagi, Mrs. K. Chitale, and Mr. L.G. Bhatnagar	Agril. Research Station University of Udaipur Durgapura, Jaipur	India
6.	Dr. R.N. Singh	N.D. University of Agril. & Technology Faizabad, Uttar Pradesh	India
7.	Dr. Gurdip Singh, Dr. Kuldip Singh, and Mr. A.S. Gill	Regional Res. Station Punjab Agril. University Gurdaspur, Punjab	India
8.	Dr. B.L. Jalali, Mr. M.S. Sangwan, and Mr. S.K. Khirbat	Haryana Agril. University Hissar, Haryana	India
9.	Mr. S.R. Kotasthane, & Mrs. Om Gupta	J.N. Krishi Vishwa Vidyalaya, Jabalpur Madhya Pradesh	India
10.	Dr. Prabhakar Shukla, Mr. R.R. Singh, and Mr. A.N. Mishra	C.S. Azad University of Agril. & Technology Kanpur, Uttar Pradesh	India
11.	Dr. Gurdip Singh, Dr. Kuldip Singh, and Mrs. Shashi Kapur	Punjab Agril. University Ludhiana, Punjab	India

contd.

S.No.	Cooperator(s)	Location	Country
12.	Dr. J.S. Grewal, and Dr. Mahendra Pal	Indian Agril. Research Institute, New Delhi	India
13.	Dr. Y.L. Nene, and Dr. M.P. Haware	ICRISAT, Patancheru Andhra Pradesh	India
14.	Dr. U.P. Singh, and Mr. V.B. Chauhan	Banaras Hindu University Varanasi	India
15.	Mr. A.H. Abdullah	Field Crops Res. Station Bakrajo, Sulamania	Iraq
16.	Ing. Rosa Maria Gomez Garza	Campo Agricola Exptl. Del Valle De Culiacan Sinaloa	Mexico
17.	Mr. S.P. Singh, and Mr. R.P. Sah	Agriculture Station Parwanipur, Birganj Narayanai Zone	Nepal
18.	Ing. Elva Llontop Castro	Experimental Station Viste, Floride Chiclayo	Peru
19.	Dr. Sami O. Freigoun	Hudeiba Agril. Research Station, Ed-Damer	Sudan
20.	Dr. W.J. Kaiser	Spillman Farm, Pullman Washington	USA
21.	Dr. John C. Phillips	California Polytechnic State University San Luis Obispo California	USA

NURSERY MANAGEMENT

The entries were planted in 2 replications. In each replication there was a single row of each entry. After every 2 test rows, 1 row of the wilt susceptible check ICC-4951 (JC-62) was planted. Fertilizer rates, insecticide application and other cultural practices were to be decided by respective locations.

One major suggestion was to plant the nursery in a root rots/wilt-sick plot.

Information on planting date; season's rainfall, relative humidity, and cloudy days; irrigation, fertilizer application, insecticides used, etc., was requested from each cooperator.

DATA COLLECTION

Request was made for collecting data (plants affected by root rots/wilt) every month. However for the purpose of the report the final figures on root rots and wilt have been considered.

SUMMARY OF THE RESULTS OF EACH LOCATION

Egypt

The nursery was planted at Giza, where ICC-4951 showed 5 to 40% wilt and root rot. Though on the whole wilt and root rots incidence was low, twenty-seven lines showed less than 10% wilt and root rots; viz., ICC-229, 267, 338, 434, 516, 867, 1891, 1910, 1913, 2072, 2089, 2104, 2812, 2883, 3099, 3684, 6366, 6385, 6880, 7248, 7254, 7681, 9001, 9117, ICC-10, G-588, and CG-663.

Ethiopia

Debre-Zeit has the problem of wilt and root rot (*Rhizoctonia solani*). The plot is not yet uniformly sick and so susceptible check JG-62 also showed no uniformity in wilt incidence. Of the 56 lines 38 lines showed very low incidence of root rot (less than 10%). Most of the lines were free from wilt incidence. Only 5 lines showed less than 5% wilt.

