

## Identification of seedborne fungal pathogens of cumin and caraway and biological control of dominant pathogens

### **Abstract**

Cultivation of cumin and caraway has recently been increased in the World for used in production of medicines and cosmetics. Pests and diseases are the most important limiting factors that reduce yield. One of these factors *Embellisia verruculosa* is Cause Damping off. Biological control is the best method to control the disease. Cumin seeds provinces were collected from Torbat-E-Jam, Taybad, Sabzevar and Rahmat Abad Mashhad, Zabol and caraway seeds were collected from Mashhad, Birjand, Bapht, and Godarkhaneh and Syrach Kerman. Fungal were isolated of seed in the laboratory. The cumin seeds average emissions 17.2 percent and seeds caraway average emissions was 2/17 percent, So the average infection of seeds was 9.3 percent. Only isolates of *Embellisia verruculosa* and *Alternaria alternata* isolated from cumin seeds were seedling stopped and the rest of were not effect cumin seeds seedling. None of the fungal isolates isolated from caraway seeds were not stopped germination of caraway and cumin seed. Seven species of fungi such as *Alternaria alternate* was disease on the aerial organs of cumin. None of the fungal isolates isolated from caraway seeds were not disease on the aerial organs of caraway and cumin seeds. pathogenesis test of fungi that effects were identified highly virulent. Antagonists of bacterial and fungal isolates Laboratory of Plant Pathology Institute and were isolated from cumin plant rhizosphere of Sabzevar were prepared. Effective antagonists of bacterial and fungal species were *Bacillus subtilis*, *Pseudomonas fluorescens*, *Trichoderma harzianum* and *Talaromyces flavus*. Effective bacterial isolates including: P5, P12, P22, P77, P92, B2, B10, B15, B17, B22, B98 and B100, The fungal isolates: Tr.2, Tr.10 and Tf.3 were selected for greenhouse experiments. In greenhouse condition inhibitory effects of these isolates on *Embellisia verruculosa* fungal were evaluated by seed treatment with antagonists agents. Isolates: P22, B2, B22 and Tf.3 caused 97/5, 90.90 and 87.5 percent healthy seedlings, respectively in seed treatment in the disease, respectively and evaluate their effectiveness by measuring the flora fresh weight and dry weight was determined.

**Keywords:** Cumin, Caraway, biological control, *Embellisia verruculosa*, Damping off, antagonist



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