

## **Field evaluation of chemical and biocontrol agents against seed and soil borne diseases of safflower**

A field experiment was conducted during *rabi* (2012 and 2013) to test the efficacy of chemical and biocontrol agents treatments for management of seed and soil borne diseases of safflower at Indian Institute of Oilseeds Research, Hyderabad. The soil in the experimental field area is sandy loam with pH: 7.8, Electrical conductivity (ds/m): 0.45; total N, P and K of 225, 14.5 and 446 kg/ha, respectively). Safflower seeds (var. A1) were seed treated with chemical and biocontrol agents, the experiment comprised of 6 treatments *viz.*, carbendazim + Mancozeb @ 0.2%, [captan@0.2%](#), *Trichoderma harzianum*, Th4dSC @ 2ml/kg, *Trichoderma asperellum* TaDOR 7316 WP @ 10gm/kg, *Pseudomonas fluorescens* Pf2 WP @ 10gm/kg and untreated control served as check and taken up for field evaluation against wilt, root rot and seedling blight. Each treatment was replicated three times in a randomized block design (RBD) with a plot size of 4 x 2.25m and 45 x 20cm spacing.

Based on the consecutive two years field trial conducted the intensity of various diseases and seed yield were significantly influenced by different seed treatments. During 2012-14 field trials, the incidence of *Fusarium* wilt, *Macrophomina* root rot and *Phytophthora* seedling blight were significantly low in different chemical and biological agents seed treatments when compared to check. Among the different seed treatment, captan @ 0.2% was found to be the most effective recording significantly least incidence of wilt (11.8%), root rot (8.7%) and where as in *Phytophthora* seedling blight carbendazim + mancozeb (SAAF) @ 0.2% treatment showed least disease severity (11.8%). The untreated check recorded the highest incidence of *Fusarium* wilt (30.7%), *Macrophomina* root rot (23.8%) and *Phytophthora* seedling blight (53.0%) (Table 1). Significantly highest seed yield (2190.0 kg/ha) was recorded in *Trichoderma harzianum* Th4dSC treatment followed by captan (2086.0 kg/ha) treatment compared to pathogen check (1100.5kg/ha) (Table 10). Thus based on the two year field trials conducted, results proved that all the chemical and antagonists significantly reduced the incidence of seed and soil borne diseases. Seed treatment with captan @2% showed least disease incidence of wilt (11.8%), root rot(8.7%) followed by carbendazim + mancozeb (SAAF) @ 0.2% (14.4 & 12.2%) where as carbendazim + mancozeb (SAAF) @ 0.2% treatment showed least disease severity of *Phytophthora* seedling blight (11.8%) followed by captan @2%. Among the biocontrol agents *T.harzianum* Th4dSC@2ml/kg was found to be effective in control of wilt (14.7%), root rot (13.3%) and seedling blight (17.7%) followed by *P. fluorescens* Pf2. Based on two years field trials Th4dSC showed highest seed yield of 2190.0 kg/ha followed by captan@ 2% 2086.0 kg/ha (Table.1). There was no phytotoxicity effect observed by using the

fungicides and biocontrol formulations (*T. harzianum* Th4dSC, *T. asperellum* TaDOR7316 WP and *Pseudomonas fluorescens* Pf2 WP). Antagonists have inhibitory effect and plant growth promotion was probably due to mechanism of mycoparasitism/hyper parasitism effective root colonization, defense enzyme activity aided in greater compatibility with better plant health and a disease protectant. Thus it is evident that biocontrol agents are effective, ecofriendly with better yield and alternative approach for any disease management practice.

**Table 10. Management of seed/soil borne diseases of safflower as influenced by chemical and biological agents seed treatment (pooled data of years 2012-13 & 2013-14)**

| Treatment   | Fusarium wilt incidence (%) | Macrophomina root rot (%) | Phytophthora seedling blight (%) | Seed yield (kg/h) | ICBR |
|---|-----------------------------|---------------------------|----------------------------------|-------------------|------|
| Carbendazim+Mancozeb @ 0.2%                             | 14.4(22.3)                  | 12.2(20.4)                | 11.8(20.0)                       | 1876.5            | 29.0 |
| Captan @ 0.2%   | 11.8(20.1)                  | 8.7(17.2)                 | 14.5(22.3)                       | 2086.0            | 37.7 |
| Metalaxyl + Mancozeb 0.2%                               | 15.3(23.0)                  | 11.9(20.2)                | 17.6(34.8)                       | 1770.5            | 24.2 |
| <i>Trichoderma harzianum</i> , Th4d SC@ 2ml/kg          | 14.7(22.5)                  | 13.3(21.4)                | 17.7(34.9)                       | 2190.0            | 41.8 |
| <i>Trichoderma asperellum</i> , Ta DOR 7316 WP @ 10g/kg | 18.9(25.7)                  | 13.8(21.8)                | 19.9(26.5)                       | 1526.0            | 15.7 |
| <i>Pseudomonas fluorescens</i> Pf2 WP @ 10g/kg          | 19.4(26.1)                  | 14.5(22.4)                | 25.3(30.1)                       | 1717.5            | 23.0 |
| Untreated check   | 30.7(33.6)                  | 23.8(29.2)                | 53.0(46.7)                       | 1100.5            |      |
| C.D. (p=0.05)   | 1.1                         | 0.5                       | 1.5                              |                   |      |
| C.V(%)  | 2.4                         | 1.3                       | 3.0                              |                   |      |
|   |                             |                           |                                  |                   |      |

\*Figures in parentheses are the arcsines to which the statistical analysis pertains