IndiaBerhampore (West Bengal)

The susceptible check, ICC-4951, showed 100% wilt. No mortality was reported due to root rots. Four lines; viz., ICC-229, 2660, 7248, and 8982 were free from wilt. Eight entries; viz., ICC-267, 516, 1913, 3396, 6494, 6926, 7254, and 10104 showed less than 10% wilt.

Bijapur (Karnataka)

The nursery was sent to Gulbarga. Dr. Hiremath decided to plant it at Bijapur where the susceptible check showed almost 100% mortality. ICC-102 showed no wilt or root rots. Twelve lines showed less than 10% wilt: ICC-519, 1913, 2072, 2104, 2660, 2883, 3439, 3539, 6366, 7681, 9117, and GG-688. The isolation attempted from the plot revealed the presence of *Fusarium* sp., *Rhizoctonia* sp. and an unidentified fungus.

Durgapura (Rajasthan)

The nursery was planted in a normal field. The mortality was less than 10% even in susceptible check rows. Low incidence of root rot was reported due to *Fusarium solani* and *Rhizoctonia bataticola*. Two lines, ICC-3103 and 6385 showed more than 10% mortality.

Faizabad (Uttar Pradesh)

Major root rot pathogens reported at this location were *Sclerotium rolfsii*, *Rhizoctonia solani*, and *R. bataticola*. Wilt was also reported

along with stunt. An interesting observation was that ICC-8933 (WR-315) which was found susceptible last year showed only 10.2 percent wilt and root rots this year. Other three lines which showed less than 10% mortality were; ICC-102, 7248, and 7254. Susceptible check lines showed uniform wilting.

Gurdaspur (Punjab)

In the sick plot, the foot rot pathogen is the dominant one followed by the wilt pathogen. All the entries except G-543, GG-588, and GG-663 (from Gurdaspur) were found susceptible to foot rot and wilt.

Hissar (Haryana)

The wilt incidence in susceptible check, ICC-4951 was almost complete. ICC-10 and ICC-3439 were free from wilt incidence but had less than 10% mortality due to root rots. Only four lines had less than 10% wilt and root rots. They were, ICC-516, 2566, GG-588, and GG-669. Nineteen lines; viz., ICC-338, 434, 2086, 2089, 2812, 2883, 3103, 3684, 5864, 6366, 6385, 6455, 6494, 6880, 6926, 7254, 8982, 9001, and 10104 had less than 10% wilt. All the lines except ICC-6081, G-543, GG-663 and GG-669 showed the incidence of stunt. Sporadic incidence of stem rot on some of the lines was reported.

Jabalpur (Madhya Pradesh)

Due to nonavailability of irrigation, only one replication was sown in wilt sick plot where JG-62 showed wilt mortality ranging from 70 to 100%. Out of 56 entries, 46 showed no mortality. Ten entries showed less than 10% wilt. No mortality due to root rots was recorded.

Kanpur (Uttar Pradesh)

The nursery was planted in a wilt-sick plot. The susceptible check, ICC-4951, showed 100% mortality. Mortality due to root rots or other diseases was not recorded. Only one entry ICC-3439 showed

less than 10% wilt. Surprisingly ICC-8933, developed as wilt resistant at Kanpur, also showed 23% wilt in one replication. All other entries showed susceptibility to wilt. It is to be noted that the work at ICRISAT has shown that races of *F. oxysporum* f. sp. *ciceri* are present and the race at Kanpur is different from the one that exists at ICRISAT Center.

