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Chickpea Breeding

Report of Work

June 1983 - May 1984

PROJECTS CP-brd-1 and CP-brd-2
Breeding desi and kabuli types



ICRISAT

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Foreword

Progress Reports 23, 24, and 25 describe the work of the Chickpea Breeding sub-program during the year 1983-84. This Report, which is the first in the series, deals with two breeding projects: CP-brd-1 and CP-brd-2. The other projects viz., CP-5, -6, -7, -9, -11, -12, -13 and -14 as the second series, and CP-brd-16 and -17 as part three are presented in Reports 24 and 25, while the results of the International Trials and Nurseries are summarized in Report 26. Project CP-brd-1 has as its objective the breeding of desi chickpeas to support national programs. The Project is complete in the sense that it covers all stages of a breeding program from crossing to variety release, and material of all these stages is available to collaborators, who wish to make use of it. Similarly Project CP-brd-2 is a conventional breeding program, but dealing with kabuli instead of desi chickpeas.

The Reports are written to compile the work results of the year for the use of those who are actively working with chickpeas, both cooperators and ICRISAT scientists. The data have undergone a first and general analysis and the results are discussed in a provisional manner. They are not ready for quotation elsewhere.

The first Report includes on page 1 a complete list of approved projects and the scientists responsible for these. It also gives on page 2 a graphic representation of weather data of Hyderabad and Hisar, and on page i a list of staff involved in the work reported.

The assistance and contributions of all cooperators at ICRISAT and many national stations in different countries are gratefully acknowledged. Without their help the reports could not have been made.

This is an informal publication and the data presented herein should not be reported

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CHICKPEA BREEDING**List of Approved Projects**

No.	Title	Project Scientist	Cooperators
CP-brd-1	Development of desi cultivars and superior breeding lines	S.C. Sethi C.L.L. Govda Onkar Singh	-
CP-brd-2	Development of kabuli cultivars and superior breeding material	J. Kumar C.L.L. Govda	-
CP-brd-5	Breeding for adaptation to late sowing	S.C. Sethi	N.P. Saxena
CP-brd-7	Breeding for new plant types	Onkar Singh C.L.L. Govda S.C. Sethi	N.P. Saxena
CP-brd-9	Comparison of breeding methods	Onkar Singh S.C. Sethi	-
CP-brd-11	International cooperation	J.B. Smithson J. Kumar	C.L.L. Govda Onkar Singh S.C. Sethi
CP-brd-12	Genetic studies of qualitative and quantitative characters	S.C. Sethi J. Kumar C.L.L. Govda Onkar Singh	-
CP-brd-13	Breeding for adaptation to early planting	Onkar Singh	N.P. Saxena
CP-brd-14	Studies of desi-kabuli introgression	C.L.L. Govda S.C. Sethi	-
CP-brd/ path-16	Breeding for disease resistance	J. Kumar M.P. Havare M.V. Reddy S.P.S. Benival	S.C. Sethi Onkar Singh C.L.L. Govda
CP-brd/ ent-17	Breeding for reduced susceptibility to <u>Heliothis</u>	C.L.L. Govda S.C. Sethi S.S. Lateef	-

Summary

CP-brd-1. Development of desi cultivars and superior breeding lines.

A total of 236 desi genotypes were sown in crossing blocks both at Hyderabad and Hisar, of which 36 were used as parents for this project to make 329 crosses in diallel and line x tester series.

An 11 x 9 line x tester trial conducted at Hyderabad showed that additive genetic variation is an important component of the total genetic variation, while the combining abilities of the different lines and testers were established. Similar results were obtained from an 11 x 11 diallel sown at Hyderabad, which also showed that parental performance is a good indication for general combining ability. The F_1 trials at Hisar were adversely affected by salinity.

Replicated F_2 trials, forming part of the early generation bulk yield testing system were carried out at Hyderabad (5) and Hisar (3), where 192 and 209 populations respectively were tested to enable selection for F_3 trial entries. The highest yield obtained at Hyderabad was 1721 kg ha⁻¹, and at Hisar 2136 kg ha⁻¹.

Three replicated F_3 trials were conducted at Hyderabad, three at Gwalior, and two at Hisar. In the former two stations a total of 79 populations and in the latter 44 populations were tested. The checks were not outyielded significantly.

From 73 F_4 bulks at Hyderabad and 40 F_4 bulks at Hisar, 2647 and 1805 single plants were selected respectively.

From 7315 F_5 - F_8 progenies grown at Hyderabad and 3816 at Hisar, 5086 and 3841 single plants were selected respectively. Promising uniform progenies were selected for further testing in replicated trials.

Preliminary yield trials were conducted at Hyderabad (4), Hisar (4), and Gwalior (2) to test 152, 70 and 173 entries respectively. Significant yield differences were recorded and some entries exceeded the checks in yield.

One advanced yield trial was conducted both at Hisar and Gwalior, where maximum yields of 1429 and 1928 kg ha⁻¹ respectively were recorded.

CP-brd-2. Development of kabuli cultivars and superior breeding material.

A total of 44 kabuli genotypes were sown in crossing blocks both at Hyderabad and Hisar, and 21 different crosses were made.

- The 21 crosses made during the 1983/84 main season were grown as F_1 's during the 1984 off-season.
- Plant growth of the 23 F_2 populations was poor and no single plant selections were made.

From 7984 progeny bulks only 4 were selected for testing in replicated trials and 704 single plant selections were made.

- Four preliminary yield trials with 93 entries in total, sown at Hisar, were badly affected by salinity. A fifth trial with lines of intermediate seed type had a mean yield of 1252 kg ha^{-1} and a range of 556-2333 kg ha^{-1} .

The advanced yield trial with 23 test entries failed at Hisar, but was successful at Gwalior. The highest yield was 1708 kg ha^{-1} , while L 550 gave 1438 kg ha^{-1} .

Project 1: Development of Desi Cultivars and Superior Breeding Lines

Objectives:

- (a) To breed high yielding, desi cultivars with stability of performance and consumer acceptance.
- (b) To contribute advanced generation breeding lines and segregating materials to chickpea growing countries.

Introduction

We continued making crosses among adapted and newly developed cultivars. The new variability was inducted by specifically identifying good lines from our tour notes of the previous season. The percentage of the progenies reaching to final stage of evaluation was checked and were able to pick out parents appearing more frequently, and thus were obviously good combiners. These were cycled back to make fresh crosses. The usual P_2 and P_3 bulk testing continued both multilocationally and at individual locations.- for the short, medium and long duration types. Similarly, single plant selections in the P_4 populations were tested in P_5 and advanced generations as progeny rows. Material for short and medium maturity was grown at Patancheru and long duration at Hisar. The elite lines from this project flow into International and Coordinated trials.

Hybridization

Our crossing block nursery consisted of 236 desi genotypes and similar sets were grown both at Hyderabad and Hisar. These included parents for one diallel and one line x tester series for each of the two locations. Also sown was a working germplasm of the promising genotypes for observation and use in the future. The countrywise breakup of the lines used in crosses has been given in Table 1.1. India, ICRISAT and Iran were the major contributors to the crossing block.

Table 1.1. The countries of origin of desi types included in crossing blocks at Hyderabad and Hisar, 1983/84.

<u>Country/Institute</u>	<u>No. of strains</u>
India	132
ICRISAT	64
Iran	24
USSR	4
Pakistan	3

Ethiopia	2
Israel	2
USA	2
Greece	1
Unknown	2
Total	236

Crossing block I and II were planted with a gap of 2-3 weeks in order to synchronise flowering of short and long duration types. Data collection for the morphological characteristics for crossing block entries was not considered necessary as the relevant information is already documented with GRU.

The crosses accomplished in this project during this season, their numbers and description are given in table 1.2. A 6 x 12 line x tester among the adapted and good combiners and newly identified promising cultivars and a 12 x 12 diallel among the newly identified types was made both at Hyderabad and Hisar. Parents involved in crosses were short and medium at the former and long and medium at the latter location. The parents used are given in table 1.3. Fifty-three back crosses were also made to improve seed size of adapted backgrounds.

Table 1.2. Crosses made among desi lines at Hyderabad and Hisar, in 1983/84.

Purpose	Type	Hyderabad	Hisar	Total
Desi-Short duration	Line x Tester	72	-	72
	Diallel	66	-	66
Desi-Long duration	Line x Tester	-	72	72
	Diallel	-	66	66
Back crossing	Seed size	53	-	53
Total		191	138	329

Table 1.3. Parents used in line x tester and diallel crosses in short and long duration desi types, 1983/84.

<u>Short duration types</u>	<u>Long duration types</u>
Annigeri	C 235
BEG 482	G 130
Chafa	H 208
GV 5/7	Pant G 104
K 850	Radhey
VR 315	T 3
NEC 249	NEC 1639
P 2974	P 1013
P 5409	P 3090
BN 31	GNG 146
BDNG 36	GL 1210
KPG 36	GF 734
ICCC 35	H75 35
ICCC 37	BG(M) 408
ICCC 38	ICCC 28
P 326	ICCC 29
JG 326	BG(M) 426
Phule G-6	RSG 44

P₁ Generation

All the P₁ crosses were yield tested at Hyderabad and Hisar. At Hyderabad there was a 11 x 9 line x tester cross of adapted x newly identified lines, and 11 x 11 diallel among new ones. The first one was grown as triple lattice and the latter as a RCB with three replications. Each plot was one row of 4 m.

Data were recorded on days to flowering, plant height, number of primary and secondary branches, pods per plant, seeds per pod, 100-seed weight and seed yield per plant. Analyses were done according to Kempthorne (1957) for the line x tester and Griffing (1956) Method 2, Model 1, for the diallel.

P₁ - 11 x 9 Line x tester at Hyderabad

Ninety nine P₁s, 20 parents and 2 checks were grown in a 11 x 11 triple lattice. Differences among entries were significant for the characters except number of primary branches (Table 1.4). Coefficients of variation were a little on the higher side for number of secondary branches, pods, seeds and yield per plant. Differences among crosses were significant for all the characters except for the primary branches. The interaction mean squares of line x tester were significant for plant height, secondary branches and weight of 100 seeds and were lesser than the lines and testers mean sum of squares

ENT ICCX No Percentage Days Days to flower Height Primary Secondary Second-plant/seed wt of seeds pod yield/seed plant

45	820045	N 52	X JG 315	57	1	99	35	3	2.55	3.77	106	0	113	9	18	3	1.07	21.6
46	820046	2E	X Anthgert	56	1	100	33	3	2.60	3.54	110	1	112	6	22	0	1.02	25.0
47	820047	2E	X BDM 9-3	54	3	98	32	3	2.74	2.70	110	1	112	6	22	0	1.04	19.0
48	820048	2E	X R 850	60	4	101	37	4	2.30	2.50	109	2	112	6	22	0	1.00	22.0
49	820049	2E	X ICCX 22	59	7	100	39	7	2.59	3.04	107	2	106	6	23	3	1.05	22.3
50	820050	2E	X Phula G-7	54	6	100	39	8	2.64	2.58	101	9	102	9	23	2	1.06	20.7
51	820051	2E	X R 2375	56	1	97	35	6	2.17	3.07	102	9	102	9	23	7	1.06	19.4
52	820052	2E	X BDM 20	61	7	102	35	6	2.62	4.93	99	9	102	6	23	0	1.06	20.7
53	820053	2E	X ICCX 80074	52	5	98	35	5	2.71	2.30	102	9	102	6	23	2	1.05	22.0
54	820054	2E	X JG 315	59	4	98	35	5	2.77	1.65	107	0	102	5	19	2	1.05	15.3
55	820055	NSG 44	X Anthgert	56	3	101	33	6	2.07	2.71	113	0	133	9	17	3	1.17	23.1
56	820056	NSG 44	X BDM 9-3	56	3	98	36	0	2.79	3.96	126	0	140	0	17	3	1.17	20.3
57	820057	NSG 44	X R 850	60	2	101	36	2	3.42	5.34	121	3	149	9	16	6	1.22	26.7
58	820058	NSG 44	X ICCX 22	57	4	101	36	1	2.06	5.12	135	4	151	0	16	9	1.13	25.0
59	820059	NSG 44	X Phula G-7	55	2	98	37	1	2.01	3.20	110	0	119	4	21	2	1.07	25.4
60	820060	NSG 44	X R 2375	56	9	98	33	7	2.49	2.03	101	1	109	0	18	0	1.00	16.9
61	820061	NSG 44	X BDM 20	57	6	99	32	1	2.70	4.00	107	0	121	0	17	2	1.10	21.1
62	820062	NSG 44	X ICCX 80074	58	2	102	36	2	2.60	4.03	109	7	122	6	12	7	1.13	16.0
63	820063	NSG 44	X JG 315	57	6	99	36	5	2.52	3.62	105	9	117	6	12	1	1.11	16.3
64	820064	JG 1258	X Anthgert	55	1	97	34	7	2.00	2.89	110	9	126	3	14	9	1.06	20.3
65	820065	JG 1258	X BDM 9-3	55	1	97	34	7	2.91	2.89	133	4	130	0	14	9	1.00	20.9
66	820066	JG 1258	X R 850	57	9	101	37	0	2.91	3.93	121	4	127	7	10	9	1.05	23.9
67	820067	JG 1258	X ICCX 22	56	1	100	32	6	2.71	2.91	113	2	119	0	10	3	1.06	22.0
68	820068	JG 1258	X Phula G-7	53	1	97	33	7	2.01	2.44	107	4	124	4	10	9	1.03	21.7
69	820069	JG 1258	X R 2375	54	7	98	33	4	2.26	1.03	107	4	124	4	10	9	1.06	19.7
70	820070	JG 1258	X BDM 20	57	0	99	36	4	2.92	3.60	135	4	131	5	17	5	1.10	20.2
71	820071	JG 1258	X ICCX 80074	57	2	99	35	9	2.63	3.08	115	0	122	5	14	0	1.06	17.5
72	820072	JG 1258	X JG 315	53	9	97	34	6	2.59	2.54	99	6	104	9	15	0	1.05	14.5
73	820073	JG 1258	X Anthgert	57	7	98	34	5	2.19	2.00	91	3	96	2	15	0	1.05	19.1
74	820074	JG 1258	X BDM 9-3	53	4	96	34	5	3.19	3.66	118	0	123	0	20	4	1.03	18.0
75	820075	JG 1258	X R 850	60	0	100	34	5	2.93	4.09	105	9	123	0	20	4	1.06	19.0
76	820076	JG 1258	X ICCX 22	59	6	100	36	4	2.45	4.49	112	0	110	1	10	0	1.04	22.0
77	820077	JG 1258	X Phula G-7	54	4	96	37	2	2.45	2.64	105	3	108	0	26	4	1.03	22.2
78	820078	JG 1258	X BDM 20	55	7	98	39	1	2.02	3.19	105	6	112	0	21	9	1.06	20.9
79	820079	JG 1258	X ICCX 80074	57	7	101	35	3	2.02	3.09	101	6	107	6	20	0	1.06	17.6
80	820080	JG 1258	X Anthgert	58	1	100	34	9	2.69	3.89	101	1	107	6	15	6	1.06	17.6
81	820081	JG 1258	X JG 315	58	2	101	36	8	2.91	4.29	125	4	135	2	13	0	1.08	10.4
82	820082	JG 1258	X Anthgert	55	7	98	36	2	2.61	2.23	106	6	104	9	20	2	1.10	10.4
83	820083	JG 1258	X BDM 9-3	55	9	100	36	0	2.93	4.30	125	3	130	7	21	6	1.05	20.1
84	820084	JG 1258	X R 850	59	1	101	38	2	2.06	5.09	117	7	125	5	21	6	1.08	27.7
85	820085	JG 1258	X ICCX 22	56	6	97	34	4	2.42	2.71	111	1	110	4	10	0	1.06	23.3
86	820086	JG 1258	X Phula G-7	53	7	100	40	7	2.42	2.60	110	7	117	2	26	5	1.05	20.3
87	820087	JG 1258	X R 2375	55	6	97	35	2	2.92	2.52	103	3	104	1	23	4	1.01	10.2
88	820088	JG 1258	X BDM 20	59	0	100	38	5	2.00	3.08	104	2	109	7	23	0	1.05	26.6
89	820089	JG 1258	X ICCX 80074	55	8	99	35	1	2.50	3.46	112	7	119	6	18	0	1.06	21.5
90	820090	JG 1258	X JG 315	57	6	99	38	3	2.55	4.04	106	0	113	9	18	3	1.05	24.2

Int	ICCC No.	Parentage	Days to maturity	Days to seed	Plant height	Primary branches	Secondary branches	Pods/ plant	Seed/ pod	Seed wt. of 100 seed	Seed yield/ plant (g)	
91	820091	64-3 x Annapurna	99	55.6	23.2	2.53	2.27	100.3	110.5	16.7	1.11	19.2
92	820092	64-3 x BDM 9-3	99	54.2	22.5	2.03	2.03	121.3	121.1	16.9	1.00	20.1
93	820093	64-3 x R 850	99	57.9	21.09	2.09	4.20	121.3	120.2	16.9	1.11	20.9
94	820094	64-3 x ICCC 22	97	57.0	21.2	3.04	3.04	121.0	121.5	17.5	1.00	22.2
95	820095	64-3 x Phula 0-7	99	56.7	21.27	3.19	3.19	122.7	122.7	20.1	1.00	22.9
96	820096	64-3 x 2375	96	53.4	21.7	3.64	3.64	123.1	123.1	18.1	1.07	26.6
97	820097	64-3 x BDM 20	97	57.6	21.7	2.94	2.94	123.4	123.4	16.3	1.16	22.7
98	820098	64-3 x ICCCL 80074	98	56.5	21.0	2.70	2.70	123.9	123.9	12.1	1.10	19.5
99	820099	61-1 x JG 115	97	57.5	21.0	2.03	2.03	120.5	122.9	12.9	1.09	17.6
100	101	Phula 0 12	98	59.5	22.9	3.2	3.2	124.1	124.9	14.9	1.12	17.6
101	101	ICCC 10	98	59.8	22.6	3.03	3.03	125.5	125.5	11.7	1.13	19.1
102	102	18-7-2 1	99	55.9	21.0	2.60	2.60	125.4	125.4	19.4	1.11	20.6
103	103	Al 97	99	59.9	21.0	2.95	2.95	126.1	126.1	19.4	1.11	20.1
104	104	R 92	99	56.7	21.6	2.53	2.53	126.4	126.6	20.6	1.05	22.9
105	105	ZE	101	57.2	21.2	2.52	2.52	126.7	126.3	19.3	1.01	22.2
106	106	R51 44	98	56.3	21.2	3.03	3.03	126.0	126.0	19.3	1.11	20.0
107	107	J5 1250	99	57.7	21.7	2.49	2.49	126.3	126.0	16.0	1.06	17.4
108	108	J5 1265	101	61.0	21.1	3.00	3.00	126.5	126.2	16.0	1.00	19.6
109	109	ICCC 6	103	60.7	21.9	3.19	3.19	126.9	126.2	20.2	1.03	22.3
110	110	64 3	101	60.9	21.0	2.49	2.49	127.1	127.7	11.7	1.03	16.5
111	111	Annapurna	103	59.1	21.9	2.99	2.99	127.3	127.9	18.9	1.13	20.5
112	112	BDM 9-3	99	56.1	21.7	3.07	3.07	127.3	127.9	13.9	1.06	19.9
113	113	R 850	107	64.0	21.6	4.42	4.42	127.7	127.1	13.9	1.00	22.2
114	114	ICCC 22	106	66.0	21.2	3.22	3.22	127.7	127.1	19.0	1.00	22.2
115	115	Phula 0-7	100	57.7	21.6	2.95	2.95	127.7	127.1	16.6	1.00	22.9
116	116	2375	101	60.7	21.6	3.57	3.57	127.8	127.6	26.6	1.02	28.6
117	117	BDM 20	104	61.4	21.9	4.19	4.19	128.5	128.2	22.2	1.05	19.0
118	118	ICCL 80074	100	63.4	21.6	2.66	2.66	128.2	128.2	12.6	1.05	19.0
119	119	JG 115	98	56.5	21.0	2.50	2.50	128.3	128.4	12.7	1.20	16.1
120	120	Annapurna	107	64.0	21.6	3.36	3.36	128.2	128.0	18.0	1.10	11.7
121	121	R 850	111	68.9	21.7	2.54	2.54	130.0	130.0	22.0	1.05	19.6
Mean			97.5	58.8	24.6	2.72	3.21	130.5	132.2	19.1	1.00	21.1
SE			1.07	1.41	1.31	0.24	0.51	13.27	14.05	0.65	0.02	2.77
CV%			1.1	2.3	5.4	24.7	26.26	26.26	26.26	26.26	3.0	21.7

meaning that additive genetic variation was more important for these characters in chickpea (Table 1.5).

Among lines, JG 1258 was a good general combiner for early flowering, 18-7-2-1 for early maturity, JG 1265 and ICCC 6 for plant height, ICCC 30 and RSG 44 for secondary branches, ICCC 30 and 64-3 for pods and seeds per plant, Phule G-12, ICCC 30 and RSG 44 for seeds per pod, 18-7-2-1, A1 97, N 52, 2E and ICCC 6 for 100 seed weight and ICCC 6 for seed yield, respectively (Table 1.6).

Among testers BDN 9-3, Phule G-7 and 2375 were good general combiners for early flowering; 2375 for maturity; K 850, Phule G-7 and JG 315 for plant height; K 850 for secondary branches; K 850 and ICCL B0074 for seeds per pod; Phule G-7, 2375 and BDN 20 for 100-seed weight, and K 850 and BDN 20 for seed yield, respectively. Overall, K 850 followed by 2375, was a good general combiner for many of the characters studied.

