Optimizing High Tunnel Sweet Cherry Production Systems

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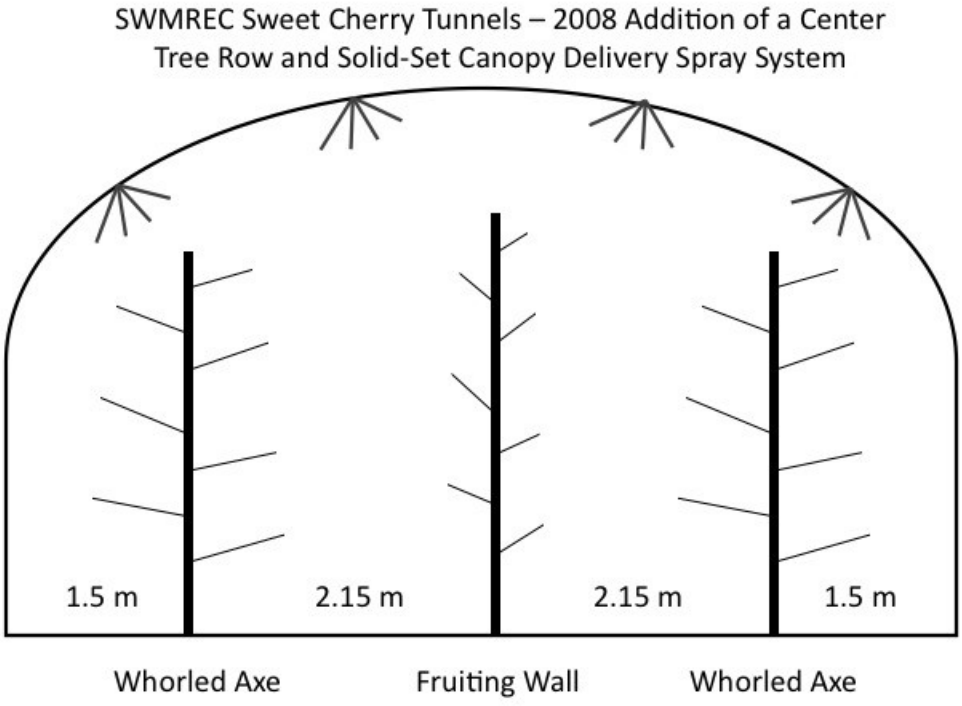
A research project on high tunnel production of sweet cherries was begun in 2005 and various updates have been reported during previous GLFW meetings. In 2007, apricots were also added to the tunnels at Clarksville (CHES). In 2008, a new research objective was to cover both the CHES and the SWMREC (Benton Harbor) tunnels earlier (several weeks before expected bloom) than in previous springs, to examine the potential for forcing earlier cherry flowering while determining how much additional risk may be incurred due to the concomitantly higher potential frequency of low temperature events. Also, different plastics having different light transmittance properties were examined at the SWMREC tunnels. Additionally, a new 3rd row (in the former tractor alley) was planted in each of the SWMREC tunnels to examine various "fruiting wall" training system strategies (such as the "UFO"). Finally, preliminary trials for developing a solid-set canopy delivery (SSCD) spray system (see figure below) were installed on the tunnel structure for potential delivery of pesticide, nutrient, and/or growth regulators (as has been reported at previous GLFW meetings by Agnello and Landers) in light of the elimination of the standard tractor alley.



By enclosing the tunnels early in 2008, results at CHES and SWMREC were quite interesting and quite distinct by location. At CHES, budbreak and bloom was advanced by about one week, resulting in fruit set in the tunnels that was concomitant with full bloom outside the tunnels. A

severe frost occurred on 30 April during full bloom outside, which resulted in a complete crop loss for the majority of the cherry varieties under test at CHES. However, cropping in the tunnels was essentially normal, to the point that some trees were overset (up to 32 kg/tree [70 lbs/tree], a relative yield of 15 ton/acre). However, at SWMREC, the smaller tunnels had been partitioned with plastic dividers for the study of the different light transmitting plastics study, and early enclosure resulted in several days of excessively high temperatures (up to 46 C) during clear sunny days prior to budbreak (even as night temperatures were subfreezing), which ultimately resulted in malformed flowers and initial leaves. Consequently, a protocol of opening of the tunnel ends daily once the temperature outside rose above freezing (and re-closure at night) was instituted. Furthermore, overnight low temperatures were not much different inside the tunnel compared to outside, suggesting that heat gain during the day is readily lost through the single layer of plastic overnight. Thus, a source of supplemental heat (such a propane heaters) may be needed if earlier forcing of bloom is a tunnel management goal. Earlier enclosure did, however, lead to excellent growth of newly-planted trees, and more rapid establishment and training of the fruiting wall tree architectural systems.

Another notable result from 2008 was the first occurrence of significant rain-induced fruit cracking conditions at CHES since the trials began. Cracking of fruit on non-protected trees of 'Rainier' and 'Lapins' was as high as 90%; unfortunately, even under the tunnels, the incidence of fruit cracking ranged from 30 to 60%. This is presumably due to movement of the water running off the tunnel covers back into the tree rows and saturating the soil, so that over the course of a week with a high rootzone water profile, warm to hot temperatures, and high humidity, excessive water entered the fruit via the xylem to the point of fruit cracking. This may not have been a problem on the well-drained sandy soil at SWMREC, but on the heavier soil at CHES, a strategy for improving either surface or subsurface drainage appears to be essential.

Additional project results and directions will be discussed.