



## RESEARCH PAPER

# Survey for the incidence of wilt disease and management of wilt in chickpea

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**Abstract :** Chickpea wilt pathogen in association with other soil-borne pathogens like root rots and foot rot also causes extensive damage to chickpea crop. The highest incidence of wilt (12.84 %) was observed in Neginahala village of Bailhongal taluka. While, the maximum wilt complex incidence of 8.94 per cent was recorded in Inchala village of Savadatti taluk. Followed by 6.18 per cent of wilt incidence was surveyed in Melmatti village of Gokak taluk and 5.64 per cent incidence of wilt complex was observed in Nerali of Hukkeri and 5.64 per cent wilt in Koliguuda of Athani taluk surveyed. higher yield was found in seed treatment with vitavax power, T<sub>4</sub> (10.32qtl/ha) which was on par with seed treatment with sprint T<sub>5</sub> (9.67 q/ha.). Among all chemicals fungicides and bioagents used for the management of wilt rot complex, the seed treatment with vitavax power (Carboxin+Thiram)@ 2g/kg seed has reduced per cent wilt disease to greater extent with 2.40 PDI and increased yield upto 10.32qtl/ha. Similarly, among various bioagents, seed treatment with *Trichoderma harzianum* @ 4 g/ kg seed + Soil application of *T. harzianum* @ 2 kg + 250 kg FYM + 50 kg *Neem* seed powder/ hectare found significant to reduce wilt incidence from 3.65 to 11.11PDI with increased yield 8.67qtl/ha to 9.90 qtl/ha during both year and which is on par with seed treatment with *T. harzianum* @ 5g + *P.fluorescens*@ 5g/ kg seed recorded 3.69 to 9.89 PDI with yield ranged 8.92 to 9.50 qtl/ha which indicates when bio control agents were combined exhibit grater control of wilt with higher yield rather than individual bio control agent used.

**Key Words :** Incidence of wilt disease, Management, Wilt in chickpea

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## INTRODUCTION

India is the major producing country for chickpea, contributing for over 75 per cent of total production in the world. Chickpea is major *Rabi* sown pulse crop in September-November and harvested in February. It is best suited to areas having low to moderate rainfall and

a mid cold weather. Excessive rains soon after sowing or at flowering stage are harmful for the crop. Chickpea is a key pulse crop being grown in 8.75 million ha with an annual production of 8.25 million tons and national productivity is 925 kg/ha (Singh, 2011). Chickpea is a major and cheap source of protein compared to animal

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protein. Chickpea is cultivated for its seeds. They are rich source of protein and form an important part of vegetarian diet. Chickpea seeds contain about 17-20 per cent of protein.

*Fusarium wilt* disease is major constraint to chickpea production due to occurrence of *Fusarium wilt* of chickpea. Causal organism of wilt *Fusarium oxysporum* f. sp. *ciceris* (Padwick) synd. and Hans. produces microconidia, macroconidia and chlamydospores. Microconidia ( $2.5-4.5 \times 5-11 \mu$ ) are oval or cylindrical, straight or curved. Macroconidia ( $3.5-4.5 \times 25-65 \mu$ ) are 3-5  $\mu$  septate or fusoid. Both 504 (Singh *et al.*, 1989). Microconidia and macroconidia are generally sparse on solid media and are formed abundantly in potato dextrose broth. Chlamydospores are formed in 15-day-old cultures singly, in pairs or in a chain and are smooth or roughwalled.

The characteristic symptoms of wilt are drooping of petioles, rachis and leaflets. The lower leaves are chlorotic, gradually turn yellow and then light brown or straw-coloured and finally dry up. Discoloration of xylem vessels extends towards stem and branches and can be seen when split open vertically. Sometimes only a few branches are affected, resulting in partial wilt. Affected plants do not show external root discoloration (Singh *et al.*, 1989). Dry root rot caused by *Macrophomina phaseolina* (Maub.) Ashby. is a serious problem and has been reported from Australia, Ethiopia, Iran, Pakistan, Bangladesh, Nepal and several other countries (Nene *et al.*, 1991 and Singh and Sharma, 2002). Although it is found in all chickpea growing areas of India.

