EVAPORATION RETARDATION OF COLD AEROSOL ULV DROPLET CLOUDS

J. O. WADE
ZENECA (ICI) Public Health, Fernhurst, Haslemere, Surrey GU27 3JE, UK

Prior to the 1970's flying insect control by 'cold aerosol ULV' (cold fogs) relied on traditional pesticides such as malathion, pirimiphos-methyl etc. applied either as oily technical grade products or as high strength oil-based solutions. There was little, if any solvent loss during creation, dispersion and drift of the aerosol droplets, and therefore negligible droplet re-sizing. Application machinery designed to produce aerosol droplet clouds with 80% of droplets with a VMD of 25% usually did so and the droplet spectrum changed little down-wind.

Development of more insecticidally active molecules resulted in the formulation of products that were no longer 'ready-for-use', requiring dilution with kerosene or the cheaper diesel (fuel) oil prior to application. Loss of volatile components from the carrier/pesticide mixture provoked a re-structuring of the aerosol droplet cloud as the cloud moved down-wind from the point of application. However, the consequences of this dynamic re-structuring could be corrected by modifications to the application technique, applied volume or original droplet spectrum.

Introduction of water miscible formulations satisfied both environmental and cost issues raised by the use of mineral oil carriers. However, evaporative losses from airborne aerosol droplets were so severe that the droplets practically disappeared a short distance from the point of creation, proving to be insecticidally useless. The stabilization of water-based droplet clouds was essential if this carrier were to be used in an open air environment and several systems utilizing glycerine, glycol and long-chain alcohols have been proposed and even commercialized.

This study demonstrates the use of a field portable self-contained droplet analysing device, the AIMS unit (KLD Laboratories, New York USA) capable of measuring up to 500 oil or water-based aerosol droplets/second to determine actual drift distances achieved using several different insecticidal formulations, both with and without 'evaporation retardants'. 'Biological' results, measured by insect knock-down and kill are compared with recorded aerosol drift information.

Field data derived from this study clearly demonstrate that oil-free water-based formulations with evaporation retardant systems in place cannot compete with either water-based emulsified oil formulation systems or with true oil-based systems either with regard to stability of the aerosol droplet spectrum or with regard to insect kill down-wind from the point of application.

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