SUMMARY OF RESULTS

Project title: Evaluation of Hydrogen Peroxide for Mildew and Postharvest Microorganisms Control

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This project was formulated because growers are increasing applications of chlorinated solutions in the field, a practice that may or may not be sufficiently efficient in reducing microbial load. We proposed instead to evaluate the effect of hydrogen peroxide solution as an antibacterial alternative to the chlorine solution, first because hydrogen peroxide could be used for the control of known lettuce diseases (e.g. downy and powdery mildew) and secondly because it does not leave any residue in the tissue.

Plants were grown at the Yuma Agricultural Center conducting agronomical practices as currently applied in commercial settings. Two of the four experiments were irrigated with overhead sprinkles and the other two experiments were planted using furrow irrigation. Overhead irrigation was included to maintain better growing conditions for the fungi being targeted (*Bremia lactucae* and *Erysiphe cichoracearum*) during the time of the season when these diseases are most likely to appear in the field. The treatments included : 1) Hydrogen Peroxide (Oxidate) applied six times every two weeks after 5-6 true leaf stage; 2) Hydrogen Peroxide applied applied four times every three weeks after 5-6 true leaf stage; 3) Two applications of Hydrogen Peroxide, before and after formation of head. Additionally we included an untreated control, a "commercial control" using a common fungicide (Procure alone or with Prophyt in the early experiments) with doses as recommended by the manufacturer and a commercial control with one application of hydrogen peroxide. We chose to work with Oxidate as the hydrogen peroxide product since it is a GRAS product and also because it can be used in organic production, an industry that lack enough agents to control agents.

As described above, one of the objectives of this study was to assess the ability of Oxidate to suppress the development of downy and powdery mildew on lettuce. The treatment, containing products with known activity against downy mildew (Prophyt) and powdery mildew (Procure), was included for comparison. Treatments were applied to head lettuce plants before the onset of disease. Due to generally dry conditions, downy mildew did not develop; however, powdery mildew reached a high level of severity by crop maturity. Application of Oxidate did not significantly reduce the severity of powdery mildew. On the other hand, the treatment with Prophyt and Procure provided a high level of disease control. Oxidate did not have any negative effect on visual quality either.

When the microbial population at harvest was evaluated mixed results were observed. However, it was interesting to observe that the lettuce treated with Procure (with or without Prophyt) consistently had more aerobic bacteria than the untreated control. Oxidate applications were generally not significantly different from the control, but the plants treated with the higher number of applications (4X and 6X) had reduced microbial population with respect to the fungicide treated plants in two of the four trials. Similarly, when Oxidate was applied to plants previously sprayed with the fungicide a reduction was observed in two of the four trials (Figures 1-4). Overall, we observed no benefit of Oxidate on powdery mildew and found variable results in regards of its performance on microbial populations. It is possible that this product will perform better if applications are scheduled immediately before and after harvest, which was not examined in this study. Given the fact that in reality most growers would at least make one application of a fungicide, more experimentation with evaluations of different combinations of the fungicides and Oxidate will allow determining the conditions necessary to enhance the effect on microbial population at harvest.

