WIND EROSION CONTROL PRACTICES FOLLOWING LATE HARVESTED POTATOES

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Blowing dust has long been considered a nuisance problem and visibility hazard in the Mid-Columbia region, and wind erosion continually degrades the soil resource. In 1991, Ecology and EPA began considering naming parts of Benton, Franklin, and Walla Walla Counties as a non-attainment area (NAA) for particulate matter 10 microns or smaller (PM-10). PM-10 regulations focus on the health hazards of the blowing dust, which in this area is from primarily agricultural sources. The region suffered 20 PM-10 "exceedances" from 1989 to 1993, an average of 4 per year, while the PM-10 regulations allow only one per year. An exceedance occurs when the PM-10 level exceeds 150 micrograms per cubic meter in a 24 hour period.

In the irrigated regions of the Columbia Basin, late harvested, low residue crops such as potatoes, carrots, and sugar beets are prone to wind erosion. In the potato production cycle, Stannard and Thornton (1994) have categorized the major wind erosion periods as: 1) After fall fumigation, 2) After spring planting of the potatoes, and 3) After the potatoes are harvested.

Maintaining and managing effective residue levels from prior high residue crops is the most economical and effective erosion control method during periods 1 and 2 above. Residue management after potato harvest is not effective simply because potato vines do not provide enough residue to give adequate protection. The most cost effective control strategy after potato harvest is to plant a cover crop (FCD, 1994). A cover crop needs to be planted early enough to allow adequate growth to provide protection. In Franklin County, WA, October 20th is considered to be the last date on which a cover crop can be planted to provide adequate cover. However, there are many times when potatoes grown under contract are not harvested until mid November. The soil in these fields is often left bare over winter because there is not enough time to establish an effective cover crop.

In order for growers to be eligible for most USDA farm programs, they must implement a farm conservation plan to minimize water and or wind erosion.

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Currently, a surface residue and green cover are about the only parameters to receive wind erosion "credits" for the farm plans because they are quantifiable (% cover) and known to be effective. Surface roughness has not really been considered because it is not easily measured and it is unclear whether it will provide effective control. To stay in compliance a grower must maintain a required amount of residue or establish a cover crop.

As part of a regional effort conducted by EPA and Ecology to address rural fugitive dust and PM-10 emission, the Franklin Conservation District (FCD) is conducting field trials to assess the effectiveness of various alternative wind erosion control treatments in late harvested potatoes.

The treatments evaluated are a combination of known erosion control methods, and common cultural practices within the potato cropping rotation. The treatments included:

1) Bare ground as left after the potatoes are dug (Check 1).
2) Late seeded cover crop, disc, packed, and planted (Check 2).
3) Bare ground worked to leave a rough surface (clods).
4) Bare ground that has been bedded/ridged.
5) Bare ground that has been ridged and worked with an artificial pitter.
6) Crusting agent (molasses based product)
7) Straw mulch at an average of 1500 lb./acre.

The FCD plots are in a field harvested in November, 1994, and treatments were applied on 12/1/94, except for straw mulch which was applied on 12/15/94. Treatments were replicated 3 times and the plot sizes were 100' by 100'. Effectiveness of the treatments for reducing potential wind erosion and PM-10 emission will be assessed with dust collecting BSNE-samplers at the center of each plot. Other indirect measurements of control effectiveness include surface roughness, residue levels, and surface dryness. Surface roughness was measured using the chain method (Saleh, 1993) and residue levels were measured by using the line and point method (McClellan, 1989). Surface roughness measurements and residue levels are shown in Figures 1 and 2 respectively. Surface dryness was an ocular estimate of the percent of ground surface showing signs of drying (Figure 3). In general, those treatments that increased roughness and decreased residue, caused more drying of the soil surface. While it is generally accepted that soil roughness decreases wind erosion potential, if the practices that increase roughness also reduce residue and causes faster drying of the soil, then there may be a net negative effect on erosion control.

Frequent rains and infrequent wind events during the Fall/Winter of 1994/95 did not provide the typical wind events needed to generate any dust collection data. The plots will be maintained throughout the winter and into late spring until planting of the following crop of beans and or corn. All the treatments are proposed to be repeated in the Fall/Winter of 1995/96. Also, we hope to have the use of an USDA-ARS wind tunnel for obtaining data from each treatment under controlled conditions using artificial wind. In addition, trials for erosion control methods after potato planting in the spring are proposed..

The FCD does not foresee a new magical black box coming forward that will control wind erosion in late harvested, low residue crops. The treatments evaluated above are not new or earth shaking. It will take a combination of good planning by growers, cooperation with processing facilities, and effective alternative measures to help control fugitive dust emissions.

References:

Franklin Conservation District, 1994. Wind Erosion/Dust Control in Irrigated Agriculture. Final Report, 35 pp.

Saleh, Ali, 1993. Chain Method (Roughness Meter) Instructions. USDA-ARS, Big Springs, TX, Unpublished Information.

Stannard, Mark and R. Thornton, 1994. Wind Erosion Control in Washington Potatoes. USDA-NRCS Technical Note PM-27, 18 pp.

McClellan, Ron, 1989. Measuring Residue with Line and Point (Line Transect) Method. USDA-NRCS, Technical Note AG-8, 5pp.