Ludhiana (Punjab)

The mortality of the test lines was mostly due to foot rot (*Operculella padwickii*) followed by wilt. The susceptible check, ICC-4951 showed 100% mortality due to wilt, foot rot, and root rots. Only one line GG-588 was free from wilt and foot rot. Incidentally this line is from Gurdaspur where foot rot is a problem. Five lines showed less than 10% wilt; viz., ICC-554, 2086, 2461, 8933, and 9001 but showed high mortality due to foot rot. GG-669 showed less than 10 percent wilt and foot rot. ICC-2812 showed less than 2% foot rot.

New Delhi

Since salinity was a problem where the nursery was planted, the data on disease incidence in second replication was not recorded. Data on disease incidence was based on actual isolations from diseased plants. The mortality was due to *Fusarium solani* (root rot) followed by *F. oxysporum* f. sp. *ciceri* (wilt), and *Rhizoctonia bataticola* (dry root rot). Sporadic incidence of collar rot (*Sclerotium rolfsii*) was also recorded. Three lines were free from any mortality; viz., ICC-102, 6081, and 7248. ICC-554 and 2072 were free from wilt and root rots. Six lines were free from wilt incidence; viz., ICC-1891, 2086, 2104, 3103, 6385, and 6494 (wilt due to *F. oxysporum* and *F. solani*). The plot was not uniformly sick and the mortality in the susceptible check lines varied between 20 and 70%.

Patancheru (ICRISAT Center) Hyderabad

The nursery was raised in a multiple disease sick plot with the wilt fungus (*F. oxysporum* f. sp. *ciceri*) as the most dominant one.

Other pathogens which caused root rots were mainly *Rhizoctonia bataticola*, *Sclerotium rolfsii*, *R. solani*, *F. solani* and the white root rot fungus. The susceptible check JG-62 showed almost 100% mortality. Two entries ICC-1910 and 7681 were free from any mortality due to wilt or root rot. Seven entries; viz., ICC-867, 1910, 2883, 6098, 7111, 8933 and ICC-10 showed no wilt and less than 10% root rots.

One entry, ICC-2104 was free from root rots and less than 3% wilt.

All five entries from Gurdaspur G-543, GG-588, GG-663, GG-669 and GG-688 showed susceptibility to wilt and root rots. Of the 51 ICRISAT entries, 27 entries showed 10% or less mortality by wilt and root rots. These were: ICC-102, 229, 338, 434, 519, 554, 2072, 2083, 2089, 2461, 2660, 3099, 3103, 3439, 3684, 4519, 5864, 5901, 6366, 6494, 6926, 7248, 7254, 8982, 9001, 10104, and 10394.

Varanasi (Uttar Pradesh)

The nursery was planted in a newly acquired field which came under chickpea cultivation probably for the first time. The susceptible check lines and test lines were free from wilt incidence or root rots. Low incidence of collar rot was reported in almost all the lines.

Iraq

The nursery was planted at Baknajo, Sulaimaniya. The mortality in test lines and in check lines was due to wilt and root rots. Since the mortality was low in all the lines including check lines (JG-62), the conclusions are not drawn.

Ascochyta blight was also observed.

Mexico

The nursery was planted at Culiacán, Sinaloa in a wilt-sick plot. ICC-4951 showed nearly 60 to 90% wilt. The plot was uniformly sick.

Forty-three lines which showed no mortality were ICC-102, 229, 338, 434, 516, 519, 554, 867, 1891, 1910, 1913, 2072, 2086, 2089, 2104, 2461, 2660, 2812, 2835, 2883, 3099, 3103, 3396, 3439, 3539, 3684, 5864, 5901, 6098, 6366, 6385, 6455, 6494, 6880, 6926, 7111, 7254, 8933, 8982, 9001, 9117, 10104, and ICC-10. Two lines, ICC-2566 and G-543 showed high susceptibility to wilt and the remaining showed less than 5% wilt/root rots. *Sclerotium rolfsii* was reported to be the pathogen of 'root rot'.

Nepal

Susceptible check ICC-4951 showed 100% mortality in all the lines. The mortality was reported because of wilt and root rots (pathogen(s) not known). Only three lines, ICC-3099, 3439, and 8982 were resistant.

