



## ***In vitro* Evaluation of Efficacy of Non Systemic and Systemic Fungicides against *Fusarium udum* Inciting Pigeonpea Wilt**

**Arunodhayam K.\*, Sarada Jayalakshmi Devi R.\*\*, Bhaskara Reddy B.V.\*\*\*, Prasanthi L.\*\*\*, Sudhakar P.\*, Mamta Sharma\*\*\*\***

\*S.V. Agricultural college, Tirupati, \*\*ANGRAU, Lam, \*\*\*Regional Agricultural Research Station, Tirupati,

\*\*\*\*International Crops Research Institute for the Semi Arid Tropics

\*Corresponding Author E-mail: [karunodayam@gmail.com](mailto:karunodayam@gmail.com)

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### **ABSTRACT**

Two non systemic fungicides viz., mancozeb and zineb and two systemic fungicides viz., carbendazim and carbendazim + mancozeb complex was evaluated for their efficacy against *F. udum* inciting wilt in pigeonpea. mancozeb was found to be the best among the two non systemic fungicides with highest inhibition of 45.20% @ 0.3% concentration. Two systemic fungicides (carbendazim and carbendazim + mancozeb) at all the concentrations resulted in 100 per cent inhibition. Carbendazim was selected for Integrated Disease Management studies based on the cost of fungicide i.e. cost of carbendazim was cheaper than the Carbendazim + mancozeb complex.

**Keywords:** *Fusarium udum*, Pigeonpea wilt, Non systemic, Systemic, Fungicides, Evaluation, in vitro

### **INTRODUCTION**

Pigeonpea crop suffers from over 210 pathogens (83 fungi, 4 bacteria, 19 viruses and mycoplasma and 104 nematodes) reported from 58 countries (Reddy *et al.*, 1990; Nene *et al.*, 1996). The major diseases that assume significant importance include wilt (*Fusarium udum* Butler), sterility mosaic (Pigeonpea sterility mosaic virus) and phytophthora blight (*Phytophthora drechsleri* Tucker f. sp. *cajani*) (Pande *et al.*, 2012). Pigeonpea wilt caused by *F. udum* is the most important soil borne disease and was first described in 1906 from

Bihar state in India (Butler, 1906). The disease appears in kharif (June) sown young seedlings during august but the highest mortality occurs at flowering and podding stage from november onwards. The yield loss of the crop depends on the stage at which the wilt disease appears. The disease can cause yield loss up to 100, 67 and 30 per cent when wilt occurs at pre-pod, maturity and pre-harvest stages, respectively. The annual crop loss due to wilt alone in India has been estimated at Rs. 37 crores (Kannaiyan *et al.*, 1984).

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In this study non systemic (mancozeb and zineb) and systemic fungicides (carbendazim and carbendazim + mancozeb complex) were evaluated for their efficacy *in vitro* and the potential and cost effective fungicide was used in the Integrated Disease Management studies.

## MATERIALS AND METHODS

*In vitro* efficacy of fungicides against the pathogen was evaluated by poisoned food technique (Nene and Thapliyal, 1993). The list of fungicides used in the present studies is given below:

### Dithane M-45, Dithane Z-75, Carbendazim and Carbendazim 25% + Mancozeb 50%.

Sl. No.	Trade Name	Common Name	Active Ingredient
1.	Dithane M-45	Mancozeb	75% W.P
2.	Dithane Z-75	Zineb	70% W.P
3.	carbendazim	Bavistin	50% W.P
4.	Carbendazim 25% + Mancozeb 50%	SAAF	75% W.P

### Poisoned food technique

To 50 ml of sterilized distilled water, required quantity of fungicide was added and mixed thoroughly. This solution was added to 50 ml of sterilized cool molten double strength PDA medium, mixed thoroughly and poured into Petri plates. 5 mm discs of four days old culture of pathogen were inoculated at the centre of Petri plates and then incubated at  $28 \pm 2^\circ\text{C}$ . Three replications were maintained for each fungicide. Medium without fungicide was kept as control. Per cent inhibition of the growth of the fungus over the control was calculated using the formula:

$$I = \frac{C-T}{C} \times 100$$

Where,

I = Per cent reduction in growth of pathogen

C = Radial growth (mm) in control

T = Radial growth (mm) in treatment

## RESULTS AND DISCUSSION

Two non systemic fungicides *viz.*, mancozeb and zineb were evaluated by poisoned food technique at various concentrations of each fungicide *viz.*, 0.1, 0.2 and 0.3 per cent. Comparatively highest percentage of inhibition was recorded with mancozeb at all the three concentrations than the zineb. Highest percentage of inhibition (45.20%) was recorded by mancozeb at 0.3% concentration,

followed by at 0.2% and 0.1% concentrations. Least percentage of inhibition (2.73) was recorded with zineb at 0.1% concentration. From the Table 1 mancozeb was found to be the best among the two non systemic fungicides. The similar type of study was conducted by Mahesh, (2010), found that chlorothalonil inhibited hundred per cent mycelial growth at 1000 and 1500 ppm, followed by 98.00, 78.20 and 64.25 per cent inhibition at 750, 500 and 250 ppm, respectively.

Similarly two systemic fungicides *viz.*, carbendazim and carbendazim + mancozeb complex were evaluated against the *F. udum* under *in vitro* conditions by poisoned food technique at various concentrations of each fungicide *viz.*, 0.05, 0.1 and 0.2 per cent. In this study among two fungicides at all the concentrations 100 per cent inhibition was noticed. There is no significant difference between the three concentrations and treatments of both the fungicides. But the carbendazim was selected for Integrated Disease Management studies based on the cost of fungicide *i.e.* cost of carbendazim was cheaper than the Carbendazim + mancozeb complex (Table2). The similar type of study was conducted by Ravi Kumara B.M. (2015) and found carbendazim 25 per cent + mancozeb 50 per cent, showed 100 per cent

inhibition at all concentrations (0.05, 0.10 and 0.20%). Benomyl, carbendazim, thiophanate methyl showed 100 per cent inhibition at 0.2 per cent concentration and more than 90 per cent inhibition was recorded in 0.05 and 0.1 per cent concentration of benomyl and carbendazim.

Among non systemic and systemic fungicides, systemic fungicides (carbendazim

and carbendazim + mancozeb complex) were proven more effective in inhibiting the pathogen. Among the two systemic fungicides (carbendazim and carbendazim + mancozeb complex) carbendazim was selected for Integrated Disease Management studies as it is cost effective.

**Table 1: *In vitro* evaluation of non systemic fungicides against *F. udum* by poisoned food technique**

Non systemic fungicides	Concentration	Mean % Inhibition
Mancozeb	0.1	24.08(29.40)
	0.2	31.04 (33.87)
	0.3	45.20 (42.25)
Zineb	0.1	2.73 (9.52)
	0.2	8.70 (17.16)
	0.3	27.85 (31.86)
<b>Source</b>	<b>F value</b>	<b>p value</b>
<b>Fungicides</b>	<b>8.619</b>	<b>0.012</b>
<b>Concentration</b>	<b>11.77</b>	<b>0.001</b>

**Table 2: *In vitro* evaluation of systemic fungicides against *F. udum* by poisoned food technique**

Systemic fungicides	Concentration	Mean % Inhibition
Carbendazim	0.05	100
	0.1	100
	0.2	100
Carbendazim + Mancozeb	0.05	100
	0.1	100
	0.2	100

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