Dust Mitigation and Monitoring Research for Williston Reservoir Beachesin British Columbia

W.F. SCHILLINGER, DEPT. OF CROP AND SOIL SCIENCES, WSU, LIND, WA ; W.G. NICKLING, WIND EROSION RESEARCH LABORATORY, UNIV. OF GUELPH, GUELPH, ONTARIO; D.W. FRYREAR, CUSTOM PRODUCTS, BIG SPRING, TX

Williston Reservoir in northern British Columbia was created when BC Hydro constructed Bennett Dam on the Peace River in 1968 to generate hydroelectric power. Williston Reservoir is the largest body of freshwater in British Columbia with a surface area of 438,000 acres and a shoreline of 1100 miles. The First Nation Tsay Keh band was forced to relocate to the north end of the reservoir as a result of the water impoundment. Each year the draw down of the Williston Reservoir for the production of hydroelectric power results in the exposure of approximately 25,000 acres of wide flat beaches with surfaces comprised predominantly of fine-grained sediments. On exposure in the spring, these sediments are prone to deflation by wind, resulting in large dust storms. With funding and coordination by BC Hydro, we initiated a 3-year study to determine the effectiveness of roughening the beach with tillage by lifting silt and clay from below the soil surface on dust mitigation by trapping saltating soil particles. The objective was to (i) evaluate the effectiveness of two tillage practices to mitigate dust from beaches, and (ii) conduct regional dust monitoring at six sites surrounding Williston Reservoir. The tillage experiment in 2008 was located on Omineca Beach and covered 185 acres. Treatments were: (i) tillage with twisted-point chisel with shanks spaced 1 m apart, (ii) tillage with a lister plow with lister blades spaced 1.3 m apart, and (iii) a check. Particulate emissions were measured using an array of 360 Big Spring Number Eight (BSNE) samplers and numerous aerosol monitors. Each of the six regional monitoring sites has a wide array of apparatus to monitor $PM_{2.5}$, PM_{10}, and total particulates on a 24-hour basis. Data from 2008 indicate that roughening the beach with tillage effectively reduced sand transport during wind events by reducing the near surface wind speed because of the increased surface roughness and by the trapping of sediment in the furrows (Fig. 1). These, and other experiments, are continuing in 2009 and 2010.

Fig. 1. Trapped sediment on the upwind edge of a twisted-point chisel plot. Trapping of sand reduces the abrasive action of the saltating sand that ejects dust into the air stream.

Agronomics and Economics of No-till Facultative Wheat at Ralston, WA, USA

L. BEWICK-SULLIVAN, DEPT. OF CROP AND SOIL SCIENCES, WSU; F. YOUNG, USDA/ARS LAND MANAGEMENT AND WATER CONSERVATION RESEARCH UNIT, PULLMAN, WA AND D. YOUNG, SCHOOL OF ECONOMIC SCIENCES, WSU

Winter wheat/dust-mulch summer fallow (WW/SF) experiences serious wind erosion in the low precipitation zone (<300 mm annual precipitation) of the Pacific Northwest (PNW). One proposed alternative to WW/SF is no-till facultative wheat (FW). Generally, FW's have less cold tolerance, a shorter but distinct period required for vernalization, and start growing and initiate flowering earlier compared with true WW's. This study compares agronomic, economic, and soil moisture components of FW/chemical fallow (FW/ChF), FW/spring wheat (FW/SW), and WW/reduced tillage SF (WW/RSF) rotations near Ralston, Washington. Over the 2003-2006 (harvest years) study period, which averaged about 300 mm annual ppt, spring soil water content (SWC) was greater for ChF compared with RSF at all depths except 0.3-0.6 m. In the fall, difference in SWC between ChF and RSF disappeared at depths below 0.6m, but was less for ChF from the soil surface to 0.6 m. WW/RSF and FW/ChF were more productive, both economically and agronomically, than FW/SW, with WW/RSF being more productive than either FW rotation by a wide margin. The FW/SW rotation produced lower yields that were more susceptible to fluctuations in crop year precipitation, contained more weeds, cost more to produce, and was less profitable than either WW/RSF or FW/ChF. Net income from the FW/ChF rotation was less variable than WW/RSF; however, net returns over total cost were consistently negative for FW/ChF and averaged \$69 rotational ha^{-1} less than WW/RSF. Even though FW/ChF yielded and earned less than WW/RSF, the FW/ChF rotation might become