



Abstract

Novel Copper Nanoparticles for the Control of Tomato Foliar and Fruit Diseases [†]

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Abstract: Grey mould caused by *Botrytis cinerea* and Late Blight caused by *Phytophthora infestans* are the most important foliar and fruit diseases that affect tomato. The application of fungicides is the main control measure for these diseases. However, the development of resistance to single-site inhibitors by both pathogens necessitates research for the development of alternative products. Initially, four novel nano-copper (Cu-NPs) formulations were evaluated in vitro. The two most efficient formulations (CN_S4_X1 and CC_S4_X2) from the in vitro assay were further evaluated for their efficacy against *B. cinerea* and *P. infestans* on tomato seedling plants (cv. Belladonna) during the fourth true leaf growth stage under controlled environmental conditions. To evaluate the protective and curative activity of the Cu-NPs that were tested, spray treatments were conducted 24, 48, and 96 h before (protective treatments) or after (curative treatments) the inoculation of the plants. For each plant, the disease severity value was measured as follows: 0 = no disease symptom; 1 = disease symptoms covered 20% of the leaf; 2 = disease symptoms covered 50% of the leaf; 3 = disease symptoms covered 70% of the leaf; and 4 = dead leaf. For both pathogens, disease severity on the plants that were treated curatively was higher than it was in plants that had been treated preventively. The applications of the two Cu-NPs against *B. cinerea* 24 h prior the inoculation led to lower disease severity with means of 1.5 and 1.3, respectively, compared to 48 h and 96 h before or after inoculation. Disease severity was significantly higher on plants treated with the commercial copper products. Similarly, the two Cu-NPs that were tested were found to be highly effective against *P. infestans* and resulted in lower disease severity at 24 h and 48 h pre-/post-inoculation. The results of this study are expected to contribute to the optimization of tomato disease control and to reduce the yield losses caused through the use of a new generation of biocides.



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