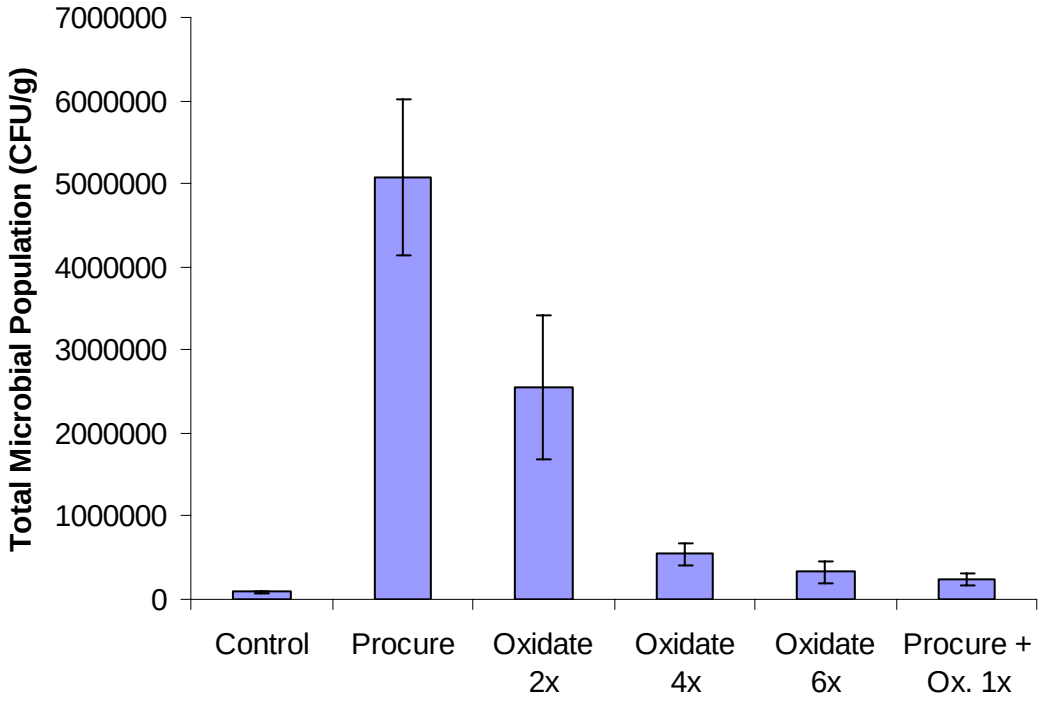

Figure 1. Effect of pre-harvest applications of Oxidate (sanitizer) and Procure (with Prophyt) on microbial population of head lettuce grown with overhead sprinkler irrigation and harvested in January. Bars indicate standard error of the mean.

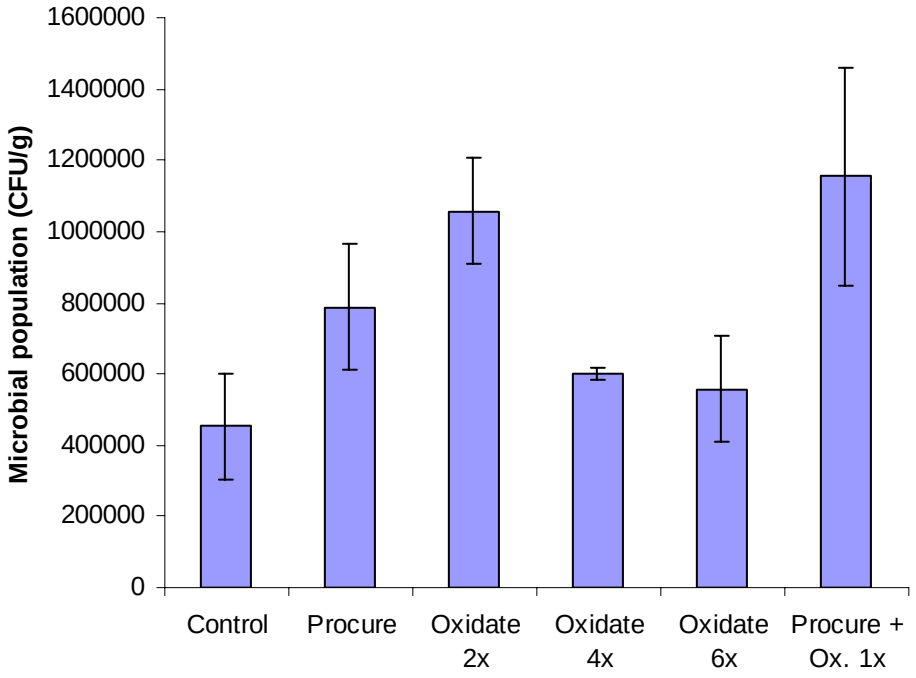

Figure 2. Effect of pre-harvest applications of Oxidate (sanitizer) and Procure (with Prophyt) on microbial population of head lettuce grown with furrow irrigation and harvested in January. Bars indicate standard error of the mean.