Peru

The nursery was planted in June 1980. ICC-4951 showed 0 to 30% wilt. The root rot incidence was low. ICC-434 was free from any mortality due to wilt and root rot. Other lines showed from 5 to 10% wilt incidence.

Sudan

The main problem was wilt, root rots, and also powdery mildew. The plot is not yet uniformly sick. The susceptible check ICC-4951 showed 18 to 70% mortality due to wilt and root rots. In the test lines the mortality was more due to root rots. ICC-10, GG-588, and GG-669 were the only lines which showed less than 10% wilt and root rots. Fourteen lines were free from powdery mildew; viz., ICC-867, 1910, 2072, 2089, 2104, 2812, 6081, 6098, 6926, 7111, 7254, 8933, 8982, and 10394.

USAPullman (Washington)

The nursery was planted at Spillman Farm, Pullman. Wilt and root rots were not important. A preemergence damping-off disease caused by *Pythium ultimum* can be important in white-seeded chickpea lines. Other diseases observed were Alfalfa mosaic, pea streak and pea enation mosaic. ICC-1913, 2083, 7111, and 9117 were not planted since we could not supply the seed for these four lines.

San Luis Obispo (California)

The nursery was planted at San Luis Obispo in California. Susceptible check lines showed 100% mortality. Thirty lines which showed no mortality were: ICC-229, 267, 519, 554, 867, 1910, 1913, 2083, 2086, 2089, 2104, 2566, 2660, 2812, 2835, 2883, 3099, 3439, 3684, 4519, 5901, 6081, 6366, 6455, 6494, 8933, 8982, 9001, GG-663, GG-669. All others except G-543 showed less than 5% wilt. The results are very similar to those obtained at ICRISAT Center.

PERFORMANCE OF ENTRIES ACROSS LOCATIONS

Of the 21 locations, we could consider the data from only 17. Performance of entries across locations is listed in Table 3.

Table 3. Performance of entries across locations

Entry No.	Pedigree	No. of locations where found promising against root rots/wilt	Locations
1	2	3	4
102	P-79	9	E, US, M, JB, ND, FAD, VA, BR, HYD
229 ^a	P-180-1	8	E, US, M, ET, BER, VA, HYD, JB
267 ^a	P-212-1	9	E, US, M, ET, N, JB, BER, VA, HYD
338 ^a	P-253	7	E, US, M, ET, JB, VA, HYD
434	P-319	7	E, US, M, ET, JB, VA, HYD
516 ^a	P-392	7	US, M, ET, JB, BER, VA, HYD
519 ^a	P-394	6	E, US, M, JB, VA, HYD
554 ^a	P-436-2	7	E, US, M, JB, ND, VR, HYD
867 ^a	P-690	7	E, US, M, ET, JB, VA, HYD
1891 ^a	P-1514	7	E, US, M, ET, JB, VA, HYD
1910	P-1542	7	E, US, M, ET, JB, VA, HYD
1913	P-1546	8	E, US, M, ET, JB, BER, VA, BR
2072 ^a	P-1670	10	E, US, M, ET, N, JB, ND, VA, BR, HYD
2083 ^a	P-1679-2	6	E, US, M, JB, VA, HYD
2086 ^a	P-1683	5	US, M, JB, VA, HYD
2089 ^a	P-1684	6	US, M, ET, JB, VA, HYD
2104 ^a	P-1696-1	8	E, US, M, N, JB, VA, BR, HYD
2461	P-2249	6	US, M, ET, JB, VA, HYD
2566 ^a	P-2559	4	US, M, JB, VA
2660 ^a	P-2686-2	7	US, M, JB, BER, VA, BR, HYD
2812 ^a	P-3036	6	E, US, M, ET, JB, VA
2835 ^a	P-3107-1	4	US, M, JB, VA
2883 ^a	P-3251	8	E, US, M, ET, JB, VA, BR, HYD

contd.