P_1 - 11 x 11 diallel at Hyderabad

Fifty-five P_1 s and 11 parents were yield tested in a trial. The design followed¹ was a randomized complete block with three replications. Plot size was a single 4 m row 60 cm apart. Data recorded were same as that of line x tester study. There were significant differences among entries for all the characters except number of primary branches (Table 1.7). There was no difference among parents for days to flowering and maturity. Cultivar 2E had maximum plant height, 18-7-2-1 maximum secondary branches, 64-3 maximum pods and seeds per plant, Phule G-12 maximum seeds/pod, N 52 largest seed size and 18-7-2-1 the heaviest seed yield per plant.

GCA variances were highly significant for all the characters (Table 1.8). SCA variances were also significant for most of the characters except for primary branches, and seeds per pod. GCA/SCA ratio was more than 1 in all the cases suggesting preponderance of additive genetic variance for these characters in chickpea.

Means and GCA effects of the parents, for different characters, and their correlations are given in Table 1.9. Cultivar N 52 and JG 1258 seemed to be good combiners for earliness; 2E, ICCC 6, Phule G-12 and JG 1265 for plant height; 18-7-2-1 for primary branches; ICCC 30 for secondary branches; ICCC 30 and 64-3 for pods and seeds per plant; phule G-12, ICCC 30 and RSG 44 for seeds per pod; 18-7-2-1, A1 97, N 52, 2E and ICCC 6 for 100-seed weight, and 18-7-2-1 and N 52 for seed yield per plant. The parents 18-7-2-1, N 52 and ICCC 30 were good general combiners for most of characters.

Correlations between means and GCA effects of the parents were positive and significant for all the characters except days to flowering. It suggested that parental performance is a good tool for selecting good general combiner for any of the characters.

Table 1.4. Estimates of general combining effects of parents and their standard errors in P₁ 11 x 9 line x tester trial at Hyderabad, 1983/84

Source	Days to		Plant height (cm)	Branches/plant		Pods per plant		Seeds per pod		Wt of 100 seeds (g)		Seed yield (g)/plant
	flower	mature		Primary	Secondary	Plant	pod	g	g	g	g	
Lines												
Phule 0-12	0.10	1.34*	-0.13	0.03	-0.06	-0.93	1.13	0.02*	-1.01**	-0.87		
ICCC 30	2.12**	2.23**	0.03	-0.05	0.56**	10.09*	15.13*	0.06**	-2.64**	-0.20		
18-7-2-1	-0.09	-1.09*	-2.02**	0.09	-0.29	-3.20	-0.23	0.00	0.60*	0.13		
AI-97	-0.37	-0.10	-1.33**	-0.01	-0.26	-5.30	-4.66	0.01	4.02**	1.72		
M 92	-0.44	-0.42	0.34	-0.14	-0.90**	-10.35*	-13.00*	-0.01	4.02**	0.45		
2E	0.42	0.06	0.73	-0.12	0.00	-16.17**	-20.76**	-0.03**	4.32**	0.45		
R90 44	0.32	0.34	0.22	0.00	0.57**	3.94	10.30	0.06**	-2.82**	-1.21		
J0 1258	-1.52**	-0.99	-0.33	0.02	-0.31	0.60	6.14	-0.03**	-1.09**	0.05		
J0 1265	0.19	-0.02	1.23*	0.13	0.33	-10.52*	-14.65*	-0.03**	-0.12	-2.92*		
ICCC 6	-0.28	-0.46	2.15**	0.02	0.16	7.28	4.92	-0.03**	1.31**	2.60*		
64-3	-0.52	-0.88	-0.90*	-0.04	-0.11	16.56**	19.67**	0.01	-3.20**	-0.04		
SE (91)	0.39	0.51	0.45	0.08	0.17	4.95	5.57	0.01	0.25	1.09		
Testers												
Anaigeri	-0.10	0.68	-1.42**	0.10	-0.43*	-5.19	-4.08	0.01	-0.02	-0.31		
BDW 9-3	-1.30**	-0.39	-0.98*	0.00	0.07	7.90	7.77	0.00	-3.41**	-2.55**		
K 850	2.11**	0.63	0.92*	0.10	0.60**	3.61	6.00	0.02*	-1.49**	3.94**		
ICCC 22	1.36**	0.23	-0.22	-0.01	0.10	6.26	6.99	0.00	-0.21	1.29		
Phule G-7	-2.61**	-0.08	0.96*	-0.11	-0.43*	-14.01**	-10.30**	-0.03**	5.60**	1.94		
2375	-1.16**	-1.22*	-0.10	-0.26**	-0.44*	-13.65**	-17.20**	-0.02*	2.62**	-0.53		
BDWG 20	1.80**	0.58	0.00	0.10	0.25	7.32	6.49	0.00	0.82**	2.90**		
ICCL 80074	-0.50	0.43	-0.12	-0.10	-0.09	1.05	3.96	0.02*	-3.16**	-2.75**		
J0 315	0.60	-0.04	0.89*	0.05	0.29	5.90	6.45	0.01	-3.75**	-2.92**		
SE (9)	0.35	0.46	0.41	0.07	0.16	4.40	5.04	0.01	0.22	0.90		

Table 1.7. Mean values of characteristics in the P₁ limit diallel trial of Hyderabad - 1993-04

S.No.	Cross no./ Name	Days to flower	Days to maturity	Plant height (cm)	Primary branch/ m/pl	Secondary branch /pl	Pods per plant	Seeds per plant	Seeds per pod	Weight of 100 seed (g)	Seed yield per plant (g)
1	ICGR-820100	59.6	109	38.3	3.44	5.11	121.1	137.9	1.15	13.7	10.9
2	ICGR-820101	21.6	108	37.9	3.44	6.00	131.9	133.9	1.21	14.1	28.7
3	ICGR-820102	94.6	105	35.4	2.56	3.72	101.6	115.2	1.14	14.2	22.7
4	ICGR-820103	34.6	103	35.9	2.22	2.78	102.6	109.3	1.07	20.2	22.3
5	ICGR-820104	38.6	104	38.8	2.67	4.11	99.9	146.1	1.06	20.2	27.1
6	ICGR-820105	28.2	106	35.6	2.89	4.44	110.0	124.7	1.09	12.9	10.3
7	ICGR-820106	58.1	110	39.3	3.11	5.22	105.3	102.9	1.04	14.9	20.6
8	ICGR-820107	54.9	107	35.8	2.89	5.89	96.4	101.7	1.08	15.3	21.8
9	ICGR-820108	54.9	109	36.9	2.89	5.00	105.2	121.7	1.11	13.1	23.0
10	ICGR-820109	59.3	107	36.0	3.00	5.33	101.6	101.6	1.12	16.0	23.3
11	ICGR-820110	59.6	105	35.4	2.67	5.00	105.4	109.2	1.19	16.7	22.9
12	ICGR-820111	59.6	105	35.8	3.11	4.67	105.3	116.8	1.12	16.6	22.9
13	ICGR-820112	68.1	107	35.7	3.11	4.78	104.1	116.2	1.12	16.7	22.9
14	ICGR-820113	59.6	111	39.7	3.11	4.89	105.2	109.2	1.12	11.7	20.3
15	ICGR-820114	57.6	110	35.3	3.11	3.11	104.2	115.2	1.12	11.7	20.3
16	ICGR-820115	61.1	107	35.3	3.00	5.49	103.7	109.9	1.15	12.6	22.0
17	ICGR-820116	62.1	111	35.7	2.89	4.89	107.8	107.3	1.15	12.6	22.0
18	ICGR-820117	58.7	107	36.2	2.67	5.70	106.0	116.4	1.08	16.9	22.9
19	ICGR-820118	60.4	111	36.9	3.11	4.89	105.2	105.2	1.15	11.7	21.3
20	ICGR-820119	59.6	107	36.0	2.67	4.89	97.9	100.0	1.07	10.0	17.7
21	ICGR-820120	55.2	107	36.8	2.78	4.56	110.7	121.6	1.02	22.1	23.9
22	ICGR-820121	57.2	105	35.1	3.11	4.78	101.3	97.0	1.11	19.9	20.1
23	ICGR-820122	57.2	105	31.7	2.22	4.44	109.9	116.4	1.11	17.1	19.9
24	ICGR-820123	58.3	102	32.7	3.22	4.22	110.7	126.4	1.02	19.2	22.7
25	ICGR-820124	56.5	100	30.3	3.11	5.22	118.1	146.8	1.07	19.4	20.3
26	ICGR-820125	56.5	104	35.4	3.22	3.44	109.6	104.3	1.04	20.2	21.3
27	ICGR-820126	58.4	105	34.2	3.00	4.78	105.3	102.3	1.17	16.1	16.1
28	ICGR-820127	58.4	109	34.6	2.44	4.00	92.0	102.9	1.12	21.9	22.9
29	ICGR-820128	60.4	109	35.7	2.44	4.22	113.4	122.3	1.17	22.9	24.9
30	ICGR-820129	57.6	105	34.1	2.89	3.44	115.0	117.1	1.17	16.7	16.7
31	ICGR-820130	57.8	107	34.1	2.89	3.44	115.1	120.0	1.04	18.1	21.7
32	ICGR-820131	58.7	104	37.2	2.78	4.11	127.2	102.1	1.04	20.0	20.2
33	ICGR-820132	59.3	106	36.4	2.89	4.44	102.1	102.1	1.04	20.0	20.2
34	ICGR-820133	58.1	105	35.8	2.78	4.11	116.4	102.1	1.04	19.2	19.2
35	ICGR-820134	57.0	103	39.0	2.44	4.56	114.1	114.2	1.12	17.9	17.9
36	ICGR-820135	56.6	104	36.0	2.56	3.22	123.0	117.0	1.09	20.1	20.1
37	ICGR-820136	54.7	101	34.9	2.78	3.11	111.0	111.4	1.04	20.1	20.1
38	ICGR-820137	55.8	101	38.1	2.78	4.44	112.9	118.4	1.02	21.1	21.1
39	ICGR-820138	57.1	104	38.2	2.11	4.44	102.6	109.2	1.04	19.4	19.4
40	ICGR-820139	54.4	105	38.2	2.89	4.78	102.2	102.2	1.04	18.8	18.8
41	ICGR-820140	60.3	105	36.7	3.00	4.11	108.2	97.4	1.04	18.8	18.8
42	ICGR-820141	60.1	100	36.7	2.89	4.44	123.4	123.4	1.04	19.2	19.2
43	ICGR-820142	68.1	107	39.0	2.89	4.78	112.3	126.0	1.04	21.5	21.5
44	ICGR-820143	68.1	100	39.4	2.67	4.44	109.9	109.9	1.04	21.5	21.5
45	ICGR-820144	59.6	105	38.3	2.44	4.44	109.9	109.9	1.04	20.2	20.2
46	ICGR-820145	54.3	105	32.6	2.67	4.44	109.9	109.9	1.04	19.2	19.2
47	ICGR-820146	58.3	104	35.1	3.22	4.22	126.7	126.7	1.07	13.8	13.8
48	ICGR-820147	58.0	104	32.9	2.78	4.22	121.6	121.6	1.10	13.8	13.8
49	ICGR-820148	59.4	107	32.9	2.56	4.22	121.6	121.6	1.10	13.8	13.8
50	ICGR-820149	57.7	105	41.8	2.44	3.00	98.0	101.0	1.04	15.9	15.9
51	ICGR-820150	57.9	118	41.8	3.11	3.67	151.4	151.4	1.02	16.1	16.1

S No.	Cross no / Name	Days to 1st flower	Days to maturity	Plant height (cm)	Primary branch- es/pl	Secondary branches /pl	Pods per plant	Seeds per plant	Seeds per pod	Weight of 100 seed (g)	Seed yield per plant (g)
52	ICCR-020151	54.7	106	36.2	2.33	3.89	123.2	129.9	1.05	13.7	17.7
53	ICCR-020152	57.1	102	36.1	2.67	3.78	89.1	93.2	1.05	16.9	15.6
54	ICCR-020153	57.1	106	39.4	2.89	5.78	147.9	162.9	1.13	13.7	22.2
55	ICCR-020154	57.9	106	37.1	2.89	6.44	150.1	158.7	1.06	14.9	23.0
56	PHULE G-12	58.4	108	34.9	2.44	5.80	106.8	124.3	1.16	14.0	17.5
57	ICCC-10	60.6	109	33.9	2.56	4.67	134.3	151.3	1.12	10.7	15.9
58	18-7-2-1	57.7	106	35.3	3.56	5.33	153.8	168.4	1.09	18.5	31.2
59	AI-97	60.7	107	30.7	2.89	4.22	95.6	110.4	1.15	19.4	21.5
60	B-52	60.1	105	34.6	2.56	2.89	62.3	66.0	1.06	29.3	19.3
61	2E	59.8	106	36.7	2.78	3.78	73.9	77.1	1.05	20.1	21.0
62	BSG 44	57.2	108	33.3	3.11	5.22	132.9	160.4	1.21	12.4	18.9
63	JG 1254	59.2	105	30.3	3.11	3.67	115.9	122.4	1.06	14.5	17.5
64	JG 1265	58.4	105	36.4	2.22	4.56	109.6	112.9	1.03	14.6	16.5
65	I 126	60.0	108	36.4	2.33	3.89	89.3	93.1	1.04	10.5	17.5
66	643	54.1	107	34.1	2.67	5.11	164.7	180.3	1.13	11.3	20.4
Grand mean		58.3	104	36.0	2.85	4.43	120.6	132.0	1.09	17.3	22.0
S.E. (mean)		1.33	1.66	1.33	0.28	0.61	17.11	17.11	0.03	0.72	3.01
S.E. s		3.2	2.7	6.6	16.7	23.0	21.9	22.5	5.5	7.2	23.7
F Value		2.55	2.25	2.97	1.20	1.94	2.76	3.10	2.20	32.56	2.00
Significance											

Table 1.0. Mean squares from the analysis of variance of F_1 in a 11 diallel trial at Hyderabad, 1953/54.

Source of variation	d.f.	Days to flower	Days to mature	Plant height (cm)	Primary branches/plant	Secondary branches/plant	Feds per plant	Seeds per plant	Seeds per pod	Weight of 100 seeds per plant (g)	Weight of seed yield per plant (g)
Replications	2	0.21	712.20	31.93	0.08	0.55	10079	19634	0.000	4.11	709.9
Entries	65	9.06**	10.69**	10.70**	0.27	2.15**	1920**	2720**	0.000**	50.36**	54.1**
Error	130	3.55	0.29	3.65	0.23	1.11	694	878	0.004	1.55	27.1
OCA	10	5.64**	14.92**	16.33**	0.10**	1.01**	1943**	3129**	0.009**	99.49**	31.0**
SCA	55	2.55**	4.65**	3.64**	0.00	0.32*	403**	503**	0.001	1.03**	15.7**
Error	130	1.10	2.76	1.00	0.00	0.37	231	293	0.001	0.52	9.0
OCA/SCA ratio	2.21	3.21	4.09	2.25	3.00	4.02	6.22	9.00	54.37	1.97	

Other F_1 s

Wherever seed permitted we grew an additional set of 204 crosses to multiply the seed. This was done to supplement the seed quantities of the F_1 trials so that we can have sufficient seed quantity for the replicated multilocation yield trial of F_2 bulks.

F_1 Trials (Hisar)

At Hisar, three F_1 trials were planted during 1983/84 season. These were:

(i) F_1 4 x 10 line x tester trial (ii) F_1 11 x 10 line x tester trial (iii) F_1 4 x 9 line x tester trial

Unfortunately, all or parts of these trials were situated in areas that had soil salinity; and many plants were killed. Hence, no data could be recorded from any of the three trials. However, the healthy plants were harvested from each cross for evaluating as F_2 populations. The pedigrees of the crosses in each of the trials is given in Tables 1.10 to 1.12.

F_2 Trials

We conducted replicated trials on 401 F_2 populations in the short, medium and long duration types at Hyderabad (192) and Hisar (209). Of these we grew 2 trials of long and one trial of medium duration at Gwalior. All the F_2 trials at Hyderabad or Hisar were in lattices except F_2 MLT-DS and -DM² at the former and F_2 MLT-DM at the latter location which were in randomized complete block design. Plot size was 4 rows of 4 meters with 30 cm between rows and 10 cm within rows. At Hyderabad data on days to 50% flowering and maturity, 100-seed weight and yield were recorded in these trials.

Hyderabad

F_2 Multilocation trial desi short and medium duration (F_2 MLT-DS and DM)

The trials comprised 23 F_2 populations for the short (DS) and medium (DM) duration crosses.² One common (DS:Annigeri, DM:K 850) and one local check (DS:Phule G-4, DM:ICCC 4). was included in the two trials. Description of these trials is reported in International Nurseries Report, 1983/84 (Progress Report No.26).

F_2 Trial 9 x 8 line x tester

The trial comprised of 72 F_2 s and 9 testers. This was a repetition of last season's F_1 ² trial. The planting was done in a 9 x 9 lattice with 3 replications.¹ Plot size followed was 4 rows of 4m. Spacing followed was 30 x 10 cm. Significant differences existed among entries for all the 4 characters recorded (Table 1.13). Maximum

Table 1.10. List of entries in the 4x10 line x tester trial at Hisar in 1983/84.

Sl. No.	ICCX- No.	Parentage		
1	820155	GL 1002	x	Pant G-114
2	820156	GL 1002	x	GL-769
3	820157	GL 1002	x	C-235
4	820158	GL 1002	x	G-543
5	820159	GL 1002	x	H 76-49
6	820160	GL 1002	x	GG-588
7	820161	GL 1002	x	H 75-35
8	820162	GL 1002	x	BG(M)-408
9	820163	GL 1002	x	ICCC 23
10	820164	GL 1002	x	T-3
11	820165	GG-685	x	Pant G-114
12	820166	GG-685	x	GL-769
13	820167	GG-685	x	C-235
14	820168	GG-685	x	G-543
15	820169	GG-685	x	H 76-49
16	820170	GG-685	x	GG-588
17	820171	GG-685	x	H 75-35
18	820172	GG-685	x	BG(M)-408
19	820173	GG-685	x	ICCC 23
20	820174	GG-685	x	T-3
21	820175	H 77-51	x	Pant G-114
22	820176	H 77-51	x	GL-769
23	820177	H 77-51	x	C-235
24	820178	H 77-51	x	G-543
25	820179	H 77-51	x	H 76-49
26	820180	H 77-51	x	GG-588
27	820181	H 77-51	x	H 75-35
28	820182	H 77-51	x	BG(M)-408
29	820183	H 77-51	x	ICCC 23
30	820184	H 77-51	x	T-3
31	820185	ICCC-29	x	Pant G-114
32	820186	ICCC-29	x	GL-769
33	820187	ICCC-29	x	C-235
34	820188	ICCC-29	x	G-543
35	820189	ICCC-29	x	H 76-49
36	820190	ICCC-29	x	GG-588
37	820191	ICCC-29	x	H 75-35
38	820192	ICCC-29	x	BG(M)-408
39	820193	ICCC-29	x	ICCC 23
40	820194	ICCC-29	x	T-3

Table 1.11. List of entries tested in 11x10 line x tester P₁ trial at Hisar in 1983/84.

