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# Effect of wheat seed dressing fungicides, botanicals and bio-control agent on Karnal bunt incidence in natural condition

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**Abstract:** In this study the efficacy of four fungicides, three botanicals and one bio-control agent under field conditions revealed that all the treatments gave reduction of Karnal bunt over check at significant level (P=0.05). Maximum disease control was achieved with Tilt 25EC (48.72%) followed by Bavistin 50WP (47.08 %), Vitavax 75WP (45.30%) and Raxil 2DS (37.61%). Among botanicals *L. camara* was adjudged best as it gave 41.88 per cent disease control. However, seed treatment of *T. viride* (Ecoderma) resulted in 28.21 percent disease control. In all treatments over all disease control level was ranged between 28.21 to 48.72 per cent. For effective disease management, source of primary inoculum must be destroy. Primary inoculum of Karnal bunt is present in seed. Therefore, eco-friendly seed treatment of wheat is necessary process for diseases management.

**Keywords:** Karnal bunt, *Neovossia indica*, *Triticum aestivum*, *T. viride* (Ecoderma)

## INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most popular grain of the world and geographical is found between 30-55ºN latitude in the Northern hemisphere and between 20-40ºS in Southern hemisphere (Kumar, 2014). The Karnal bunt of wheat disease (*Neovossia indica* (Mitra) Mundkur) was first reported by Mitra in 1931 on wheat (*Triticum aestivum* L.) from Karnal (Haryana) in India. Around 70 countries quarantine constraint on wheat from countries where Karnal bunt is known to occur (Lari *et al*. 2006). In Himachal Pradesh zone-I is a hot spot for KB. Therefore, a domestic response does not allow seed for cultivation purpose in zone-II and zone –III. Karnal bunt causes heavy losses in wheat production mainly in Northern and Central India. The disease is spreading at an alarming rate in the states, due to its soil, seed and airborne nature. Weather conditions in this region are conductive for Karnal bunt as in Punjab. The highest KB incidence (53.3%) was recorded from Jammu region of J&K followed by Punjab (33.7%). The Karnal bunt incidence in 2015-16 crop seasons was lower than the 2014-15 (IIWBR, 2016-17).

The mechanism of antagonism was attributed to antibiosis in culture filtrates. *Trichoderma* spp. have been reported to secrete vast anti-microbial secondary metabolites and hydrolytic enzymes i.e. cellulases, chitinases, lipasees, proteases, etc., which are help in host recognition and pathogen control (Srivastava *et al.* 2010; Harman, 2011 and Harman *et al.,* 2012; Hermosa *et al.,* 2012, Shanmugaiah *et al.,* 2009). Besides, the production of a large variety of volatile secondary metabolites by *Trichoderma* like ethylene, hydrogen cyanide, alcohols, aldehydes, alamethicine and ketones up to C4 chain- length also play an important role in biocontrol (Landreau *et al.,* 2002). The inhibitory effect of *L. camara* on teliospore germination may be attributed due to the presence of antisporulant compound like Pentacyclic triterpenoids (Barceloux and Donald 2008). Application of Tilt 25EC was found effective highly effective in Karnal bunt prone area of Punjab (Aujla and Sharma 1990, Kumar and Singh, 2014). All efforts to control the disease through cultural practices and chemical treatment have been futile. The only alternative and long term control measures to avert this disease.

## MATERIALS AND METHODS

Dry seed treatment with fungitoxicants i.e. Vitavax 75WP (2.5g/kg), Bavistin 50WP (2.5g/kg), Raxil 2DS (1.0g/kg) and antagonist- *T. viride* (5.0g/kg) were done by mixing seed and fungitoxicants/antagonists separately in polythene begs and mixed properly before sowing. In case of Tilt (1.0mL/l) and phyto-extracts (25%) seed was dipped for 30 minutes. Seed was dried in shade before showing. All treatments were replicated thrice in a randomized block design (RBD). Seed of susceptible wheat variety UP-2338 was used for sowing at Experiment farm of HAREC, Dhaulakuan. The plot size was kept 1.5m x 2.0m with line spacing of 25 cm. Data on seed germination; Karnal bunt incidence and grain yield were recorded. Data was analysed

RBD test by the help of CPSC-1 software. Karnal bunt incidence (KBI) was recorded after threshing as per formula of Aujla *et al.* (1989a).

