Agricultural PM_{10} Emissions from Cotton Field Disking in Las Cruces, NM

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Agriculture has been linked to increases in particulate matter (PM) concentrations during periods of high wind speed or during agricultural land preparation activities such as disking, harvesting and tillage operations in the vicinity of agricultural fields. A cotton field in the New Mexico State University Leyendecker Plant Science Research Farm in Rio Grande valley south of Las Cruces, NM was used for the disking experiments in March 2008. Concentrations of particles and herbicides (prometryn and trifluralin), and meteorological parameters were measured during nine sampling events using a variety of instruments; DustTrak (TSI model 8520) for real-time PM_{10} measurements, MetOne (MOI model ES-640) for real-time PM_{10} and TSP measurements, BGI PQ200 for integrated Total Suspended Particle measurements, Micro-Orifice Uniform Deposit Impactor (MOUDI) [MSP model 100] for PM size distributions, polyurethane foam (PUF) adsorbents combined with filters for particulate and gaseous phase herbicides, and 3-D sonic anemometers (MOI model 50.5) for wind speed and direction. The field events were designed to measure particle and herbicide concentrations at different heights before and after herbicide application, as well as near and far from a disking tractor. Preliminary results show that particles less than 1 μm contributed between 10% and 40% to the total particle mass concentration during all sampling events. Particle concentrations decreased with increasing distance from the ground for all disking events, whereas particle concentrations were almost independent of height for background events. Near-source disking event particle concentrations were 4 to 7 times higher than those for far-source disking and background events. Laboratory analysis of field herbicide concentrations is in progress. The laboratory results will give an insight on the relationship between herbicide gas-particle partitioning, PM concentrations and size distributions, and field meteorological conditions during the various sampling events.