

Application of Cinnamon Oil Nano-Emulsion to Inhibit *Salmonella* Spp. on Alfalfa Seeds

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Introduction: Seed Sprouts have become a fresh produce item commonly linked to food-borne illness. There has been foodborne outbreaks linked to consumption of alfalfa seeds and sprouts associated with *Salmonella* Spp. Surface sterilizing with antimicrobial agents like cinnamon oil may reduce the attachment of microbes without effecting the nutrient value and germination of the alfalfa seeds. Nano-emulsion of cinnamon oil prepared by sonification which has stable configuration in attaching on the surface of the seeds and sprouts have shown effective antimicrobial activity.

Purpose: The purpose of the study is to test the effectiveness of Cinnamon oil Nano-emulsion on three different strains of *Salmonella* Spp. for the treatment of alfalfa seeds and sprouts.

Methods: Alfalfa Seeds and sprouts were treated with control, 0.75% and 1% Cinnamon oil Nano-emulsion after artificially inoculating the seeds with the bacterial cocktail made from three different strains of *Salmonella*. 5% Cinnamon oil Nano-emulsion was prepared using sonication method by combining Tween 80, DI water and pure cinnamon oil. Three batches of seeds are then treated with DI water, 0.75% and 1% of Cinnamon oil Nano-emulsion for 1 minute and left for drying in the drying hood for 24 hours. The treated samples were enumerated at the intervals of 0hr, 24hr and 48 hr.

Results: 0.75% and 1% Nano-emulsion treated seeds showed significant amount of reduction in *Salmonella* compared with the control. Greatest reduction was seen after 24 hours of treatment with the Nano emulsion with 1.16 log reduction with 0.75 % and 1.32 log reduction with 1% after 24 hours. The sprouts did not show a significant amount of reduction compared to seeds; Future studies will evaluate higher concentration of nanoemulsions for antimicrobial activity on sprouts.

Significance: This data suggest that nanoemulsions of cinnamon oil may be effective as an antimicrobial treatment for alfalfa seeds and sprouts.