

Title Evaluation of electrolyzed oxidizing water for phytotoxic effects and pre-harvest management of gray mold disease on strawberry plants

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Abstract

Near neutral (pH = 6.3–6.5) electrolyzed oxidizing water (EO water) has been demonstrated to inactivate fungi in pure culture and to mitigate infection on fruit surfaces. One possible alternative or supplement to traditional pre-harvest crop management practices that currently rely on the use of large quantities of fungicides is near neutral EO water. In the present work, treatment of *Botrytis cinerea* or *Monilinia fructicola* with near neutral EO water (50 or 100 ppm total residual chlorine (TRC)) in pure culture resulted in a 10^6 reduction and 100% inactivation as evidenced by negative broth enrichment. When applied in concert with 50 or 100 ppm EO water, treatments of Captan 50WP (captan), Rovral (iprodione), Iprodione 4LAG (iprodione), or Switch 62.5 WDG (cyprodinil and fludioxonil) effectively inhibited fungal growth of *B. cinerea* as evidenced by a 10^6 reduction on the direct plate and negative broth enrichment. Treatments of Captan 50WG (captan), Rovral (iprodione), Iprodione 4LAG (iprodione), Switch 62.5 WDG (cyprodinil and fludioxonil), Captan 80 WDG (captan), or Captevate (captan and fenhexamide) when applied in concert with 50 or 100 ppm EO resulted in a 10^6 reduction of *M. Fructicola* and 100% inactivation as evidenced by negative broth enrichment. Strawberry plants sprayed with EO water (pH = 6.3–6.5) at concentrations of 50 and 100 ppm TRC once per week, did not result in significant ($P > 0.05$) phytotoxicity relative to a water (0 ppm TRC) treatment. In this study, the application of 100 ppm EO water (pH = 6.3–6.5) twice per week to strawberry plants infected with *B. cinerea* was more effective ($P \leq 0.05$) than a once per week Captan application and as effective as a once per week captan/once per week EO treatment. The once per week captan/once per week EO treatment was significantly more effective ($P \leq 0.05$) than the captan once per week treatment. Dip treatments of strawberries in near neutral EO solutions (50 and 100 ppm TRC; pH = 6.3–6.5) did not leave a chlorine residue on the fruit relative to a water dip. The results from this study suggest that near neutral EO solutions could be used to manage infection of *B. cinerea* on strawberry plants in the field and also as a disinfection solution for harvesting equipment, greenhouses, packing houses and in commercial facilities to prevent or manage infections of *B. cinerea* and *M. fructicola*.