

عنوان مقاله:

Effect of Carum copticum nano-essence against Saprolegnia and Fusarium, and the Use of Multiplex PCR Assay for the Detection of These Organisms in Rainbow trout *Oncorhynchus mykiss*

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خلاصه مقاله:

This study aimed to investigate the fungal species isolation and confirmation by the Multiplex PCR method in aquatic fish. Evaluation of the inhibitory effect of nano-essential oils of *Carum copticum* on isolated fungal species was also conducted in this study. The PCR results showed that 3 out of 5 samples were diagnosed with *Fusarium solani*, and two of them were positive for *Saprolegnia*. Moreover, in 0.1% of the females' nanoparticles, one peak appeared that showed a particle with an average diameter of 360 nm, and two nanoparticles showed a peak with a mean diameter of 242 nm. The results of minimum inhibitory concentrations (MIC) and minimum fungicidal concentrations (MFC) showed that 0.01% nano essential oil had 0.08 and 0.07 mg/ml MIC values against *Fusarium solani* and *Saprolegnia*, respectively. Gram/ml was on the growth of *Fusarium solani* species. The essential oils of female plants had an MIC of 0.07 in 0.1% essential oil and 0.03 mg/ml in 0.01% essential oil in *Saprolegnia*. Furthermore, in the case of 0.1% nano essential oil, the results showed the MIC values of 0.04 and 0.03 mg/ml against *Fusarium solani* and *Saprolegnia*, respectively. The MFC values of 0.1% nano essential oil were 0.1 and 0.07 mg/ml against *Fusarium solani* and *Saprolegnia*, respectively. It was not found on *Fusarium* and *Saprolegnia*. Overall, the results of this study using PCR for direct detection showed that 70% and 50% of the samples were *Fusarium solani* and *Saprolegnia* positive, respectively; therefore, the PCR was an efficient method for the detection of fungi. According to the results of nano-essential oil (0.1%) of females, this nano-essence had a strong inhibitory effect on *Fusarium solani* and *Saprolegnia*.

کلمات کلیدی:

Carum copticum, *fusarium*, Multiplex PCR, nano-essence, *Oncorhynchus mykiss*, *Saprolegnia*

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