

Micro/Nano-Sized Emulsions Exhibit Antifungal Activity against Cucumber Downy Mildew

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Abstract : Cucumber is a major economic crop in the world. The global production of cucumber in 2017 was more than 71 million tonnes. Nonetheless, downy mildew, caused by *Pseudoperonospora cubensis*, is a devastating and common disease on cucumber in around 80 countries and causes severe economic losses. The long-term usage of fungicide also leads to the occurrence of fungicide resistance and decreases host resistance. In this study, six types of oil (neem oil, moringa oil, soybean oil, cinnamon oil, clove oil, and camellia oil) were selected to synthesize micro/nano-sized emulsions, and the disease control efficacy of micro/nano-sized emulsions were evaluated. Moreover, oil concentrations (0.125% - 1%) and droplet size of emulsion were studied. Results showed cinnamon-type emulsion had the best efficacy among these oils. The disease control efficacy of these emulsions increased as the oil concentration increased. Both disease incidence and disease severity were measured by detached leaf and pot experiment, respectively. For the droplet size effect, results showed that the 114 nm of droplet size synthesized by 0.25% cinnamon oil emulsion had the lowest disease incidence (6.67%) and lowest disease severity (33.33%). The release of zoospore was inhibited (5.33%), and the sporangia germination was damaged. These results suggest that cinnamon oil emulsion will be a valuable and environmentally friendly alternative to control cucumber downy mildew. The economic loss caused by plant disease could also be reduced.

Keywords : downy mildew, emulsion, oil droplet size, plant protectant

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