Contribution of Backwash Effect from an Axial-Fan Orchard Sprayer to Downwind Drift Potential
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Experimental Design

1. Guthion insecticide (azinphos-methyl, AZM) was sprayed in two passes to the first 50 trees in rows 1 & 2 of a commercial apple orchard.
2. The first pass sprayed row one from out to in with the leeward nozzles in the off position.
3. The second pass sprayed rows 1 & 2 with nozzles on each side of the sprayer in the on position.
4. For each sprayer pass, silica gel deposition plates were placed on the ground along four transects extending perpendicular from tree row one. Each transect was considered a replicate experimental unit.

Analytical Methods

1. Plates were cut into small pieces and placed in jars with 30 mL of acetone:hexane (1:1). Jars were shaken for 20 minutes at high speed.
2. Extracts were filtered and then concentrated to dryness on a vacuum rotary evaporator.
3. The Guthion residues were re-dissolved in ethyl acetate.
4. Guthion residues were detected and quantitated using a gas chromatograph (GC) equipped with a PFPD (pulsed flame photometric detector).
5. Limit of detection was determined to be ~0.001 µg/cm².

Results

- Residues of Guthion were detected at a distance of 100 feet from the orchard following both 1 & 2 sprayer passes. However, residues were lower when only one pass was made.
- Residues were also detected in the alleys between unsprayed rows.
- The backwash effect contributed ~35% of the total drift outside of the orchard with a maximum contribution at 40 feet downwind.

Conclusions

The air backwash effect contributes significantly to drift. The current product label direction for outside row spraying will not minimize residues depositing outside of the orchard. A device is needed on the sprayer to reduce the effect of the air backwash.

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