Sl. No.	ICCC- No.	Parentage
1	820201	Phule G-12 x Pant G-114
2	820202	Phule G-12 x GL-769
3	820203	Phule G-12 x C-235
4	820204	Phule G-12 x G-543
5	820205	Phule G-12 x H 76-49
6	820206	Phule G-12 x GG-588
7	820207	Phule G-12 x H 75-35
8	820208	Phule G-12 x BG(M)-408
9	820209	Phule G-12 x ICCC 23
10	820210	Phule G-12 x T-3
11	820211	ICCC 30 x Pant G-114
12	820212	ICCC 30 x GL-769
13	820213	ICCC 30 x C-235
14	820214	ICCC 30 x G-543
15	820215	ICCC 30 x H 76-49
16	820216	ICCC 30 x GG-588
17	820217	ICCC 30 x H 75-35
18	820218	ICCC 30 x BG(M)-408
19	820219	ICCC 30 x ICCC 23
20	820220	ICCC 30 x T-3
21	820221	18-7-2-1 x Pant G-114
22	820222	18-7-2-1 x GL-769
23	820223	18-7-2-1 x C-235
24	820224	18-7-2-1 x G-543
25	820225	18-7-2-1 x H 76-49
26	820226	18-7-2-1 x GG-588
27	820227	18-7-2-1 x H 75-35
28	820228	18-7-2-1 x BG(M)-408
29	820229	18-7-2-1 x ICCC 23
30	820230	18-7-2-1 x T-3
31	820231	A1-97 x Pant G-114
32	820232	A1-97 x GL-769
33	820233	A1-97 x C-235
34	820234	A1-97 x G-543
35	820235	A1-97 x H 76-49
36	820236	A1-97 x GG-588
37	820237	A1-97 x H 75-35
38	820238	A1-97 x BG(M)-408
39	820239	A1-97 x ICCC 23
40	820240	A1-97 x T-3
41	820241	N-52 x Pant G-114
42	820242	N-52 x GL-769

Sl. No.	ICCX- No.	Parentage	
43	820243	N-52	x C-235
44	820244	N-52	x G-543
45	820245	N-52	x H 76-49
46	820246	N-52	x GG-588
47	820247	N-52	x H 75-35
48	820248	N-52	x BG(M)-408
49	820249	N-52	x ICCC 23
50	820250	N-52	x T-3
51	820251	2E	x Pant G-114
52	820252	2E	x GL-769
53	820253	2E	x C-235
54	820254	2E	x G-543
55	820255	2E	x H 76-49
56	820256	2E	x GG-588
57	820257	2E	x H 75-35
58	820258	2E	x BG(M)-408
59	820259	2E	x ICCC 23
60	820260	2E	x T-3
61	820261	RSG 44	x Pant G-114
62	820262	RSG 44	x GL-769
63	820263	RSG 44	x C-235
64	820264	RSG 44	x G-543
65	820265	RSG 44	x H 76-49
66	820266	RSG 44	x GG-588
67	820267	RSG 44	x H 75-35
68	820268	RSG 44	x BG(M)-408
69	820269	RSG 44	x ICCC 23
70	820270	RSG 44	x T-3
71	820271	JG 1258	x Pant G-114
72	820272	JG 1258	x GL-769
73	820273	JG 1258	x C-235
74	820274	JG 1258	x G-543
75	820275	JG 1258	x H 76-49
76	820276	JG 1258	x GG-588
77	820277	JG 1258	x H 75-35
78	820278	JG 1258	x BG(M)-408
79	820279	JG 1258	x ICCC 23
80	820280	JG 1258	x T-3
81	820281	JG-1265	x Pant G-114
82	820282	JG-1265	x GL-769
83	820283	JG-1265	x C-235
84	820284	JG-1265	x G-543
85	820285	JG-1265	x H 76-49
86	820286	JG-1265	x GG-588
87	820287	JG-1265	x H 75-35
88	820288	JG-1265	x BG(M)-408

Sl. No.	ICCX- No.	Parentage		
89	820289	JG-1265	x	ICCC 23
90	820290	JG-1265	x	T-3
91	820291	ICCC 6	x	Pant G-114
92	820292	ICCC 6	x	GL-769
93	820293	ICCC 6	x	C-235
94	820294	ICCC 6	x	G-543
95	820295	ICCC 6	x	H 76-49
96	820296	ICCC 6	x	GG-588
97	820297	ICCC 6	x	H 75-35
98	820298	ICCC 6	x	BG(M)-408
99	820299	ICCC 6	x	ICCC 23
100	820300	ICCC 6	x	T-3
101	820301	64-3	x	Pant G-114
102	820302	64-3	x	GL-769
103	820303	64-3	x	C-235
104	820304	64-3	x	G-543
105	820305	64-3	x	H 76-49
106	820306	64-3	x	GG-588
107	820307	64-3	x	H 75-35
108	820308	64-3	x	BG(M)-408
109	820309	64-3	x	ICCC 23
110	820310	64-3	x	T-3

Table 1.12. List of entries tested in 4x9 line x tester P₁ trial at Hisar in 1983/84.

Sl. No.	ICCX- No.	Parentage		
1	820311	GL 1002	x	Annigeri
2	820312	GL 1002	x	BDN 9-3
3	820313	GL 1002	x	K-850
4	820314	GL 1002	x	ICCC-22
5	820315	GL 1002	x	Phule G-7
6	820316	GL 1002	x	2375
7	820317	GL 1002	x	BDNG-20
8	820318	GL 1002	x	ICCL 80074
9	820319	GL 1002	x	JG-315
10	820320	GG-685	x	Annigeri
11	820321	GG-685	x	BDN 9-3
12	820322	GG-685	x	K-850
13	820323	GG-685	x	ICCC-22
14	820324	GG-685	x	Phule G-7
15	820325	GG-685	x	2375
16	820326	GG-685	x	BDNG-20
17	820327	GG-685	x	ICCL 80074
18	820328	GG-685	x	JG-315
19	820329	H 77-51	x	Annigeri
20	820330	H 77-51	x	BDN 9-3
21	820331	H 77-51	x	K-850
22	820332	H 77-51	x	ICCC-22
23	820333	H 77-51	x	Phule G-7
24	820334	H 77-51	x	2375
25	820335	H 77-51	x	BDNG-20
26	820336	H 77-51	x	ICCL 80074
27	820337	H 77-51	x	JG-315
28	820338	ICCC-29	x	Annigeri
29	820339	ICCC-29	x	BDN 9-3
30	820340	ICCC-29	x	K-850
31	820341	ICCC-29	x	ICCC-22
32	820342	ICCC-29	x	Phule G-7
33	820343	ICCC-29	x	2375
34	820344	ICCC-29	x	BDNG-20
35	820345	ICCC-29	x	ICCL 80074
36	820346	ICCC-29	x	JG-315

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Table 1.13. Mean values of characteristics in F₂ 9 x 8 line x tester -DS trial at Hyderabad, 1983-84.

Ent no.	ICCX- flow mat- uring urlty (g)	Percentage seeds (kg/ha)	Plant stand	Days to 50%	Days to	Weight of 100	Seed yield
1	810001	Annigeri X Phule G-5	76	53.0	94	22.3	1454
2	810002	Annigeri X Phule G-7	77	45.5	89	24.9	1680
3	810003	Annigeri X 2375	81	45.3	88	23.3	1469
4	810004	Annigeri X BDN 20	75	50.2	90	19.4	1497
5	810005	Annigeri X JG 315	84	50.9	91	16.9	1692
6	810006	Annigeri X ICCL 80074	73	47.0	90	18.5	1560
7	810007	Annigeri X ICCL 31	83	51.8	93	17.6	1485
8	810008	Annigeri X ICCL 31	81	45.9	89	17.5	1607
9	810009	BDN 9-3 X Phule G-5	81	51.4	92	19.2	1528
10	810010	BDN 9-3 X Phule G-7	76	46.8	87	23.0	1448
11	810011	BDN 9-3 X 2375	81	44.8	88	20.5	1602
12	810012	BDN 9-3 X BDN 20	81	50.4	90	19.4	1467
13	810013	BDN 9-3 X JG 315	91	48.0	91	14.5	1442
14	810014	BDN 9-3 X ICCL 80074	79	45.0	87	17.1	1443
15	810015	BDN 9-3 X ICCL 31	79	48.6	92	14.5	1336
16	810016	BDN 9-3 X ICCL 31	77	44.7	90	15.1	1498
17	810017	JG 62 X Phule G-5	82	51.8	93	19.4	1294
18	810018	JG 62 X Phule G-7	82	47.2	90	21.8	1343
19	810019	JG 62 X 2375	68	48.8	91	20.0	1285
20	810020	JG 62 X BDN 20	70	51.0	93	18.3	1207
21	810021	JG 62 X JG 315	85	48.7	91	15.0	1342
22	810022	JG 62 X ICCL 80074	77	48.8	91	17.5	1403
23	810023	JG 62 X ICCL 31	82	50.9	92	14.3	1245
24	810024	JG 62 X ICCL 31	74	45.5	92	15.2	1053
25	810025	P 326 X Phule G-5	78	58.7	100	17.1	1360
26	810026	P 326 X Phule G-7	88	49.5	94	18.6	1518
27	810027	P 326 X 2375	82	51.5	97	18.1	1377
28	810028	P 326 X BDN 20	91	54.5	97	16.7	1328
29	810029	P 326 X JG 315	91	54.1	95	12.6	1218
30	810030	P 326 X ICCL 80074	70	52.8	98	14.4	1281
31	810031	P 326 X ICCL 31	92	58.7	100	12.4	1169
32	810032	P 326 X ICCL 31	85	52.9	96	13.3	1311
33	810033	ICCC 22 X Phule G-5	100	52.7	93	25.5	1604
34	810034	ICCC 22 X Phule G-7	85	47.1	90	26.2	1721
35	810035	ICCC 22 X 2375	88	49.2	91	24.6	1574
36	810036	ICCC 22 X BDN 20	73	54.2	93	23.5	1464
37	810037	ICCC 22 X JG 315	92	52.0	91	19.5	1554
38	810038	ICCC 22 X ICCL 80074	82	51.6	93	19.5	1531
39	810039	ICCC 22 X ICCL 31	77	50.5	94	19.0	1406
40	810040	ICCC 22 X ICCL 31	76	54.1	92	19.4	1322
41	810041	ICCC 4 X Phule G-5	81	57.8	99	17.7	1442
42	810042	ICCC 4 X Phule G-7	78	50.8	95	20.2	1428
43	810043	ICCC 4 X 2375	78	50.8	96	20.1	1335
44	810044	ICCC 4 X BDN 20	82	55.9	97	17.4	1445
45	810045	ICCC 4 X JG 315	74	55.4	95	13.9	1330

Int no.	ICCL- flow- ering	Parentage mat- urity	seeds (kg/ha)	Plant stand	Days to 50%	Days to	Weight of 100	Seed yield
46	810046	ICCC 4 X ICCL 80074		82	52.8	98	16.1	1425
47	810047	ICCC 4 X ICCC 31		77	58.0	99	13.2	1335
48	810048	ICCC 4 X ICCC 31		82	49.1	90	14.7	1458
49	810049	BG 212 X Phule G-5		77	57.3	97	16.4	1335
50	810050	BG 212 X Phule G-7		74	47.6	93	20.2	1518
51	810051	BG 212 X 2375		74	49.8	93	18.4	1420
52	810052	BG 212 X BDNG 20		78	53.4	95	17.0	1467
53	810053	BG 212 X JG 315		83	51.9	94	13.1	1262
54	810054	BG 212 X ICCL 80074		79	50.9	93	15.6	1441
55	810055	BG 212 X ICCC 31		79	57.0	96	13.2	1285
56	810056	BG 212 X ICCC 31		90	51.0	91	14.1	1419
57	810057	H 73-10 X Phule G-5		76	57.8	97	17.8	1395
58	810058	H 73-10 X Phule G-7		78	53.8	96	18.5	1339
59	810059	H 73-10 X 2375		74	52.8	96	18.1	1407
60	810060	H 73-10 X BDNG 20		78	55.4	95	17.3	1329
61	810061	H 73-10 X JG 315		81	54.0	95	13.9	1237
62	810062	H 73-10 X ICCL 80074		73	54.6	96	15.8	1452
63	810063	H 73-10 X ICCC 31		91	56.3	96	13.5	1372
64	810064	H 73-10 X ICCC 31		86	51.0	92	14.8	1499
65	810065	K 850 X Phule G-5		82	56.7	96	26.8	1548
66	810066	K 850 X Phule G-7		77	49.4	93	29.0	1589
67	810067	K 850 X 2375		97	50.4	92	26.3	1736
68	810068	K 850 X BDNG 20		72	52.7	94	25.7	1498
69	810069	K 850 X JG 315		79	52.7	93	20.0	1547
70	810070	K 850 X ICCL 80074		72	53.7	94	21.0	1483
71	810071	K 850 X ICCC 31		89	56.2	97	18.3	1542
72	810072	K 850 X ICCC 31		93	51.8	91	18.2	1505
73		Phule G-5		84	57.7	96	25.0	1477
74		Phule G-7		69	43.6	90	28.8	1423
75		2375		83	46.5	88	26.7	1320
76		BDNG 20		77	53.6	95	25.0	1465
77		JG 315		76	50.3	92	14.2	1448
78		ICCL 80074		84	48.5	88	17.5	1565
79		ICCC 31		81	57.4	96	14.0	1358
80		ICCC 31		82	43.0	87	15.7	1325
81		Annigeri		82	48.2	89	19.5	1573
		MEAN		81	51.4	93	18.6	1431
		SE		6.4	0.88	0.8	0.57	84.7
		CVX		15.9	3.4	1.8	6.1	11.8

yield of 1736 kg/ha was given by the cross K 850 x 2375 (S10067) followed by cross ICC 22 x Phule G-7. Both of these involved large seeded parents and matured in about 90 days. Check variety Annigeri recorded 1573 kg/ha.

F_2 trial 8 x 8 diallel

The entries (crosses and parents) were the same as in 8 x 8 F_1 diallel of last season. This trial was in 6 x 6 lattice with three replications. Plot size was 4 rows 4 m, with row spaced at 30 cm. Crosses that gave good yield were S1008 (Phule G-7 x BONG 20), S10083 (Phule G-7 x ICCL 80074), and S10084 (Phule G-7 x ICCL 30) etc. (Table 1.14). Among parents BONG 20 gave the highest yield (1341 kg/ha). The crosses Phule G-7 x ICC 30, Phule G-7 x ICC 31, BONG 20 x ICCL 80074 and Phule G-7 x 2375 were somewhat consistent in their performance in the two (F_1 and F_2) generations. Some of the F_1 s did not maintain their performance in F_2 s perhaps owing to dissipation of heterotic effects. Diallel analysis of F_2 was quite in agreement with the F_1 for yield, days to flower and seed weight whereas some difference existed for days to maturity (Tables 1.15 and 1.16).

F_2 Trial-4 DS

The trial comprised of 25 entries, 23 F_2 populations and 2 checks Annigeri and K 850. Differences among entries were significant for yield, seed weight flowering and maturity. None of the populations gave higher seed yield than the check K 850 (Table 1.17). However ICC 820059 (RSG 44 x Phule G-7) and -820109 (Phule G-12 x 64-3) were the two top yielding crosses in this trial. Populations that were advanced for F_3 trials have been marked with asterisks.

F_2 Trial-5 DS

The layout of this trial was similar to trial 4. Significant differences among entries were noted for flowering, maturity and 100-seed weight but not for seed yield (Table 1.18). Cultivar K 850 was the highest yielding in this trial, followed by F_2 population ICC 820137 (N 52 x JG 1265) and ICC 820113 (ICC 30 x 2E). Poor entries were rejected and the rest will be retained for F_3 trials next season.

Hisar

We tested 209 F_2 's of long duration maturity group in replicated trials. Forty six of these F_2 's were tested multilocally at 10 sites as F_2 MLT-DL; and twenty three F_2 's were tested at Hisar and Gwalior. The remaining 140 F_2 's were tested at Hisar only. Plot size was 4 rows of 4 meters, with 30 cm between rows and 10 cm between plants. At Hisar, the germination was good in all the F_2 trials. Crop growth was, however, affected due to patches of soil salinity. Observations were recorded only for days to 50% flowering and maturity, and seed yield (kg/ha). Plots were visually scored for

Table 1.14. Mean values of characteristics in F_2 8 x 8 diallel -88 at Hyderabad, 1983-84.

Int no.	ICCL-no.	Parentage	Plant stand	Days to 50% flowering	Days to maturity	Weight of 100 seeds (g)	Seed yield (kg/ha)
1	810073	Phule G-5 X Phule G-7	89	50.0	91	30.3	1157
2	810074	Phule G-5 X 2375	119	49.7	91	26.8	1158
3	810075	Phule G-5 X BDNG 20	93	52.5	92	25.7	1271
4	810076	Phule G-5 X JG 315	98	50.7	90	18.7	1170
5	810077	Phule G-5 X ICCL 80074	89	50.3	89	21.2	1256
6	810078	Phule G-5 X ICC 30	102	55.5	93	18.9	1160
7	810079	Phule G-5 X ICC 31	96	51.0	90	19.1	1157
8	810080	Phule G-7 X 2375	96	42.3	85	29.0	1228
9	810081	Phule G-7 X BDNG 20	73	50.0	95	27.8	1388
10	810082	Phule G-7 X JG 315	103	48.3	88	21.0	1227
11	810083	Phule G-7 X ICCL 80074	82	42.3	86	24.7	1355
12	810084	Phule G-7 X ICC 30	101	49.4	94	19.8	1361
13	810085	Phule G-7 X ICC 31	95	43.1	82	22.7	1234
14	810086	2375 X BDNG 20	98	46.6	87	25.9	1221
15	810087	2375 X JG 315	71	49.4	94	20.4	1005
16	810088	2375 X ICCL 80074	92	48.9	86	22.6	1290
17	810089	2375 X ICC 30	96	49.6	92	21.1	1083
18	810090	2375 X ICC 31	96	44.3	87	22.6	1093
19	810091	BDNG 20 X JG 315	97	50.1	90	19.1	1062
20	810092	BDNG 20 X ICCL 80074	93	51.1	92	20.4	1272
21	810093	BDNG 20 X ICC 30	99	53.6	94	17.1	1021
22	810094	BDNG 20 X ICC 31	112	48.2	86	18.8	1217
23	810095	JG 315 X ICCL 80074	96	49.4	88	17.3	1134
24	810096	JG 315 X ICC 30	100	52.4	90	14.9	1045
25	810097	JG 315 X ICC 31	101	47.0	87	13.5	1135
26	810098	ICCL 80074 X ICC 30	101	51.7	90	16.4	1155
27	810099	ICCL 80074 X ICC 31	99	48.5	87	17.5	1140
28	810100	ICC 30 X ICC 31	92	49.2	89	15.0	830
29		Phule G-5	71	56.9	93	27.6	868
30		Phule G-7	84	41.7	84	30.8	1189
31		2375	89	42.5	89	27.3	1090
32		BDNG 20	84	52.3	92	24.7	1341
33		JG 315	113	48.5	87	15.4	1017
34		ICCL 80074	93	48.7	85	16.9	1239
35		ICC 30	104	56.5	92	13.9	1036
36		ICC 31	92	39.4	82	15.9	1003
		Mean	95	48.9	89	21.1	1155
		SE	9.3	0.73	1.4	0.64	89.5
		CV%	17.1	2.6	2.8	5.3	13.4

Table 1.15. Mean squares from the analysis of variance of F_2 8 x 8 diallel trial at Hyderabad, 1983/84

Source of variation	d.f	Days to 50% flowering	Days to maturity	Wt. of 100 seeds (g)	Seed Yield (kg/ha)
Replications	2	0.34	2.75	0.68	7164
Entries	35	51.00**	39.81**	71.27**	67563**
Error	70	1.98	11.83	1.10	64851
GCA	7	73.42**	33.91**	113.73**	74884**
SCA	28	2.98**	7.76*	1.27**	17963
Error	70	0.66	3.68	0.37	14950
GCA/SCA ratio	25.32	4.36	89.55	4.12	

Table 1.16. Means and general combining ability effects of parents in F_2 8 x 8 diallel trial at Hyderabad, 1983/84

Parent	Days to 50% flowering		Days to maturity		Wt. of 100 seeds (g)		Seed Yield (kg/ha)	
	Mean	GCA	Mean	GCA	Mean	GCA	Mean	GCA
Phule G-5	57.0	3.33**	93.7	1.83**	27.6	2.58**	803	-43.66
Phule G-7	41.7	-3.08**	85.3	-0.87	30.8	4.68**	1250	133.75**
Phule	42.7	-2.58**	90.0	-0.60	27.3	3.27**	1271	36.54
2375	52.3	1.69**	90.7	1.88**	24.7	1.38**	1312	46.26
SDHG 20	49.0	0.46	87.0	-0.60	15.4	-3.85**	993	-105.45**
JG 315	49.0	-0.11	86.3	-1.17*	16.9	-1.82**	1323	80.63*
ICCL 80074	56.3	3.39**	91.7	2.47**	13.9	-3.92**	1035	-75.96*
ICCC 30	39.3	-3.11**	83.3	-2.87**	15.9	-2.93**	982	-72.12*
ICCC 31								
F		0.99**		0.91**		0.99**		0.78*
SE (g)		0.240		0.567		0.170		36.160

* Significant at 5% level, ** Significant at 1% level.

Table 1.17. Mean values of characteristics in P₂ trial-4 B6, Hyderabad, 1983-84.

Ent No.	ICCK/ICC numbers	Percentage	Plant stand	Days to 50% flowering	Days to maturity	Weight of 100 seeds (g)	Seed Yield (kg/ha)
1	820089	Phule G-12 X JG 315	101	59.0	107	14.7	990
2	820049	2E X ICCC 22	96	58.5	103	20.1	1118
3	820058	RSO 44 X ICCC 22	77	61.6	104	17.2	968
4	820039	RSO 44 X Phule G-7	96	56.6	105	18.4	1213
5	820065	JG 1258 X BDM 9-3	88	58.9	104	19.0	984
6	820077	JG 1265 X Phule G-7	106	59.9	106	20.0	1163
7	820078	JG 1265 X 2375	88	58.1	106	17.5	1010
8	820087	ICCC 6 X 2375	81	56.6	102	20.3	1075
9	820089	ICCC 6 X ICCL 80074	95	58.6	104	17.0	1170
10	820090	ICCC 6 X JG 315	96	57.2	102	17.7	780
11	820091	64-3 X Annigeri	90	54.9	103	13.6	903
12	820092	64-3 X BDM 9-3	98	58.0	102	11.4	1026
13	820093	64-3 X 850	82	59.4	104	19.1	1019
14	820097	64-3 X BDM 20	89	58.6	105	13.0	1090
15	820100	Phule G-12 X ICCC 30	70	57.0	100	12.0	1000
16	820104	Phule G-12 X 2E	65	56.0	102	10.3	1035
17	820105	Phule G-12 X RSG 44	114	59.2	110	12.1	907
18	820106	Phule G-12 X JG 1258	105	56.0	107	13.0	940
19	820107	Phule G-12 X JG 1265	86	57.5	109	19.0	810
20	820108	Phule G-12 X ICCC 6	102	55.5	103	14.8	1007
21	820109	Phule G-12 X 64-3	107	54.7	102	13.8	1197
22	820111	ICCC 30 X AI-97	94	58.4	107	14.9	1094
23	820112	ICCC 30 X H 52	88	58.0	107	15.6	1161
24	4918	Annigeri	82	56.0	106	17.7	610
25	5003	K-850	106	62.2	104	22.9	1311
		Mean	93	57.5	105	16.0	1022
		SE	5.9	0.70	1.3	0.63	82.9
		CV%	10.9	2.4	2.1	6.0	13.2

Table 1.18. Mean values of characteristics in P₂ trial-3 DS at Hyderabad, 1983-84.

