

Vapor vs Spray Drift Deposition and Meteorological Factors Influencing the Vapor Deposition Gradient

Authors: Jody Stryker, Stone Environmental; Lauren Padilla, Stone Environmental; John Brausch, BASF

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The off-field spray drift and vapor drift of volatile and semi-volatile pesticides are two important atmospheric transport processes they may result in ecological and human exposure. Accurately attributing off-field transport to the respective sources is important for guiding appropriate mitigation strategies. However, there is no definitive method for determining whether off-target exposure occurred as the result of spray drift versus vapor phase deposition. For this presentation, we first compare vapor and spray drift deposition with distance curves based on a reference emission rate for a hypothetical semi-volatile compound. The objective is to illustrate where vapor and spray drift deposition may overlap and assess similarities in the gradient with distance that would be expected from each source under similar environmental conditions. By linking theoretical assumptions about off-target effects to the deposition profiles, we evaluate whether the pathways of spray drift versus vapor drift might be uniquely identified from observations of effects in distant fields. Additionally, in order to better understand the potential for off-target exposure from the vapor drift pathway, we aim to determine the driving influences on vapor phase pesticide transport and deposition. We use a sensitivity analysis to evaluate weather factors that lead to the steepest and flattest vapor deposition profiles. The conclusion of this work is a summarization of environmental conditions that would result in the potential for off-target plant effects with and without an observed spatial gradient. Through this effort, we also highlight key environmental parameters to control in field studies that seek to quantify vapor-phase deposition.