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Fugitive dust emissions from agricultural land within the Columbia Plateau, USA

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Winter wheat – summer fallow is the conventional crop rotation employed on $>$1.5 million ha in the Columbia Plateau region of the Pacific Northwest United States. Although summer fallow is used to conserve soil water and control weeds during non crop years, dust emissions from land in summer fallow contribute to poor air quality across the region. In eastern Washington, for example, the US EPA national ambient air quality standard for PM10 (particulates less than 10 micrometers) is exceeded each year due to blowing dust. No studies have assessed the loss of soil or PM10 from agricultural fields during high wind events within the Columbia Plateau. Therefore, instrumentation was installed to measure sediment and PM10 flux at the windward and leeward positions in a field maintained in summer fallow. Soil loss over a four year period ranged from 0 to 2320 kg/ha. Suspension-sized particulates ($<$100 μm in diameter) comprised $\geq$90% of the eroded sediment, indicating that direct suspension and not saltation was the dominant erosion process. The corresponding loss of PM10 ranged from 0 to 210 kg/ha. Loss of PM10 comprised 5 to 12% of the total soil loss. Alternative tillage or cropping practices are sought that will reduce the loss of topsoil and PM10 from summer fallow fields during high wind events.