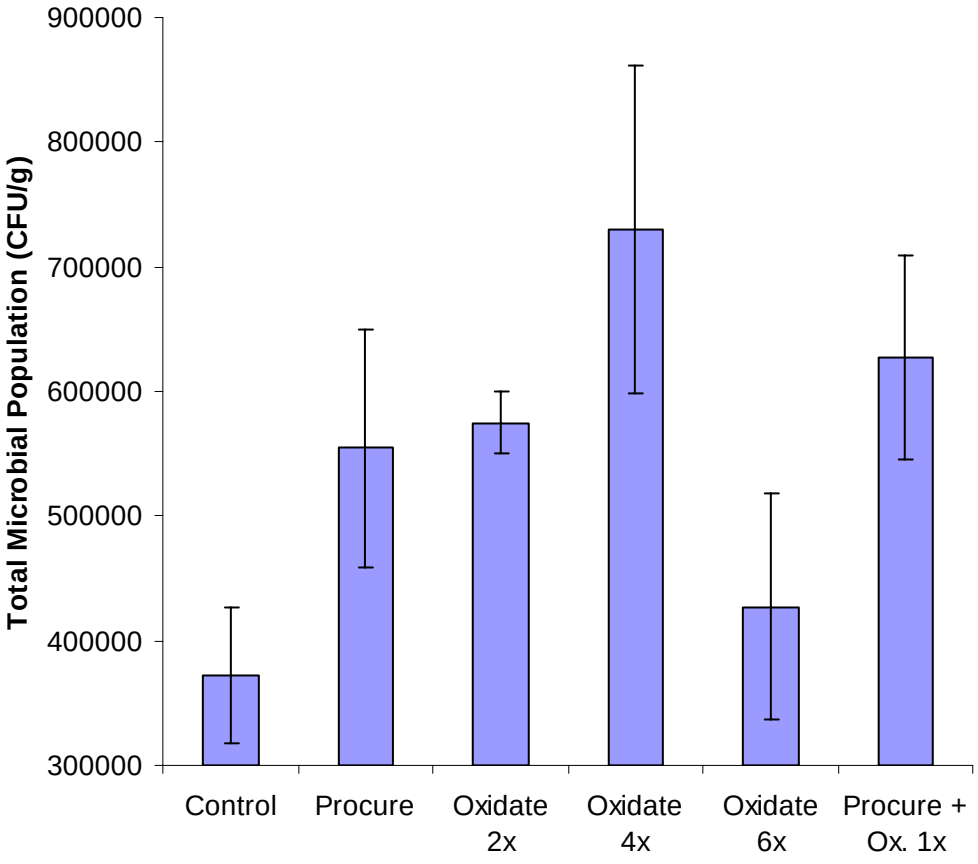

Figure 3. Effect of pre-harvest applications of Oxidate (sanitizer) and Procure on microbial population of head lettuce grown with overhead sprinkler irrigation and harvested in March. Bars indicate standard error of the mean.

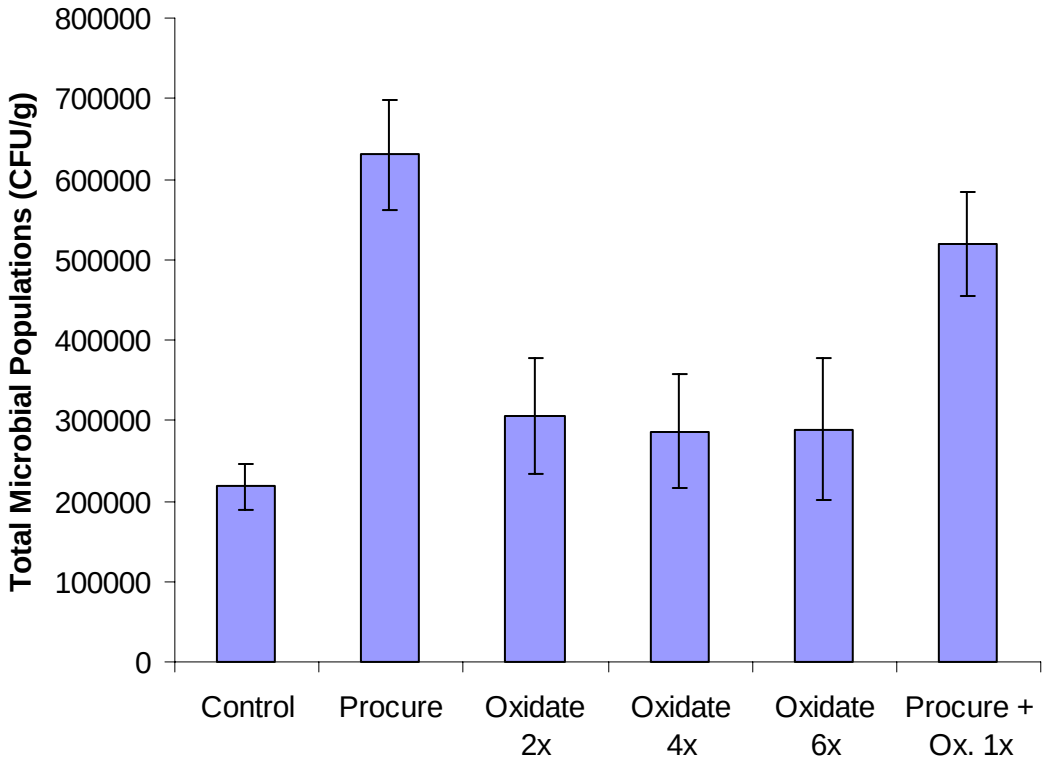

Figure 4. Effect of pre-harvest applications of Oxidate (sanitizer) and Procure on microbial population of head lettuce grown with furrow irrigation and harvested in March. Bars indicate standard error of the mean.