

Physics of Particle Drift

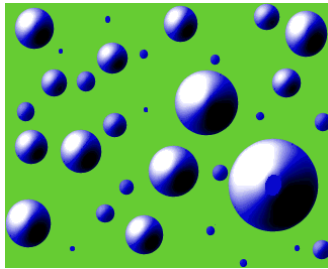
Andrew Hewitt

Spray Drift

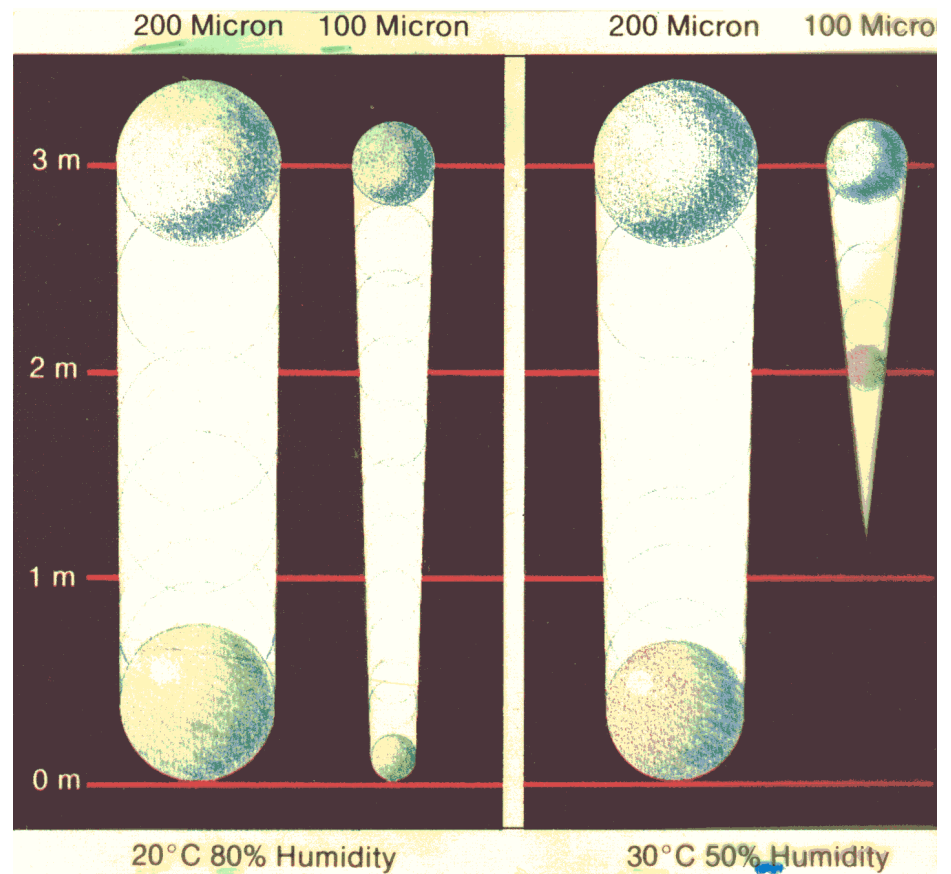
- Spray fate is a complex process which is why modelling can help assess the interaction of key factors such as droplet size, spray release position, meteorological conditions, atmospheric stability, canopy interactions and so on
- Spray drift is the movement of droplets off-target at the time of application or soon thereafter, prior to the point of the deposition of the droplets
- Spray drift exposure to non-target sensitive areas from a spray application depends on a) the availability of airborne drift and b) the direction of the sensitive areas relative to the direction (vertical and horizontal) of the wind

Avoiding Spray Drift Exposure the “Easy” Way

- Don't spray small droplets (<~100-150 μm)