## MATERIAL AND METHODS

### Survey for the incidence of wilt-root rot complex :

The rapid roving survey for incidence of wilt disease complex in chickpea was carried in different villages of various taluka of Gokak, Savadatti, Bailhongal, Athani and Hukkeri of Belgaum dist. during 2013-14. To know chickpea wilt complex incidence at flowering stage in major chickpea growing areas of Belagavi districts. The disease incidence was recorded by using following formula:

$$\text{Per cent disease incidence} = \frac{\text{No. of plant infected}}{\text{Total no. of plants observed}} \times 100$$

### *In vivo* evaluation of chemicals and bio-control agents:

Field studies were conducted at farmers field at

Bailhongal of Belagavi for two consecutive years during the *Rabi* season of year 2013-14 and 2014-15. The experiment was designed as Randomize Block Design (RBD) with three replications and nine treatments with genotype A-1 was used. For the field study of wilt complex management, seed treatment with different fungicides and bioagents were used for seed treatment along with soil application at different concentrations. Before sowing seeds are treated with these selected fungicides as well as bioagents and untreated seed served as control. All agronomic practice was carried out as per recommendations. The data on percent disease incidence and yield were recorded.

### Treatment details are as follows:

T<sub>1</sub> = Seed treatment with captan @ 2g / kg seed, T<sub>2</sub> = Seed treatment with *Trichoderma harzianum* @ 4 g/ kg seed + Soil application of *T. harzianum* @ 2 kg + 250 kg FYM + 50 kg *Neem* seed powder/ hectare (PoP), T<sub>3</sub> = Seed treatment with Carbendazim @ 2g/kg seed, T<sub>4</sub> = Seed treatment with vitavax power (Carboxin+Thiram)@ 2g/kg seed, T<sub>5</sub> = Seed treatment with sprint (Carbendazim+Mancozeb) @ 2g/kg seed, T<sub>6</sub> = Seed treatment with *Trichoderma harzianum*@10g/ kg seed, T<sub>7</sub> = Seed treatment with *Pseudomonas fluorescens*@10g/kg seed, T<sub>8</sub>= Seed treatment with *T. harzianum*@5g + *P. fluorescens*@5g/kg seed, T<sub>9</sub>= Untreated control.

## RESULTS AND DISCUSSION

Incidence of wilt disease complex in chickpea was carried by rapid roving survey in different villages of Belgaum dist. during 2013-14 (Table 1). The roving survey revealed that, Gokak, Savadatti, Bailhongal, Athani and Hukkeri villages of Belgaum dist. recorded moderate wilt incidence. The highest incidence of wilt (12.84 %) was observed in Neginahala village of Bailhongal taluka. While, the maximum wilt complex incidence of 8.94 per cent was recorded in Inchala village of Savadatti taluk. Followed by 6.18 per cent of wilt incidence was surveyed in Melmatti village of Gokak taluk and 5.64 per cent incidence of wilt complex was observed in Nerali of Hukkeri and 5.64 per cent wilt in Koliguuda of Athani taluk surveyed. The mean incidence wilt complex of 6.28 per cent was recorded in from different talukas of Belgaum dist. Presence of two pathogens mainly *Fusarium oxysporum* f. sp. *ciceri* and *Rhizoctonia bataticola* resulting in wilt complex was observed in

many places.

Per cent incidence of wilt revealed that, all the tested chemical treatments have reduced the wilt incidence compared to the untreated control ( $T_0$ ) has recorded maximum wilt incidence (45.65%) and lowest yield (4.40 qtl/ha) during two consecutive years 2013 and 2014. Minimum disease was observed in vitavax power  $T_4$  (2.40%) with high yield (10.32qtl/ha) which is followed by sprint recorded 3.64 PDI with yield (9.67qtl/ha),  $T_1$  (3.71%) with yield of 9.64 qtl/ha was observed with seed treatment (Table 2). However, the combined applications of seed treatment with *Trichoderma harzianum* @ 4 g/ kg seed + Soil application of *T. harzianum* @ 2 kg + 250 kg FYM + 50 kg *Neem* seed powder/ hectare (PoP) ( $T_2$ ) recorded 3.65 PDI of wilt with 9.90 qtl/ha yield. Followed by seed treatment with *T. harzianum* @ 5g + *P.fluorescens*@ 5g/kg seed ( $T_8$ ) was found to have 3.69 per cent disease wilt with 9.50 qtl/ha yield when compared to control plot recorded highest per cent disease of wilt of 21.24 and 45.65 and lowest yield of 6.33 qtl/ha and 4.40 qtl/ha, respectively during consecutive year 2013-

14 and 2014-15.