Ent no.	ICCX- no.	Parentage	Plant stand	Days to 50% flowering	Days maturity	Weight of 100 seeds (g)	Seed yield (kg/ha)
1	820113	ICCC 30 x 2E	117	59.0	105	17.0	1192
2	820114	ICCC 30 x RSG 44	120	61.1	106	11.3	912
3	820115	ICCC 30 x JG 1258	99	63.3	110	11.7	815
4	820116	ICCC 30 x JG 1265	104	64.0	108	11.7	962
5	820119	18-7-2-1 x A1-97	80	53.0	103	18.2	885
6	820124	18-7-2-1 x JG 1265	96	60.0	104	16.3	862
7	820125	18-7-2-1 x ICC 6	78	57.5	105	18.2	1045
8	820126	18-7-2-1 x 64-3	100	56.5	101	14.5	965
9	820127	A1-97 x N 52	83	57.5	102	20.1	960
10	820129	A1-97 x RSG 44	92	56.8	104	14.4	1067
11	820131	A1-97 x JG 1265	85	56.0	103	17.3	1091
12	820133	A1-97 x 64-3	90	58.0	104	14.4	888
13	820134	N 52 x 2E	67	53.9	100	23.2	756
14	820135	N 52 x RSG 44	109	57.1	104	17.9	1047
15	820136	N 52 x JG 1258	107	56.7	104	18.0	1068
16	820137	N 52 x JG 1265	93	56.9	103	20.6	1228
17	820140	2E x RSG 44	91	56.7	105	16.4	1139
18	820142	2E x JG 1265	108	59.4	105	18.2	1045
19	820144	2E x 64-3	103	54.1	104	13.9	986
20	820145	RSG 44 x JG 1258	93	60.3	105	12.7	859
21	820146	RSG 44 x JG 1265	108	59.5	104	13.0	956
22	820152	JG 1265 x ICC 6	108	56.3	105	16.4	1069
23	820154	ICCC 6 x 64-3	102	56.3	101	14.4	994
24		AMVICERI	84	57.3	104	17.9	907
25		K 850	117	60.3	106	11.8	1301
		Mean	90	58.6	104	16.4	1008
		SE	9.9	0.83	1.0	0.42	116.0
		CV%	17.5	2.3	1.7	4.5	20.1

stunt incidence on 1 to 9 scale (1-free, 9-most susceptible).

F_2 MLT-DL:

The trial had 46 F_2 , 2 common checks (H 208, K 850) and two local checks. The trial was planted as RBD with 3 replications. Results of the trial are reported in the International Nurseries Report, 1983/84.

F_2 Trial-2 DL

This trial was grown at Hisar and Gwalior. The trial consisted of 23 F_2 's and two checks (H 208 and K 850) in 5 x 5 partially balanced lattice with 3 replications. The results are presented in Table 1.19. At Gwalior the coefficient of variation was lower, compared to Hisar. Yield levels were lower at Hisar because of drought, stunt and due to salinity. We have selected populations with lower stunt incidence score and reasonably good yield for further testing in F_3 .

F_2 Trials 3 to 6-DL

Two of the trials consisted of 23 F_2 's each, and the other two trials had 47 F_2 's. Each trial had two checks, H 208 and K 850. The first two trials were 5 x 5 balanced lattices with 3 replications, and the latter 7 x 7 simple lattices with 2 replications. As mentioned earlier crop growth was variable, and coefficients of variation high in all the trials. The data are presented in Tables 1.20 to 1.23. We selected high yielding bulks having lower stunt incidence for further testing in F_3 .

F_3 Trials

We tested 163 F_3 populations in eight replicated trials at Hyderabad (107) or Hisar (56). Two trials each from Hyderabad and Hisar of medium and long durations, respectively, were also repeated at Gwalior. The trials were either randomized complete blocks, balanced lattice squares or triple lattice with 3 replicates and plots of 4 rows spaced at 30cm.

The incidence of collar rot and wilt reduced the plant stands at Hyderabad. At Hisar, the occurrence of salinity in patches caused variability in plant stands and growth.

Days to 50% flowering and to maturity, weight of 100 seeds, and seed yield were recorded in all trials. In addition, the long duration trials at Hisar were scored for vigour and incidence of stunt disease.

F_3 Multilocation trials - desi short and medium duration (F_3 MLT-DS and -DM)

Table 1.19. Mean values of characteristics in P₃ trial-2 at Mirsar (M) and Gwalior (G) in 1981-82.

Sat no.	ICC/ ICC No.	Percentage	Plant stand		Days to 50% flowering		Days to maturity		Seed yield		Stunt score		Weight of 100-seeds (g)	
			M	G	M	G	M	G	M	G	M	G	M	G
1*	010289	Pant 0-114 X ICC 27	71	74.5	81.6	162	144	1224	2078	4	11.6	18.0		
2	010261	Pant 0-114 X ICC 29	65	73.7	73.0	161	143	400	2004	6	13.4			
3*	010268	Pusa 209 X DM(M)-408	63	79.1	83.9	162	144	1304	1611	3	10.7			
4	010270	Pusa 209 X ICC 29	73	75.0	82.3	161	145	990	1629	6	11.7			
5*	010272	GL 769 X 04 588	74	79.5	80.3	163	144	1082	1613	3	11.6			
6*	010273	GL 769 X M 75-35	64	74.4	83.2	162	145	1370	1927	4	13.9			
7	010276	GL 769 X ICC 23	65	75.6	78.0	161	145	777	1473	5	14.9			
8*	010281	M 208 X 04 588	69	77.4	85.0	159	145	1204	2053	3	10.9			
9*	010283	M 208 X M50 44	68	75.0	79.5	166	145	787	2033	6	11.6			
10*	010287	M 208 X ICC 28	61	77.6	85.3	163	146	996	1938	9	13.0			
11*	010288	M 208 X ICC 29	67	75.6	82.6	161	145	1332	1929	3	11.7			
12*	010290	0 130 X 04 588	69	81.4	81.6	162	145	1392	1904	3	11.5			
13*	010290	0 130 X D6 77-29	72	79.5	88.7	161	146	1504	1699	3	12.3			
14	010300	C 235 X M 75-35	75	78.0	86.6	161	145	939	1822	6	13.0			
15*	010315	0 343 X ICC 29	71	77.9	84.6	160	145	1154	1792	4	11.7			
16*	010319	06-203 X M50 44	63	76.6	79.6	161	144	1012	1691	5	10.9			
17	010325	06 588 X M 75-35	66	81.0	79.6	160	145	585	1857	4	16.1			
18*	010330	06 588 X ICC 23	69	77.3	78.0	160	142	892	2136	9	14.6			
19*	010342	04 588 X D6 77-29	61	83.6	87.9	160	146	1014	1578	5	11.1			
20*	010348	M 75-35 X ICC 29	79	75.9	80.1	163	145	1177	1773	4	13.7			
21*	010349	M 75-35 X D6 77-29	69	81.5	84.0	160	145	989	1923	3	17.9			
22	010363	ICC 23 X ICC 29	71	76.6	82.6	161	145	110	2038	5	16.0			
23*	010369	ICC 23 X D6 77-29	70	78.0	86.1	160	147	1054	1923	5	14.1			
24	M 208		50	79.0	81.0	161	143	903	1755	4	11.3			
25	K 850		65	77.0	85.6	161	147	576	1306	6	24.4			
	Mean		68	77.0	83.3	161	145	1021	1821		13.4			
	SE		5.7	1.18	1.50	0.9	0.0	208.3	170.5		0.47			
	CV%		14.7	2.6	3.1	0.9	0.9	35.3	16.2		6.1			

* Bulks selected for P₃ tests in 1984/85.

Table 1.20. Mean values of characteristics in F_2 trial 3 at Hisar, 1983-84.

Ent no.	ICCC no.	Parentage	Plant stand	Days to 50% flowering	Days to maturity	Seed yield (kg/ha)	Stunt score	Vigor score
1	820156	GL 1002 x GL 769	63	81.9	161	1645	3	3
2	820160	GL 1002 x GG 588	77	87.8	161	710	5	4
3	820161	GL 1002 x H 75 35	80	84.5	161	1010	4	3
4	820162	GL 1002 x BG(H) 408	81	87.9	158	968	5	3
5	820163	GL 1002 x ICC 23	72	80.7	162	1557	4	3
6	820164	GL 1002 x T 3	68	90.0	163	1394	4	3
7	820166	GG 685 x GL 769	78	79.6	162	1266	3	3
8	820169	GG 685 x H 76 49	51	92.6	161	952	5	4
9	820170	GG 685 x GG 588	78	92.2	158	1335	3	3
10	820173	GG 685 x ICC 23	73	89.4	161	980	4	4
11	820174	GG 685 x T 3	61	94.7	161	759	5	4
12	820175	H 77-51 x PANT G-114	64	87.4	161	1582	4	3
13	820183	H 77-51 x ICC 23	72	79.8	162	919	5	3
14	820193	ICCC 29 x ICC 23	64	74.3	162	1136	5	4
15	820288	JG 1265 x BG(H) 408	70	82.9	163	1011	5	4
16	820302	64-3 x GL 769	80	71.5	161	586	6	4
17	820304	64-3 x G 543	78	75.8	160	1063	5	4
18	820324	GG 685 x PHULE G-7	75	69.1	161	530	6	5
19	820326	GG 685 x BDNG 20	64	86.2	161	753	5	4
20	820335	H 77-51 x BDNG 20	77	81.4	160	1395	4	3
21	820341	ICCC 29 x ICC 22	67	78.2	162	957	5	3
22	820342	ICCC 29 x PHULE G-7	76	62.6	162	544	6	4
23	820343	ICCC 29 x 2375	65	73.1	160	457	7	4
24		H 208	85	71.9	161	1029	4	3
25		K 850	48	76.6	160	885	6	4
	Mean		71	81.3	161	1017	5	4
	SE		6.4	2.23	0.8	259.7	0.6	0.3
	CV%		15.7	4.8	0.8	44.2	23.1	14.2

Table 1.21. Mean values of characteristics in P₂ trial-4 at Hisar, 1983-84.

Int no.	ICCI- no.	Percentage	Plant stand to500	Days to flowering	Days to maturity	Seed yield (kg/ha)	Stunt score	Vigor score
1	820171	GC 685 X H 75-35	61	92.5	160	1025	3	4
2	820172	GC 685 X GC(H) 408	61	95.1	158	1044	4	4
3	820176	H 77-51 X GL 769	60	86.2	159	1280	4	4
4	820181	H 77-51 X H 75-35	61	87.4	161	995	4	3
5	820186	ICCC 29 X GL 769	71	79.2	160	1456	4	3
6	820190	ICCC 29 X GC 508	67	79.1	160	772	4	4
7	820195	GL 1002 X GC 685	58	94.0	160	645	6	4
8	820197	GL 1002 X ICOC 29	61	78.3	160	795	5	4
9	820198	GC 685 X H 77-51	72	86.4	160	931	4	4
10	820214	ICCC 30 X G 543	62	83.8	159	970	6	3
11	820251	2R X PANT G-114	66	66.6	159	644	5	4
12	820267	RSC 44 X H 75-35	69	81.0	159	1348	4	3
13	820277	JG 1258 X H 75-35	54	79.7	159	668	6	4
14	820286	JG 1265 X GC 508	65	77.5	160	929	5	4
15	820287	JG 1265 X H 75-35	70	77.3	160	1150	4	3
16	820292	ICCC 6 X GL 769	70	62.7	158	936	5	3
17	820297	ICCC 6 X H 75-35	60	66.2	160	598	5	4
18	820303	64-3 X C 235	64	74.0	158	722	6	4
19	820305	64-3 X H 76-49	65	70.3	161	419	7	5
20	820313	GL 1092 X K 850	63	82.4	158	681	5	4
21	820314	GL 1002 X ICOC 22	62	77.4	160	719	6	4
22	820315	GL 1002 X FRBLB G-7	57	59.9	157	391	8	5
23	820316	GL 1002 X 2375	56	64.5	159	400	7	5
24	H 208		70	76.2	160	612	5	4
25	K 850		44	78.5	160	474	6	4
	Mean		63	78.1	159	826	5	4
	SE		5.7	2.10		1.1	194.2	0.7
	CV%		15.8	4.7	1.2	40.7	24.1	14.4

Table 1.22 Mean values of characteristics in P₂ trial-5 at Bilar, 1963-64

Ent no	ICCR no.	Percentage	Plant stand	Days to 50% flowering	Days to maturity	Seed yield (kg/ha)	Stunt score	Vigor score
1	820321	Gd 685 X BDM 9-3	72	74.5	161	831	5	3
2	820327	Gd 685 X ICCR 80074	60	70.0	161	1134	5	3
3	820332	H 77-51 X ICCR 22	72	76.9	159	1306	5	3
4	820153	GL1002 X Pant G 114	61	70.6	162	1190	5	3
5	820159	GL 1002 X H 76-49	70	80.0	161	1179	5	3
6	820165	Gd 685 X Pant G-114	53	70.0	160	779	6	4
7	820168	Gd 685 X G 543	56	80.4	162	691	6	4
8	820178	H 77-51 X G 543	64	85.1	161	969	5	3
9	820180	H 77-51 X Gd 588	82	89.0	161	976	5	3
10	820182	H 77-51 X BG(M) 408	53	83.5	162	729	5	4
11	820185	ICCR 29 X Pant G-114	50	70.9	159	1141	5	3
12	820189	ICCR 29 X H 76-49	53	76.5	159	860	6	3
13	820191	ICCR 29 X H 75-35	73	70.0	160	857	5	3
14	820192	ICCR 29 X BG(M) 408	58	77.4	160	766	5	3
15	820194	ICCR 29 X T 3	65	50.4	159	780	6	4
16	820196	GL 1002 X H 77-51	50	80.5	162	1067	5	3
17	820199	Gd 685 X ICCR 29	59	83.6	160	1312	6	3
18	820200	H 77-51 X ICCR 29	56	75.9	160	804	6	3
19	820201	Phule G 12 X Pant G 114	44	65.1	161	1121	7	4
20	820202	Phule G 12 X GL 769	50	64.1	161	671	5	3
21	820201	Phule G 12 X C 235	57	62.9	159	740	6	3
22	820204	Phule G 12 X G 543	66	66.0	160	771	6	3
23	820205	Phule G 12 X H 76-49	66	65.5	160	1009	6	4
24	820206	Phule G 12 X Gd 588	64	60.4	160	437	5	4
25	820207	Phule G 12 X H 75-35	60	66.0	161	863	6	4
26	820211	ICCR 30 X Pant G 114	62	74.6	161	1062	6	3
27	820213	ICCR 30 X C 235	47	73.6	163	666	7	4
28	820215	ICCR 30 X H 76-49	40	74.6	162	700	7	4
29	820216	ICCR 30 X Gd 588	40	70.4	160	714	6	4
30	820217	ICCR 30 X H 75-35	57	81.9	159	1032	6	3
31	820218	ICCR 30 X BG(M) 408	55	76.0	161	760	6	4
32	820219	ICCR 30 X ICCR 23	55	76.0	161	1268	4	3
33	820220	ICCR 30 X T 3	60	81.4	161	1328	5	2
34	820221	18-7-2-1 X Pant G 114	50	66.1	160	1062	5	3
35	820222	18-7-2-1 X GL 769	52	65.6	162	844	7	4
36	820223	18-7-2-1 X C 235	65	72.0	162	959	5	4
37	820224	18-7-2-1 X G 543	74	65.6	160	686	6	4
38	820227	18-7-2-1 X H 75-35	86	67.0	163	311	8	4
39	820228	18-7-2-1 X BG(M) 408	50	60.0	161	436	7	4
40	820229	18-7-2-1 X ICCR 23	60	59.9	161	344	7	4
41	820231	A1-97 X Pant G 114	56	74.0	160	1271	5	3
42	820233	A1-97 X C 235	47	77.9	160	833	6	3
43	820235	A1-97 X H 76-49	64	67.6	162	462	5	4
44	820236	A1-97 X Gd 588	72	75.9	161	969	5	3
45	820238	A1-97 X BG(M) 408	36	66.7	161	259	7	5
46	820239	A1-97 X ICCR 23	51	63.0	161	236	7	4
47	820241	H 52 X Pant G 114	58	70.0	162	717	7	4
48		H 208	67	72.1	161	939	6	4
49		K 850	55	76.0	160	650	7	4
		Mean	58	73.3	161	847	6	4
		SE	0.3	2.20	1.0	258.0	0.8	0.4
		CVA	20.1	4.2	0.9	43.1	20.7	15.9

Table 1.2: Mean values of characteristics in F₂ trial-6 at Hissar, 1993-04.

Srt no.	ICCC no.	Parentage	Plant stand	Days to 50% flowering	Days to maturity	Seed yield (kg/ha)	Stunt score	Vigor score
1	020242	H 52 X OL 769	43	72.0	161	1120	4	3
2	020243	H 52 X C 235	56	75.2	160	729	6	3
3	020247	H 52 X H 75-35	55	90.9	160	231	7	4
4	020248	H 52 X DG(M) 400	63	66.7	160	295	8	4
5	020250	H 52 X T 3	62	68.9	160	154	8	5
6	020252	2H X OL 769	47	61.8	161	321	7	4
7	020253	2H X C 235	50	66.8	160	231	8	4
8	020254	2H X OG 500	58	58.8	159	395	7	5
9	020257	2H X H 75-35	49	67.8	160	689	6	4
10	020258	2H X DG(M) 400	46	58.1	160	217	8	4
11	020260	2H X T 3	54	69.6	161	115	9	5
12	020262	R50 44 X OL 769	38	75.3	159	1067	6	3
13	020264	R50 44 X O 543	49	79.8	161	1076	5	3
14	020265	R50 44 X H 76-49	63	77.8	159	954	5	3
15	020266	R50 44 X OG 500	66	72.3	160	761	6	3
16	020268	R50 44 X DG(M) 400	39	75.0	161	530	4	4
17	020269	R50 44 X ICCC 23	64	75.2	159	571	6	3
18	020270	R50 44 X T 3	43	80.8	160	417	7	4
19	020273	JO 1258 X C 235	50	79.8	160	944	6	4
20	020274	JO 1258 X O 543	57	76.7	160	590	6	4
21	020276	JO 1258 X OG 500	53	70.5	160	467	6	4
22	020278	JO 1258 X DG(M) 400	53	79.9	160	502	7	4
23	020282	JO 1265 X OL 769	61	75.9	161	574	6	3
24	020283	JO 1265 X C 235	50	75.9	160	569	7	4
25	020284	JO 1265 X O 543	70	73.9	160	1054	8	3
26	020285	JO 1265 X H 76-49	34	78.2	161	801	8	4
27	020289	JO 1265 X ICCC 23	31	76.6	159	493	8	5
28	020290	JO 1265 X T 3	57	73.4	159	609	7	3
29	020291	ICCC 6 X PAMT O 114	52	66.5	161	635	8	4
30	020293	ICCC 6 X C 235	53	68.1	159	375	9	4
31	020294	ICCC 6 X O 543	47	67.1	160	315	7	4
32	020301	64-3 X PAMT O-114	61	80.3	162	791	8	3
33	020307	64-3 X H 75-35	59	73.6	156	260	8	4
34	020308	64-3 X DG(M)-400	44	75.1	160	75	8	5
35	020309	64-3 X ICCC 23	42	68.4	160	134	8	5
36	020311	OL 1002 X Annigori	53	66.2	161	382	8	4
37	020312	OL 1002 X BDM 9-3	46	67.4	160	344	8	5
38	020319	OL 1002 X JO 315	45	76.0	160	755	8	3
39	020320	OG 605 X Annigori	35	76.9	161	285	7	4
40	020322	OG 605 X ICCC 22	62	67.0	161	987	6	3
41	020325	OG 605 X 2375	50	75.0	160	174	7	4
42	020329	H 77-51 X Annigori	53	66.6	159	242	8	4
43	020330	H 77-51 X BDM 9-3	59	65.9	161	679	8	4
44	020331	H 77-51 X K 850	48	79.7	159	1075	9	4
45	020338	ICCC 29 X Annigori	46	68.5	162	247	7	3
46	020340	ICCC 29 X K 850	54	75.3	160	839	7	4
47	020346	ICCC 29 X BDM 20	45	76.6	162	481	7	4
48		H 200	62	72.8	162	687	7	4
49		K 850	45	75.7	162	686	6	4
		Mean	52	72.5	160	539	6	4
		SE		7.1	2.52		0.7	0.6
		CV%		19.0	4.9		67.6	15.6

The trials were sown at Hyderabad (DS) and Gwalior (DM). Short duration trial comprised 14 F_3 populations and one common (Annigeri) and one local check. Similarly, there were 12 F_3 populations, one common (K 850), and one local check in medium duration trial. Details of the entries and the data recorded are given in the International Nurseries Report, 1983/84 (Progress Report No.26).

F_3 Trials - desi short duration (F_3 trial -2 and -3-DS)

Two trials were grown at Hyderabad. Both were 5 x 5 balanced lattice squares with 3 replicates and included a common check Annigeri in addition to 23 F_3 populations selected on the basis of their performance in F_2 trials in 1982/83.

Although there were significant differences among the entries for all the four characteristics recorded, none produced significantly higher yield than the check Annigeri (Tables 1.24 and 1.25). Thirty one F_3 populations, mostly high yielders but a few intermediate and poor yielders (indicated in the table) will be grown as F_4 bulks at Hyderabad for single plant selections in 1984/85.

