Optimizing sprayer setting for ozonated water to improve plants disease control efficacy

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**Abstract.** The environmental and socioeconomic constraints force the agricultural sector to find alternative plant protection solutions. As a result, several alternative plant protection products (PPP) have been developed in the last decades. Ozonated water sprayed on the vegetation proved to be a partial alternative to agricultural chemical PPP for fungal and bacterial plant disease. The ozonated water efficacy is related to the production of reactive oxygen species (ROS). At the same time, ozonated water showed no significant phytotoxicity when the spraying was carried out under well-ventilated conditions.

In the present study, an electrolytic ozonating water tool was installed on a commercial mist-blower axial sprayer then the redox potential was measured to assess the sanitizing effects on plants due to ROS concentration. First, the redox potential (ORP) was measured inside the tank, after the pump, at the nozzle level, and on a test bench that simulates the vertical wall of the plant. Next, the redox growth rate was measured at each point to assess the system's latency. Then, different nozzle types and fan speeds were used to measure the effect of different droplet sizes on redox potential.

According to the result, redox potential decreases by 7%, 15%, and 11% after the pump, at the nozzle, and the test bench, respectively. These losses are affected by the droplet size and they increase in the case of a smaller droplet. The use of air-inclusion nozzles decreased the redox potential loss by reducing the exchange between the ozonated water and the atmosphere. The founding presented in the eventually accepted paper delineates essential considerations for applying ozonated water as an alternative to conventional plant protection products.