Large Droplets Drift Very Little

The time that a large droplet is suspended in the air depends on the height from which it is released and its average velocity in the vertical direction. A large droplet released in air will fall at an increasing velocity until the droplet's weight is equal to the upward force on the droplet due to air friction. When these two forces are equal, the object will fall at a constant velocity known as the terminal or settling velocity.The terminal velocity of a large droplet is relatively high because it takes high velocities to generate enough friction force to balance the object's weight. Depending on the height from which a large droplet is released, it could strike the ground before reaching its terminal velocity. Large droplets drift very little primarily because their suspension time is small.

Small Droplets Can Drift For Great Distances

The settling velocity of a small droplet is very low because its weight is low. If the droplet is suspended in air that has an updraft velocity greater than the settling velocity of the droplet in still air, the droplet will actually rise rather than fall.

The weight of most spray droplets diminishes with time because the volatile portion of the spray droplet evaporates. Evaporation reduces the weight of small droplets more rapidly than larger ones because they have more surface area relative to their mass. Therefore, a small particle that consists primarily of water is drift-prone initially and becomes even more drift-prone with time.

Because the vertical velocity of small droplets can be either down or up and the wind direction can change during the extended time that a small droplet is suspended, it is virtually impossible to predict the distance that the droplet will drift. Neither the suspension time nor the average horizontal velocity can be predicted with any degree of certainty. A small droplet will either completely vaporize or the nonvolatile portion of the droplet (many spray mixtures contain some small amount of nonvolatile oil) will eventually settle to the ground due to the ever present force of gravity. The air mass carrying the droplet must remain calm for a relatively long time in order for the droplet to settle out.

RECOMMENDATIONS FOR REDUCING DRIFT AND DRIFT PROBLEMS

- Nozzles should be used that produce as large of a droplet spectrum as possible while yielding adequate plant coverage and pest control. Large nozzle orifices and low spray pressure creates a large droplet spectrum. It may be necessary to apply higher than normal amounts of diluted spray per acre when using large droplets to avoid drift in order to get adequate coverage.

- Do not make applications during temperature inversions. An inversion is a stable atmospheric condition characterized by an increase in air temperature with an increase in height above the ground until at some height a barrier of cold air is met. Use a column of smoke near the application site to check for an inversion. The smoke will rise to the level of the cold air barrier and will then move laterally below it.

- Usually less material will drift from the target field during an inversion, but the material that does leave the target field remains in a more concentrated cloud and the level of residue that settles onto nontarget areas will be higher than usual. Even though the amount of chemical that drifts from the target area during an inversion is often less, the potential for a drift problem can be greater because the small droplets are not lofted into the upper atmosphere, diluted and spread over a large area.

- Make applications when the wind is blowing away from any highly sensitive nontarget areas and the wind velocity should range between 3 to 10 mph. Extremely low winds are avoided because they indicate inversion conditions and winds above 10 mph are avoided because relatively large droplets can be transported into neighboring fields.

- Leave a buffer zone of approximately 300 feet between the treated field and any particularly sensitive areas. Buffer zones will avoid contamination of neighboring areas by the displacement of relatively large spray droplets. However, buffer zones will not effectively eliminate low level contamination of distant areas by the small droplets formed by all commercially available nozzles.

- The nozzles must provide adequate coverage and pest control while minimizing small, drift prone