Figure 1: Surface Roughness for various treatments for wind erosion control.

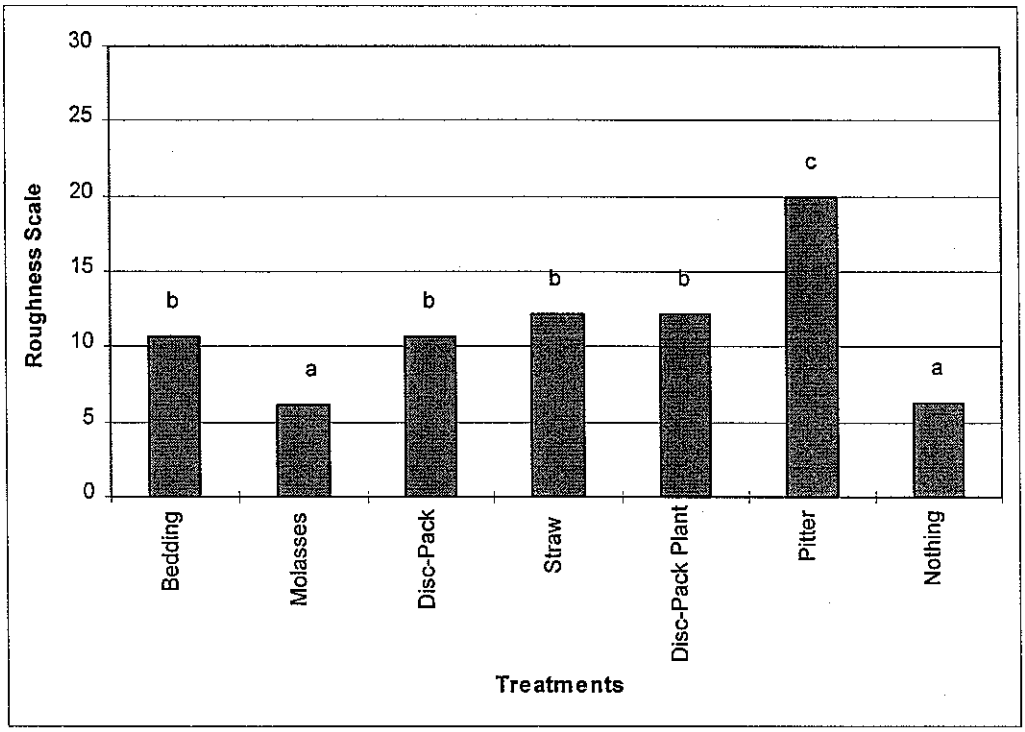

Figure 2: Surface residue for various treatments for wind erosion control.

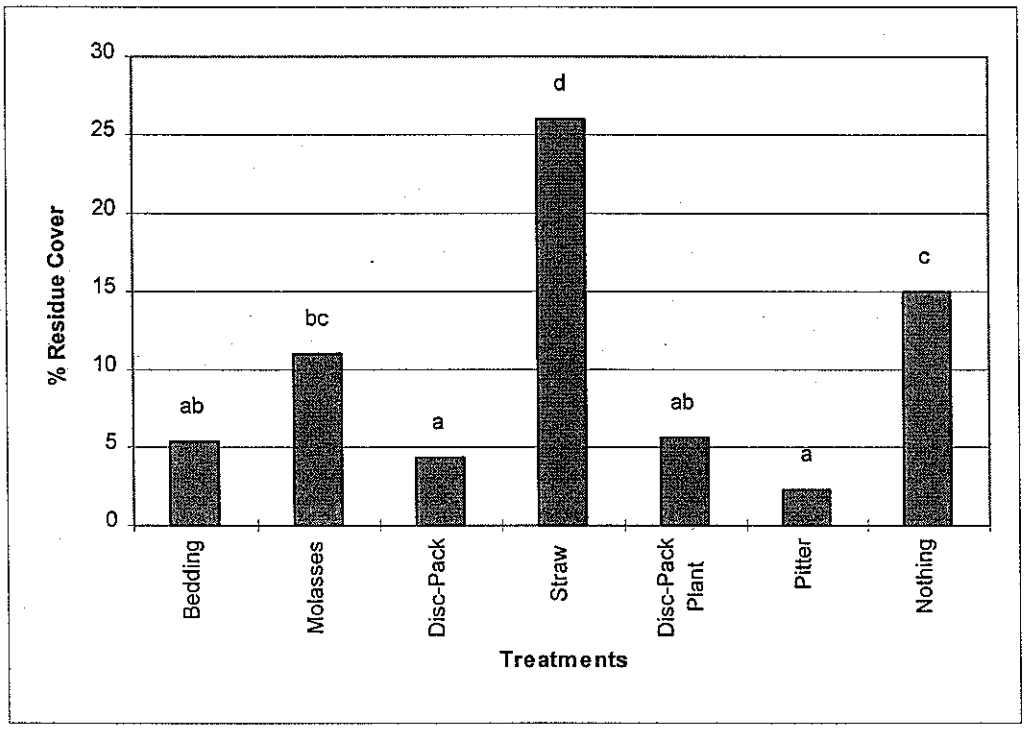

Figure 3: Surface dryness for various treatments for wind erosion control.