

# Integrated management of pigeonpea wilt disease incited by *Fusarium udum* var. *Cajani*

■ S. V. PAWAR, G. D. DESHPANDE, D. N. DHUTRAJ AND UTPAL DEY

## SUMMARY

Evaluation of different fungicides and biocontrol agents revealed that all the fungicides as well as biocontrol agents have significantly improved germination (%) over untreated control. Combination of seed treatment (T<sub>9</sub>) with thiram+ carbendazim + *T. viride* + *Rhizobium* and soil application of *T. viride* was significantly superior and was at par with T<sub>8</sub>, T<sub>7</sub>, T<sub>6</sub>, T<sub>5</sub>, T<sub>4</sub> and T<sub>2</sub>. All the fungicides alone or in combination with *T. viride* + *Rhizobium* seed treatment were significantly superior over control and were at par.

**Key Words :** Integrated management, Wilt, Pigeonpea

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Wilt of pigeonpea being mainly soil borne and to some extent seed borne, the management of the disease needs, integrated approach. The seed transmission of *Fusarium udum* externally as well as internally, is well documented in the literature (Nakkeeran and Devi, 1997). The internal seed transmission of *Fusarium udum* has been reported in susceptible and tolerant cultivars, but it was not internally seed borne in resistant cultivars. The internal seed borne nature of the fungus was confirmed by repeated laboratory studies and growing in pot test. Gowdar and Kulkarni (1999) conducted laboratory and glass house tests to determine the compatibility of antagonists (*T. viride* and *T. harzianum* @ 4 g/kg seed) with fungicide (carbendazim @ 0.05 per cent and captan @ 0.2 per cent as seed treatment) for the control of *Fusarium* wilt of pigeonpea caused by *F. udum*. In glasshouse tests, seed treated with carbendazim and

carbendazim + *T. viride* showed 90 per cent germination in comparison with 76 per cent in control.

## MATERIALS AND METHODS

This experiment was planned in Randomized Block Design with three replications and nine treatments. Three biological agents ST<sub>4</sub> *Trichoderma viride*, ST<sub>5</sub> *Pseudomonas fluorescens*, ST<sub>6</sub> *Rhizobium* were used at the rate of 10 g/kg of seed of ICP-2376 (susceptible cultivar). Three chemicals viz., ST<sub>2</sub> thiram at the rate of 3 g/kg seed, ST<sub>4</sub> carbendazim @ 2 g/kg seed, ST<sub>2</sub> captan @ 3 g/kg seed, ST<sub>7</sub> thiram + carbendazim + *Trichoderma viride* + *Rhizobium* [(2 g/kg) (thiram and carbendazim), 10 g/kg (*Trichoderma viride* and *Rhizobium*) and ST<sub>8</sub> thiram + carbendazim + *Trichoderma viride* + *Rhizobium* + soil application (10 ml/kg of soil before sowing) were used for seed treatment and soil application. A control ST<sub>0</sub> was sown without any seed treatment and soil application. The experiment was conducted in pots using the sick soil from Agricultural Research Station Badnapur. The observation on germination (%) and wilting (%) were analyzed statistically.

## RESULTS AND DISCUSSION

Different fungicides and bioagents were tested either by seed or soil application or by combination as shown in material and methods. Experiment was planned in Randomized

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**Table 1: Effect of fungicides / bio-agents on germination (%) and wilt (%) incidence in pigeonpea**