All the treatments showed increased yield significantly compared to the untreated control  $T_0$  (6.33q/ ha and 4.40qtl/ha). However, highest yield was found in seed treatment with vitavax power,  $T_4$  (10.32) which was on par with seed treatment with sprint  $T_5$  (9.67 q/ ha). Among all chemicals fungicides and bioagents used for the management of wilt rot complex, the seed treatment with vitavax power (Carboxin+Thiram)@ 2g/ kg seed has reduced per cent wilt disease to greater extent with 2.40 and increased yield upto 10.32 qtl/ha. Similarly among various bioagents used for the manangement of wilt disease seed treatment with *Trichoderma harzianum* @ 4 g/kg seed + Soil application of *T. harzianum* @ 2 kg + 250 kg FYM + 50 kg *Neem* seed powder/ hectare found significant to reduce wilt incidence from 3.65 to 11.11 PDI with increased yield 8.67qtl/ha to 9.90 qtl/ha during both consecutive year and which is on par with seed treatment with *T. harzianum* @ 5g + *P.fluorescens*@5g/kg seed recorded 3.69 to 9.89 PDI with yield ranged 8.92 to 9.50 qtl/ha.

**Table 1 : Survey for the chickpea wilt incidence in northern Karnataka of Belagavi for Rabi 2013**

District	Taluk	Village	Disease incidence (%)	
Belagum	Savadatti	Vakkunda	5.20	
		Inchala	8.94	
		Chachadi	4.84	
		Murgod	4.0	
		Savadatti	5.6	
		Tavalageri	7.6	
		Yadahalli	8.1	
		Yargatti	10.3	
		Bailhongal	Bailwad	8.48
			Sampagoa	6.45
	Neginahala		12.84	
	Govinkoppa		4.25	
	Murkumbi		6.34	
	Gokak		Melmatti	6.18
			Doddanatti	4.3
			Herenandi	3.7
			Hirehulageri	6.9
			Ankalagi	4.68
	Hukeri	Nerali	3.42	
		Athani	Ananthpura	3.65
Sheghunasi	4.58			
Koliogudda	5.64			
District mean*			6.28	

**Table 2 : Fungicides and bio control agents on chickpea wilt incidence and yield during Rabi 2013-14 and 2014-15**

Treatments	Per cent disease incidence 2013-14	Yield qtl/ha 2013-14	Per cent disease incidence 2014-15	Yield (qtl/ha) 2014-15
T <sub>1</sub> : Seed treatment with captan @ 2g / kg seed	3.71	9.64	9.56	8.70
T <sub>2</sub> : Seed treatment with <i>Trichoderma harzianum</i> @ 4 g/ kg seed + Soil application of <i>T. harzianum</i> @ 2 kg + 250 kg FYM + 50 kg <i>Neem</i> seed powder/ hectare (PoP)	3.65	9.90	11.11	8.67
T <sub>3</sub> : Seed treatment with carbendazim @ 2g/kg seed	3.83	9.52	7.93	8.78
T <sub>4</sub> : Seed treatment with vitavax power (Carboxin+Thiram)@ 2g/kg seed	2.40	10.32	5.26	9.58
T <sub>5</sub> : Seed treatment with sprint (Carbendazim+Mancozeb) @ 2g/kg seed	3.64	9.67	7.97	8.83
T <sub>6</sub> : Seed treatment with <i>Trichoderma harzianum</i> @ 10g/kg seed	4.89	9.12	11.82	8.58
T <sub>7</sub> : Seed treatment with <i>Pseudomonas fluorescens</i> @ 10g/kg seed	5.11	8.92	11.52	8.50
T <sub>8</sub> : Seed treatment with <i>T. harzianum</i> @ 5g + <i>P.fluorescens</i> @ 5g/kg seed	3.69	9.50	9.89	8.92
T <sub>9</sub> : Untreated control	21.24	6.33	45.65	4.40
S.E.±	0.69	0.23	1.98	0.13
C.D. (P=0.05)	2.07	0.69	5.93	0.40
C.V.	20.53	4.26	18.07	2.93

The effect of various fungicides on the management of wilt and yield of chickpea during both the consecutive years of studies revealed that, seed treatment with vitavax power (Carboxin+Thiram)@ 2g/kg seed reduced wilt incidence upto 2.40 PDI and had highest yield of 10.64 qtl/ha for 2013-14 and 5.26 PDI with 9.58 qtl/ha yield for 2014-15. However, all the treatments are significantly differed from the control plot and significant increase in the yield was observed when bio control agents were combined rather than individual bio control agent used.

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