1	2	3	4
3099 ^a	P-3614	9	E, US, M, ET, N, JB, ND, VA, HYD
3103 ^a	P-3617	6	E, US, M, JB, VA, HYD
3396 ^a	P-4083	6	US, M, N, JB, BER, VA
3439 ^a	P-4116-1	9	E, US, M, N, JB, KAN, VA, BR, HYD
3539 ^a	P-4237	6	E, US, M, JB, VA, BR
3684 ^a	P-4321-2	6	US, M, ET, JB, VA, HYD
4519 ^a	P-6067	5	E, US, JB, VA, HYD
5864 ^a	T-3 (Owattior)	5	US, M, JB, VA, HYD
5901 ^a	T-32	5	US, M, JB, VA, HYD
6081 ^a	JG-57	5	US, M, JB, ND, VA
6098 ^a	JG-74	6	E, US, M, JB, VA, HYD
6366	NEC-312	8	E, US, M, ET, JB, VA, BR, HYD
6385	NEC-348	7	E, US, M, ET, JB, ND, VA
6455	NEC-460	5	E, US, M, JB, VA
6494	NEC-529	6	US, M, JB, BER, VA, HYD
6880 ^a	NEC-1089	5	US, M, ET, JB, VA
6926	NEC-1166	7	E, US, M, JB, BER, VA, HYD
7111 ^a	NEC-1470	6	E, US, M, JB, VA, HYD
7248 ^a	NEC-1621	10	E, US, M, ET, JB, ND, FAD, BER, VA, HYD
7254 ^a	NEC-1627	9	E, US, M, ET, JB, FAD, BER, VA, HYD
7681 ^a	P-1179	9	E, US, M, ET, JB, FAD, VA, BR, HYD
8933 ^a	WR-315	6	E, US, M, JB, VA, HYD
8982	NEC-346	8	E, US, M, N, JB, BER, VA, HYD
9001 ^a	NEC-426	7	US, M, ET, N, JB, VA, HYD
9117 ^a	NEC-847	7	E, US, M, ET, JB, VA, BR
10104 ^a	P-6131	8	E, US, M, N, JB, BER, VA, HYD
10394 ^a	Coll.No. 129	6	E, US, M, JB, VA, HYD
-	ICCC-10	9	E, US, M, ET, S, JB, H, VA, HYD

contd.

1	2	3	4
-	G-543	3	E, JB, VA
-	GG-588	10	E, US, M, ET, S, JB, H, LA, GUR, VA
-	GG-663	7	US, M, ET, JB, ND, GUR, VA
-	GG-669	9	US, M, S, JB, H, LA, GUR, VA, BR
-	GG-688	5	US, M, JB, VA, BR

^aThese entries were included in the 1978-79 ICRRWN.

ET - Egypt, E - Ethiopia, (India: BER - Berhampore, BR - Bijapur, FAD - Faizabad, GUR - Gurdaspur, H - Hissar, JB - Jabalpur, KAN - Kanpur, LA - Ludhiana, ND - New Delhi, HYD - ICRISAT, VA - Varanasi), M - Mexico, N - Nepal, S - Sudan, US - USA.

Three entries; viz., ICC-2072, 7248, and GG-588 did well across 10 locations. Eight entries; viz., ICC-102, 267, 3099, 3439, 7254, 7681 ICC-10 and GG-669 performed well across 9 locations. Of the remaining, 7 entries did well across 8 locations, 12 entries at 7 locations, 15 entries at 6 locations, 8 entries at 5 locations, 2 entries at 4 locations and 1 entry at 3 locations.

PROGRAM FOR 1980-81

Sixty entries originating in 4 countries and from ICRISAT have been included in the ICRRWN for 1980-81. The nursery has been sent to 35 locations in 17 countries.