**Problem Solver: Bell Peppers Hit with Late Season Losses to Decay**

**The Problem**
A shipper of green bell peppers was experiencing a sudden large increase of claims due to blackening and decay, primarily of the cap and stem. Shipment times were only 2 to 3 days.

**Analysis**  Trevor Suslow 2/2/2000

**Handling**
- No changes in handling practices or equipment
- No changes in pre-shipment routine that included packing in vented corrugated cartons, palletizing, load stabilization with corner boards, and forced-air cooling, generally for 25-35 min at 39°F (4°C).

**Field and Harvest**
- Harvest period was mid September through mid October with high day temperatures, cool night temperatures and occasional rainfall.
- Field yields were very high and fruit size distribution was heavily to jumbo grades
- Field accumulation prior to movement to packing operations was often over an extended period of time
- Bin fruit was not shaded
- Bins were relatively new, undamaged, and cleaned regularly
- Following transport to packing the bins were staged in an open area in full sun exposure
- Packing followed the simplified sequence of wet dump (chlorinated), lift conveyer with chlorinated spray-bar, wax application, sorting –grading–handpacking.
- Shipment often occurred within 3-4 hours of packing; during the initial period of frequent claims the highway carrier was occasionally LTL less-than-load) without refrigeration.

**Lab Diagnostics**
- Retained fruit and returned fruit from receivers were analyzed for the primary agent involved in decay
- The bacterial soft-rot pathogen *Erwinia carotovora* subsp. *carotovora* was the predominant organism isolated. Re-inoculation of green peppers and stem-cap reproduced the blackened decay symptoms seen as the majority spoilage defect

**Solutions**
Based on observations and discussion with the grower and shipper the following two primary modifications were made which dramatically reduced losses;
- Harvest crews did not pick fruit until dew-condensate was substantially gone
- A dry dump was used until other changes were implemented to reduce high fruit pulp temperatures relative to comparatively lower well-water temperatures in the dump tank. Water infiltration due to this temperature differential was obvious in stems and caps and accelerated decay. Improvements in chlorination practices were also needed.

**Other Factors to Consider**
A quick, simplified response was needed to minimize significant immediate economic loss, but several other factors were valuable to consider for evaluating future preventive management practices. These include,
- Excessive application of nitrogen fertilizer and irrigation water promoted a dense leaf canopy and delayed drying of plant surfaces.
- On-the-plant decay, a result of secondary infections following poorly controlled insect damage, provided a continuous source of inoculum especially with periodic rain and conditions promoting heavy dew formation.
- Careful harvesting was needed to reduce the number of decayed fruit in the bins which carried the pathogen and introduced a higher than normal “chlorine demand” to the dump tank making routine chlorine practices ineffective.
- Providing more frequent transportation and/or shading prior to packing would reduce field heat accumulation during this seasonal period when early morning harvest was not desirable
- Large fruit size tended to block air flow through carton side vents. Adjustments to routine cooling schedules, based on time alone, were needed.