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Emergency Wind Erosion Control

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Emergency Wind Erosion Control

The most effective control of wind erosion is to ensure a protective cover of residue and/or growing crop throughout the critical erosion period. This is especially important during periods of high velocity winds and dry soil. Control measures such as strip cropping, residue management, reduced tillage, grass strips, and windbreaks are effective management methods for reducing erosion. Most of these practices increase the surface roughness and thus reduce surface wind velocities. However, the prevention methods must be planned at least a season or more in advance.

Cropland can be quite susceptible to wind erosion under some conditions. A particularly serious hazard is created when crop residues are burned or removed for

Full coverage with wide chisel spacing.

forage. Marginally productive cropland may not produce sufficient residue to protect against wind erosion. In addition, overgrazed or poorly vegetated rangeland may also subject to wind erosion.

Tillage implements that leave the most residue on the soil surface provide the best wind erosion protection. Implements that sever the roots and lift weeds without destroying or burying much of the residue are ideal for maintaining vegetative cover. Herbicides are also useful to help control weeds and reduce tillage needs. Intense crop rotation in combination with minimum or no-till practices produces the highest amount of crop residues and has the lowest financial risk. For example, a wheat-rowcrop-fallow rotation (2 crops in 3 years) is more productive than a wheat-fallow rotation (2 crops in 4 years), and it provides more residue and crop growth for protection from wind erosion.

Stripped, approximately 50 percent coverage with narrow chisel spacing.

Once soil movement has started, it is difficult to completely stop further damage. However, prompt action may prevent a small erodible spot from damaging an entire field or adjacent fields.

Legal Aspects

Kansas law (Kan. Stat. Ann. §2-2001 through 2-2008) addresses wind erosion control. If soil is blowing off any property in quantities large enough to cause erosion damage, damage on land downwind, or injury to the public health, soil blowing must be lessened or stopped. If the landowner cannot or will not stop wind erosion in a timely manner, county commissioners are authorized to have emergency wind erosion control performed. County commissioners can create a soil-drifting fund from which costs of erosion control can be paid. To create the fund, the county commissioner can levy a tax against all taxable tangible personal property of the county at a rate not to exceed 1.00 mill. (Kan. Stat. Ann. §2-2007 and 79-1947)

Alternatively, the commissioner (after notice and hearing), can recover the cost of any emergency tillage by levying a special assessment against the land. The special assessment is not to exceed $3 per acre for each acre on which work is done for any one year, unless such amount is not adequate to cover the actual cost of the work (Kan. Stat. Ann. §2-2008 (b))

Emergency Control

Mulching

Once wind erosion has started it can be reduced by mulching with manure or other anchored plant materials such as straw or hay. To be effective, at least 1.5 to 2 tons per acre of straw or grass or 3 to 4 tons per acre of corn or sorghum stover are needed to control areas of erosion. Residue can be spread by hand, spreader or other mechanical equipment. A stubble puncher or disk set straight may be used to anchor residue and prevent it from being blown away. Wet manure application should be 15 to 20 tons/acre.

However, mulches are practical only for small areas, so mulching is most effective when applied before the soil starts to move.

Emergency Tillage

Emergency tillage is a last-resort method that can be effective if done promptly and with the right equip-

ment. The purpose of emergency tillage is to increase surface roughness and produce clods resistant to erosion. A rough surface reduces wind velocity. The larger clods resist movement and provide traps to catch the moving soil particles.

Chisels are frequently used to roughen the surface. The chisel point, speed and depth of operation should be combined to produce the roughest surface with the most firm, resistant clods. Research has shown that a narrow chisel (2 inches wide) on 24 to 54 inches spacing and operated 3 to 6 inches deep will usually bring sufficient resistant clods to the surface to control erosion on fine-textured soils. A medium shovel (4 inches wide) can be effective for medium-textured soils. Spacings are narrower where there is no cover and wider in areas of partial cover, such as growing crop or plant residue. If the erosion conditions recur or persist, a second chiseling should split the first spacing.

Emergency tillage does not significantly reduce wheat yields of an established crop. Studies in southwest Kansas and Manhattan demonstrate that by using a 40 inch chisel spacing, wheat yields were reduced by 1 bushel per acre on an entire field and 5.5 bushels per acre on the emergency tillage area.

Tilling strips across the field is effective. The success of strip tillage is highly dependant on climatic, soil, and cover condition. If the strip method is used, the strips should be as narrow as practical and 50 percent of the field should be emergency tilled. Narrow chisel spacing (20 to 24 inches) is needed for the strip method. If 50 percent of the area has been strip-tilled and erosion persists, the omitted strips can be emergency tilled to make tillage full cover.

Wide chisel spacings are used in the full-field coverage method. The space between chisel grooves can be chiseled later should wind persist.

All tillage operations should be perpendicular or across the direction of the prevailing wind. For most of Kansas, this means in an east-west direction.

The best wind erosion control is created with maximum surface roughness when resistant clods cover a major portion of the surface. Research shows that lower travel speeds of 2 to 3 m.p.h. generally produce the largest and most resistant clods. However, speeds of 5 to 7 m.p.h. produce the greatest roughness. Because clod resistance is usually reduced at higher speeds, the effect may not be as long-lasting as at lower speeds. Thus, higher speeds are recommended where erosion is already in progress, while lower speeds might be a better choice in anticipation of erosion.

Depth of tillage usually affects clod stability more than travel speed, but optimum depth is highly dependent on soil conditions and compaction.

If the problem is severe and the wheat has already been destroyed or the ground is bare, chisels 4 to 6 inches wide on a 24 to 30 inch spacing will generally provide enough clods to control erosion. Operating depth should be 4 to 6 inches.

Loose sandy soils require different tillage to effectively control erosion. Clods cannot be formed at the surface that will be sufficiently resistant to erosion on sandy soils. Drastic measures are needed to roughen the surface and provide adequate protection. A 14-inch moldboard lister spaced 40-50 inches apart (or an 8-inch lister on 20- to 24-inch spacing) is needed to create sufficient surface roughness. The first listing should be shallow, not more than about 4 to 5 inches deep. Then, when additional treatment is needed, the depth should become progressively deeper. The original ridge may be split as an alternative.

Tips for effective emergency tillage

1. Assess residue and plant cover prior to the wind blowing, and take preventive action with emergency tillage. It is much easier to prevent the problem from starting than to stop erosion after it begins.

2. Use the combination of tractor speed, tillage depth, and shovel size that will produce the roughest surface with the most resistant clods.

3. Always start at the upwind location when the field is blowing. A sufficient area upwind of the eroding spot should be tilled in addition to the area presently blowing.

4. Till in a direction perpendicular to the prevailing wind direction. For rowcrop areas it may be necessary to compromise direction and follow the row pattern. If stubble remains between the rows leave as much of the stubble as possible.