Turbidity and Organic Matter Station (Estimated time about 20 minutes)

Supplies needed: Chlorine test strips, PAA test strips, 50 ppm solution of Chlorine and PAA, two small clear cups, pinches of dirt, pictures of turbid water from packhouses

Key concepts:

a. Monitoring turbidity is NOT about dirt on food
b. Turbidity binds and off gases free chlorine.
c. High amounts of turbidity register as free chlorine when using ORP as a monitoring device

Where this fits in the PSA GT: Module 5.2

The Setup: 112.48 (b) states "You must visually monitor the quality of water that you use during harvest, packing, and holding activities for covered produce (for example, water used for washing covered produce in dump tanks, flumes, or wash tanks, and water used for cooling covered produce in hydrocoolers) for buildup of organic material (such as soil and plant debris).

Most people think this is about moving bacteria from one piece of produce to another. Unfortunately, the research (as far as I understand) shows no consistent correlation between increases in organic matter load and increases in bacterial contamination.

One area where organic matter load DOES cause problems is in sanitizer monitoring and effectiveness. Many postharvest systems use Oxidative Reductive Potential (ORP) monitors to estimate the amount of free chlorine in the wash water. At a certain point, the turbidity can register just like free chlorine to the meter. This can lead to growers thinking they have enough sanitizer in their water when they actually don't.

With regard to turbidity, not all sanitizers are created equal. Some sanitizers, like PAA, tend not to be very sensitive to organic matter. In other words, presence of organic matter (measured as turbidity) does not affect the concentration of PAA much. Others, like chlorine are VERY sensitive. Presence of organic matter can cause the concentration of free chlorine to crash rapidly. This demo will show just how sensitive sanitizers are to the presence of organic matter.

While you're waiting for the chlorine to equilibrate in the solution, a discussion on turbidity might be useful to generate conversation. Potential facilitator questions may include:

- In the course of OFRRs and farm visits, how have growers talked about postharvest turbidity management?
- Are growers monitoring for turbidity?

- How are they monitoring it?
- Are growers using turbidity to schedule wash water changes?
- What criteria are they using?

Pass around pictures of wash water taken both in the tanks and drawn out as samples. Have the participants compare how dirty they look compared to the water with dirt in it.

The Demo: Place equal volumes of pre-mixed solutions of 50 ppm PAA and 50 ppm chlorine into two cups each (e.g., 2 cups of PAA, 2 cups of chlorine). Add a pinch of dirt to one of the chlorine cups and one of the PAA cups. Do this at the very beginning before you even start to talk with the group. Mix the dirt in and take a test strip measurement for each solution. Wait about 20 minutes and do the exact same thing. (Note: This works best with near continuous gentle agitation and if you use a long strip that you can dip on both sides. Dip the clean sample first)