

A wilt-resistant line 'IPA 204' of long-duration pigeonpea (*Cajanus cajan*)*

A K CHOUDHARY¹

Indian Institute of Pulses Research, Kanpur, UttarPradesh 208 024

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Pigeonpea [*Cajanus cajan* (L.) Millsp.] is the second most important grain legume after chickpea (*Cicer arietinum* L.) in India. The main concern, however, is stability in production, which is highly affected by pigeonpea wilt, especially in north-east plains, central and peninsular India. The disease is caused by a soil-borne fungus *Fusarium udum*. The incidence of wilt alone causes 20–25% yield losses in the north-east plains (Dhar and Reddy 1999). However, loss in individual plants was found nearly 100% when wilt occurred at pre-podding stage, 67% at podding stage and 29.5% at pre-harvest stage (Kannaiyan and Nene 1981). This disease can occur at any stage of plant development, from young seedling to the pod-filling stage. The best way to deal with this disease is to grow cultivars with built-in resistance to the causal organism. None of the existing varieties and land races under cultivation in north-east plains appears to be resistant to wilt disease. This calls for development and release for resistant types to ensure stability of production in this zone. The present paper deals with a genotype 'IPA204' which has shown broad and stable resistance to the wilt pathogen besides having very good yield potential.

'IPA 204' was derived from a cross, 'Bahar' × 'Ac 314-314' following pedigree method of selection. It has compact plant type and indeterminate growth habit. Plants are tall (1.75–2.0 m) with green stem colour. Standard (outer petal) is golden-yellow without any streaks on either side. Pods are green with black stripes. Seeds are medium bold (12 g/100 seeds) and light-brown in colour. Based on its agronomic performance in station trial at IIPR, Kanpur, it was put to AICRP (pigeonpea) initial varietal trial (IVT) for assessment of its performance over the ruling check varieties of long-duration pigeonpea, such as 'Bahar', 'Narendra Arhar 1'. Keeping its good performance in IVT (5% superiority over the best check), it was decided to assess its wilt reaction in wilt-sick nursery of AICRP on pigeonpea located in almost all pigeonpea-growing regions of the country. The wilt



Fig 1 Field view of susceptible check 'Bahar' and resistant line 'IPA 204' in wilt sick nursery at flowering stage

reaction of 'IPA 204' was assayed at a total of 24 locations (3, 10, 5, and 6 locations during 2005–09). At each location, it was replicated twice along with other test entries keeping an inter-row and plant-to-plant spacing at 75 cm and 20 cm, respectively. At each location, at least one susceptible check (such as 'Bahar', 'ICP 2376', etc.) was also put along with the test entries; however, the same check was not used at all the locations. Data on per cent plant mortality/replication were recorded at flowering, full podding, and harvesting stages. The mean per cent mortality has been presented in Table 1.

It is obvious from Table 1 that mean plant mortality (%) in 'IPA 204' ranged from 0.00 (at Badnapur during 2006–07) to 27.25 (at IIPR, Kanpur during 2008–09). The wilt reaction of this entry varied from resistant (16 locations) to moderately resistant (8 locations). In the north-east plains zone (Dholi, Faizabad and Kanpur) and central India (Badnapur, Rahuri, Bharunch, Khargone and Akola), the wilt reaction was similar, that is, from resistant to moderately resistant. However, in south India (ICRISAT, Warangal, and Gulbarga), the test entry showed exclusively resistant reaction during all the 3 years.

So far 5 variants (strains) of *F. udum* have been identified

*Short note

¹Senior Scientist (e mail: akiipr23@yahoo.com), Crop Improvement Division

Table 1 Wilt reaction of 'IPA 204' in wilt-sick nursery at different locations.

