REPORT TO THE AGRICULTURAL RESEARCH FOUNDATION
FOR THE OREGON PROCESSED VEGETABLE COMMISSION
December 2011

Project Title: Evaluation of carrot seed treated with germicidal light to reduce populations of seed-borne *Xanthomonas hortorum* pv. *carotae*

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Background and Justification: Bacterial leaf blight of carrot is an important disease throughout carrot production worldwide. The causal organism, *Xanthomonas hortorum* pv. *carotae* (formerly *X. campestis* pv. *carotae*), is commonly seed-borne and the importance of seed contamination in subsequent disease has been demonstrated. Oregon and Washington produce a major portion of the world carrot seed supply, making bacterial blight particularly important in the seed fields of the Pacific Northwest (PNW). The pathogen causes reductions in seed germination as well as blight of the foliage, affecting seed yield and seed quality. Treatment with hot water or a copper pesticide is recommended for affected seed lots, adding additional expenses. Hot water treatments can destroy *Xanthomonas* but also can reduce subsequent seed germination. An alternative to hot water was examined, germicidal UV-C light. UV-C light is inexpensive to use and seeds remain dry during treatment, eliminating the associated risks/costs of wet seed.

Objective #1 for 2011 and Accomplishments: Conduct a seed evaluation of several fresh carrot seed lots for *Xanthomonas* contamination levels and test the effects of UV light, hot water, and hydrogen peroxide on seed contamination.

> UV-treatment did not result in an overall reduction in *Xanthomonas* levels associated with seed. Seed-borne levels of *Xanthomonas* were significantly reduced in 1 of the 5 carrot seed lots examined during 2010, so UV-C may be useful in limited situations.

Seven carrot seed lines or lots were divided into nontreated and UV-treated; treated seeds were exposed for 1 hour to germicidal UV light. *Xanthomonas* levels were assessed in seeds by soaking overnight 0.1 g sub-samples of carrot seed in 0.085% NaCl and then dilution plating ground-up seeds onto a *Xanthomonas*-selective culture medium.

There were little differences in *Xanthomonas* population levels between UV-treated and nontreated seeds (Figure 1). *Xanthomonas* infestation is probably located too far inside carrot seed for UV-C to penetrate but perhaps there is a difficulty with sufficient UV-C exposure on all facets of the carrot seed surface.
Figure 1. Seed-borne populations of *Xanthomas* on carrot seed lots tested during 2011.

**Objective #2 for 2011 and Accomplishments:** Establish a field trial to evaluate the use of UV seed disinfestation on carrot growth and disease levels using fresh seeds.

No Bacterial leaf blights symptoms have developed to date on the carrot plants in the field plots. Generally, bacterial leaf blight severity was not reduced in greenhouse studies funded by ARF or the 2010 field funded by OPVC, only one carrot seed lot showed a significant disease reduction in the 2010 field study.

Plots were established on the OSU Botany Farm with five carrot seed lots (A-E) on 12 August. Plots consisted of 3 rows of carrot, each 3.3 ft in length (26 seeds per row foot), with 14” spacing between rows. Plots were arranged randomly within blocks, but separated by treatment group to avoid cross contamination with *Xanthomonas* via splashing water. Plants were over-watered, and through much of the season were watered during evenings to promote leaf wetness and disease development. Disease levels were monitored throughout the growing season but disease did not develop in these field plots. Plants started to senesce during December but still no distinctive black necrotic leaf sections are apparent. The environmental conditions were quite cool this fall and the optimum temperatures for this disease are between 77° and 86°F; infection does not occur below 65°F. Weather turned cool about 6 weeks after sowing, too cool for successful infection. So unfortunately, the field experiment has concluded with no results.