The least drift-prone formulations of pesticides are pellets and granules. The use of these formulations is somewhat limited because they cannot be used to apply chemicals to plant foliage. They are widely used to apply chemicals to the soil or when treating aquatic weeds.

Height of Emission

The time that large droplets remain airborne and consequently the time that the wind has to act on them depends on the height of the nozzle above the ground.

The emission height of small droplets is not necessarily a major factor in determining distance that it might drift. The weight of a small droplet is very small and it can actually rise rather than fall because upward components of the wind can generate friction forces larger than the droplet's weight. A small droplet can be emitted from a nozzle close to the ground (18 inches or standard boom height) and remain aloft much longer than a larger droplet emitted at a much higher height.

Size of the Treated Area

This factor tends to be overlooked by many applicators of agricultural chemicals. The amount of residue that drifts onto a neighboring crop after treating 10, 20, or 50 acres might not cause damage to the crop, but at some number of acres the residue level can cause damage. Because the amount of residue in surrounding fields depends on the number of acres treated in the target field, an applicator should spread out the treatment of large fields over as many days as feasible. This increases the chances of the drift being spread out by various wind directions at a residue level low enough to avoid crop damage.

The size of the area that can be treated by an aircraft in a short period of time is what causes many drift problems related to aerial application. It is often reasoned that aircraft cause drift problems because of the relatively high height of the spray boom. The height of the spray boom can cause high residues in an adjacent field due to swath displacement, but probably is not a major factor in the level of residue in more distant fields.

Airblast sprayers that are sometimes used to treat low growing crops generally produce a very small, drift-prone droplet spectrum. These sprayers are used because they can cover a wide swath (40 to 80 feet) without a cumbersome wide boom. If enough of these sprayers were placed in a field so that approximately 1000 to 1500 acres could be treated in a day (an acreage treatable by an aircraft), the resulting drift problem in distant fields could be much greater than one caused by an aircraft because there is a greater percentage of small droplets emitted by the sprayers.

NOZZLES PRODUCE A WIDE SPECTRUM OF DROPLETS

Drift would be much less of a problem, if nozzles were available that could produce a narrow range of droplet sizes with no droplets below approximately 150-200 micrometers in diameter. Commercially available hydraulic nozzles produce a wide droplet spectrum with droplets ranging from below 100 up to 500 micrometers and larger. The extremes on both ends of the spectrum are not very effective in controlling most pests. The small droplets are prone to drift from the target field and the extremely large ones contain a lot of pesticide that does not effectively contribute to plant coverage.

Large droplets are not very effective in achieving plant coverage because the volume of a droplet varies as the cube of the droplet diameter. Neither a 250 nor a 500 micrometer droplet are very prone to drift from the target field because both quickly settle to the ground. A 500 micrometer droplet contains eight times the pesticide as the 250 micrometer droplet and this pesticide would be far more effective, in relation to coverage, if it were in eight 250 micrometer droplets. An ideal nozzle would produce droplets in the 250 to 300 micrometer range. These droplets would be large enough to avoid long range drift problems, but small enough to yield acceptable spray coverage. These droplets drift a very short distance because the wind does not have much time to act on them before they reach the ground.

SWATH DISPLACEMENT IS PREDICTABLE

Swath displacement is usually about 25 feet for low pressure ground sprayers and up to 300 feet for sprays applied by aircraft. Swath displacement is the predictable component of chemical drift and is dependent on the droplet size, the height from which the droplet is released, and the wind speed. If swath displacement was the only component of drift, drift would not be as serious of a problem as it is. A pesticide applicator would merely leave a buffer strip between the last rows of the treated field and an