Year	Location	LSI	Per cent infection (susceptible check)	Per cent infection 'IPA 204'	Wilt reaction of 'IPA 204'
2005-06	Dholi	72.3	74.9 ('Bahar')**	6.1	Resistant*
	Badnapur	36.1	100.0 ('ICP 2376')	4.3	Resistant
	Rahuri	34.8		19.3	Moderately resistant
2006-07	Rahuri	74.7	100.0 ('ICP 2376')	16.4	Moderately resistant
	Bharunch	32.4		4.0	Resistant
	Khargone	25.0	67.0 ('ICP 2376')	5.8	Resistant
	Badnapur	45.4	100.0 ('ICP 2376')	0.0	Resistant
	ICRISAT	60.8	100.0 ('ICP 2376')	2.6	Resistant
	Warangal	32.1	63.1 ('ICP 2376')	6.1	Resistant
	Gulbarga	63.2	100.0 ('PT 221')	4.2	Resistant
	Dholi	49.1	90.0 ('Bahar')	12.0	Moderately resistant
	Faizabad	41.6	100.0 ('Bahar')	6.0	Resistant
2007-08	Akola	44.3		13.0	Moderately resistant
	Dholi	29.4	90.0 ('ICP 2376')	8.0	Resistant
	Gulbarga	39.2	100.0 ('ICP 2376')	7.6	Resistant
	Rahuri	45.4	100.0 ('ICP 2376')	8.3	Resistant
	Badnapur	30.7	93.5 ('ICP 2376')	19.4	Moderately resistant
	ICRISAT	29.7	95.8 ('ICP 2376')	9.3	Resistant
2008-09	Badnapur	18.5	100.0 ('ICP 2376')	14.3	Moderately resistant
	Dholi	20.8	80.7 ('ICP 2376')	10.3	Moderately resistant
	Gulbarga	17.1	96.7 ('ICP 2376')	3.8	Resistant
	Rahuri	33.9	100.0 ('ICP 2376')	8.1	Resistant
	ICRISAT	25.6	100.0 ('ICP 2376')	4.8	Resistant
	IIPR, Kanpur	21.8	91.8 ('ICP 2376')	27.3	Moderately resistant

*disease reaction quantified on the basis of acceptable scale used by pathologists (resistant: up to 10% wilted plants; moderately resistant: >10-30% wilted plants); **Susceptible check in parentheses

and documented (Reddy *et al.* 1996, Mishra and Dhar 2003, and Mishra 2004). The first one (I) is widely prevalent. In north-east plains, Uttar Pradesh has recorded the presence of all the 5 variants, whereas Bihar has the 4. In south and central India, only 3 strains (I, II and III and I, III and V respectively) are found (IIPR 2008). As 'IPA 204' displayed resistant reaction uniformly in the south zone, it must be resistant to all the 3 variants of this zone. Even at Dholi (adjoining region of both Muzaffarpur and Samastipur districts of Bihar), wherefrom 4 variants have been reported, the mean per cent mortality over 4 years was <10%. However the average per cent plant mortality at IIPR, Kanpur (where the presence of all the 5 strains of the wilt pathogen has been reported) was 27.30. Therefore it could be called resistant to all the prevalent 5 variants of wilt pathogen of pigeonpea. Keeping its uniform and stable resistant reaction, it was recommended as potential donor for wilt resistance in the Annual Group Meet on Pigeonpea (2009).

SUMMARY

Pigeonpea is the second important grain legume of India. In north-east plains, long-duration pigeonpea is grown almost exclusively as an intercrop with other tall cereals.

Development of wilt-resistant lines is the major objective to ensure stability in pigeonpea production and productivity. One genotype 'IPA 204' of long-duration pigeonpea was developed following pedigree method. This high-yielding line showed resistant to moderately resistant wilt reaction at 24 locations spread across various pigeonpea-growing regions of the country. Therefore, it could be considered resistant to all the reported 5 strains of *F. udum*. Keeping its stability of resistance for the last 4 years, it was recommended as the potential donor for wilt resistance in the Annual Group Meet on Pigeonpea (2009).

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