Effects of Tree Canopy and Weather on Pesticide Drift from California Orchards and Vineyards

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Introduction

Sprayer ownership/use by San Joaquin Valley specialty and general crop producers (Source: 2018 Agricultural Application Engineering Program needs assessment).

Importance of spray related productivity issues to San Joaquin Valley specialty and general crop producers (Source: 2018 Agricultural Application Engineering Program needs assessment).

Experimental Methods

Table: Attributes of target tree/vine and orchard/vineyard used in studies.

Orchard and Tree Canopy Characteristics

Experimental Results

Table. Effects of crop characteristics and weather parameters on drift based on Multiple Linear Regression at 0.05 significance level.

Table: Characteristic of Effect Factors

Figure: Trends of Drift Response

Figure: Effects of Crop Characteristics and Weather Parameters

Figure: Main Effect of Factors

Conclusions

The canopy represented three canopy types: small - gape, medium - citrus, and large - grape.

- Airborne drift of downstream distances of 0.5 to 1.5 ft was greatest in grape, then citrus, and finally general crops, which was significantly greater than ground-level height (gauche). Sampling height generally did not have a significant effect on airborne drift.

- Downwind drift had the greatest drift from orchards. This result is consistent with other studies, which have shown that downwind drift is much lower than the upwind drift.

- Canopy diameter, wind direction, wind speed, air temperature, and relative humidity were significant factors in orifice size and direction, which has implications for drift potential.

- Relative humidity and atmospheric pressure were significantly correlated with drift.

- The effect of wind speed and atmospheric pressure was not significant and downwind distance.

- Airspeed, all right factors were negatively correlated with 50% of the variance in downwind drift with the exception of wind speed, which was positively correlated.

- The speed, canopy and droplet size were targeted for the experiment. The results showed that the speed, air temperature, wind speed, and atmospheric pressure had a significant effect on drift.

- The canopy characteristics and weather parameters were significant factors in drift potential. This is consistent with other studies, which have shown that canopy characteristics and weather parameters are significant factors in drift potential.

Recommendations

- Landowners and growers should target canopy characteristics and weather parameters to increase the potential for drift.

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