F_3 Trial - 2DM

The trial was sown at Hyderabad and Gwalior as a 6 x 6 triple lattice and included 33 F_3 populations selected from F_2 trials in 1982/83, two standard checks (Annigeri and K 850), and a local check.

There were significant differences among entries for all the characteristics recorded (Table 1.26). Flowering and crop duration were longer and seed yields larger at Gwalior than at Hyderabad. As expected, Annigeri produced the heaviest seed yield at Hyderabad. But several F_3 s gave significantly higher yields than K 850, the medium duration check. At Gwalior, ICCX 810194 produced heaviest seed yields followed by ICCX-810141, -810151 and -810242, but none was significantly superior over local check. Nineteen F_3 s (indicated in table) will be advanced as F_4 bulks at Hyderabad for single plant selections in 1984/85.

F_3 Trials - desi long duration (F_3 trial -2 and 3 DL)

Two trials were sown at Hissar and Gwalior as 5 x 5 balanced lattice squares with 3 replicates. Each trial included 22 F_3 populations, selected on the basis of performance in F_2 trials in 1982/83, and three checks.

Both trials flowered later, matured earlier, and produced higher seed yields at Gwalior than at Hissar (Tables 1.27 and 1.28). None of the F_3 s outyielded the best check with a significant margin, although differences among entries were significant for all characteristics and few produced numerically higher yields than the checks. Selected populations (as indicated in the tables) will be grown next season as F_4 bulks for single plant selections.

Table 1.24. Mean values of characteristics of entries in F₄ trial-2 80 at Hyderabad, 1933/34.

Entry No	Parentage	Days to 50% flowering	Days to reproductive maturity	Weight of 100 seeds (g)	Yield (kg/ha)
ICCH 010004a	Amalgari x Samba 20	44.2	91.9	23.0	1940
ICCH 010011a	SMB 8-3 x 2375	49.1	90.7	20.4	1848
ICCH 010014a	SMB 8-3 x ICCCL 00074	48.5	66.6	17.2	1800
ICCH 010021a	SMB 8-3 x SMB 315	47.3	98.0	16.9	1300
ICCH 010033a	ICCC 22 x 2375	50.3	47.1	25.9	1370
ICCH 010038a	ICCC 22 x ICCE 31	49.2	48.8	19.6	1240
ICCH 010041a	SMB 212 x 2375	49.1	46.9	17.6	1210
ICCH 010044a	S 73 10 x Samba 20	54.0	100.1	18.5	1080
ICCH 010045a	S 804 x Samba 6-7	46.4	97.3	20.9	1080
ICCH 010072a	S 804 x ICCE 31	52.2	45.9	20.9	1770
ICCH 010073a	S 804 x ICCE 31	54.3	43.3	19.3	1200
ICCH 010076a	Samba 6-8 x 2375	46.9	44.2	24.0	1340
ICCH 010077a	Samba 6-8 x Samba 20	56.4	94.9	24.0	1020
ICCH 010081a	Samba 6-8 x ICCCL 00074	51.9	97.2	22.7	1900
ICCH 010082a	Samba 6-7 x Samba 20	47.2	69.4	25.6	1080
ICCH 010083a	Samba 6-7 x 20 315	46.3	94.8	20.8	1020
ICCH 010087a	Samba 6-7 x ICCE 31	48.7	98.3	20.9	1520
ICCH 010092a	2375 x SMB 315	45.3	48.7	20.9	1600
ICCH 010092a	Samba 20 x ICCCL 00074	54.0	42.7	23.4	1890
ICCH 010094a	Samba 20 x ICCE 31	49.9	46.4	18.7	1400
ICCH 010098a	ICCC 00074 x ICCE 30	48.3	52.2	17.2	1400
ICCH 010102a	Amalgari x Samba 44	50.6	68.9	16.9	1360
ICCH 010108a	Amalgari x ICCE 23	51.6	41.8	18.9	1090
ICCH 010164a	Amalgari x ICCE 37	53.0	68.3	19.4	1750
ICC 4914	Amalgari	49.9	46.0	19.7	1840
Mean		49.6	67.9	21.4	1384
SD		1.76	2.02	0.86	180.2
Cv(%)		6.2	7.4	1.9	17.3

a Populations selected for F₄ bulks in 1964/65.

Table 1.25. Mean values of characteristics of entries in P₃ trial-3 DS at Hyderabad, 1963/64.

Cross No	Parentage	Days to 50% flowering	Reproductive period	Days to maturity	Weight of 100 seeds (g)	Seed Yield (kg/ha)
ICCH 810003a	Amnigori x 2375	53.2	44.1	97.4	20.2	1410
ICCH 810012a	DM 9-3 x DM9 20	48.4	45.5	94.1	24.3	1030
ICCH 810013a	DM 9-3 x J6 315	47.4	48.0	95.0	14.0	1460
ICCH 810034a	ICCC 22 x Phulo 6-7	51.2	43.9	95.5	24.9	1520
ICCH 810038a	ICCC 22 x ICCC 30	50.9	46.0	94.6	18.7	1490
ICCH 810043a	ICCC 4 x 2375	48.6	51.2	98.8	21.5	1430
ICCH 810052a	DM 212 x DM9 20	53.6	45.0	98.7	17.6	1400
ICCH 810070a	K 850 x ICCL 80074	52.5	47.1	98.9	23.0	1450
ICCH 810071a	K 850 x ICCC 30	56.2	45.2	101.4	19.0	1470
ICCH 810091a	DM9 20 x ICCC 30	52.0	46.1	98.4	16.4	1540
ICCH 810112a	DM 9-3 x DM9 46	46.5	48.2	94.3	13.8	1590
ICCH 810178	K 850 x ICCC 27	56.8	44.0	100.6	19.3	1400
ICCH 810179	K 850 x ICCC 28	50.3	43.9	101.0	21.3	1400
ICCH 810191	Pusa 209 x Phulo 6-7	48.5	50.4	99.4	19.4	1350
ICCH 810196	Q 130 x ICCC 30	55.6	47.0	103.1	12.5	1350
ICCH 810197	Pusa 209 x ICCC 31	52.7	49.1	101.7	13.2	1090
ICCH 810200	SL 769 x 2375	52.0	47.1	99.5	19.0	1200
ICCH 810209	M 208 x DM9 20	55.5	44.4	100.3	17.7	1450
ICCH 810213a	M 208 x ICCC 31	52.4	47.2	99.2	13.7	1210
ICCH 810215	M 208 x Phulo 6-7	52.6	49.7	102.1	22.1	1490
ICCH 810221	Q 130 x ICCC 31	54.5	47.2	101.6	13.6	1370
ICCH 810238a	DM 203 x Phulo 6-7	43.7	54.0	98.2	20.6	1500
ICCH 810248a	M 76-49 x 2375	53.4	46.8	100.3	25.0	1410
ICCH 810249a	M 76-49 x DM9 20	55.0	45.4	99.9	23.4	1400
ICCH 4910	Amnigori	53.3	41.9	95.3	19.3	1690
Mean		52.2	46.7	98.9	19.0	1444
SE _c		0.89	1.06	0.90	0.64	106.5
CV(%)		3.0	3.0	1.6	5.0	12.8

a Populations selected for P₄ bulks in 1966/67.

Table 1.26. Characteristics of entries in P₃ trial-20M at Hyderabad and Qwiler, 1983/84.

Entry No.	Parentage	Plant days to stand 50% score flowering			Reproductive period			Days to maturity			Weight of seed yield 100 seeds (g)			Collar rot			Wilt score (1-9)		
		0	5	10	P	0	5	10	P	0	5	10	P	0	5	10	P	0	5
ICCG 010025	P 326 x Phulo 0-5	2	56.7	79.5	45.0	54.7	101	136	16.1	16.3	1570	1590	7.96	2.10					
ICCG 010034	Bg 212 x J6 315	2	53.3	71.9	46.8	60.0	90	132	13.2	15.3	1370	2020	16.00	2.10					
ICCG 010055	Bg 212 x ICCG 30	3	51.2	72.7	46.0	61.7	103	134	13.0	14.0	1350	1750	15.95	2.34					
ICCG 010065	K 850 x Phulo 0-5	4	57.9	77.1	46.9	56.2	102	133	29.1	25.7	1350	1600	11.00	2.42					
ICCG 010069a	K 850 x J6 315	3	54.3	73.7	46.9	59.6	101	133	20.1	18.3	1890	2010	10.92	2.31					
ICCG 010071a	K 850 x ICCG 30	3	55.1	75.4	47.6	58.3	103	134	17.4	19.7	1560	1800	15.77	2.35					
ICCG 010132	P 326 x ICCG 27	4	57.9	76.7	46.5	57.1	104	134	16.9	16.7	1560	1610	17.71	1.95					
ICCG 010134	P 326 x ICCG 27	2	57.9	77.0	46.5	55.9	105	133	11.3	11.7	1240	1900	17.82	3.33					
ICCG 010134a	P 326 x ICCG 28	2	59.0	78.0	46.2	66.2	106	136	13.0	14.3	1300	1800	11.45	2.90					
ICCG 010139	ICCG 22 x Bg 44	4	53.4	65.5	46.1	63.3	99	133	18.1	19.7	1330	1930	9.70	2.96					
ICCG 010143a	ICCG 22 x ICCG 23	3	44.0	57.5	53.1	74.1	97	134	14.7	15.3	1650	2130	13.75	1.92					
ICCG 010143b	ICCG 22 x ICCG 28	4	57.7	77.4	45.7	57.6	103	135	20.1	20.0	1800	1600	7.91	2.40					
ICCG 010151a	ICCG 4 x ICCG 27	3	53.9	78.2	48.6	58.6	101	134	12.6	13.7	1830	2390	12.10	3.83					
ICCG 010152	ICCG 4 x ICCG 28	4	59.3	77.8	45.1	56.9	104	135	14.6	15.7	1360	1810	14.85	3.91					
ICCG 010159a	ICCG 4 x ICCG 23	3	55.9	73.2	46.4	62.5	103	135	14.7	17.0	1380	1790	14.85	2.74					
ICCG 010162	Bg 312 x ICCG 29	2	54.4	78.7	47.7	55.0	102	133	12.5	14.0	1300	1870	11.31	2.40					
ICCG 010166a	Bg 73-10 x Bg 64	2	55.9	72.1	45.5	60.6	101	133	13.3	13.0	1300	1950	13.66	3.33					
ICCG 010167	Bg 73-10 x Bg 44	2	57.7	80.2	48.1	54.2	102	136	12.0	12.3	1360	1780	28.68	1.77					
ICCG 010169a	Bg 73-10 x Bg 44	2	57.1	77.1	45.5	56.4	103	133	12.1	13.3	1350	2090	9.41	4.92					
ICCG 010170	Bg 73-10 x ICCG 27	3	59.1	79.7	43.9	53.0	103	134	15.6	16.0	1290	1780	15.32	3.20					
ICCG 010171a	Bg 73-10 x ICCG 28	3	49.3	65.1	51.3	68.4	101	134	15.5	15.7	1400	1930	13.49	3.63					
ICCG 010175a	K 850 x Bg 64	3	54.0	71.0	45.5	62.1	99	133	17.8	19.7	1260	1970	10.35	3.22					
ICCG 010179a	K 850 x ICCG 27	3	57.3	72.5	44.9	61.1	102	134	16.5	18.0	1270	2010	14.46	4.45					
ICCG 010179b	K 850 x ICCG 28	3	57.4	78.0	45.3	56.6	103	135	18.0	20.3	1500	2040	16.21	2.80					
ICCG 010190	Bg 209 x Phulo 0-5	4	57.7	78.0	44.1	55.3	102	134	18.0	16.0	1310	1630	9.00	2.90					
ICCG 010194a	Bg 209 x J6 315	3	52.1	78.0	47.7	63.7	100	134	12.9	13.7	1370	2160	10.81	2.42					
ICCG 010212	Bg 209 x ICCG 30	2	57.1	73.9	45.1	60.9	102	135	13.1	14.3	1610	1970	11.27	3.34					
ICCG 010216	G 130 x Bg 315	2	54.1	77.5	48.1	57.2	103	136	12.5	13.3	1300	1600	11.40	1.41					
ICCG 010220	G 130 x ICCG 30	2	59.5	80.9	43.6	55.4	104	134	13.3	13.7	1300	1800	10.71	2.11					
ICCG 010230	Bg 203 x Phulo 0-5	2	58.3	77.4	46.4	57.0	101	134	16.3	16.6	1400	2090	14.23	2.66					
ICCG 010242a	Bg 203 x J6 315	2	53.1	73.4	48.4	59.5	100	133	12.7	13.3	1820	2170	10.73	2.82					
ICCG 010242b	Bg 203 x ICCG 30	2	57.4	77.4	43.4	56.9	101	134	12.0	13.3	1310	2090	10.90	2.62					
ICCG 010246a	Bg 76-49 x Phulo 0-5	4	55.9	78.6	48.9	56.6	101	135	24.9	22.7	1690	1960	9.41	2.70					
ICCG 4910	Anagiri	4	51.5	55.4	43.9	77.3	95	133	20.0	22.7	1710	1630	6.20	1.70					
ICC 5003	K 950	4	58.1	76.2	45.9	58.0	104	134	37.1	25.0	660	1630	12.47	3.90					
	Local Check	2	48.0	64.3	48.3	64.2	99	132	16.1	15.0	800	2110	20.60	3.05					
0.715	Mean	2.0	55.5	74.0	46.1	59.9	102	134	16.1	16.5	1392	1921	13.03	2.67					
	SE	0.50	0.97	1.00	1.27	1.66	1.1	0.0	0.56	0.50	142.7	190.4	3.500						
	CV(%)	30.5	3.0	4.2	4.0	4.0	1.9	1.0	6.0	5.1	17.8	17.9	46.6	60.4					

a Populations selected for P₄ bulks in 1984/85.

Table 1.27. Mean values of characteristics of entries in P₃ trial -2 DL at Gwalior and Bikaner, 1983/84.

Cross No.	Percentage	Initial Plant stand		Days to 50% flowering		Reproductive period		Days to maturity		Weight of 100 seeds (g)		Seed yield (kg/ha)		Stunt Viger score (1-9)	
		G	H	G	H	G	H	G	H	G	H	G	H	G	H
ICCR 800128a	BQ 209 x H 208	1.33	63.4	80.8	79.2	63.7	84.2	104	163	11.5	2090	1610	2.99	2.94	
ICCR 800217a	BQ 209 x K 850	2.33	72.7	80.8	77.8	66.1	86.1	107	164	12.2	2020	1660	3.04	2.44	
ICCR 800127	BQ 769 x P 2161	1.67	69.2	86.1	79.4	60.9	83.7	107	163	12.3	1700	1440	3.08	3.11	
ICCR 800129a	GL 769 x C 235	1.33	69.8	77.7	77.6	66.7	85.1	105	163	11.7	1750	1600	3.08	3.14	
ICCR 800132	GL 769 x H 208	1.67	68.7	79.7	75.2	65.2	87.9	105	163	11.8	1970	1490	4.09	3.49	
ICCR 800135	GL 769 x P 2161	2.00	68.8	85.1	82.7	68.8	88.0	106	163	12.3	1700	1210	3.08	3.64	
ICCR 800137	GMQ 16 x C 235	1.67	63.5	80.5	80.5	64.8	83.5	105	163	12.5	2010	1840	3.22	4.02	
ICCR 800138	GMQ 16 x P 378	2.00	70.6	80.8	78.2	63.7	84.4	105	162	12.7	1890	1800	6.32	3.91	
ICCR 800141a	GMQ 16 x HEC 177	1.33	76.9	87.7	78.5	59.2	81.9	107	162	12.5	1910	1400	3.16	2.50	
ICCR 800143a	GMQ 16 x P 2161	1.33	85.1	84.9	81.8	61.7	82.0	107	163	12.5	1770	1580	2.99	3.07	
ICCR 800157a	ICCC 3 x HEC 177	1.00	75.6	73.7	74.8	70.2	89.4	104	164	10.9	2200	1360	6.33	3.21	
ICCR 800160a	ICCC 3 x Pant G 114	1.00	62.8	81.4	76.4	63.4	86.5	105	163	11.9	2040	1930	6.31	3.18	
ICCR 800161a	ICCC 4 x C 235	1.00	64.8	85.9	78.6	60.5	84.3	106	163	12.1	1760	1720	4.36	2.91	
ICCR 800162a	ICCC 4 x G 130	1.00	64.4	84.9	77.3	60.9	86.5	106	164	11.7	2160	1230	5.99	3.82	
ICCR 800174	ICCC 13 x P 326	1.67	63.3	76.4	75.1	68.7	87.8	105	163	13.0	1870	1210	6.08	3.99	
ICCR 800225a	ICCC 17 x BQ 209	2.00	69.8	79.6	76.9	66.0	86.4	105	163	13.3	2210	1610	3.33	2.72	
ICCR 800178	ICCC 17 x P 178	2.00	76.5	80.5	75.5	64.4	87.3	105	163	11.9	1850	1370	5.01	3.05	
ICCR 800182a	ICCC 20 x C 235	1.67	69.3	84.3	78.6	62.5	84.0	107	163	12.8	1900	1620	3.67	3.15	
ICCR 800241a	ICCL 79065 x BQ 203	1.00	63.7	74.7	74.1	68.9	89.3	104	164	11.7	2190	1910	3.30	3.13	
ICCR 800244a	ICCL 79080 x BQ 203	1.00	76.7	81.4	73.7	63.9	88.2	105	162	11.1	1990	1870	3.33	3.10	
ICCR 800201	ICCL 79080 x C 235	1.67	79.4	81.1	78.7	64.2	85.5	105	164	12.0	1790	1470	4.13	3.20	
ICCR 800204	ICCL 79080 x H 208	1.67	73.8	79.4	74.9	65.2	88.9	105	164	12.1	1690	1350	4.36	3.15	
ICC 11514	H 75-35	3.33	68.9	81.1	78.8	67.2	85.2	108	164	20.0	1390	1010	3.68	3.42	
ICC 4954	H 208	3.00	64.7	85.9	77.0	60.7	85.4	107	162	11.2	1740	1470	6.34	3.27	
ICC 5003	K 850	4.33	62.8	80.7	76.2	64.2	83.2	105	161	24.3	1770	1800	6.33	3.70	
0.623 0.288	Mean	1.76	69.4	81.4	77.5	64.2	85.5	106	163	12.9	1900	1430	4.24	3.27	
	SE _x	0.35	4.77	1.35	1.35	1.34	1.54	0.8		0.6	0.33	156.2		310.4	
	CVE	34.6	3.0	3.6	3.1	0.9	0.6	6.5	14.3	25.5	25.4	15.2			

a Populations selected for P₄ bulks in 1984/85.

Table 1.28 Mean values of characteristics of entries in P₃ trial-3 DL at Guelter and Elser, 1983/84.

Cross No.	Percentage	Initial plant stand			Days to 50% flowering			Reproductive period			Days to maturity (1-9)			Weight of seed yield (kg/ha)			Stunt vigor score		
		G	B	E	G	B	E	G	B	E	G	B	E	G	B	E	G	B	E
ICCX 808224a	ICCC 13 x K 850	1.94	79.8	75.7	71.8	69.3	91.3	145	163	16.9	1500	1500	1500	3.56	2.98				
ICCX 808128a	BG 209 x Pant 6-114	1.35	85.3	83.1	76.7	60.8	66.0	104	164	11.0	1400	1420	1420	3.67	3.00				
ICCX 810144a	ICCC 23 x ICCC 29	2.49	77.1	80.3	68.0	65.4	94.3	146	163	15.8	1690	1160	1160	4.26	2.99				
ICCX 810151a	ICCC 4 x ICCC 27	1.43	78.0	75.5	70.0	67.6	93.3	104	163	14.2	1820	1850	1850	4.81	3.35				
ICCX 818153a	ICCC 4 x ICCC 29	1.18	78.5	77.1	72.1	68.1	91.2	104	164	13.6	1720	1310	1310	4.92	3.39				
ICCX 818160	BG 212 x ICCC 27	0.97	84.3	76.7	72.5	67.6	90.4	145	163	10.5	1930	1070	1070	4.56	3.48				
ICCX 818168	B 73-10 x ICCC 23	3.09	75.8	81.2	71.8	64.2	91.1	145	163	17.7	1220	1050	1050	4.99	3.56				
ICCX 818176	K 850 x BG(M) 408	2.09	83.3	78.1	74.0	65.8	88.3	104	163	17.7	1400	1100	1100	5.67	3.70				
ICCX 818177	K 850 x ICCC 23	4.59	64.7	81.1	70.1	64.7	92.5	106	162	20.2	1370	1120	1120	5.14	3.81				
ICCX 818267	BG 209 x ICCC 23	2.11	77.2	78.2	74.6	66.7	88.7	145	163	14.4	1560	1300	1300	4.07	3.48				
ICCX 818268	BG 209 x ICCC 27	1.92	76.8	78.6	72.5	65.5	91.2	144	164	11.2	1500	1030	1030	5.36	3.38				
ICCX 818271a	BG 209 x BG 77-29	1.00	82.3	81.0	79.3	64.2	84.0	146	164	11.3	1900	1030	1030	2.64	2.63				
ICCX 818275a	GL 769 x BG(M) 408	1.92	81.8	79.8	77.2	64.6	86.5	144	164	11.7	1890	1280	1280	3.75	2.70				
ICCX 818277	GL 769 x ICCC 27	1.40	87.5	78.1	73.5	64.0	89.4	142	163	11.5	1370	1360	1360	4.90	3.28				
ICCX 818283a	B 208 x BG 44	1.82	69.6	73.5	72.1	69.9	91.0	143	164	11.4	1590	1320	1320	4.00	3.72				
ICCX 818292a	G 130 x BG 44	1.25	79.4	89.4	78.0	56.0	85.1	145	164	13.5	1630	1700	1700	3.73	3.30				
ICCX 818294a	G 130 x ICCC 23	1.97	81.4	80.0	74.1	64.6	88.2	144	162	11.3	1580	1890	1890	3.07	2.67				
ICCX 818295a	G 130 x ICCC 27	1.38	73.2	82.2	74.5	62.6	88.7	145	163	11.0	1320	1200	1200	4.49	3.31				
ICCX 818298a	G 130 x BG 77-29	1.91	80.2	66.5	77.9	59.1	85.0	106	163	10.8	1690	1400	1400	3.39	2.46				
ICCX 818353	BG 44 x ICCC 28	2.09	76.3	79.3	73.7	66.9	90.2	146	164	13.3	1410	1030	1030	3.20	3.93				
ICCX 818356	BG(M) 408 x ICCC 23	1.72	74.7	74.2	73.0	67.7	88.7	144	163	14.8	1330	1190	1190	4.98	3.62				
ICCX 818364	ICCC 23 x BG 77-29	2.08	73.4	83.4	76.0	62.3	84.6	146	161	14.1	1100	810	810	6.00	4.23				
ICC 11514	B 73-35	3.04	75.3	84.9	76.7	62.0	87.4	147	166	19.3	1130	1170	1170	3.50	2.83				
ICC 4954	B 208	2.65	78.7	84.8	75.0	60.2	88.4	145	163	11.0	1320	1540	1540	3.51	2.71				
ICC 5003	K 850	4.27	62.2	80.0	75.9	58.4	86.7	146	162	24.2	1610	830	830	5.07	6.22				
0.705 0.297	Mean	2.07	77.5	80.5	74.2	64.3	88.9	145	163	14.0	1500	1300	1300	4.44	3.29				
19.1 27.5	SE±	0.380	3.02	1.55	1.02	1.57	1.19	0.6	0.5	0.50	100.9	103.9	103.9						
	CV%	0.5	3.3	2.3	4.2	2.3	0.7	0.6	7.2	10.6									
		31.9																	

a Populations selected for P₄ bulks in 1984/85.

