

# Multilocal Evaluation of Pigeonpea for Resistance to Phytophthora Blight

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## Abstract

One hundred and forty three pigeonpea accessions and 757 elite breeding lines were evaluated for resistance to phytophthora blight (*Phytophthora drechsleri* f. sp. *cajani* (Pal *et al.*) Kannaiyan *et al.*) at seven locations in India for three to seven seasons between 1984/85 and 1990/91. Three accessions, KPBR 80-2-1, KPBR 80-2-2, and ICP 9252 were moderately resistant to the disease with an average disease incidence of 11-20% (range 1-38%), compared to 89% (range 67-100%) in the susceptible control. These can be used as donor parents for breeding for resistance.

## Introduction

Phytophthora blight (PB) of pigeonpea caused by *Phytophthora drechsleri* f.sp. *cajani* (Pal *et al.*) Kannaiyan *et al.* was first observed in 1966 in New Delhi, India (Williams *et al.*, 1968; 1975). The disease was later found to be serious in Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Maharashtra, and Uttar Pradesh. This disease has also been reported from Australia, Dominican Republic, Kenya, Panama, and Puerto Rico (Reddy *et al.*, 1990). A few lines reported to be resistant to PB earlier (Pal *et al.*, 1970; Kannaiyan *et al.*, 1981) became susceptible to a new isolate (P<sub>3</sub>) of the fungus isolated at ICRISAT, Patancheru (Reddy *et al.*, 1990). In view of the importance of the disease in several parts of India which receive high rainfall and are prone to water stagnation, screening for resistance to PB was undertaken through joint ICAR and ICRISAT collaborative project, and the results are presented in this paper.

## Materials and Methods

One hundred and forty three germplasm accessions identified as resistant at location, and 757 elite breeding lines were screened for resistance to PB at seven locations between 1984/85 and 1990/91 kharif (rainy) seasons through joint ICAR and ICRISAT disease nurseries. Screening was done for seven seasons at Patancheru; for six seasons at Kanpur,

New Delhi, Pantnagar, and Varanasi; five seasons at Sehore; and three seasons at Baroda. PB incidence at all the locations was high (67-100% incidence in the susceptible control) (Table 1).

Fifty seeds of each test line were sown in a 5 m row with a spacing of 75 x 10 cm after the first monsoon rains in June. Every two test lines were alternated by one row of a highly susceptible check, ICP 7119 (Hy 3C), to monitor PB incidence in the nursery. The trials were laid out in a randomized complete block design with two replications. Disease nurseries were irrigated frequently to increase the humidity level and promote development and spread of the disease. Infected plant-debris was incorporated back in to the field at harvest to maintain the disease sick plots.

PB incidence was recorded at maturity. Based on the average PB incidence (%), test lines were categorized as resistant (R) (with 0-10% incidence), moderately resistant (MR) (11-20%), moderately-susceptible (MS) (21-40%), and susceptible (S) (41-100% disease incidence). Since there was variation in disease incidence between seasons at the same location, mean disease incidence over seasons was calculated.

## Results and Discussion

Three germplasm accessions, KPBR 80-2-1, KPBR 80-2-2, and ICP 9252 were moderately resistant to

Table 1. Pigeonpea germplasm accessions showing resistance to phytophthora blight (PB) at six locations in India (1984/85 to 1990/91)

Entry	Pedigree/ Origin	PB incidence (%)							
		Baroda (3)*	New Delhi (6)	Kanpur (6)	Pantnagar (6)	Patancheru (7)	Sehore (5)	Varanasi (6)	Average
KPBR 80-2-1	Kanpur	11	1	17	28	9	7	6	11
KPBR 80-2-2	Kanpur	8	7	25	27	25	7	31	19
ICP 9252	Icrisat	4	12	38	27	25	14	22	20
ICP 7119**	Hy 3C	78	100	67	96	97	89	97	89

\* Figures in parentheses indicate the number of seasons for which evaluation was done at a location.

\*\* Susceptible check

PB at seven locations across seasons (Table 1). None of the 757 breeding lines showed resistance to PB.

Short- and medium-duration lines showed high susceptibility at all the locations. The three germplasm accessions which showed moderate resistance (Table 1) were long-duration types. The differential response of many pigeonpea lines to PB at different locations could be due to the existence of physiologic races in the blight pathogen (Reddy *et al.*, 1990), variation in inoculum density, environmental conditions, and uneven disease infection. PB incidence in KPBR 80-2-2 and ICP 9252 was lower (4-14%) at Baroda, New Delhi, and Sehore than at Kanpur, Pantnagar, and Patancheru (22-38%).

Experience has shown that it is difficult to get high levels of stable resistance to PB in pigeonpea. This is the first report of multilocational evaluation of pigeonpea. This is the first report of multilocational evaluation of pigeonpea for resistance to PB, and identification of three lines with moderate resistance to this disease across the locations. These lines may be used as donor parents for breeding for resistance to PB and high yield.

## Acknowledgements

The authors thank Dr S.D. Naphade, Baroda, Dr R.P. Gupta, Kumarganj, and Dr P.N. Chavan, Akola for conducting trials at their respective locations. Approved as JA no. 1437 by ICRISAT.

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Received : 18.12.92.