The inhibitory effect of *Thymus vulgaris* and *Carum copticum* essential oil on the growth of *Rhizoctonia solani,* the causal agent of potato stem canker in *vitro* and greenhouse conditions

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ABSTRACT

Potato is one of the most important food and economic crops in all over the world, *Rhizoctonia solani*, the causal agent of stem canker causes high loss of the product quality and quantity annually. In this study, the effects of two essential oils of *Thyme* and *Carum*, were investigated on the colony growth rate and inhibitory growth in concentrations of 100, 200, 300, 400 and 500 ppm on PDA medium. *In vitro* tests, essential oils of *thyme* and *Carum* in two concentrations of 0.5 and 0.75, the combination of *thyme* 0.25+ *Carum* 0.25 and Rovral-Ts fungicide at 1.5 at 1000 were evaluated in a completely randomized block design in four replications. The tubers substratum cultivated in soil contaminated by *R. solani* that planted in pots were inoculated by essential oils and fungicides. The disease severity data were recorded and scored six weeks after inoculation using Das scale. The results demonstrated that fungal growth rate under treatment by *Thyme* at 500 ppm (21.63 mm /day) and *Carum* (17.7 mm/day) and *thyme* + *Carum* (67.85) essences were more than 50 percent growth inhibitory. The results of disease severity index in greenhouse revealed that *Thyme* and *Carum* essences and Rovral-Ts fungicide respectively by 28.1, 35.92 and 17.17 percent were successful in disease control as well as the mean of fresh and dry weight of shoot area under *Thyme* treatment increased relatively.

Keywords: Potato, *Rhizoctonia solani*, essential oil, *Thymus vulgaris*, *Carum copticum*, inhibitory

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