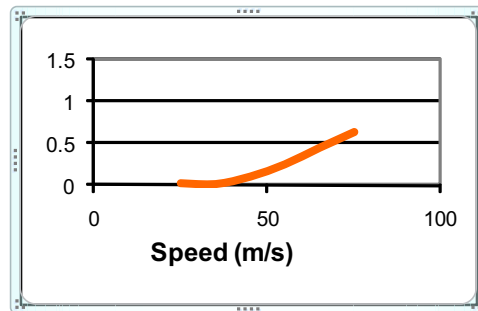
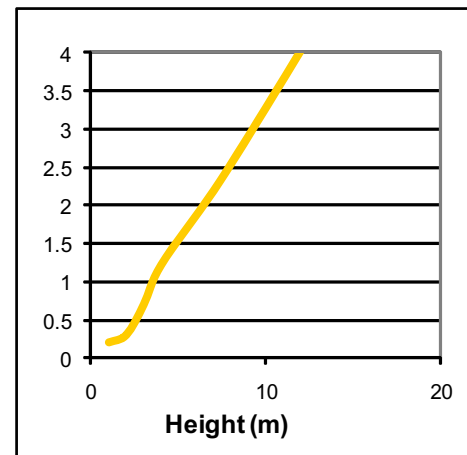
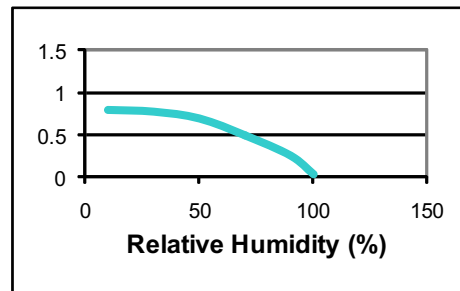
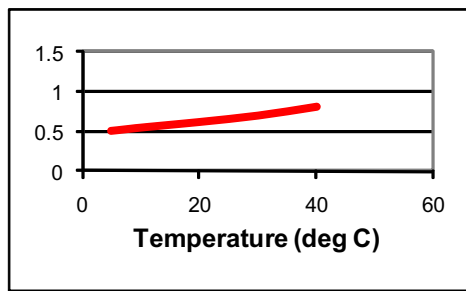
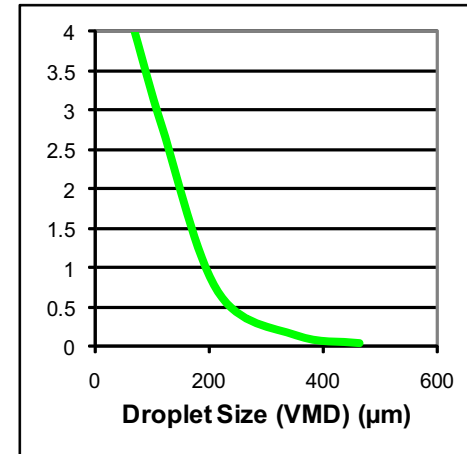
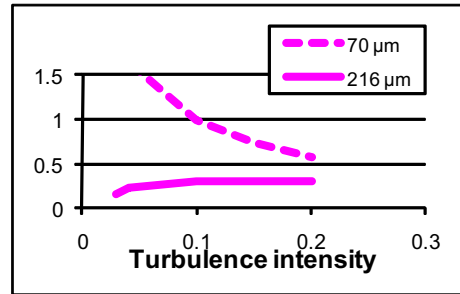
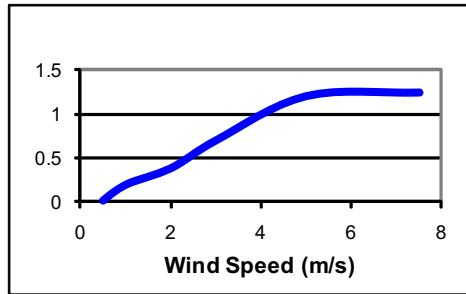


Droplet Diameter (micrometers)	Fall velocity (m/s)	Drift distance Downwind (m)
10	0.003	1000
30	0.027	111
100	0.25	12
300	1.2	2.5
1000	5.0	0.6



Avoiding Spray Drift Exposure the “Hard” Way

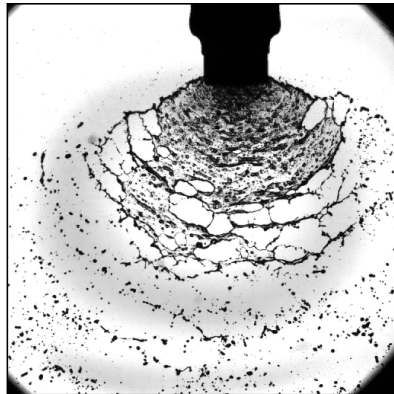
- If there are some “Fines” in the spray, there can be some mass of the applied spray that can move off-target under unfavourable conditions (physical and air shields can help reduce this, e.g. hoods)
- The movement and deposition of these “Fines” will depend on many factors and variables associated with the particle size/ velocity/ shape spectrum, application technique, boom height, sprayer wake/ vortices, meteorological and atmospheric conditions, evaporation rate, canopy, barriers, electrostatic charge, etc.



AgDRIFT Sensitivity analysis - effect of application parameters on spray drift deposition

Spray Dynamics

- Spray dynamics are affected by nozzle type, energy input (e.g. spray pressure, rotation rate, air shear) and tank mix physical properties from the sum of all components of the tank mix, and are not always intuitive especially for non-Newtonian tank mixes



Data and Modeling Gaps

- Additional data on spray dynamics is always valuable, given the ever-expanding range of nozzles, tank mixes and application scenarios
- Further work is ongoing on modeling of ground-based applications
- With DRT programs, opportunities exist for new and verified application systems and techniques to avoid/ manage spray drift exposure to non-target sensitive areas