Correlations

There were consistent positive correlations between days to flowering and to maturity at Hyderabad and Gwalior but not at Hisar (Table 1.29). Early maturing types tended to produce more at Hyderabad and Gwalior but less at Hisar. Similarly, large seeded types tended to be higher yielders at Hyderabad but poor yielders at Gwalior. Other correlations were small and inconsistent.

F_4 populations

F_4 bulks were space planted in unreplicated plots of upto 50 rows to give maximum populations of 1000 plants. Based on their performance in F_3 trials in 1982/83 (see R.O.W.1982/83; Tables 1.31 to 1.37), 73 and 40 F_4 bulks were sown and 2647 and 1805 single plants were visually selected at Hyderabad and Hisar, respectively.

Progeny rows

The numbers of progenies sown and single plants selected both at Hyderabad and Hisar are given in Table 1.30. We grew over 19000 progenies both at Hyderabad (13085) and Hisar (6774). The two-row progenies were planted in an augmented design with two checks repeated after every twenty progenies. We used Annigeri and K 850 as the checks at Hyderabad and H 208 and K 850 at Hisar. Where seed number permitted the progenies went into two plantings. This was done in order to diversify environments--at Hyderabad under sprayed and unsprayed conditions, and at Hisar the second planting was later than the first one.

Data on flowering and maturity scores were recorded in all the progenies to classify the material as short, medium and long duration. Visual ratings were also recorded for appearance. Promising and uniform looking progenies were harvested and their yields were compared with the moving average of the checks. Progenies (F_4 - F_8) giving good seed yield and registering maximum increase over the moving average of the check were selected for inclusion in International Chickpea Screening Nurseries whereas others were selected for preliminary yield trials. Where the progenies were not still uniform, good single plants were selected for further progeny tests. Single plant selection continued in F_3 and F_4 progenies and no bulking was done as the material was still segregating.

Preliminary Yield Trials

Ten preliminary yield trials of the breeding lines and germplasm lines were conducted at Hyderabad (4) and Hisar (4) for one short and long duration, respectively. Two trials of medium duration were evaluated at Gwalior.

Short duration

Table 1 29. Correlations among characters in F_3 trials at Hyderabad, Gwalior and Hissar, 1983/84.

	DPF		DPF		DM		DM		SWT	
	V	SWT	V	SWT	V	SWT	V	SWT	V	SWT
Hyderabad										
F_3 trial-2 DS	0.30**	-0.09	-0.05	0.01	-0.21	0.17				
F_3 trial-2 DS	0.69**	-0.04	-0.16	-0.13	-0.30**	0.24*				
F_3 trial-2 DM	0.61**	0.03	0.05	-0.04	-0.31**	0.04				
Gwalior										
F_3 trial-2 DM	0.34**	-0.09	-0.31**	-0.03	-0.07	-0.10*				
F_3 trial-2 DL	0.50**	-0.08	-0.15	0.10	-0.33**	-0.32**				
F_3 trial-3 DL	0.46**	0.15	-0.20	0.26*	-0.10	-0.12				
Hissar										
F_3 trial-2 DL	-0.11	-	-0.20*	-	0.22					
F_3 trial-3 DL	-0.14	-	0.09	-	0.47**					

DPF = Days to 50% flowering

DM = Days to maturity

SWT = Weight of 100 seeds

SY = seed yield

Table 1.30. Number of deas progenies sown and plants selected at Hyderabad and Misar, 1983/84

Generation	Numbers grown		Single Plants Selected			
	Hyderabad	Misar	Total	Hyderabad	Misar	Total
	I	II	I	II	I	II
P ₁	-	156	-	156	-	91
P ₂	320	750	-	1390	2021	2264
P ₃	2584	1369	1329	6611	1117	674
P ₄	1119	991	650	3410	554	430
P ₅	2333	2225	800	6318	594	374
P ₆	939	865	43	1910	-	-
Total	7315	5770	3016	2002	19003	5086
					3041	8927

Table 1.31. Mean values of characteristics in Preliminary yield trial-1 at Hyderabad, 1951-54.

Int. no.	Selection number/ name	Plant stand	Days to flowering	Days to maturity	Yield of seed (kg/ha)	Seed yield (kg/ha)
1	ICCL 81101	98	47.3	86	18.0	1250
2	ICCL 81104	94	48.0	83	18.6	1250
3	ICCL 81108	79	52.1	90	18.8	800
4	ICCL 81207	87	52.2	91	18.4	1000
5	ICCL 81211	114	53.3	89	18.1	1000
6	ICCL 81212	100	53.7	88	18.9	800
7	ICCL 81216	91	49.1	81	18.9	1070
8	ICCL 81220	94	52.9	89	16.6	1000
9	ICCL 81220	100	43.1	83	14.9	1000
10	ICCL 81223	112	52.6	90	16.8	1047
11	ICCL 81226	100	51.5	87	18.0	1130
12	ICCL 81201	86	39.0	79	19.3	713
13	ICCL 81202	78	39.8	79	16.6	947
14	ICCL 81203	71	48.9	87	14.7	1213
15	ICCL 81205	83	49.4	88	16.0	1000
16	ICCL 81206	100	46.9	86	17.8	1043
17	ICCL 81211	94	45.4	87	16.0	1047
18	ICCL 81214	93	47.0	83	16.1	1000
19	ICCL 81215	93	39.1	82	13.8	1047
20	ICCL 81216	93	42.0	84	16.3	990
21	ICCL 81217	94	44.0	84	16.4	1047
22	ICCL 81218	116	43.6	83	14.8	1036
23	ICCL 81219	91	31.6	87	13.7	906
24	ICCL 81220	87	44.7	86	22.7	1031
25	ICCL 81221	78	49.7	87	13.1	802
26	ICCL 81224	92	41.9	83	14.7	800
27	ICCL 81226	87	50.1	87	14.4	1000
28	ICCL 81227	72	47.7	86	18.4	1000
29	ICCL 81228	90	52.4	90	15.0	1054
30	ICCL 81229	75	54.1	91	14.3	904
31	ICCL 81230	100	51.2	84	17.0	1077
32	ICCL 81231	96	52.5	89	12.6	1054
33	ICCL 81232	104	52.9	89	16.2	1000
34	ICCL 81234	105	52.1	87	18.8	1004
35	ICCL 80035	100	46.4	86	13.1	1040
36	ICCL 81229	104	48.2	89	22.6	1054
37	ICCL 81248	102	45.7	85	13.6	1040
38	ICCX-761365-BP-BP-12P-BP (P 514 x P5(K 850 x P378))	90	43.2	83	15.1	1029
39	AKG 2	38	60.3	111	14.2	804
40	BDGG 25	75	48.2	87	16.2	873
41	ICCC 40	101	48.4	87	17.7	1207
42	L 34	95	49.1	86	14.8	800
43	PHULE 6 8	86	40.1	84	20.1	1088
44	ICCX-770019-BP-BP-26P-BP (Annigeri x K 850)	89	47.3	86	18.2	1100
45	ICCX-761131-BP-BP-11P-1P-BP (Chafa x ICX-750877-P1)	102	42.0	82	15.1	1209
46	ICCX-750886-21P-BP-2P-2P-BP (WR 315 x P 1214)	107	49.4	86	17.6	1133
47	BDN 9-3	98	42.4	84	14.1	1096
48	K 850	74	57.2	96	25.8	961
49	Annigeri	94	45.6	86	18.2	1282
	MEAN	92	47.8	87	16.2	1054
	SE	7.7	0.90	0.7	0.41	70.1
	CVA	16.7	3.8	1.7	5.1	13.3

Table 1.32. Mean values of characteristics in PYT-2 at Hyderabad, 1983-84.

Ent no.	Plant stand	Days to 50% flowering	Days to maturity	Weight of 100 seeds (g)	Seed yield (kg/ha)
1	121	46.1	85	16.3	1106
2	112	48.2	89	14.8	1163
3	119	53.4	89	15.6	1119
4	122	40.6	84	20.9	1074
5	108	51.0	91	19.2	1145
6	123	43.5	87	16.1	1274
7	121	51.8	89	15.9	1227
8	118	43.4	86	21.9	1119
9	99	47.7	87	29.1	1162
10	120	52.2	88	14.5	1170
11	125	48.4	86	17.5	1169
12	123	50.5	85	16.2	1153
13	128	52.0	86	15.8	1036
14	110	46.7	84	16.8	1154
15	100	47.9	87	20.3	1371
16	137	42.5	82	16.2	1384
17	107	48.2	88	16.2	1143
18	131	48.6	87	14.2	1223
19	117	44.3	85	15.7	1175
20	124	47.1	86	14.2	1211
21	111	40.7	82	18.2	1274
22	113	43.5	84	17.4	1179
23	131	39.7	80	16.8	1325
24	117	46.6	88	16.5	1331
25	129	48.1	86	15.8	1243
26	125	44.7	85	15.7	1264
27	114	45.0	83	14.7	1134
28	102	38.5	82	19.7	1354
29	113	37.8	80	20.0	1111
30	122	41.1	80	14.8	1172
31	111	49.3	89	15.0	1136
32	118	43.3	82	11.7	1188
33	118	49.9	86	16.6	1324
34	123	42.7	83	15.9	1196
35	117	47.7	86	17.7	1241
36	119	42.5	84	11.8	1187
37	123	40.5	82	13.1	1270
38	128	49.5	85	14.8	1155
39	129	41.2	81	13.6	1173
40	118	45.7	88	18.2	1308
41	115	43.1	85	18.3	1316
42	114	43.8	86	20.0	1335
43	117	51.6	89	14.7	1223
44	115	47.7	87	20.3	1216
45	113	49.8	87	13.8	1160

46	126	48.5	85	15.9	937
47	117	41.0	83	18.0	1050
48	102	56.4	96	26.7	962
49	119	46.6	86	17.4	1255
Mean	118	46.1	86	17.0	1196
SE	7.0	0.95	0.8	0.39	64.2
CV(%)	11.9	4.1	2.0	4.7	10.7

Table 1.33 Correlations among characters in Preliminary Yield Trial-1 in the upper diagonal and Preliminary Yield Trial-2 in the lower diagonal at Hyderabad, 1983/84

	Plant stand	Days to 50% flowering	Days to maturity	Wt. of 100 seeds (g)	seed yield (kg/ha)
Plant stand	1.00	-0.17*	-0.37**	-0.05	0.28**
Days to 50% flowering	-0.05	1.00	0.79**	-0.12	-0.22**
Days to maturity	-0.25**	0.77**	1.00	-0.04	-0.29**
Wt of 100 seeds (g)	-0.29**	0.06	0.27**	1.00	0.13
Seed yield (kg/ha)	0.11	-0.08	-0.02	-0.06	1.00

Table 1 34 Characteristics of entries in Germplasm trial-1 DS at Hyderabad, 1983/84

ICC No	Pedigree	Days to 50% flowering	Days to maturity	Weight of 100 seeds (g)	Seed Yield (kg/ha)
ICC 4540	P 6088	50.7	98.0	14.1	669
ICC 4953	GM-5/7	42.4	88.7	28.4	750
ICC 5568	V 138	51.2	99.3	11.2	838
ICC 5876	R 4-1A	37.6	87.1	29.2	700
ICC 5884	BH 1	45.2	92.6	21.1	610
ICC 5824	K 11	38.2	86.7	28.0	710
ICC 5826	K 582	39.1	87.2	18.3	690
ICC 5832	751-E	35.9	87.8	25.1	690
ICC 5884	T 18	47.1	95.3	26.3	750
ICC 6001	T 120	38.5	88.0	27.2	540
ICC 6074	JG 45	43.6	93.3	22.6	710
ICC 6819	MEC 1153	50.6	98.9	14.8	740
ICC 7810	T 708	38.8	87.8	29.0	660
ICC 7684	1-22-7	44.9	93.6	16.0	560
ICC 7689	1-209 15	47.4	94.3	12.8	580
ICC 7694	2-28-23	44.5	91.7	16.2	610
ICC 8348	GRAM G P 7	38.1	86.7	26.4	670
ICC 8377	OSMARABAD-1-4	47.3	96.4	11.2	600
ICC 8619	WP-2654 A	49.8	98.8	14.4	990
ICC 8822	H 31	40.2	88.1	25.0	810
ICC 10941	RPSP 333 1	52.8	101.5	11.9	650
ICC 11042	RPSP 430-1	45.8	95.3	15.8	820
ICC 11044	RPSP 431-1	43.8	92.4	15.2	710
ICC 11045	RPSP 432	46.6	95.6	14.8	650
ICC 11046	RPSP 433	46.4	91.8	14.4	530
ICC 11047	RPSP 433-1	45.9	93.9	14.3	670
ICC 11051	RPSP 437	46.0	95.7	14.2	600
ICC 11055	RPSP 442	46.3	95.2	11.5	680
ICC 11058	RPSP 443-1	46.0	94.4	12.4	650
ICC 11146	JG 1251	38.5	86.7	30.4	720
ICC 11530	ICCC 9	37.7	88.8	18.7	660
ICC 12159	PR 4356	40.6	89.0	24.0	670
ICC 12249	ICCC 3539 WR	48.8	96.0	15.0	690
ICC 12333	ICCC 24	42.7	92.2	25.9	590
ICC 4918	Annigeri	49.7	94.3	17.9	760
ICC 5003	R 859	51.6	98.9	26.3	1160
Mean		44.4	92.8	19.3	700
SE _d		1.21	1.57	1.40	105.7
CV ² (%)		4.7	2.9	13.0	26.1

Table 1.35. Mean values of characteristics of entries in completed trial-2 DS at Hyderabad, 1963/64.

ICC No.	Pedigree	Days to maturity	Weight of 100 seeds (g)	Seed Yield (kg/ha)	Wilt score (1-9)
ICC 14	P 8	94.4	14.6	1420	2.96
ICC 78	P 61-1	101.6	16.1	990	4.06
ICC 1542	P 1328	97.3	13.9	740	7.13
ICC 2875	P 3230-1	94.4	14.9	690	7.08
ICC 3162	P 3934-1	95.2	14.1	500	8.34
ICC 3386	P 4083	97.4	18.0	1690	2.77
ICC 3457	P 4197-2	93.5	13.2	730	8.46
ICC 4999	T 101	97.0	32.0	1290	2.27
ICC 5160	T 507	94.6	13.2	980	2.69
ICC 5568	V 138	97.2	13.2	1340	4.31
ICC 5695	BH 28	95.0	25.3	950	1.26
ICC 5823	K 4-2	96.4	17.0	1870	2.35
ICC 5959	T 83-2	99.3	29.5	920	1.19
ICC 6121	36 112	94.6	10.5	1010	2.07
ICC 7700	26-5	98.6	15.5	900	2.45
ICC 8405	T 113	92.7	30.9	1440	2.22
ICC 10072	AMM 120-2	94.1	16.8	1120	3.07
ICC 10963	RRP 350	96.4	16.6	980	4.04
ICC 11522	ICCC 1	98.6	19.8	1200	2.62
ICC 11577	RRSP 539	97.8	13.6	990	3.68
ICC 12217	ICC 5549N	97.0	18.6	1310	2.35
ICC 12427	K 850 n Radhey	101.6	14.1	1000	2.33
ICC 12440	ICC 2650 BMR	96.0	15.0	1210	3.35
ICC 4918	Amnigori	96.5	20.6	1190	3.17
ICC 5003	K 850	100.2	27.5	1140	2.76
Mean		96.8	19.2	1060	3.47
SE±		1.19	0.50	139.6	0.620
CV(%)		2.1	4.5	32.6	30.9

Table 1.36. values of characteristics in FFT-DH at Gualier, 1983-84.

Ent	Selection	Days to 50% flowering	Days to maturity	Weight of 100 (g)	yield (kg/ha)
1	ICCL 82115	77.8	147	15.4	2128
2	ICCL 82119	85.1	145	11.9	2254
3	ICCL 82302	78.6	146	14.4	2560
4	ICCL 82324	91.2	147	15.5	2804
5	ICCL 82335	74.2	146	13.7	2314
6	ICCL 83139	81.7	148	16.7	1517
7	ICCL 83140	87.8	147	17.1	1754
8	ICCL 83141	78.8	147	15.4	1937
9	ICCL 83142	77.6	147	12.9	2065
10	ICCL 83145	82.1	148	16.0	1792
11	ICCL 83301	75.4	145	12.5	1661
12	ICCL 83302	73.5	145	18.2	2279
13	ICCL 83303	79.2	148	16.5	2413
14	ICCL 83317	77.2	148	24.3	2891
15	ICCL 83319	76.0	144	16.7	2479
16	ICCL 83320	75.3	145	17.1	1978
17	ICCL 83322	80.3	145	11.9	1888
18	ICCL 83323	76.9	148	15.8	1882
19	ICCL 83324	65.3	146	16.7	2022
20	ICCL 83325	79.0	147	13.8	2182
21	ICCL 83326	76.0	146	12.8	2214
22	ICCL 83330	82.7	145	14.4	2178
23	ICCL 83331	77.8	145	15.2	1880
24	ICCL 83332	79.4	147	13.2	2091
25	ICCL 83334	75.4	146	15.3	2386
26	ICCL 83335	75.4	149	15.6	2111
27	ICCL 83336	80.8	148	14.1	2188
28	ICCX-770060-BP-BP-1P-BP	76.2	148	15.2	1890
29	ICCX-770060-BP-BP-24P-BP	76.0	146	15.6	1984
30	ICCX-770029-BP-BP-36P-BP	79.4	147	14.9	2293
31	ICCX-770029-BP-BP-41P-BP	75.7	147	14.5	2220
32	ICCX-770026-BP-BP-8P-BP	79.9	145	16.0	2048
33	ICCX-770028-BP-BP-51P-BP	76.7	146	13.7	2147
34	ICCX-770435-BP-BP-19P-BP	85.1	145	17.6	2217
35	ICCX-760686-BP-BP-22P-2P-BP	77.0	147	16.1	2071
36	ICCX-760789-BP-BP-45P-1P-BP	84.6	146	18.4	2281
37	ICCX-760628-BP-BP-13P-2P-BP	79.6	145	17.9	2079
38	ICCX-760635-BP-BP-59P-2P-BP	60.4	146	13.7	1837
39	ICCX-760654-BP-BP-23P-1P-BP	78.4	148	15.0	2045
40	ICCX-761467-BH-BH-11B-1P-BP	79.0	149	15.5	2097
41	ICCX-761675-BH-BH-9H-4P-BP	80.3	146	15.8	2121
42	ICCX-760840-BP-BP-25P-1P-BP	76.4	146	13.7	2682
43	ICCX-760695-BP-BP-19P-2P-BP	79.3	145	13.4	2719
44	ICCX-760315-BP-BP-45P-2P-BP	85.4	146	15.3	2122
45	ICCX-750760-BP-BP-36P-1P-1P-BP	76.5	145	14.2	2429

46	ICCX-750760-BP-BP-75P-1P-2P-BP	79.8	146	13.8	2009
47	ICCX-752766-BP-BP-41P-1P-2P-BP	76.1	146	14.5	2354
48	K 850	82.6	147	23.6	2322
49	Local check	79.1	147	12.3	1915
	Mean	78.5	146	15.4	2134
	SE	1.60	0.8	0.35	179.3
	CVX	4.1	1.1	4.5	16.8

Table 1.37. Correlations among characters in the Preliminary Yield Trial-DM at Quailor, 1983/84.