Treat. code	Treat. key	Treatments	Method	Germination		Wilt	
				(%)	Arc sin	(%)	Arc sin
T <sub>1</sub>	F <sub>4</sub>	Control	N.A.	83.33	(62.51)	82.97	(56.92)
T <sub>2</sub>	F <sub>1</sub>	Thiram	S.T.	100.00	(89.98)	36.66	(21.70)
T <sub>3</sub>	F <sub>2</sub>	Captan	S.T.	100.00	(89.98)	43.33	(25.96)
T <sub>4</sub>	F <sub>3</sub>	Carbendazim	S.T.	100.00	(89.98)	30.00	(17.32)
T <sub>5</sub>	B <sub>1</sub>	<i>T. viride</i>	S.T.	100.00	(89.98)	26.66	(15.52)
T <sub>6</sub>	B <sub>2</sub>	<i>P. fluorescens</i>	S.T.	100.00	(89.98)	36.66	(21.63)
T <sub>7</sub>	R <sub>1</sub>	<i>Rhizobium</i> alone	S.T.	100.00	(89.98)	40.00	(23.67)
T <sub>8</sub>	F <sub>1</sub> +F <sub>3</sub> +B <sub>1</sub> +R <sub>1</sub>	Thiram + Carbendazim + <i>T. viride</i> + <i>Rhizobium</i>	S.T.	100.00	(89.98)	23.33	(13.55)
T <sub>9</sub>	F <sub>1</sub> +F <sub>3</sub> +B <sub>1</sub> +R <sub>1</sub> +B <sub>1</sub> S.A.	Thiram + Carbendazim + <i>T. viride</i> S.T. + <i>Rhizobium</i> + soil application of <i>T.V.</i> S.T. + S.A. ( <i>T.v.</i> )	S.T. + S.A. ( <i>T.v.</i> )	100.00	(89.98)	20.00	(11.57)
		S.E. ±		2.93	(4.65)	6.85	(4.53)
		CD 0.05		8.79	(13.93)	20.51	(13.57)

S.T. : Seed Treatment, S.A. : Soil Application

**Statistical significance for wilt (%)**

F <sub>1</sub> +F <sub>3</sub> +B <sub>1</sub> +R <sub>1</sub> +B <sub>1</sub> S.A.	Thir + Carbn + <i>T.v.</i> + <i>Rhizo</i>	<i>T.v.</i>	Carb.	<i>P. fluore</i>	Thiram	<i>Rhizobium</i>	Captan	Control	CD
T <sub>9</sub>	T <sub>8</sub>	B <sub>1</sub>	F <sub>3</sub>	B <sub>2</sub>	F <sub>1</sub>	R <sub>1</sub>	F <sub>2</sub>	F <sub>0</sub> B <sub>0</sub> R <sub>0</sub>	0.05
11.57	13.5	15.48	17.52	21.63	21.7	23.7	25.96	56.92	13.57

Block Design (RBD) with three replications. Seeds were treated with different fungicides / bioagents/ *Rhizobium* as shown in material methods. After seed treatment with fungicides seeds of susceptible cultivar were sown in sick soil in plastic container. In treatment ST<sub>9</sub>, the soil application of *T. viride* broth was done @ 10 ml/pot of 0.5 kg soil. The observations as on germination (%) were noted 10 days after sowing and the observations on wilt (%) were noted 90 days after sowing. The results of the experiment are given in Table 1.

Results (Table 1) revealed that fungicides as well as biocontrol agents have significantly improved germination (%) over untreated control. Combination of seed treatment (T<sub>9</sub>) with thiram + carbendazim + *T. viride* + *Rhizobium* and soil application of *T. viride* was significantly superior and was at par with T<sub>8</sub>, T<sub>7</sub>, T<sub>6</sub>, T<sub>5</sub>, T<sub>4</sub> and T<sub>2</sub>. All the fungicides alone or thiram + carbendazim in combination with *T. viride* + *Rhizobium* seed treatment were significantly superior over control.

The efficacy of thiram has been tested by many workers by PFT method (Sumita and Gaikwad, 1995). However, increase in the seedling emergence and reduction in wilt incidence was observed by Gholve and Kurundkar (2002) with seed treatment of pigeonpea by *T. viride*. The efficacy of carbendazim has been tested by PFT by Dikkar *et al.* (2001) and Podhar *et al.* (2000). Ajaiah *et al.* (2003) could protect pigeonpea from *Fusarium udum* wilt disease with *Pseudomonas aeruginosa*. Pandey and Updhaya (2000) screened 11 fungi from rhizosphere and non rhizosphere soil of pigeonpea and found that, *Trichoderma viride* exhibited strong antagonism by inhibiting hyphal growth of *F. udum*. *Trichoderma viride* has been tested as seed dresser by many workers (Singh, 2000). Observations are in agreement with Gowder and Kulkarni (1999). Similar results on the inhibition zone by *T. harizanium* have been reported by Patel and Anahosur (2001).

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