

Advancements in Exposure Measurements and Low-cost Sensors in Agriculture

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Agricultural workers are exposed to different hazards, such as particulate matter (PM), toxic gases, excessive heat, noise, and ultraviolet (UV) radiation. These hazards have been associated with increased mortality rates and adverse health effects. Filter-based gravimetric measurements are used to determine mass concentrations for PM. Gravimetric measurements have high accuracy and precision but are temporally limited and are associated with high labor cost. In addition, real-time devices that measure gas, UV light, and noise exposures are expensive and are not widely distributed. Therefore, due to cost, regulatory exposure measurements for different hazards are infrequent and do not represent real-time exposure for workers. Low-cost sensors have become increasingly popular during previous years to provide real-time measurements in environmental and occupational settings. These sensors are affordable, light-weight, and have a small form factor that gives them the advantage to become wearable devices that can be distributed among workers. Farmworkers have the highest average working hours per week compared to other occupations and monitoring their exposure in real-time would be beneficial for detecting these hazards. In addition, the data collected with these sensors can be used for epidemiological studies that will allow associations between the exposure and related adverse health effects to be more accurately assessed. This work discusses the recent advancements in exposure measurements using low-cost sensors for different hazards and the benefits and limitations of using these sensors in different agricultural settings.