

Agricultural workers are prone to exposure to mixed dust of inorganic and organic compounds. Diverse working conditions and operations in agriculture make direct measurements of the mixed dust exposure difficult. This study was conducted to develop a new dust generation system to determine possible exposure potency indicators of soil samples. The dust generator consists of a blower, a rotating chamber and a settling chamber. The rotating chamber has inner baffles to provide sufficient agitation of the samples while the chamber is rotating. A blower provides air into the rotating chamber, and the suspended dust is moved to the settling chamber through a perforated pipe. A small fan inside the settling chamber helps maintain suspension of the dust. Various size fractions of dust are sampled on filters suspended in the chamber via outlet ports and attached pumps. Air pressure is released through a filter plate mounted on the wall of the settling chamber. The following operating conditions were used to optimize results for dust sample: 300 g soil sample, blower choke 1/4 open, sampling time of 3 minutes, rotation speed of 16 rpm. To evaluate the characteristics of dust from the generation system, we collected dust samples from agricultural fields while the soil was prepared for planting. Bulk soil samples were collected from the fields where dust samples were collected. Analytical results using X-ray diffractometry (XRD) for mineralogical composition, and scanning electron microscope energy-dispersive X-ray spectra indicated that mineralogical and elemental characteristics of laboratory-generated dust and agricultural field dust are similar. It was observed that soils with higher silt and clay percentages produced more dust than soils with higher sand content. Soil with higher moisture content produced less dust than the same soil at lower soil moisture content. The results suggest that the new dust generation system can provide valuable information about soil dust characteristics.