	Days to 50% flowering	Days to maturity	Wt. of 100 seeds (g)	Seed yield (kg/ha)
Days to 50% flowering	1.00	0.37**	0.07	0.17*
Days to maturity		1.00	0.10	0.13
Wt. of 100 seeds (g)			1.00	0.02
Seed yield (kg/ha)				1.00

Table 1.38. Mean values of characteristics of entries in Germplasm trial-DM at Quailor, 1983/84.

ICC No.	Pedigree	Days to 50% flowering	Days to maturity	Weight of 100 seeds (g)	Seed yield (kg/ha)
ICC 55	P 4411	76.5	133	15.8	1640
ICC 2836	P 3111	62.6	130	17.2	1350
ICC 4879	P 3676	67.8	134	13.9	1350
ICC 6054	SM 37	62.0	135	22.2	1050
ICC 6115	SM 107	74.2	134	20.5	1610
ICC 6390	MSC 187	73.2	135	13.6	1500
ICC 7000	S 140-Brown	61.1	135	24.1	1470
ICC 7645	P 8003	74.1	134	22.6	1450
ICC 7701	63-1	63.1	129	16.3	1610
ICC 7743	MSC 422	65.5	131	14.5	1480
ICC 9001	MSC 426	76.1	134	14.7	1350
ICC 9107	MSC 618	78.4	137	10.8	1300
ICC 10944	RPSP 335	69.3	135	14.8	1420
ICC 11365	PR 4340	74.0	134	15.7	1480
ICC 11842	ICCC 21	72.0	134	24.2	1620
ICC 11899	ILC 1201	62.0	129	16.5	1670
ICC 11914	MSC 731	78.7	135	15.5	1730
ICC 12236	ICC 5190M	69.9	134	17.1	1200
ICC 12310	JM 4226-1	62.7	131	16.9	1740
ICC 12439	ICC 1918DM	76.4	133	13.8	1390
ICC 12461	ICC 2874 DM	79.4	133	15.1	1000
ICC 12461	ICC 6040 DM	65.3	132	21.0	1440
ICC 12470	ICC 10519 DM	70.0	134	12.9	1530
ICC 4910	Local check	66.0	134	21.7	1520
ICC 3003	E 850	75.0	134	25.0	1900
	Mean	69.3	133	17.9	1540
	SE _e	1.72	0.8	0.54	151.0
	CV(%)	4.3	1.1	5.2	17.0

At Hyderabad, two trials of 7 x 7 balanced lattice squares with 4 replications; and one of 6 x 6 and the other of 5 x 5 both with 3 replications were conducted. One medium duration trial of 7 x 7 balanced lattice square was conducted at Gwalior. Plot size was 4 rows of 4m long and 30 cm apart, and experiments were planted on broad beds 1.5 m wide at Hyderabad, whereas at Gwalior on two sides of the 60 cm wide ridges and at Hisar on the flat.

Trial-1

This trial comprised of 49 entries, of which 11 were from last year's PYT, 30 were the advanced breeding lines bulked this year, and 5 were promising cultivars from different locations. Three checks BDN 9-3, K 850 and Annigeri were included for comparisons. Data recorded for the five characters (Table 1.31) was reliable since CVs were low. The entries differed among themselves for all the characters. The seed yield of only two entries exceeded that of Annigeri and only one, ICCL 83227 was significantly so giving 1409 kg/ha compared with 1282 of the check.

Trial-2

All the 49 entries were breeding lines bulked in the previous season.

As many as 39 outyielded the check Annigeri but none of these were significantly different (Table 1.32). However, two sister lines 770019-BP-BP-35P-BP and 770019-BP-BP-28P gave the maximum yield of 1384 and 1371 kg/ha respectively. Six entries have been selected for inclusion in ICSN-DS.

Correlations among characters

Correlation coefficients among characters are given in table 1.33. In PYT-1 days to flowering is highly correlated with maturity and both of these have a negative association with yield. Early types are generally more suitable for peninsular conditions.

Germplasm Trials

We selected 57 promising short duration desi accessions from the germplasm during 1982/83 season at Hyderabad. These were tested in two trials with two checks Annigeri and K 850.

Trial-1

The trial included 34 germplasm entries and two checks (Annigeri and K 850). These were grown as a 6 x 6 triple lattice with 3 replications. The trial was partially affected by Sclerotium rolfsii and the CV was high (26%). The check K 850 gave the maximum yield

(1160 kg/ha) and none of the germplasm lines could exceed it (Table 1.34).

Trial-2

This trial comprised 23 germplasm entries and two checks. These 25 entries were planted in a 5 x 5 balanced lattice square design with 3 replication. The trial was also affected by Sclerotium rolfsii and CV was 22.8%. In addition to other data we recorded disease score as well (Table 1.35). One of the checks, Annigeri, gave seed yield of 1150 kg/ha and recorded a disease score of 3.17 on a 1-9 scale (1-free and 9-highly susceptible). Among the entries, highest yield (1510 kg/ha) was recorded in ICCL 12427 with a disease score of 2.37.

Medium duration

PYT-1

The trial with 49 medium duration entries was conducted at Gwalior. Five entries were repetition of last year, 22 were the newly bulked lines, 20 were the advanced breeding lines, and the checks K 850 and GW 3.

Eleven entries gave higher yield than the check K 850 which recorded 2322 kg/ha (Table 1.36). Entries 760695-BP-BP-25P-1P-BP and 760840-BP-BP-25P-1P-BP gave significantly higher seed yields (2719 and 2682 kg/ha, respectively) than the check. Five entries were contributed to ICSN-DM.

Correlations among characters

Days to flowering and maturity showed good positive association with each other and both were positively associated with yield in turn, although, days to flowering was significantly so. The correlation between maturity and seed weight, nonsignificant though, was positive (Table 1.37).

Germplasm trial-DM

A trial of 23 medium duration germplasm entries with K 850 and GW 3 as checks was conducted at Gwalior. The design was a 5 x 5 balanced lattice square with three replications. Data for days to flowering and maturity, 100-seed weight and seed yield were recorded (Table 1.38). The check cultivar K 850, recorded the highest yield (1900 kg/ha) and none of the germplasm entries could outyield it. ICCL 2874 DRR which was statistically at par with the check yield.

Long duration

Four preliminary yield trials (PYT's) were conducted at Hisar comprising 173 bulks in advanced generations (P_6 - P_8). Three of the trials were 7 x 7 balanced lattice squares with four replications, and one was a 6 x 6 triple lattice. The former three trials had 2 checks; and the latter trial had 4 checks. Germination and initial crop growth were good. However, all the trials were affected by salinity. Yield levels were low and coefficients of variation were high (Table 1.39 to 1.42). We rejected entries that were poor on the basis of mean yield, stunt incidence score and visual score. The remaining entries will be re-tested in the coming season.

Advanced Yield Trial

The advanced yield trial was conducted at Gwalior and Hisar. It consisted of 18 entries and two checks (H 208 and K 850). Fourteen entries were from ICRISAT and four were from HAU, Hisar. At ICRISAT, entries were selected from previous year's PYT's and the International Chickpea Screening Nurseries. The trial was planted as randomized blocks with four replications. Plot size and spacing was similar to preliminary yield trials. The combined data for Hisar and Gwalior are given in Table 1.43. The trial at Gwalior was good, and we got acceptable yield levels. The trial at Hisar was partly damaged by salinity and stunt incidence. We selected 3 entries for re-testing in next years AYT. Line ICCL 81290 has been selected for testing in the International Chickpea Cooperative Trial (ICCT).

Table 1.39. Mean values of characteristics in PYT-1 at Hisar, 1983-84.

Snt no.	Selection number	Plant stand	Days to 50% flowering	Days to maturity	Seed yield (kg/ha)	Stunt score	Vis. score	
1	ICCX-770329-23-1P-1P-BT-BP-BH	57	66.8	162	844	7	4	
2	ICCX-770329-13-2P-1P-BT-BP-BH	65	69.6	164	904	7	4	
3*	ICCX-770329-88P-88P-28P-BT-BP-BH	55	71.4	163	779	8	3	
4	ICCX-770329-88P-88P-8P-BT-BP-BH	59	72.9	164	855	5	3	
5*	ICCX-770329-B-B-4P-BT-BP-BH	53	73.4	163	760	5	4	
6*	ICCX-770329-B-B-47P-BT-BP-BH	59	71.9	162	934	8	3	
7	ICCX-770401-1-1P-2P-BT-BP-BH	38	70.1	163	267	7	4	
8*	ICCX-770401-29-1P-1P-BT-BP-BH	50	77.4	163	910	5	3	
9*	ICCX-770401-88P-88P-4P-BT-BP-BH	72	81.2	164	739	3	3	
10	ICCX-770401-B-B-21P-BT-BP-BH	50	81.2	162	737	6	4	
11	ICCX-770401-1-1P-1P-BT-BP-BH	40	74.0	164	303	6	4	
12	ICCX-770401-6-1P-1P-BT-BP-BH	52	57.7	164	590	6	4	
13	ICCX-770401-20-1P-1P-BT-BP-BH	72	75.5	162	408	5	3	
14*	ICCX-770401-1-2P-1P-BT-BP-BH	51	79.0	165	824	4	3	
15	ICCX-770401-15-2P-1P-BT-BP-BH	60	74.8	163	645	5	4	
16	ICCX-770401-20-2P-1P-BT-BP-BH	57	73.2	163	508	5	4	
17*	ICCX-770401-55-1P-1P-BT-BP-BH	65	75.4	164	1434	3	3	
18	ICCX-770401-B-B-8P-BT-BP-BH	59	71.9	162	561	7	4	
19*	ICCX-770401-47-1P-1P-BT-BP-BH	68	79.6	163	1272	3	3	
20*	ICCX-770402-B-B-12P-BT-BP-BH	62	77.0	162	1050	4	3	
21	ICCX-770402-B-B-38P-BT-BP-BH	57	71.6	163	832	6	3	
22*	ICCX-770402-B-B-34P-BT-BP-BH	59	72.6	164	1166	4	3	
23*	ICCX-770402-B-B-17P-BT-BP-BH	54	74.6	162	1126	4	3	
24*	ICCX-770402-1-2P-2P-BT-BP-BH	51	73.1	164	1236	5	3	
25*	ICCX-770402-1-2P-1P-BT-BP-BH	70	71.4	165	899	8	3	
26	ICCX-770402-52-1P-1P-BT-BP-BH	76	72.7	161	744	6	4	
27*	ICCX-770402-1-1P-1P-BT-BP-BH	60	73.0	165	1039	5	3	
28*	ICCX-770402-48-2P-1P-BT-BP-BH	62	75.0	163	1381	3	3	
29	ICCX-770402-26-1P-1P-BT-BP-BH	42	74.6	162	863	5	4	
30	ICCX-770402-60-2P-1P-BT-BP-BH	66	73.8	164	821	5	3	
31	ICCX-770402-69-1P-1P-BT-BP-BH	64	74.5	164	847	5	4	
32	ICCX-770402-38-2P-2P-BT-BP-BH	59	68.5	164	920	6	3	
33*	ICCX-770402-28-1P-1P-BT-BP-BH	45	78.8	165	849	4	3	
34*	ICCX-770402-88P-88P-3P-BT-BP-BH	51	74.1	163	972	5	4	
35*	ICCX-770402-88P-88P-30P-BT-BP-BH	63	78.2	165	893	4	3	
36*	ICCX-770402-B-B-24P-BT-BP-BH	61	70.5	164	1465	3	3	
37	ICCX-770402-B-B-30P-BT-BP-BH	58	73.0	164	935	4	4	
38*	ICCX-770402-B-B-1P-BT-BP-BH	65	76.4	164	1091	4	3	
39*	ICCX-770402-B-B-21P-BT-BP-BH	56	72.6	163	914	5	3	
40	ICCX-770402-B-B-2P-BT-BP-BH	55	72.9	163	715	6	3	
41*	ICCX-770402-B-B-8P-BT-BP-BH	62	67.5	164	1082	5	3	
42	ICCX-770402-B-B-14P-BT-BP-BH	39	73.1	165	707	6	3	
43	ICCX-770426-36-2P-1P-BT-BP-BH	38	66.6	166	605	6	4	
44*	ICCX-770426-54-2P-1P-BT-BP-BH	68	77.4	162	1632	3	2	
45*	ICCX-770426-88P-88P-5P-BT-BP-BH	77	81.0	163	1364	3	2	
46	ICCX-770425-B-B-7P-BT-BP-BH	52	75.5	163	742	5	4	
47	ICCX-770425-B-B-39P-BT-BP-BH	44	73.9	163	414	6	4	
48	ICC-4954 H-208	60	79.1	162	1461	4	2	
49	ICC-5003 K-850	56	74.9	163	1071	3	3	
	Mean	58	73.8	163	892	5	3	
	SE		4.9	1.48	0.8	143.1	0.7	0.3
	CV%		17.0	4.0	0.9	32.1	28.7	17.3

* Selected for PYT in 1984-85

* Selected for AYT in 1984-85

Table 1.40 Mean values of characteristics in PYT-2 at Hiscar, 1983-84.

Ent no.	Selection number/name	Plant stand	Days to maturity	Seed yield (kg/ha)	Stunt score	Vigor score
1*	ICCL-81234	70	163	1022	5	3
2	ICCL-81297	64	162	770	6	4
3	ICCL-81399	60	161	882	5	4
4	ICCL-81300	72	161	670	6	5
5	ICCL-81310	70	162	834	6	4
6*	ICCL-82124	74	161	1134	5	4
7	ICCL-82403	73	161	795	6	4
8*	ICCL-82405	67	161	881	3	4
9*	ICCL-82411	64	162	1094	4	3
10	ICCL-82415	65	161	847	5	4
11*	ICCL-82420	75	162	1047	4	4
12	ICCL-82421	61	162	840	6	4
13*	ICCL-82425	64	161	1064	5	4
14*	ICCL-82427	60	161	1049	4	4
15*	ICCL-82435	71	160	1109	5	4
16	ICCL-82436	56	161	517	6	4
17	ICCL-82438	60	162	819	5	4
18	ICCL-82439	55	163	1350	3	3
19	ICCL-82441	53	161	402	7	5
20	ICCL-82445	70	161	741	6	4
21	ICCX-760293-BN-BN-1N-BN	65	162	873	5	3
22a	ICCX-760379-BN-BN-21N-BN	67	162	1636	4	3
23*	ICCX-761983-BN-BN-12N-BN	73	163	1088	5	3
24*	ICCX-761963-BN-BN-15N-BN	64	161	1077	4	3
25*	ICCX-760757-BN-BN-13N-BN	61	162	1028	5	3
26*	ICCX-760757-BN-BN-14N-BN	71	162	967	5	4
27	ICCX-760947-BN-BN-6N-BN	70	162	707	5	4
28	ICCX-761707-BN-BN-6N-BN	65	162	716	6	4
29*	ICCX-761879-BN-BN-1N-BN	73	162	1110	4	4
30*	ICCX-761879-BN-BN-7N-BN	65	162	1020	5	3
31	ICCX-761805-BN-BN-2N-BN	67	163	948	7	4
32*	ICCX-761889-BN-BN-9N-BN	65	162	1086	4	3
33	ICCX-761876-BN-BN-2N-BN	62	161	831	5	4
34	ICCX-780736-4N-1P-8P-BN-2N-BN	64	161	844	5	4
35a	ICCX-751922-12N-1N-BN-1N-2N-BN	71	161	1159	3	3
36	ICCX-740842-7P-LB-BN-1N-BN-1N-1N-BN	60	163	1038	6	3
37	ICCL-81292	59	161	779	6	4
38*	ICCX-740072-B-5N-LB-8P	62	161	1008	4	3
39*	ICCX-760757-BN-BN-6N-BN	57	161	1023	5	4
40*	ICCX-760757-BN-BN-10N-BN	55	163	1023	5	4
41*	ICCX-760757-BN-BN-11N-BN	66	162	1093	4	4
42	ICCX-760920-BN-BN-1N-BN	62	162	779	5	4
43*	ICCX-760947-BN-BN-1N-BN	62	162	1063	4	3
44*	ICCX-761721-BN-BN-6N-BN	75	161	977	5	3
45	ICCX-752097-42P-8P-1N-1N-BN	74	162	669	6	4
46	ICCL-81290	62	162	1203	4	4
47	ICCC-14	58	162	899	5	3
48	ICC-4954 N-208	62	162	1004	5	4
49	ICC-5003 K-850	44	160	513	6	4
	Mean	65	162	924	5	4
	SE	5.7	0.6	156.3	0.6	0.3
	CV%	17.5	0.8	13.4	26.2	16.1

Selected for PYT in 1984-85

Selected for ATY in 1984-85

Table 1.41. Mean values of characteristics in PYT-3 at Hicar, 1983-84.

Set no.	Selection number/ name	Plant stand	Days to50% flower- ing	Seed yield (kg/ha)	Stunt score	Vis. score
1	ICCX-770431-B-BN-10N-BN	59	97.0	303	7	4
2	ICCX-770431-B-BN-22N-BN	62	94.9	545	6	4
3	ICCX-770431-B-BN-20N-BN	57	96.3	437	6	4
4a	ICCX-770142-B-BN-17N-BN	66	76.3	931	5	3
5a	ICCX-770114-B-BN-3N-BN	50	76.3	1032	4	3
6*	ICCX-780537-B-BN-6N-BN	71	77.6	545	6	4
7*	ICCX-780003-B-BN-3N-BN	62	74.5	675	5	3
8a	ICCX-780530-BN-BT-23N-BN	62	76.1	972	5	4
9	ICCX-780517-BN-BT-1N-BN	54	76.5	535	7	4
10*	ICCX-780404-BN-BT-7N-BN	61	80.8	837	6	3
11	ICCX-770142-B-BN-49N-BN	60	74.5	510	6	4
12	ICCX-770152-B-BN-6N-BN	65	76.6	511	5	4
13*	ICCX-770009-B-BN-5N-BN	64	91.0	785	5	4
14*	ICCX-770009-B-BN-3N-BN	71	84.0	671	5	4
15	ICCX-780521-BN-BT-1N-BN	64	76.2	526	6	4
16	ICCX-780517-BN-BT-10N-BN	67	75.0	615	6	4
17	ICCX-770026-B-BN-14N-BN	61	73.9	200	7	5
18*	ICCX-770910-BN-14N-2N-BN	61	75.0	680	5	4
19	ICCX-760750-B-BP-BN-2N-BN	48	77.4	398	7	4
20	ICCX-761104-B-BP-BN-1N-BN	65	75.7	486	6	3
21*	ICCX-760633-B-BP-BN-2N-BN	69	79.6	573	6	4
22	ICCX-760603-B-BP-BN-10N-BN	59	76.5	351	6	4
23*	ICCX-761423-B-BP-BN-10N-BN	60	72.5	663	6	3
24	ICCX-760343-B-BP-BN-8N-BN	67	73.5	663	6	4
25	ICCX-760360-B-BP-BN-26N-BN	59	92.1	620	6	4
26*	ICCX-760953-BN-BN-6N-4N-BN	68	86.3	654	5	3
27*	ICCX-760857-BN-BN-10N-2N-BN	58	81.2	770	5	3
28	ICCX-761707-BN-BN-4N-5N-BN	61	68.0	432	6	4
29	ICCX-761720-BN-BN-4N-2N-BN	66	76.0	431	6	4
30*	ICCX-761670-BN-BN-7N-1N-BN	59	85.3	986	4	4
31	ICCX-761809-BN-BN-11N-1N-BN	56	79.7	605	6	3
32	ICCX-761903-BN-BN-10N-2N-BN	51	75.7	450	6	4
33*	ICCX-761809-BN-BN-12N-3N-BN	74	78.9	549	5	4
34*	ICCX-761787-BN-BN-11N-1N-BN	54	72.1	900	5	4
35	ICCX-751230-4N-BN-1N-1N-1N-BN	58	61.0	355	7	4
36	ICCX-751295-15N-BP-1N-1N-3N-BN	62	70.1	282	6	5
37	ICCX-750811-3N-BP-1N-1N-1N-BN	55	92.3	507	6	4
38	ICCX-750850-BN-BN-5N-1N-1N-BN	55	76.1	608	6	4
39*	ICCX-750830-BN-BN-10N-1N-1N-BN	59	87.2	703	6	4
40	ICCX-750693-BN-BN-BN-2N-1N-BN	52	93.5	337	7	5
41*	ICCX-750760-BN-BN-BN-1N-2N-BN	66	82.7	544	6	4
42	ICCX-750790-BN-BN-BN-3N-1N-BN	63	93.2	579	7	4
43*	ICCX-751245-BN-BN-BN-6N-3N-BN	57	76.3	666	5	3
44*	ICCX-750754-BP-BP-27P-1P-1N-BN	61	76.1	540	6	4
45*	ICCX-750411-3N-1N-BN-1N-1N-1N-BN	61	80.5	793	6	4
46*	ICCX-740842-19P-1N-2P-BN-1N-1N-1N-BN	65	81.4	508	6	4
47a	ICCX-761160-1N-1P-1N-BN-2N-1N-1N-BN	60	76.0	978	4	3
48	ICC 4954 H 200	56	76.2	655	6	4
49	ICC 5003 K 850	50	76.5	558	6	4
	Mean	61	79.0	603	6	4
	SE	4.4	1.16	118.0	0.5	0.3
	CVA	14.4	2.9	39.4	17.6	13.8

* Selected for PYT in 1984-85

a Selected for AYT in 1984-85

Table 1.42. Mean values of characteristics in preliminary yield trial-4 at Hisar, 1983-84.