## RESULTS AND DISCUSSION

A field trial was conducted to see the effect of promising seed dresser fungicides, phyto-extracts and bio-control agents on the incidence of Karnal bunt of wheat under natural infection condition at Dhaulakuan. The data presented in Table-1 indicated that all the treatments supported good germination and significantly incidence of KB over check (11.72 %). However, maximum disease control was achieved with Tilt 25EC as it resulted in 48.72 % disease control followed by Bavistin 50WP (47.08%) and Vitavax 75WP (45.30%). Bavistin 50WP and Tilt 25EC did not show any significant difference in their efficacy. However, these differed significantly from Vitavax 75WP. *Lantana camara* seed treatment resulted in 41.88% disease control followed by Raxil 2DS (37.61%). *Eucalyptus globulus, Ageratum conyzoids* and *Trichoderma viride* gave 36.75, 34.19 and 28.21% disease control, respectively. None of the treatments showed phytotoxicity symptoms. Seed treatment with fungicides, phyto-extracts and bio-control agent was not much effective as these resulted in 28.21 to 48.72 per cent control of KB under natural conditions. Kumar and Singh (2014) stated that an effective management practice against KB of wheat, integration of fungicidal seed treatment with foliar sprays of phyto-extracts, bio-control agent and fungicide revealed that seed treatment with Tilt 25EC (0.1%) and few sprays of Tilt 25EC (0.1%), one at flag leaf stage followed by another at 50 per cent emergence of spikes and seed treatment of Tilt plus one spray of *L. camara* and one spray of Tilt 25EC gave cent per cent disease control under field conditions. Seed treatment with Tilt 25EC plus one spray of *T. viride* at flag leaf stage and another spray *L. camara* at 50 per cent emergence of spikes gave 95.84 per cent disease control.

Srivastava (2014) conducted two years field trials revealed that seed treatment with *Trichoderma viride* recorded a disease incidence of 0.64 per cent and that of *Tricoderma harzianum* was 0.95 per cent. Bacterial biocontrol agents *Pseudomonas flouresence* (Resident) and *P. flouresence* (PDBC) recorded a disease incidence of 0.99 and 1.16 per cent. Distilled water used as control recorded a disease incidence of 1.92 per cent. Aujla and Sharma (1990) also reported that fungicides applied as seed and soil treatment were not much effective. However, combination of soil treatment with Brassicol (quintozene), seed treatment with carbendazim and thiram for primary inoculum and spray treatment with propiconazole gave 80.8% KB of wheat. Aujla *et al.* (1989b) reported effectiveness of Blitox, Emisan, Thiram and Bavistin on seed treatment against Karnal bunt. They suggested that fungicide seed treatment need to be coupled with carrier chemicals to eradicate internal seed borne inoculum. Carbendazim and seed protectants (Thiram, Emison, Foltaf and Blitox) when applied as a slurry resulted in 100 per cent inhibition of surface contamination of teliospores.

Sharma and Basandrai (2000) reported that wheat seed treatment with *T. viride* resulted in 20% control of Karnal bunt of wheat. *T. viride* in the present study also gave 28 per cent disease control. Sharma *et al.* (1996) studied the antagonistic potential of *Gliocladium* and *Trichoderma* spp. against *N. indica* and found that seed dip treatment of bunted seed in culture filtrate, had no effect on seed borne inoculum. However, a powdered formulation of *T. viride* @ 4g/kg seed significantly reduced teliospores germination. Antagonistic activity of *Trichoderma* spp., *Gliocladium deliquescens* and *G. virens* against *N. indica* have also been reported by other workers *in vitro* and *in vivo* condition (Amer *et al.,* 2000; Kumar, 2013 and Sharma *et al.,* 2014).

## Conclusion

Seed treatment with fungicides, phyto-extracts and bio -control agent was not much effective as these resulted

**Table 1.** Effect of wheat seed treatments with fungicides, botanicals and bio-control agent on yield and incidence of Karnal bunt.

| Treatments | Dose (%) | Germination (%)* | Karnal bunt | | Average yield (q/ ha)* |
|---|---|---|---|---|---|
| | | | Incidence (%)* | Control (%)* | |
| Tilt 25EC | 0.1 | 86.33 (69.11)** | 6.05 (14.24 ) | 48.72 (44.03) | 35.00 |
| Bavistin 50WP | 0.25 | 93.67 (73.83 ) | 6.20 (14.41) | 47.08 (43.31) | 34.33 |
| Vitavax 75WP | 0.25 | 86.33 (69.11 ) | 6.50 (14.76 ) | 45.30 (41.84) | 34.33 |
| Raxil 80 WP | 0.1 | 83.67 (67.48 ) | 7.32 (15.69 ) | 37.61 (37.76) | 31.67 |
| *Lantana camara* | 25 | 94.67 (75.93 ) | 6.63 (14.92) | 41.88 (41.18) | 37.33 |
| *A. conyzoids* | 25 | 91.33 (73.10) | 7.76 (16.17) | 34.19 (35.51) | 34.33 |
| *Eucalyptus globulus* | 25 | 91.33 (73.10) | 7.46 (15.85) | 36.75 (37.02) | 35.33 |
| *T. viride* | 0.5 | 92.67 (74.32 ) | 8.43 (16.87 ) | 28.21 (31.98) | 32.67 |
| Check | | 87.00 (69.74 ) | 11.72 (20.01 ) | - | 31.00 |
| CD (P=0.05) | | 4.28 | 0.268 | 1.29 | - |

**Note:** *Average of three replications, Seed treated with fungicides, botanicals and bio-control agent was done before sowing, **Figure in parenthesis are arc sine values

in 28.21 to 48.72 per cent control of Karnal bunt under natural conditions. This indicated that seed treatment alone was not sufficient to contain Karnal bunt under field conditions. Therefore, integration of fungicide, bio-control agent and phyto-extract is cheaper and eco-friendly practice for the of Karnal bunt of wheat. This may provide a better management of the disease.

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