Droplet Characterization Methods

Prior to field cage trials, droplet characterization is conducted to verify that the spray system is producing droplets within the desired size range and distribution. This information is used to calibrate equipment and ensure application quality before the field trial begins. The methods used for droplet characterization vary depending on the application type. For ground-based applications, the wave-slide method and the DC-IV droplet analysis system are most commonly used. For aerial applications, droplet characterization is typically performed by making a single spray pass over a series of slide samplers positioned within the spray swath and analyzing the resulting droplet deposits. Detailed information on these methods is provided below.

Regardless of the collection method used, the resulting samples must be analyzed using a droplet analysis method.

Wave-slide Method. The wave-slide method involves collecting droplets on a 1-inch Teflon-coated glass slide attached to a pole and quickly swiping the slide through the spray cloud. The flat face of the slide should be positioned perpendicular to the spray direction to maximize droplet collection. Once droplets have been collected, a droplet analysis method should be utilized to analyze the droplets. A known limitation of the wave-slide method is variability introduced by differences in swipe technique among collectors. Having the same person collect samples can make the results more consistent.

DC-IV Method. DC-IV is an aerosol dispersion measurement device available for purchase from KLD Labs (Hauppauge, NY, USA). This technology uses a thin wire in a metal handle that is placed directly in the spray cloud. Droplet size is measured as the spray contacts the wire. The device's associated software summarizes droplet information and provides several summary metrics including volume median diameter (VMD), mass median diameter (MMD), number of droplets collected, DV 0.1, and DV 0.9. A major consideration with using the DC-IV is that it requires electrical power and

the wire that collects the droplets is delicate and subject to breakage if not used carefully and according to the instructions.

Aerial Application Droplet Collection. For aerial application equipment, droplet characterization is typically conducted early in the morning when winds are calm, just before or after sunrise. Droplet samplers are attached to a shepherd's hook or PVC stand approximately 1.5 m high. Three sets of droplet samplers (either 3 mm or 1 inch slides) are set up. The initial sampler is placed on the center of the spray line, with one sampler to the left and one to the right spaced 25ft away from the center line.

Slides are labeled and placed into the droplet samplers. When the samplers are ready, the pilot is notified and begins takeoff. Samplers are turned on as the aircraft is spotted approaching the spray line. The aircraft should apply the material from a height of 50ft and begin applying product at least 50ft prior to the samplers and shut off approximately 50ft after passing the samplers.

Approximately 5 minutes post-spray, or when the droplets have visibly stopped falling, the samplers are turned off and the slides are collected and taken to the lab for immediate droplet analysis, see this resource for more information. Droplet samplers and stands are collected and exposed to sunlight for at least one day for sanitization before being returned to the storage area.