Ent no.	Acc. no.	Plant stand	Days to 50% flowering	Days to maturity	Seed yield (kg/ha)	Stunt score	Visual score
1	ICC 456	68	79.2	162	1026	6	3
2*	ICC 465	52	78.3	163	1206	5	4
3*	ICC 698	51	94.9	162	1058	4	4
4	ICC 801	53	81.7	162	868	5	4
5*	ICC 899	52	81.5	163	1236	4	3
6*	ICC 1234	62	82.8	161	938	5	3
7	ICC 1336	62	77.7	165	1036	4	3
8*	ICC 1354	58	80.5	163	1084	5	3
9	ICC 1651	49	98.6	165	828	4	3
10*	ICC 1718	64	84.9	164	1353	4	3
11a	ICC 1762	61	89.7	163	1738	3	2
12*	ICC 1764	47	78.5	163	983	4	3
13	ICC 1773	62	84.9	164	905	5	3
14	ICC 1778	52	86.2	162	897	5	4
15a	ICC 1787	67	87.4	163	1695	4	2
16	ICC 1818	49	67.1	161	391	7	4
17*	ICC 1849	64	86.2	162	1280	5	3
18	ICC 1854	68	84.7	162	969	4	3
19	ICC 1909	62	92.2	162	915	4	3
20	ICC 1916	60	80.0	162	717	6	4
21	ICC 1931	58	80.5	161	559	7	4
22	ICC 1947	64	81.5	161	763	5	4
23*	ICC 1960	61	85.3	163	1037	4	3
24	ICC 1962	44	96.2	161	843	5	4
25a	ICC 1963	70	82.2	164	1420	4	3
26*	ICC 1973	54	85.6	162	1056	5	3
27*	ICC 2017	57	82.2	163	1124	5	4
28*	ICC 2032	58	92.1	164	1119	5	3
29a	ICC 2304	57	82.1	163	1510	4	3
30*	ICC 2337	74	93.5	163	1250	4	3
31*	ICC 2410	68	78.3	162	1227	5	3
32a	ICC 2534	63	80.9	162	1501	5	4
33	ICC 6919	68	82.7	163	1700	4	3
34a	ICC 11669	52	88.8	165	1525	4	2
35	ICC 4954	56	77.1	161	1158	6	4
36	ICC 5003	40	74.9	163	766	4	3
	Mean	59	83.9	163	1102	5	3
	SE	6.0	2.21	0.7	223.3	0.7	0.3
	CV%	17.6	4.6	0.8	35.1	27.1	16.3

* = Selected for PYT in 1984-85.
a = Selected for AYT in 1984/85.

Table 1.43. Mean values of characteristics in Advanced Yield Trial at Gwalior and Misar, 1983/84.

Ent. No	Selection Number/Name	Plant stand		Days to 50% flowering		Days to maturity		Wt. of 100 seeds (g)		Seed yield kg/ha		Stunt Score			
		Gwalior	Misar	Gwalior	Misar	Gwalior	Misar	Gwalior	Misar	Gwalior	Misar	Gwalior	Misar		
1	ICCR-760379-BH-BH-25H-BH	2	67a	50a	81.0	76.0	146	146	-b	11.6	-b	1642	734	6	4
2	ICCR-761983-BH-BH-5H-BH	3	67	54	77.3	73.8	144	144	-	14.1	-	1920	396	6	4
3	ICCR-761991-BH-BH-7H-BH	1	67	57	77.7	77.8	143	143	-	11.2	-	1785	346	7	4
4*	ICCR-751245 BH BH-BH-7H-BH	1	67	64	77.3	74.5	142	142	-	12.6	-	1507	1034	6	4
5*	ICCR-751245-BH BH BH-10H BH	1	67	51	80.0	75.0	144	144	-	11.4	-	1626	1429	5	3
6	ICCR-750653 BH BH-BH-1H-1H-BH	3	00	54	81.0	74.8	147	147	-	18.0	-	1452	172	8	5
7	ICL 81257	1	33	54	80.0	78.0	144	144	-	11.2	-	1626	617	6	4
8	ICL 81300	1	33	54	71.7	72.3	143	143	-	11.4	-	1729	562	7	5
9	ICCR 740145-B 5H-BH 1H BH 1H-1H-BH	2	33	44	79.7	77.5	145	145	-	14.0	-	1555	929	7	5
10	ICL 4951	1	67	52	79.0	74.3	145	145	-	11.3	-	1896	448	6	4
11*	ICCR 740174-BH BH-3H BH 1A-761774-BH BH-3H BH	1	67	53	81.3	73.5	145	145	-	11.8	-	1309	932	5	4
12	ICCR 740156 P 5H 1H 1P 1P 1P-2H-BH	1	67	63	73.3	70.0	142	142	-	12.2	-	1658	352	8	4
13	ICL 81290	3	67	64	82.7	76.0	143	143	-	14.5	-	1253	1323	4	2
14	ICL 81278	1	33	53	81.3	79.0	144	144	-	11.0	-	1690	466	7	4
15	M 82 1	1	33	62	80.3	77.0	144	144	-	11.7	-	1555	940	7	4
16	M 82 3	1	33	62	83.0	92.5	145	145	-	11.4	-	1428	495	6	4
17	M 82-19	2	33	63	79.7	73.0	145	145	-	14.9	-	1444	784	6	4
18	M 82-22	1	00	65	81.7	89.0	146	146	-	11.2	-	1663	450	6	4
19	ICL 4954 H 208	3	67	56	79.7	75.0	145	145	-	11.7	-	1285	359	7	5
20	ICL 5003 K 850	5	00	48	82.7	76.5	145	145	-	24.5	-	1365	344	7	5
Mean		2	20	56	79.5	76.8	144	144	-	13.2	-	1567	636	6	4
SE±		0	47	6.3	1.39	0.99	1.0	1.0	0.47	-	158.6	226.0	0.6	0.3	
CV(%)		36	89	22.7	3.0	2.6	1.2	1.2	6.1	-	17.5	71.1	19.3	16.3	

a - Actual stand count at Misar, score (1-5) at Gwalior

b - Data not recorded

* - Retained for testing in AYT in 1984/85.

Project 2: Development of Kabuli Cultivars and Superior Breeding Material

Objectives:

- (a) To breed high yielding, disease resistant kabuli cultivars with good consumer acceptance.
- (b) To contribute advanced breeding lines and segregating populations to the programs in kabuli producing countries.

Introduction

Our efforts to breed superior breeding lines of kabuli types continued at Hisar location. Emphasis on incorporation of resistance to wilt, ascochyta wilt, botrytis gray mold, and Heliothis was increased (see Projects 16 and 17). During this season we initiated back-crossing program to improve the seed size.

Hybridization

This year we made 21 crosses using 44 lines from the crossing block. These 44 lines/cultivars were from nine different sources, with the major share contributed from ICRISAT and India (Table 2.1). Out of the 21 crosses made 15 crosses were for back cross to improve seed size of high yielding lines with smaller seeds (Table 2.2).

Table 2.1. The countries of origin of kabuli entries included in crossing blocks at Hyderabad and Hisar, 1983/84.

Country/ Institute	No. of strains
Cyprus	1
ICARDA	2
ICRISAT	20
India	10
Iran	1
Jordan	1
Morocco	1
USA	3
USSR	5
Total	44

Table 2.2. Crosses made in 1983/84 to combine high yield and increased seed size in kabuli types.

ICCV No.	Female Parent	Male Parent
High yield and seed size		
830330	L 550 x	L 144
830331	ICCC 32 x	Rabat
830332	GL 629 x	L 144
830333	GL 629 x	Rabat
830334	GL 629 x	Jordanian local
830335	GL 629 x	Cyprus local
Back crosses - high yield and seed size		
830336	(L 550 x Rabat)	x L 550
830337	(L 550 x Jordanian local)	x L 550
830338	(L 550 x Cyprus local)	x L 550
830339	(ICCC 32 x L 144)	x ICC 32
830340	(ICCC 32 x Jordanian local)	x ICC 32
830341	(ICCC 32 x Cyprus local)	x ICC 32
830342	(ICCC 33 x L 144)	x ICC 33
830343	(ICCC 33 x Rabat)	x ICC 33
830344	(ICCC 33 x Jordanian local)	x ICC 33
830345	(ICCC 33 x Cyprus local)	x ICC 33
830346	(ICCC 34 x L 144)	x ICC 34
830347	(ICCC 34 x Rabat)	x ICC 34
830348	(ICCC 34 x Jordanian local)	x ICC 34
830349	(ICCC 34 x Cyprus local)	x ICC 34
830350	(GL 629 x L 144)	x GL 629

P₁ Generation

The 21 crosses mentioned above were planted in the off-season nursery in Kashmir during summer, 1984 for generation advancement.

P₂ Generation

Twenty three P₃ populations were grown at Hisar. Plant growth was poor, and hence single plant selection was not possible. Each cross was bulk harvested for planting as P₃ bulks in the next season.

P₃ to P₈ Generation

We planted 7984 progeny bulks and selected 4 progeny bulks and 704 single plants (Table 2.3). From among 488 P₃ to P₈ progenies evaluated, we selected 50 lines and 510 single plants for further evaluation. Selected progeny lines will be evaluated in replicated trials next year.

Preliminary Yield Trials

Ninety three promising kabuli lines were evaluated in four replicated trials. Thirteen intermediate seed types were evaluated in a separate replicated trial to assess their yield potential.

Preliminary yield trials 1 to 4 each had 23 test entries plus two checks. The trials were planted as 5 x 5 balanced lattice squares with three replications. Each entry was planted as four-row plot of four meter length. Row to row distance was 30 cm and plant to plant 10 cm.

All the four trials were affected by lack of moisture and salinity at maturity. Hence, yield measurements were not taken. However, the entries were visually rated for early vigour, overall growth and incidence of stunt disease. Very poor entries were rejected. Remaining entries will be repeated in the preliminary yield trials in 1984/85 season (Tables 2.4 to 2.7).

Preliminary Yield Trial-5 was conducted to observe the yield potential of intermediate seed types. The trial had 13 test entries and two checks. Data are presented in Table 2.8. Two lines, ICCX 780591-BH-2H-BH and 780581-BH-10H-BH were higher yielding than both desi and kabuli checks.

Advanced Yield Trial

The advanced yield trial had 23 test entries and two checks. Row spacing and design was same as that for preliminary trial, except that the number rows were eight. The trial was conducted both at Hisar and Gwalior. As in the case of preliminary trials, yield data was not recorded at Hisar. At Gwalior, the crop growth was good. The data from Gwalior is presented in Table 2.9. Based on the performance at Gwalior and visual ratings at Hisar 19 lines were retained for re-testing in advanced yield trial during 1984/85.

Table 2.3. The numbers of populations/progenies grown in P_2 and more advanced generations and selections made in 1983/84.

Generation	Number grown		Number selected	
	Bulks	Progenies	Bulks	Progenies
F_3		382	11	400
F_4	79	-	4	704
F_5/F_8	-	488	50	410
Total	79	870	65	1514

Table 2.4. List of entries in Preliminary Yield Trial-1 of kabuli lines at Hissar in 1983/84.

~~Table 2.4~~ Entry

@1	ICCX-741300-7P-1H-2H-BH-BH-BH
S2	ICCX-740649-14P-1P-1H-2H-BH-BH-BH
@3	ICCX-740765-1H-1H-4P-BP-BP-BH
@4	ICCX-751271-BP-BH-32H-BH-BH
@5	ICCX-750265-3H-BH-BH
@6	ICCX-751268-BP-BH-60H-1H-BH
7	ICCX-780591-BH-19H-BH
@8	ICCX-780604-BH-11H-BH
@9	ICCX-780581-BH-1H-BH
@10	ICCX-780581-BH-3H-BH
@11	ICCX-780591-BH-4H-BH
@12	ICCX-770222-BH-6H-BH
@13	ICCX-730237-BH-BH-1H-BH
14	ICCX-770216-BH-BH-4H-BH
@15	ICCX-770173-BH-BH-1H-BH
16	ICCX-780604-BH-12H-1H-BH
@17	ICCX-780581-BH-12H-1H-BH
@18	ICCX-760282-BH-BH-10H-BH
19	ICCX-760282-BH-BH-12H-BH
@20	ICCX-760282-BH-BH-14H-BH
@21	ICCX-760282-BH-BH-15H-BH
@22	ICCX-760282-BH-BH-16H-BH
@23	ICCX-760282-BH-BH-17H-BH
24	ICCC 34
25	L 550

@ Repeated in Preliminary Yield Trial in 1984/85.

S Contributed for Advanced yield testing in 1984/85.

Table 2.5. List of entries in Preliminary Yield Trial-2 of kabuli lines at Hisar in 1983/84.

Sl. No.	Entry
@1	ICCX-761302-6H-BH-1H-BH
2	ICCX-761459-4H-BH-1H-BH
@3	ICCX-761293-5H-4H-1H-BH
@4	ICCX-761293-7H-1H-1H-BH
5	ICCX-761301-4H-1H-1H-BH
@6	ICCX-761251-7H-3H-1H-BH
7	ICCX-761661-57H-2P-1H-BH
@8	ICCX-770171-BH-BH-1H-BH
@9	ICCX-770173-BH-BH-6H-BH
10	ICCX-760481-BH-BH-14H-BH
@11	ICCX-770171-BH-BH-3H-BH
@12	ICCX-770171-BH-BH-4H-BH
@13	ICCX-780588-BH-1H-1H-BH
@14	ICCX-770191-BH-BH-3H-BH
@15	ICCX-770191-BH-BH-4H-BH
@16	ICCX-770191-BH-BH-5H-BH
@17	ICCX-770171-BH-BH-5H-BH
@18	ICCX-761287-7H-1H-BH-BH
@19	ICCX-761301-22H-1H-BH-BH
@20	ICCX-760692-55P-1P-BH-BH
@21	ICCX-760625-BH-BH-1H-BH
22	ICCX-760165-BH-BH-5H-BH-BH
@23	ICCX-760282-BH-BH-12H-BH-BH
24	ICCC 34
25	L 550

@ Repeated in Preliminary Yield Trial in 1984/85.

Table 2.6 . List of entries in Preliminary Yield Trial-3 of kabuli lines at Hisar in 1983/84.

Sl. No.	Entry
@1	ICCX-760282-BH-BH-23H-BH
@2	ICCX-760625-BH-BH-2H-1H-BH
@3	ICCX-760625-BH-BH-7H-1H-BH
@4	ICCX-760282-BH-BH-8H-1H-BH
@5	ICCX-751268-BP-BH-10H-1H-BH
@6	ICCX-751271-BP-BH-23H-1H-BH
7	ICCX-751271-BP-BH-100H-1H-BH
8	ICCX-751271-BP-BH-111H-1H-BH
@9	ICCX-750752-BP-BP-100P-1H-BH
10	ICCX-760282-BH-BH-18H-1H-BH
@11	ICCX-760282-BH-BH-7H-1H-BH
12	ICCX-760093-28H-2H-BH-1H-BH
13	ICCX-751268-30P-1H-BH-1H-BH
14	ICCX-751261-BP-BH-56H-1H-BH
@15	ICCX-751268-BP-BH-75H-1H-BH
@16	ICCX-751268-BP-BH-78H-1H-BH
@17	ICCX-751270-BP-BH-38H-1H-BH
@18	ICCX-751261-BP-BH-47H-1H-BH
19	ICCX-760165-BH-BH-2H-1H-BH
@20	ICCX-750678-140P-1P-BP-BP-BH
@21	ICCX-750705-255P-2P-BP-BP-BH
22	ICCX-751267-20H-1H-BH-BH-BH
@23	ICCX-751268-43P-1H-BH-1H-BH
24	ICCC 34
25	L 550

@ Repeated in Preliminary Yield Trial in 1984/85.

Table 2.7. List of entries in Preliminary Yield Trial-4 of kabuli lines at Hissar in 1983/84.

Sl. No.	Entry
@1	ICCX-751268-47P-1H-BH-1H-BH
2	ICCX-751228-17P-1H-1H-1H-BH
@3	ICCX-751261-BP-BH-39H-1H-BH
4	ICCX-751270-BP-BH-33H-1H-BH
@5	ICCX-751270-BP-BH-38H-1H-BH
6	ICCX-751270-BP-BH-50H-1H-BH
@7	ICCX-751271-BP-BH-38H-1H-BH
8	ICCX-751271-BP-BH-50H-1H-BH
9	ICCX-751271-BP-BH-BH-4H-BH
@10	ICCX-751287-BP-BH-4H-BH-2H-BH
11	ICCX-751270-BP-BH-35H-1H-2H-BH
@12	ICCX-751270-BP-BH-38H-1H-1H-BH
@13	ICCX-750211-1P-3P-1H-BH-1H-BH
@14	ICCX-750219-7P-3P-1H-1H-1H-BH
@15	ICCX-750360-4H-5P-1H-1H-1H-BH
@16	ICCX-751230-BP-BP-26P-BP-1H-BH
@17	ICCX-750946-17H-1H-1H-BH
@18	ICCX-750099-1H-1P-1H-BH
19	ICCX-750406-21H-1P-1H-2H-BH
@20	ICCX-751270-BP-BH-24H-1H-BH
@21	ICCX-770314-BH-16H-BH
@22	ICCX-760282-BH-BH-18H-BH
@23	ICCX-770314-BH-16H-BH
24	ICCC 34
25	L 550

@ Repeated in Preliminary Yield Trial in 1984/85.

Table 2.8. Characteristics of entries in Preliminary Yield Trial-5 (intermediate seed types) at Hisar, 1983/84.

Sl. No.	ICCA-Name	Days to 50% flower	Days to mature	Yield kg/ha	Rank
1	760701-269P-1P-BH-BH	80.3	155.0	1153	8
2	760048-13H-1P-1H-BH-BH-BH	77.7	157.7	1132	10
3	780581-BH-10H-BH	86.3	157.3	1965	2
4	751268-BP-BH-26H-1H-BH	70.7	153.3	840	13
5	750735-BP-BH-BH-2H-BH	59.3	158.0	1153	8
6	780351-6P-BH-BH-BH	86.3	157.0	1021	11
7	780709-BH-3H-BH	93.7	158.0	1375	5
8	780582-BH-2H-BH	90.0	159.0	1271	7
9	780582-BH-8H-BH	84.0	152.5	563	14
10	780591-BH-2H-BH	88.7	162.7	2333	1
11	770222-BH-3H-BH	92.7	162.7	1277	6
12	770205-BH-1H-BH	87.7	152.0	1722	3
13	770210-BH-3H-BH	87.7	153.7	1000	12
14	L 550	80.7	155.0	556	15
15	H 208	86.0	154.3	1413	4
	Mean	83.44	156.55	1252.0	
	SE	2.34	3.60	353.7	
	CV(%)	4.9	4.0	49.0	

Table 2.9. Characteristics of entries in Advanced Yield Trial of kabuli entries grown at Quailor center during 1983/84.

Sl. No.	ICC No/ Name	Days to 50% flower	Days to 50% mature	Plant height at 100 days (cm)	Seed weight of 100 seeds(g)	Seed yield (kg/ha)	Rank
1*	740701-94P-2P-BB-BB	80.0	137	37.6	19.3	1196	18
2*	740105-7P-2P-1P-BB-BB	75.7	138	46.9	21.4	1356	8
3*	750946-23B-2B-BB-BB	76.5	139	50.3	20.6	1708	1
4*	751267-3B-2B-BB-BB	78.6	139	45.1	20.9	1516	3
5*	741300-7P-1B-2B-BB-BB	67.1	136	44.4	20.3	1173	20
6*	740649-14P-1P-1B-2B-BB-BB	72.2	135	40.0	20.9	1328	11
7	751267-14B-1B-BB-BB	77.5	135	41.2	20.0	1277	16
8	751268-12P-1B-BB-BB	77.8	139	39.3	21.2	1324	12
9*	740440-12P-1P-1B-1B-BB-BB	76.8	137	37.0	20.7	1402	7
10*	751270-BP-BB-7B-BB-BB	76.9	137	45.8	21.9	1343	10
11*	751271-BP-BB-32B-BB-BB	83.8	141	42.6	18.5	1142	22
12*	751271-BP-BB-38B-BB-BB	77.3	142	51.8	23.5	988	25
13*	741106-3P-1B-1P-1B-1B-BB-BB	77.8	135	44.1	19.8	1660	2
14*	760692-17P-1P-BB-BB	82.8	136	42.6	16.5	1480	5
15*	750946-24B-3B-BB	78.2	137	47.6	20.7	1166	21
16*	750946-24B-7B-BB	84.6	140	44.1	24.6	1089	24
17*	750946-24B-4B-BB	81.2	138	44.9	23.4	1127	23
18*	741183-2B-1P-1B-BB-BB	76.1	138	38.9	24.8	1223	17
19*	751271-5P-1B-BB-BB-BB	80.9	136	38.4	23.3	1296	13
20	751287-BP-BB-4B-BB-BB	73.3	136	39.0	22.0	1179	19
21	751268-BP-BB-32B-1B-BB	71.4	137	40.6	20.5	1282	14
22*	751268-BP-BB-60B-1B-BB	75.3	136	45.4	24.6	1513	4
23*	751287-BP-BB-9B-BB-BB	75.5	138	48.6	23.4	1281	15
24	ICCC 34	76.3	135	39.0	21.7	1356	9
25	L 530	76.2	136	43.0	20.1	1438	6
	Mean	77.36	137.4	43.13	21.39	1314	
	SE+	2.25	1.0	1.81	0.46	122.7	
	CV(X)	5.05	1.3	7.27	3.75	16.2	

* Retained for testing in Advanced Yield Trial in 1984/85.