

References

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Preliminary Studies on the Incidence of Major Diseases and Insects in *Cajanus platycarpus* Germplasm at ICRISAT Asia Center

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Genetic variation in the tertiary genepool of the cultivated species is of immense value to plant breeders in

developing long-term research and development strategies. *Cajanus platycarpus* is a wild relative of pigeonpea which, at present, cannot be crossed with the cultivated types. However, some successful efforts have been made in this direction using advanced techniques such as embryo rescue. The present study identifies promising characteristics in *C. platycarpus* accessions which can be used in future hybridization programs.

For phytophthora blight screening, 1-week-old seedlings grown in pots in a greenhouse (25°C) were drench-inoculated with a mycelial suspension of P3 isolate of *Phytophthora drechsleri* var *cajani*. Blight mortality was recorded when the susceptible control showed 100% mortality. For sterility mosaic (SM) disease screening, the seedlings raised in pots were staple-inoculated with SM-infected leaves carrying the eriophyid mite vector. Disease observations were recorded when the susceptible control showed 100% disease incidence. For fusarium wilt screening, the accessions were sown in wilt-sick soil in pots in a greenhouse (28±2°C) with the wilt-susceptible control. Observations were recorded at maturity of test lines. Screening for cyst nematode was done in 15-cm diameter plastic pots filled with nematode-infested soil with an infestation level of 15–20 nematode eggs and juveniles per cm³ of soil. The root systems were examined 30–35 days after germination for the presence of young cysts. The number of young cysts on each root system was counted and rated on 1–9 scale with 1 being highly resistant (no cyst) and 9 highly susceptible (>30 cysts).

Table 1. Reaction of *Cajanus platycarpus* accessions to major pigeonpea diseases and insects, IAC, rainy season 1992.

Accession	Phytophthora blight (%)	Sterility mosaic (%)	Cyst nematode (1–9)	Pod borer (%)	Podfly (%)	Total pod damage (%)
ICPW 60	93.3	100	7	18.7	46.4	63.8
ICPW 61	0.0	100	7	26.1	14.2	40.3
ICPW 62	25.0	100	2	6.2	21.2	27.7
ICPW 63	44.4	100	8	15.8	60.8	74.9
ICPW 64	35.3	100	7	5.5	42.0	47.5
ICPW 65	0.0	100	6	15.1	30.7	45.3
ICPW 66	18.2	100	-	17.4	33.5	50.9
ICPW 67	6.3	100	8	17.2	66.7	77.4
ICPW 68	5.6	100	8	24.6	51.2	65.2
ICPW 69	0.0	100	2	25.1	32.2	52.2
ICPW 70	10.1	100	3	9.5	49.3	58.8
ICPW 71	0.0	100	8	15.4	35.5	47.4
ICPW 72	10.5	100	6	8.3	46.5	54.8
Control	95.0	100	9	100.0	- ¹	100.0

1. Due to 100% pod-borer damage, podfly damage could not be assessed.

To determine the reaction to insect pests, an unreplicated 4-m long single row of each accession was sown under insecticide-free conditions on 29 Jun 1992. The interrow spacing was 60 cm, and intrarow spacing 25 cm. In each accession all the pods were collected at maturity from three randomly selected plants. The pods were inspected for damage caused by the pod borer (*Helicoverpa armigera*) and podfly (*Melanagromyza obtusa*).

Screening for phytophthora blight revealed a large variation in the expression of disease. ICPW 61, 65, 69, and 71 were free from disease while ICPW 60 was susceptible to the same extent as the control (Table 1). ICPW 67 and 68 recorded less than 10% phytophthora blight. All the *C. platycarpus* accessions expressed sterility mosaic disease. None of the accessions showed susceptibility to fusarium wilt. In pigeonpea, wilt incidence increases with the age of the crop, and the disease symptoms usually appear 3 months after sowing. In the present evaluation, all the accessions matured within 90 days, and as at this time no wilt symptoms were observed in the known wilt-susceptible line, it is possible that the test materials completely escaped from the disease, as in case of extra-short-duration pigeonpea (Reddy et al. 1986). A large variation was observed among the *C. platycarpus* accessions for susceptibility to cyst nematodes (Table 1). ICPW 62 and 69 (with score of 2) were found to be the most promising accessions.

Mean *Helicoverpa* pod-borer damage among the *C. platycarpus* accessions was low (Table 1) and none of the lines recorded more than 26% pod damage. ICPW 64, 62, 72, and 70 seemed promising, with less than 10% pods damaged. The control pigeonpea recorded 100% pod-borer damage which did not permit its assessment for podfly damage. Among the *C. platycarpus* accessions the podfly damage ranged between 14.2% (ICPW 61) to 66.7% (ICPW 67). Considering the total pod damage, ICPW 62 was the best with 27.7% damage (Table 1).

Considering the diseases and insect scoring, ICPW 69 looks promising. This line also recorded least damage by phytophthora and cyst nematode. In the present study some lines with low insect/disease scores have been identified. These observations should be confirmed before selecting them as parents in pigeonpea breeding programs.

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Phytophthora Blight Resistance in Wild Pigeonpea

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Evaluation of over 14000 accessions of cultivated pigeonpea for resistance to phytophthora blight at ICRISAT Asia Center, Patancheru, resulted in identification of several lines resistant to P2 isolate of the fungus in both field and laboratory evaluations (Kannaiyan et al. 1981). But against more virulent P3 isolate, though some lines such as KPBR 80-2 showed tolerance to the disease in the field, they all showed susceptibility to the disease in seedling stage evaluation in laboratory (Reddy et al. 1991). In field evaluation also, in seasons when the disease occurred in the seedling stage (within 30 days of germination), they succumbed to the disease. This field tolerance in pigeonpea was later explained by adult plant nature of resistance to the disease (Sarkar et al. 1992).

In the search for resistance to the disease in wild pigeonpeas, two accessions of *Cajanus platycarpus* (ICPW 61 and ICPW 66) showed resistance to the disease in seedling evaluation (<10-day-old plants) in repeated tests. Mortality in these lines was <10% compared to 100% mortality in such susceptible controls as ICP 7119. These two lines showed resistance to blight in both drench and spray inoculation methods. Figures 1a and 1b show the resistance of *C. platycarpus* accessions ICPW 61 and ICPW 66 against P2 and P3 isolates compared to susceptible pigeonpea lines ICP 7119, ICP 2376 and KPBR 80-2 in spray inoculation method.

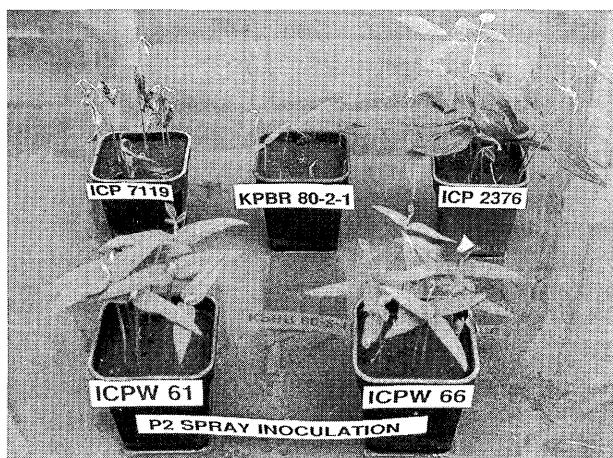


Figure 1a. Reactions of wild pigeonpea accessions (ICPW 61 and ICPW 66), and pigeonpea lines (ICP 7119, KPBR 80-2, and ICP 2376) to P2 isolate of *Phytophthora drechsleri* f. sp. *cajani*.